

**RETURN BIDS TO:**  
**RETOURNER LES SOUMISSIONS À:**  
**Bid Receiving - PWGSC / Réception des soumissions**  
**- TPSGC**  
**11 Laurier St./11 rue Laurier**  
**Place du Portage, Phase III**  
**Core 0B2 / Noyau 0B2**  
**Gatineau, Québec K1A 0S5**

**SOLICITATION AMENDMENT**  
**MODIFICATION DE L'INVITATION**

The referenced document is hereby revised; unless otherwise indicated, all other terms and conditions of the Solicitation remain the same.

Ce document est par la présente révisé; sauf indication contraire, les modalités de l'invitation demeurent les mêmes.

**Comments - Commentaires**  
Ce Document Comporte des Exigences Relatives à la Sécurité/This Document Contains a Security Requirement

**Vendor/Firm Name and Address**  
**Raison sociale et adresse du**  
**fournisseur/de l'entrepreneur**

**Issuing Office - Bureau de distribution**  
Construction Services Division/Division des services de construction  
11 Laurier St./11 Rue Laurier  
3C2, Place du Portage  
Phase III  
Gatineau, Québec K1A 0S5

<b>Title - Sujet</b> Gas boilers/chaudières aux gaz	
<b>Solicitation No. - N° de l'invitation</b> EP067-151608/A	<b>Amendment No. - N° modif.</b> 005
<b>Client Reference No. - N° de référence du client</b> 20151608	<b>Date</b> 2015-01-30
<b>GETS Reference No. - N° de référence de SEAG</b> PW-\$\$\$FG-340-66385	
<b>File No. - N° de dossier</b> fg340.EP067-151608	<b>CCC No./N° CCC - FMS No./N° VME</b>
<b>Solicitation Closes - L'invitation prend fin</b> <b>at - à 02:00 PM</b> <b>on - le 2015-02-05</b>	<b>Time Zone</b> <b>Fuseau horaire</b> Eastern Standard Time EST
<b>F.O.B. - F.A.B.</b> <b>Plant-Usine:</b> <input type="checkbox"/> <b>Destination:</b> <input checked="" type="checkbox"/> <b>Other-Autre:</b> <input type="checkbox"/>	
<b>Address Enquiries to: - Adresser toutes questions à:</b> Brouillet, Richard	<b>Buyer Id - Id de l'acheteur</b> fg340
<b>Telephone No. - N° de téléphone</b> (819) 956-0457 ( )	<b>FAX No. - N° de FAX</b> (819) 956-8335
<b>Destination - of Goods, Services, and Construction:</b> <b>Destination - des biens, services et construction:</b> Public Works and Gouvernement Services Canada 555, 601 et 615 Booth Street, Ottawa, ON K1A 0E9	

**Instructions: See Herein**

**Instructions: Voir aux présentes**

<b>Delivery Required - Livraison exigée</b>	<b>Delivery Offered - Livraison proposée</b>
<b>Vendor/Firm Name and Address</b> <b>Raison sociale et adresse du fournisseur/de l'entrepreneur</b>	
<b>Telephone No. - N° de téléphone</b> <b>Facsimile No. - N° de télécopieur</b>	
<b>Name and title of person authorized to sign on behalf of Vendor/Firm</b> <b>(type or print)</b> <b>Nom et titre de la personne autorisée à signer au nom du fournisseur/</b> <b>de l'entrepreneur (taper ou écrire en caractères d'imprimerie)</b>	
<b>Signature</b>	<b>Date</b>

Solicitation No. - N° de l'invitation

EP067-151608/A

Amd. No. - N° de la modif.

005

Buyer ID - Id de l'acheteur

fg340

Client Ref. No. - N° de réf. du client

20151608

File No. - N° du dossier

fg340EP067-151608

CCC No./N° CCC - FMS No/ N° VME

---

**AMENDMENT 5 IS RAISED TO ATTACH ADDENDUMS 3 AND 4 AND TO ATTACH THE  
GEOTECHNICAL REPORT**

**CLAUSES AND CONDITIONS REMAIN THE SAME**

**555/601/615 BOOTH STREET  
STAND ALONE HEATING**

PROJECT NO. R.060128.002

Page 1 of 1  
DATE: January 26, 2015

The following changes in the tender documents are effective immediately. This addendum will form part of the contract documents.

**SPECIFICATIONS**

**1. SECTION 31 00 99 – EARTHWORK FOR MINOR WORKS**

.1 ADD Item 3.1.1.3:

- .3 Refer to City of Ottawa utility plan F-10-14 for approximate location of existing Bell services located within area of work. Existing service consists of seven (7) 75 mm diameter conduits and one (1) 25 mm diameter fibre conduit. Protect integrity of existing services to accommodate new work to approval of appropriate authority. Following uncovering of subsurface conditions, allow two (2) weeks for review of conditions by authority and Departmental Representative. Departmental Representative to pay costs of relocation, if required.**

.2 REVISE Item 3.1.2.1:

- .1 Arrange with appropriate authority for relocation of buried services that interfere with execution of work. Pay costs of relocating services, **unless otherwise indicated.****

Enclosure: City of Ottawa Utility Plan F-10-14

**555/601/615 BOOTH STREET  
STAND ALONE HEATING**

PROJECT NO. R.060128.002

Page 1 of 1  
DATE: January 28, 2015

The following changes in the tender documents are effective immediately. This addendum will form part of the contract documents.

**SPECIFICATIONS**

**1. SECTION 01 14 26 – LIMITED PHASE II ENVIRONMENTAL SITE ASSESSMENT  
555 BOOTH STREET, OTTAWA**

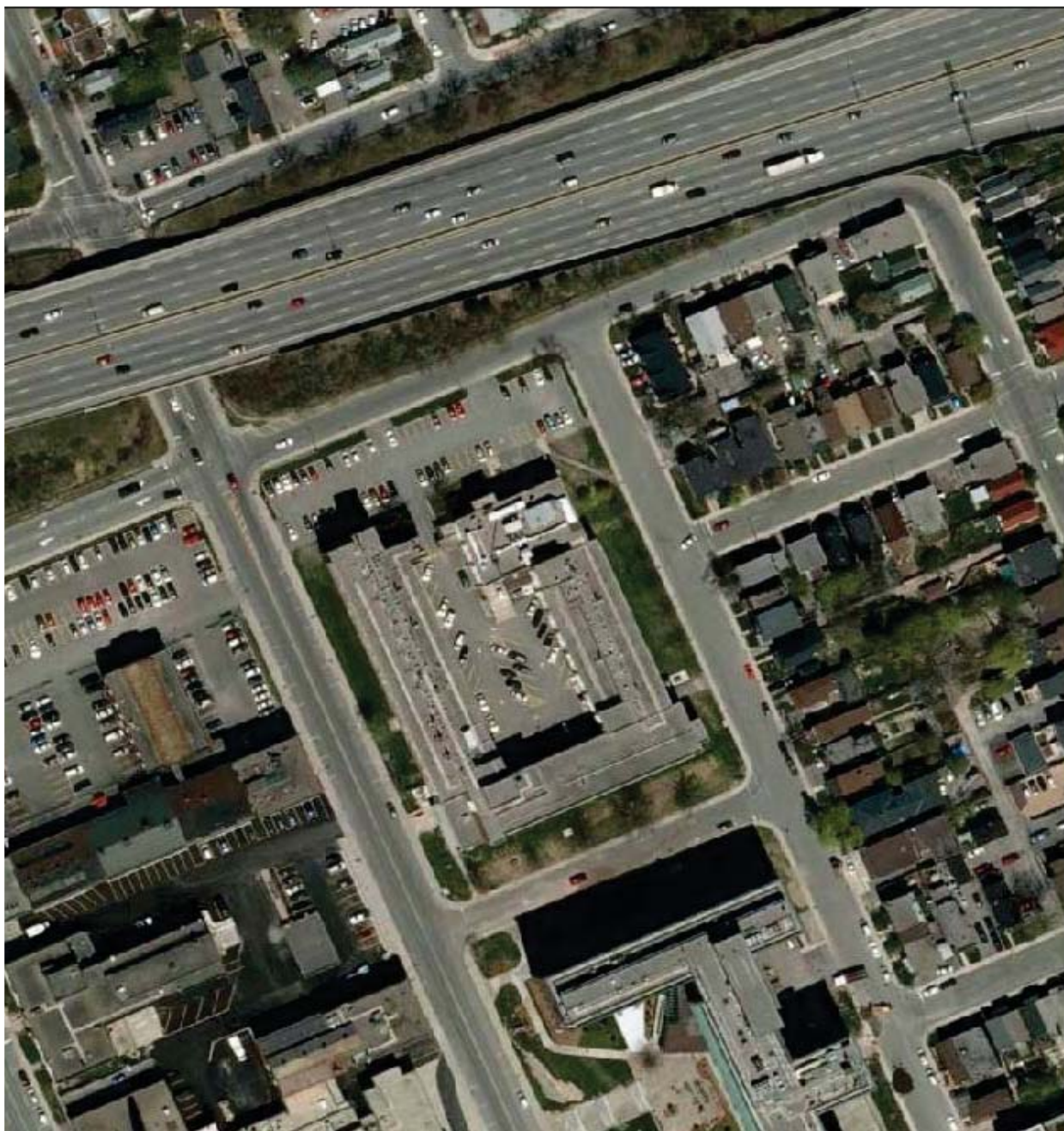
.1 REVISE Item 1.1.3:

**.3 The Site is currently registered as a “Class 2 – Medium Priority for Action” under the Federal Contaminated Site inventory.**

.2 ADD Item 1.2.2:

**“.2 Based on the latest available environmental site assessment conducted at 555 Booth Street (i.e., *WSP Limited Phase II ESA* report dated January 21<sup>st</sup> 2014), the contaminants that are present within the soil and/or groundwater on-site above the applicable federal guidelines and/or standards include: metals petroleum hydrocarbon products, volatiles, polycyclic aromatic compounds.”**

Enclosure: Phase II ESA - 555 Booth St – January 21, 2014



Limited Phase II Environmental  
Site Assessment  
555 Booth Street, Ottawa, Ontario  
Natural Resources Canada (NRCan)

131-20711-06  
January 21, 2014

**DRAFT**



2611 Queensview Drive, Suite 300  
Ottawa ON K2B 8K2  
Telephone: 613.829.2800 Fax: 613.829.8299  
[www.wspgroup.com](http://www.wspgroup.com)

---

## Executive Summary

WSP Canada Inc. (WSP, previously Genivar) was retained by Real Property and Environmental Management of Natural Resources Canada (NRCan) to conduct a Limited Phase II Environmental Site Assessment (ESA) at an NRCan property located at 555 Booth Street, Ottawa, Ontario (the "Site"). The objective of the Phase II ESA was to determine the environmental quality of soil and groundwater within the exterior areas of the Site. The Phase II ESA was completed to meet the requirements of the Canada Standard Association (CSA) document entitled "CAN/CSA-Z769-00 (R2013) - Phase II Environmental Site Assessment".

The Site is located in the Northeast quadrant of the Booth Street Complex which is a series of buildings owned by NRCan which has historically dealt with chemicals and fuels since the early 1900's. The Site contains one of the last buildings built for NRCan in 1955. Prior to 1955 the Site was historically used as a railway yard and an auto wrecking and trimming facility.

The Site is currently registered as a contaminated site under the Federal Contaminated Site Inventory. The Directory of Federal Real Property (DFRP) number for the Site is 58475-001. The Site is currently registered as Class 3, which is "Low Priority for Action" under the National Classification System for Contaminated Sites (NCSCS).

The field program was carried out in December 2013 and January 2014. Three boreholes were advanced on-Site and were instrumented with monitoring wells. Representative soil and groundwater samples were selected for laboratory analysis of the contaminants of concern (COCs) including petroleum hydrocarbons fraction F1 to F4 (PHC F1-F4), volatile organic compounds (VOCs) including benzene, toluene, ethylbenzene and xylenes (BTEX), semi-volatile organic compounds (SVOCs) which also includes polycyclic aromatic hydrocarbons (PAHs). In total, six soil samples and seven groundwater samples were submitted for laboratory analysis. These included groundwater samples from the two existing (pre-2013) groundwater monitoring wells as well as one field duplicate sample per media for quality assurance/quality control (QA/QC) purposes. Further a composite soil sample was submitted for a toxicity characteristic leaching procedure (TCLP) analysis.

The laboratory results were compared to the Canadian Council of Ministers of the Environment (CCME) Soil Quality Guidelines (SQGs), Canada-Wide Standard (CWS) and/or Federal Interim Groundwater Quality Guideline (IGQGs), as applicable. The laboratory results were also compared to the Ontario provincial Site Condition Standards (SCSs) as provided by the Ontario Regulation 153/04 (Ontario Ministry of Environment). Guidelines/standards for commercial land use were utilized. TCLP analysis results were compared to the values provided by the Ontario Regulation 347, Waste Management.

The results of the Phase II ESA identified soil and groundwater contamination in excess of the federal and provincial guidelines/standards for commercial land uses. The following presents a summary of the findings.



### **Soil Quality**

- There was no visual or olfactory evidence of contamination observed other than evidence of fill material (brick veneer fragments, glass, etc.). No sheens, film or free-phase liquid petroleum hydrocarbons were noted during the drilling and the subsequent groundwater sampling activities.
- The laboratory analytical results for the soil samples submitted during the current investigation met the applicable CCME SQGs and/or CCME CWS for VOCs, non-PAH SVOCs and PHCs, although elevated concentrations of PHC F2-F4 below the CCME CWS were detected at all sampling locations.
- The results for soil samples collected at two out of three borehole locations exceeded the CCME SQGs by up to 3.47X for one or more metal parameters including copper, lead, and zinc.
- The results for soil samples collected at all three borehole locations exceeded the CCME SQGs for carcinogenic PAH parameters for human health. Benzo[a]Pyrene total potency equivalents (B[a]P TPEs) were calculated for all soil samples and all exceeded both the soil quality guideline of 0.6 µg/g based on the incremental lifetime cancer risk (ILCR) of 1 in 1,000,000 (Ontario target) and 5.3 µg/g based on the ILCR of 1 in 100,000 (target in some other jurisdictions). The highest calculated B[a]P TPE for the soil samples was 74.3 µg/g which exceeded the Ontario target for ILCR by 123X. Furthermore, soil samples collected at all three borehole locations exceeded the CCME SQG for human health effects of the carcinogenic PAH parameters for protection of potable water sources. The calculated index of additive cancer risk (IACR) exceeded the soil quality guideline of 1.0 (unit-less) and ranged from 28.76 to 297.95, which is almost 300X the accepted value. The laboratory results for soil samples collected at all three borehole locations also exceeded the CCME SQGs for protection of environmental health by up to 188.91X for one or more PAH parameters.
- Comparison of the calculated B[a]P TPEs for all available soil samples results (historical and current) indicates that 30 out of 32 soil samples have returned B[a]P TPEs exceeding the Ontario target of 0.6 µg/g. Twenty six out of 32 soil samples have returned B[a]P TPEs exceeding 5.3 µg/g corresponding the target cancer risk of  $10^{-5}$ . Given the history of the Site uses and the laboratory results, it is reasonable to conservatively consider the soil within the entire exterior areas of the Site impacted above the federal soil quality guidelines/standards. The vertical extent of impacted soil extends from the ground surface to the shallow bedrock surface with an average depth of roughly 1.5 metres below ground surface (m bgs). It is our understanding that the on-Site building is constructed directly on the bedrock surface.

### **Groundwater Quality**

- Groundwater samples collected at all five monitoring well locations met the federal IGQGs for the PHC and VOC parameters tested excluding chloroform. Federal IGQGs do not provide numerical

values for PHC F3-F4. The PHC and VOC parameters concentrations were all below the laboratory detection limits, excluding chloroform which was detected at concentrations marginally (up to 1.55X) above the IGQG at two out of five monitoring wells. Chloroform is a by-product of municipal water chlorination (disinfection) and is occasionally detected at minor concentrations within shallow groundwater in urban areas due to leaks in water distribution systems.

- Groundwater samples results for all five monitoring well locations exceeded the IGQGs by up to 70.59X for one or more metal parameters including barium, cadmium, copper, lead, molybdenum, selenium, silver and zinc.
- Groundwater samples collected at all five monitoring well locations exceeded the federal IGQGs by up to 256.67X for most of PAH parameters and for one non-PAH SVOC parameter (Bis(2-ethylhexyl) Phthalate). Bis(2-ethylhexyl) Phthalate (DEHP) concentration exceeded the federal IGQG of 16 µg/L by 2.75X at one of the existing monitoring well locations. DEHP has been widely used as a plasticizer in manufacturing of articles made of PVC. It has also been used in adhesive and sealants production. Detection of DEHP at monitoring well B-91 can be due to a variety of reasons including the monitoring well construction (PVC screen and riser, potential use of adhesives, etc.).
- No sheens, film or free-phase liquid petroleum hydrocarbons were noted during the drilling and the subsequent groundwater sampling activities.
- Considering the distribution of the monitoring wells across the Site, and the presence of groundwater within fractured bedrock that facilitates the contaminants transport, the lateral extent of impacted groundwater can be conservatively estimated to be across the entire Site, which is approximately 11,200 m<sup>2</sup>.
- Although contaminants were identified at all groundwater monitoring well locations, the highest number of contaminants and their level of contamination were detected at monitoring wells located within the central portion of the Site (courtyard) and somehow the most down-gradient monitoring wells on-Site. This can be indicative of the main sources of impacts being on-Site, while impacts from off-Site up-gradient sources are possible to a lesser degree.
- The contaminated groundwater on-Site is flowing through fractured bedrock rather than through unconsolidated material (soil), which facilitates the contaminants transport. For this reason, off-site migration of impacts is likely.

#### **Contaminated Site CS-58475-001 and NCSCS Classification**

Based on all available laboratory results the COCs that are present within the soil and/or groundwater on-site above the federal guidelines and/or standards include: metals, PHCs, SVOCs/PAHs and VOCs.

The lateral extent of the on-Site contaminated soil is conservatively estimated to extend to the entire exterior surface area of the Site, which is approximately 6,400 m<sup>2</sup>. The vertical extent of the on-Site contaminated soil extends from the ground surface to the surface of shallow bedrock, which is roughly



assumed at 1.5m. This equals to a total volume of 9,600 m<sup>3</sup> in volume or 19,200 metric tonnes of contaminated soil exceeding the federal guidelines/standards. Using an average cost of \$100-\$125/metric tonne, the cost associated with the excavation and off-site disposal of impacted soil is estimated at approximately \$1,920,000-\$2,400,000, taxes excluded. The results of the TCLP test indicated that the impacted soil is considered non-hazardous solid waste for disposal purposes.

A NCSCS spreadsheet was completed for the contaminated site CS-58475-001, which resulted in an updated score of 67.9, representing a Class 2 contaminated site with "Medium Priority for Action".

### **Recommendations**

Based on the results of the Phase II ESA as well as the previous investigations completed for the Site, the following recommendations are made:

- Completion of a human health Preliminary Quantitative Risk Assessment (PQRA) and a Screening Level Ecological Risk Assessment (SLERA) are recommended. The liability cost for the completion of a PQRA and SLERA is approximately \$50,000, taxes excluded.
- Until such time that the aforementioned PQRA and SLERA are conducted, completion of an annual groundwater sampling event is recommended. Contaminants of concern include metals, PHCs, VOCs, and SVOCs/PAHs. It is also recommended to use low flow groundwater sampling technique to reduce any agitation and silt suspension.

## Table of Contents

<b>1.0</b>	<b>INTRODUCTION.....</b>	<b>1</b>
1.1	OBJECTIVES .....	1
1.2	SITE DESCRIPTION .....	1
1.3	BACKGROUND.....	2
1.4	LIMITATIONS OF ASSESSMENT .....	5
<b>2.0</b>	<b>SCOPE OF WORK .....</b>	<b>6</b>
<b>3.0</b>	<b>METHODOLOGY.....</b>	<b>8</b>
3.1	STANDARD PROCEDURES.....	8
3.2	HEALTH AND SAFETY PLAN.....	8
3.3	BOREHOLE DRILLING AND MONITORING WELL INSTALLATION.....	8
3.4	SOIL SAMPLING .....	9
3.5	FIELD SCREENING MEASUREMENTS.....	10
3.6	GROUNDWATER SAMPLING.....	10
3.7	QUALITY ASSURANCE/QUALITY CONTROL (QA/QC) .....	11
<b>4.0</b>	<b>APPLICABLE STANDARDS AND GUIDELINES.....</b>	<b>11</b>
4.1	FEDERAL STANDARDS AND GUIDELINES .....	11
4.1.1	<i>Soil Guidelines/ Standards</i> .....	12
4.1.2	<i>Groundwater Guidelines</i> .....	12
4.2	PROVINCIAL STANDARDS.....	13
<b>5.0</b>	<b>INVESTIGATION RESULTS AND DISCUSSION .....</b>	<b>14</b>
5.1	RESULTS .....	14
5.1.1	<i>Subsurface Stratigraphy</i> .....	14
5.1.2	<i>Field Screening – Soil and Groundwater</i> .....	14
5.1.3	<i>Analytical Results - Soil</i> .....	15
5.1.4	<i>Analytical Results – Soil Leachate</i> .....	19
5.1.5	<i>Analytical Results – Groundwater</i> .....	19
5.1.6	<i>Quality Assurance/Quality Control (QA/QC)</i> .....	23
5.2	DISCUSSIONS .....	24
5.2.1	<i>Soil Quality</i> .....	24
5.2.2	<i>Groundwater Quality</i> .....	25
5.2.3	<i>Extent of Soil Contamination</i> .....	26
5.2.4	<i>Extent of Groundwater Contamination</i> .....	26
<b>6.0</b>	<b>CONTAMINATED SITE SUMMARY .....</b>	<b>27</b>
6.1	IDENTIFICATION OF CONTAMINATED SITES.....	27
6.2	NATIONAL CLASSIFICATION SYSTEM .....	27
<b>7.0</b>	<b>CONCLUSIONS.....</b>	<b>28</b>
7.1	GENERAL .....	28
7.2	SOIL.....	28
7.3	GROUNDWATER.....	30
7.4	CONTAMINATED SITES .....	31
7.5	UPDATED NCSCS CLASSIFICATION.....	31
<b>8.0</b>	<b>RECOMMENDATIONS.....</b>	<b>32</b>
<b>9.0</b>	<b>SIGNATURES.....</b>	<b>32</b>
<b>10.0</b>	<b>REFERENCES.....</b>	<b>33</b>

## Appendices

Appendix A	Site Figures
Appendix B	Site Photographs
Appendix C	Borehole/Monitoring Well Logs
Appendix D	Summary of Laboratory Analytical Results
Appendix E	NCSCS Detailed Evaluation Forms
Appendix F	Laboratory Certificates of Analysis
Appendix G	Health and Safety Plan and Underground Utility Locates

## FIGURES

Figure 1 – Site Location Plan
Figure 2 - Site Plan and Groundwater Elevations (December 2013)
Figure 3 – Soil Concentrations in Excess of CCME SQGs (December 2013)
Figure 4 – Groundwater Concentrations in Excess of Federal IGQGs (December 2013)
Figure 5 – Contaminated Site CS-58475-001

## LIST OF TABLES (within Text)

Table 3-1 Summary of Laboratory Submitted Soil Samples and Analyzed COCs .....	9
Table 3-2 Summary of Laboratory Submitted Groundwater Samples and Analyzed COCs .....	10
Table 5-1 Depth to Groundwater – December 27, 2013.....	14
Table 5-2 Soil Samples Exceeding CCME Guidelines and/or Standards for Commercial Land Use .....	16
Table 5-3 Groundwater Samples Exceeding IGQGs for Commercial Land Use.....	20
Table 6-1 Updated Contaminated Site Information .....	27

## **TABLES (within Appendices)**

Table D1	Metals Soil Analytical Results
Table D2	VOCs Soil Analytical Results
Table D3	PHCs Soil Analytical Results
Table D4	PAHs Soil Analytical Results - Comparison to CCME Guidelines for the Protection of Human Health based on Carcinogenic Effects of PAHs
Table D5	PAHs Soil Analytical Results - Comparison to CCME Guidelines for the Protection of Environmental Health
Table D6	PAHs Soil Analytical Results - Comparison to Ontario Regulation 153/04
Table D7	SVOCs (excluding PAHs) Soil Analytical Results - Comparison to CCME Guidelines
Table D8	Metals Groundwater Analytical Results
Table D9	VOCs Groundwater Analytical Results
Table D10	SVOCs / PAHs Groundwater Analytical Results
Table D11	PHCs Groundwater Analytical Result

## 1.0 INTRODUCTION

WSP Canada Inc. (WSP, previously Genivar) was retained by Real Property and Environmental Management of Natural Resources Canada (NRCAN) to conduct a Limited Phase II Environmental Site Assessment (ESA) at an NRCAN property located at 555 Booth Street, Ottawa, Ontario (the "Site"). A Site Location Map and a Site Plan are included in Appendix A as Figures 1 and 2, respectively.

The Phase II ESA was completed in accordance with the NRCAN's Standing Offer No. 7000000605 for the period 2013-07-10 to 2016-07-10, and WSP's proposal and workplan dated November 11, 2013 as well as further communications with NRCAN.

### 1.1 OBJECTIVES

The objective of the Phase II ESA was to determine the environmental quality of soil and groundwater within the exterior areas of the Site.

Please note that, a geotechnical investigation was conducted concurrently with the Phase II ESA to assess soil conditions at the location of a proposed standalone heating plant within the southwestern corner of the Site. The standalone geotechnical investigation report is issued separately.

### 1.2 SITE DESCRIPTION

The Site is located on the east side of Booth Street, with Orangeville Street (formerly Elizabeth Street) running along the north property line. The Site is accessed from the north side through Orangeville Street. Lebreton Street South and Daniel McCann Street run along the east and south property lines. The Site is legally described as (reference: City of Ottawa E-Map, accessed January 17, 2014):

- "E M R BLDG Plan 40, Lot 1 to 4, Lot 7 to 18, Plan 23 Lot 30 PT Lot 27 BOOTH E LEBRETON W" (Property Identification Number (PIN): 041040153; and
- "E M R BLDG Plan 40, Lot 1 to 4, Lot 7 to 18, Plan 23 Lot 30 PT Lot 27 BOOTH E LEBRETON W (PIN: 041040156).

The Site is rectangular in shape with the approximate dimensions of 127m X 86m and a total surface area of approximately 1.01 hectare. Paved parking areas cover the central and northern portion of the Site. Landscaped areas cover the Site perimeter.

The Site is located in the Northeast quadrant of the Booth Street Complex which is a series of buildings owned by NRCAN which has historically dealt with chemicals and fuels since the early 1900's. The Site contains one of the last buildings built for NRCAN in 1955. The building contains a radioactivity ores wing (east portion), a chemistry wing (west portion) and an administration wing (south portion). Prior to 1955 the Site was historically used as a railway yard and an auto wrecking and trimming facility.

The Site is currently registered as a contaminated site under the Federal Contaminated Site Inventory as follows:

- Directory of Federal Real Property (DFRP) number: 58475-001 (CanmetMINING);
- Status: Detailed testing completed, remediation / risk management planned;
- Site Status: Active;
- Classification: Low Priority for Action;
- Latitude, Longitude: 45.402893, -75.705858;
- Contamination Estimate: 7,829 m3; and
- Contaminant Type: "Petroleum hydrocarbons and PAHs", "metal, metalloid, and organometallic"

### 1.3 BACKGROUND

WSP was provided with the following reports associated with the past assessments conducted onsite, which are briefly summarized below:

- Raven Beck Environmental Ltd. NRCan Booth Street Complex Environmental Site Assessment, March 7, 1995.
- Duke Engineering & Services. Environmental Site Assessment and Contaminated Sites Remedial Plan, Booth Street Complex, Ottawa, Ontario, March 23, 2001.
- Aqua Terre Solutions Inc. Spring 2003 Groundwater Sampling Program, NRCan Booth Street Complex, Ottawa, Ontario, June 2003.
- Aqua Terre Solutions Inc. Winter 2006 Groundwater Sampling Program, NRCan Booth Street Complex, Ottawa, Ontario, March, 2006.
- Jaques Whitford (Stantec) Limited. File Review, Historical Review and Gap Analysis, Northeast Quadrant, 555 Booth Street, Ottawa, Ontario, February 20, 2009.

#### Environmental Site Assessment, Raven Beck Environmental Ltd, 1995

An Environmental Site Assessment was conducted by Raven Beck Environmental Ltd. (Raven Beck) in 1995, and consisted of a thorough background search of the property and review of historical documents including fire insurance plans, air photographs, and former reports relating to the Booth Street Complex including the Site. A soil sampling program was also implemented across the entire Booth Street Complex, and eight samples were submitted from BH-48 to BH-54 from the north portion of 555 Booth Street for laboratory analysis of benzene, toluene, ethylbenzene, and xylenes (BTEX), total petroleum hydrocarbons (TPH), polycyclic aromatic hydrocarbons (PAHs) and polychlorinated biphenyls (PCBs). Results were not provided with the report. Raven Beck (1995) identified the following environmental concerns:

- Historical Land Use:
  - The Site was listed as a railway yard prior to the construction of the building in the late 1950's/early 1960's;
  - Former location of underground storage tanks (USTs) located in the courtyard of the building; and,



- Laboratory operations on-Site which includes mineral dressing, process metallurgy and radioactivity.

*Environmental Site Assessment and Contaminated Sites Remedial Plan, Booth Street Complex, Duke Engineering & Services (Duke, 2001).*

Duke Engineering & Services carried out an environmental investigation and contaminated sites remedial plan in 2001 of the entire Booth Street Complex. The investigation included the drilling of six boreholes on 555 Booth Street: two along the south property line, three along the west property line, and one on the northeast corner. Boreholes B-91 and B-95 located on the west property line and northeast corner were completed into monitoring wells.

Laboratory results from the Raven Beck 1995 and 1996 studies were compiled and added to the table for comparison of the CCME (Canadian Council of Ministers of the Environment) soil quality guidelines (SQGs), 1991 – commercial/industrial land use and CCME, SQGs, 1999 for commercial/industrial land use. TPH results were compared to the Ontario Ministry of Environment (MOE), 1997 - commercial/industrial property use in non-potable groundwater.

The results of the metals/semi-metals, heavy oils and PAHs analysis indicated the following parameters in excess of the utilized guidelines/standards: arsenic, mercury, total chromium, copper, lead, nickel, zinc, heavy metals, naphthalene, phenanthrene, benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene and indeno(1,2,3-cd)pyrene.

Groundwater samples were submitted for laboratory analysis and were compared to the MOE 1997 *Guideline for Use at Contaminated Sites in Ontario*, Groundwater Remediation criteria for non-potable groundwater condition (coarse grained soils). Groundwater analysis revealed all samples were below the applicable guideline. The groundwater flow direction was determined to be southwest.

The Site (555 Booth Street), which is identified as the northeast quadrant of the Booth Street Complex and contaminated site number 58475-1, was classified using the CCME National Classification System (NCS). The Site was ranked as a NCS Class 3 Site – Low Priority for Action.

The recommendations of this report included the completion of a Site-Specific Risk Assessment (SSRA) and Risk Management (RM) plan.

*Groundwater Sampling Program, Aqua Terre Solutions Inc., 2003*

A Groundwater Sampling Program was conducted by Aqua Terre Solutions Inc. (Aqua Terre) in 2003, and consisted of a sampling program of all existing monitoring wells in the Booth Street Complex. The groundwater samples from wells B-91 and B-95 at 555 Booth Street (identified as the Northeast Quadrant) were submitted to Paracel Laboratories for analysis of metals, PAH and petroleum hydrocarbon parameters. All samples were below the applicable MOE 1997 criteria for non-potable groundwater. The groundwater flow in this area was determined to be flowing to the southwest.

Groundwater Sampling Program, Aqua Terre Solutions Inc., 2006

A Groundwater Sampling Program was conducted by Aqua Terre Solutions Inc. in 2006, and consisted of a sampling program of all existing monitoring wells in the Booth Street Complex. The groundwater samples from wells B-91 and B-95 at 555 Booth Street (identified as the Northeast Quadrant) were submitted for metals and PAH analysis at Accutest Laboratories. The samples were compared to the MOE, 2004 Table 3 Site Condition Standards (SCSs), all types of property uses in a non-potable groundwater condition, coarse textured soils. All samples were below the applicable Table 3 SCSs for non-potable groundwater. The groundwater flow in this area was determined to be flowing to the southwest.

File Review, Historical Review, and Gap Analysis, Jaques Whitford (Stantec) in 2009

A File Review, Historical Review and Gap Analysis was conducted by Jaques Whitford (Stantec) in 2009, and consisted of a thorough review of historical records, past reports, and a summary of the past data. The review also included a gap analysis to identify any areas that may have been overlooked in previous investigations.

Jaques Whitford (2009) identified the following environmental concerns:

➤ Historical Land Use:

- The northeast portion of the Site contained a former auto wrecking and trimming facility (early 1900's);
- A former railway yard and tracks were located on the south portion of the Site;
- The east portion of the building is a generator of hazardous wastes (acid wastes – heavy and other metals, alkaline wastes, aliphatic solvents, waste oils and lubricants, alkaline phosphates, paints, pigments and other coatings, organic and inorganic chemicals, light fuels and petroleum distillates);
- The Site is registered as a PCB storage site;
- The Site is identified as containing former/present USTs;
- A historical furnace oil spill occurred on the east adjacent property (235 Plymouth) with confirmed soil contamination;
- The Canadian National Railway (CNR) was historically running east-west on the north adjacent property (now Highway 417);
- A former by-product coke oven was located at 562 Booth Street in the 1920's-30's, located southwest of the Site;
- Leaking USTs were removed from north of 562 Booth Street in 1996. Contamination may have followed a buried steam pipe trench north into the 555 Booth Street building.

Many boreholes located on the north, southeast, west and courtyard of the Site were confirmed to have soil concentrations of inorganics, PAH, and petroleum hydrocarbons (PHC's) above the applicable CCME Soil Quality SQGs (1999) or CCME Canada-Wide Standards (CWS, revised 2008).

The report concluded that a Phase II ESA should be completed on the Site to include volatile organic compounds (VOCs), PHC fractions F1-F4, radioactivity, semi-volatile organic compounds (SVOCs), PAHs, PCBs, and metals. An updated preliminary quantitative risk assessment (PQRA), ecological risk evaluation (ERE) and national classification system for contaminated sites (NCSCS) scoring should be completed with updated soil and groundwater results.

#### **1.4 LIMITATIONS OF ASSESSMENT**

- The conclusions regarding environmental conditions, which are presented in this report, are based on a scope of work authorized by NRCan. Note, however, that virtually no scope of work, no matter how exhaustive, can identify all contaminants or all conditions above and below ground. This report therefore cannot warrant that all conditions on or off the Site are represented by those identified at specific locations.
- The conclusions presented herein are based on information obtained up to and including the submission date of this document. Any Site operations or land uses that may have changed since this submission may render the conclusions invalid.
- The assessment is partly based on information from various sources (laboratories, other consultants, and etc. as referenced within the report) of which the accuracy has not been verified, and because observations made during the field investigations are limited as provided above, this report does not guarantee that latent or undiscovered conditions will not become evident in the future. WSP has prepared this report using information understood to be factual and correct and shall not be responsible for conditions arising from information or facts that were not disclosed to WSP.
- This document and the information contained herein have been prepared solely for the use of NRCan. No other party may use or rely upon the above captioned report or any portion thereof without the express written consent of WSP. WSP will consent to any reasonable request by NRCan to approve the use of this report by other parties.

## 2.0 SCOPE OF WORK

In order to assess the environmental quality of soil and groundwater at the Site, the following scope of work was developed, in consultation with NRCan:

- Completion of utility clearance for the specified borehole/monitoring well locations;
- Advancement of up to 3 exterior environmental boreholes. The boreholes were to be advanced within the following general areas:
  - Northwest area of the Site, where Duke Engineering & Services (Duke, 2001) identified concentrations of petroleum hydrocarbons above the federal guidelines/standards (borehole/monitoring well BHMW1);
  - Central areas of the Site within the courtyard where no groundwater monitoring well exists (borehole/monitoring well BHMW2); and
  - Southwest area of the Site, which is considered the most down-gradient location on-Site given the inferred groundwater flow direction towards southwest (borehole/monitoring well BHMW3). Due to the extensive presence of utilities including fiber optics at the most southwestern area of the Site, BHMW3 was placed at the southwest corner of the courtyard.
- The environmental boreholes were advanced to up to 4.64 m below ground surface (m bgs). In average, 1.4 m of drilling within the overburden and 3.1 m of rock coring was to be completed. The environmental boreholes were to be instrumented with monitoring wells and finished by flush mounts at the ground surface;
- Collection and screening of soil samples and selection of representative soil samples for laboratory analysis of the contaminants of concern (COCs) including PHC F1-F4, BTEX, VOCs, PAHs/SVOCs, and metals. A total of up to 7 soil samples including 2 samples per borehole location and 1 field duplicate soil sample (10%) for quality assurance / quality control (QA/QC) purposes were to be submitted to Caduceon Environmental Laboratories (Caduceon), which is a Canadian Association for Laboratory Accreditation Inc. (CALA) accredited laboratory for the required analysis. Due to shallow soil condition (approximately 1 m deep), only 1 sample was submitted for BHMW1. Additionally, 1 soil sample was submitted for pH analysis. As well, 1 composite soil sample was to be submitted for toxicity characteristic leaching procedure (TCLP) test for disposal of the drilling cutting excess soil. The excess soil was picked up and disposed by Veolia Environmental Inc. of Ottawa.
- Collection of groundwater samples from the 2 existing (B-91 and B-95) and the 3 proposed monitoring wells (BHMW1 to BHMW3). Groundwater samples were to be submitted for laboratory analysis of the COCs including PHC F1-F4, BTEX, VOCs, PAHs/SVOCs, and metals. A total of up to 6 groundwater samples including 1 sample per monitoring well and 1 field duplicate sample (10%) for QA/QC purposes were to be submitted to Caduceon.
- Preparation of an updated NCSCS; and

- Preparation of a letter report summarizing the field activities, the laboratory results, discussions, conclusions and recommendations. The report includes the text, figures, tables, borehole logs and laboratory certificates. The Phase II ESA report was to be completed to meet the requirements of Canada Standard Association (CSA) document entitled "CAN/CSA-Z769-00 (R2013) - Phase II Environmental Site Assessment".

## **3.0 METHODOLOGY**

### **3.1 STANDARD PROCEDURES**

The Phase II ESA was completed in accordance with standard procedures, which reflect, but may not be limited to the requirements of the following documents:

- CCME, Guidance Document on the Management of Contaminated Sites in Canada, 1997, PN 1279;
- CCME Guidance Manual on Sampling, Analysis, and Data Management for Contaminated Sites - Volume I/II, 1993, PN 1101 and 1103;
- CSA, Phase II Environmental Site Assessment, CSA Z769-00 (R2013);
- CSMWG (Contaminated Sites Management Working Group), 1999, A Federal Approach to Contaminated Sites Contaminated Sites Management Working Group;
- Treasury Board Secretariat, 2002, Policy on Accounting for Costs and Liabilities Related to Contaminated Sites; and
- CCME, Subsurface Assessment Handbook for Contaminated Sites, 1994, PN 1144.

### **3.2 HEALTH AND SAFETY PLAN**

WSP prepared a Health and Safety Plan (HASP) for the intrusive activities, which identified appropriate field protocols, including Personal Protective Equipment (PPE), safety training, contingency plans, including directions to the nearest hospital, and contact information. A brief start-up meeting was conducted in November, 2010 and the HASP was provided to the project team and discussed prior to initiating the intrusive study.

The HASP was maintained throughout the field program. All field staff were instructed on the protocols of the plan and the proper use of personal protective equipment. Worker health and safety standards were assured by following stringent safety precautions in accordance with the applicable sections specified under the Canada Labour Code. A copy of the HASP utilized during the field program is included in Appendix G.

### **3.3 BOREHOLE DRILLING AND MONITORING WELL INSTALLATION**

The field program was carried out at the Site on December 17<sup>th</sup> and 21<sup>st</sup>, 2013. A total of three boreholes, all of which were completed into monitoring wells (BHMW1 to BHMW3), were advanced to depths ranging from 4.31 m to 4.64 m, below ground surface (m bgs). All boreholes were advanced using a truck-mounted CME 55 drilling rig equipped with hollow-stem augers.

Borehole/monitoring well locations are illustrated in Figure 2, Appendix A. Borehole/monitoring well logs are included in Appendix C.



Groundwater monitoring wells were installed in each of the three boreholes to facilitate the collection of groundwater samples. The monitoring wells were installed in accordance with the Ontario Water Resources Act – R.R.O. 1990, Regulation 903, as amended. All the monitoring wells were constructed using 50 mm diameter, schedule 40, flush-joint threaded polyvinyl chloride (PVC) screens and risers. The construction details of the installed monitoring wells are provided in the borehole logs in Appendix C. Clean sand (sand pack) was added in the annular space of well screen to at least 30 cm above the top of the screen, followed by a bentonite seal to approximately 30 cm below the existing ground surface. The tops of the riser pipes, were sealed with a j-plug and protected with a flush-mount.

All three monitoring wells were equipped with dedicated Waterra™ tubing and foot valves. Upon completion each monitoring well was purged and developed to remove any residual sediment or drill cuttings.

### 3.4 SOIL SAMPLING

A 0.61 m stainless steel split spoon soil sampler was used to collect the soil samples from the boreholes. Disposable nitrile gloves were used during sample collection to minimize the potential for cross-contamination. Soil samples were described in the field by WSP staff, and observations were recorded into a dedicated field book as per standard procedures outlined in the Canadian Foundation Engineering manual (CFEM, 2006). Soil samples selected for chemical analysis were stored at a temperature of less than 4°C and handled under chain of custody procedures until received at the laboratory. The soil samples selected for laboratory submission were considered to be representative of worst-case conditions in the boreholes based on field instrument screening results, as well as observations of olfactory and visual characteristics.

Caduceon Environmental Laboratories (Caduceon) for chemical analyses. The soil samples submitted for chemical analysis are summarized in

Table 3-1. Excess soil cuttings generated during the drilling activities were stored in sealed steel soil drums and left on-site for subsequent disposal. The soil drums were picked up by Veolia Environmental for off-site disposal on January 15th, 2014.

**Table 3-1 Summary of Laboratory Submitted Soil Samples and Analyzed COCs**

Sample ID	Sample Depth (m bgs)	Parameter Analyzed
BHMW1-SS1	0.15-0.61	PHC F1-F4, BTEX, SVOC/PAHs, VOCs, Metals, pH
BHMW2-SS1	0.15-0.61	PHC F1-F4, BTEX, SVOC/PAHs, VOCs, Metals

Sample ID	Sample Depth (m bgs)	Parameter Analyzed
BHMW2-SS3B	1.52-1.83	PHC F1-F4, BTEX, SVOC/PAHs, VOCs, Metals
BHMW3-SS1	0.15-0.61	PHC F1-F4, BTEX, SVOC/PAHs, VOCs, Metals
BHMW3-SS3	1.22-1.47	PHC F1-F4, BTEX, SVOC/PAHs, VOCs, Metals
Dup-1 (Duplicate of BHMW2-SS3B)	1.52-1.83	PHC F1-F4, BTEX, SVOC/PAHs, VOCs, Metals

### 3.5 FIELD SCREENING MEASUREMENTS

Soil samples collected from the boreholes were screened for relative organic vapour levels (ROVL) using a RKI Eagle 2, catalytic combustible gas detector (CCGD). The RKI Eagle 2 was calibrated according to manufacturer procedures prior to use in the field and a record is maintained on file.

The ROVL measurements recorded in the soil samples collected at the Site were found at various levels ranging from non-detectable to 10 ppm using CCGD. The individual vapour readings for each soil sample are presented in the borehole logs in Appendix C.

### 3.6 GROUNDWATER SAMPLING

On December 27, 2013 the wells were purged of three volumes or until dry conditions were achieved three times before groundwater samples were collected on December 28, 2014 except for PAH/SVOCs for BHMW3 which did not yield enough sample due to low recovery. WSP staff returned to the Site and collected the outstanding sample for PAHs/SVOCs at BHMW3 on January 7th, 2014. Waterra tubing and inertial lift foot valves were used to purge and sample the groundwater. Samples submitted for metals analysis were filtered using a 45 micron filter prior to deposit into the sample container. The samples were collected and placed into laboratory-supplied bottles and kept according to chain of custody procedures until received at the laboratory. All sample containers were placed in an ice-packed cooler before and during transportation to Caduceon as per Table 3-2.

**Table 3-2 Summary of Laboratory Submitted Groundwater Samples and Analyzed COCs**

Sample ID	Parameter Analyzed
B-91	PHC F1-F4, BTEX, SVOC/PAHs, VOCs, Metals
B-95	PHC F1-F4, BTEX, SVOC/PAHs, VOCs, Metals
BHMW1	PHC F1-F4, BTEX, SVOC/PAHs, VOCs, Metals

Sample ID	Parameter Analyzed
BHMW2	PHC F1-F4, BTEX, SVOC/PAHs, VOCs, Metals
BHMW3	PHC F1-F4, BTEX, SVOC/PAHs, VOCs, Metals
Dup-1 (Duplicate of B-95)	PHC F1-F4, BTEX, SVOC/PAHs, VOCs, Metals

Prior to groundwater sampling, static groundwater depths as well the possible presence of free product was recorded at each monitoring well locations using a Solinst (model 122) interface meter. As well, an elevation survey was conducted on December 27<sup>th</sup>, 2013 for the ground surface of all the monitoring wells on-site.

Vials used for VOCs and PHC F1 soil analysis were checked to ensure the vial was filled to the line indicating the correct methanol level. Sample containers were labelled with sample identification, the project number, and the sampling date. A laboratory supplied chain of custody was completed. One copy was sent with the samples to the laboratory, and one copy was retained for the project file.

Nitrile gloves were replaced after each sample was collected to reduce the potential for cross-contamination of the samples. Field equipment was cleaned with soap and water and was rinsed with deionized water between samples.

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

WSP maintains a standard QA/QC program for all Phase II ESAs. The field sampling and QA/QC program was completed in accordance with the *Guidance Manual on Sampling, Analysis, and Data Management for Contaminated Sites - Volume I/II*, (CCME, 1993), and/or *Guidance on Sampling and Analytical Methods for Use at Contaminated Site in Ontario* (MOE, 1996). Documentation of the field results such as location, weather, field measurements, number of samples, parameters collected for, time sampled, volume, hydrocarbon readings and equipment type were completed. All project documentation was maintained and controlled under each specific work site and sampling area by the appointed field supervisor. Boring, monitoring well installation, soil and groundwater sampling was completed in accordance with industry standards, and applicable provincial/federal guidelines/ standards. The soil samples were placed in laboratory supplied containers and maintained at below 4°C in an ice chest, under a Chain of Custody protocol prior to being submitted for chemical analyses to Caduceon, which is a certified laboratory by the Canadian Association for Laboratory Accreditation Inc. (CALA) and Standards Council of Canada (SCC) for the parameters tested.

## 4.0 APPLICABLE STANDARDS AND GUIDELINES

### 4.1 FEDERAL STANDARDS AND GUIDELINES

In accordance with NRCan requirements, the results from the analytical sampling program were compared to applicable federal guidelines/ standards. Where CCME guidelines/ standards were not

available for a particular COC, environmental guidelines or standards from other jurisdictions (i.e. Provincial) were applied.

#### **4.1.1 Soil Guidelines/ Standards**

The soil analytical results were compared to the following guidelines/ standards:

- CCME, Canada-Wide Standards for Petroleum Hydrocarbons (PHC) in Soil, 2001. Table 1 (Revised January 2008), Summary of Tier 1 Levels (mg/kg) for surface soil, commercial use, coarse textured soil;
- CCME, Canadian Environmental Quality Guidelines (CEQGs), 2008, revised 2010: Canadian Soil Quality Guidelines (SQGs) for the Protection of Environmental and Human Health, Polycyclic Aromatic Hydrocarbons, Tables 1 and 2, SQGs for Carcinogenic and Other PAHs (mg/kg), soil quality guideline for human health and environmental health for commercial land use, coarse textured soil, and;
- CCME Canadian Environmental Quality Guidelines, Soil Quality Guidelines for the Protection of Environmental and Human Health, Summary Table, commercial land use, coarse textured soil, accessed on-line, January 13, 2014.

#### **4.1.2 Groundwater Guidelines**

The groundwater analytical results were compared to the following guideline:

- Federal Interim Groundwater Quality Guidelines (IGQGs) for Federal Contaminated Sites, May 2010, Table 3 Generic Guidelines for Commercial and Industrial Land Use, Tier 1, coarse textured soil.

Please note that, however, the federal IGQG document indicates:

*"The transport models used to develop the numerical guidelines assume that contaminant transport occurs through unconsolidated soils. If transport between the contaminant source and receptor (e.g. surface water body) is through fractures instead of unconsolidated soils, either a transport distance of zero should be assumed (i.e. the Canadian Water Quality Guidelines for the Protection of Aquatic Life should be applied to groundwater), or a site-specific risk assessment should be conducted".*

Groundwater level measurements completed during this investigation indicate that groundwater table is below the surface of shallow bedrock on-site. Based on the borehole logs reviewed from previous investigations, depth to bedrock increases within the southern areas of the Booth Street complex and likely, sufficient groundwater transport occurs through unconsolidated soils before any groundwater/surface water interaction at the nearest surface body (Dow's Lake). Regardless, the Canadian Water Quality Guidelines for the Protection of Aquatic Life (CWQG PAL) are added to the

tabulated laboratory results (Appendix D) but are not discussed within the text unless the comparison indicates an instance where the laboratory result exceeds the CWQG PAL but meets IGQG for any specific parameters (e.g.: where CWQG PAL < laboratory results < IGQG).

## 4.2 PROVINCIAL STANDARDS

The SCSs listed in Table 7 of the Ontario MOE document entitled "*Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act. (2011)*" were considered applicable to the Site as described below. Table 7 provides generic SCSs for shallow soil in a non-potable groundwater condition. The SCSs associated with "industrial/ commercial/ community land use" for soil and "all types of property uses" for groundwater and for coarse textured soil were utilized:

- The Site is used by NRCan for office/laboratory activities (commercial purposes);
- There is no water body within 30 m of the Site. The nearest water body is Dow's Lake which is a man-made lake located approximately 515 m south of the Site;
- Depth to bedrock on-site is < 2m;
- The Site is not considered "environmentally sensitive" as the Site is not located within or adjacent to an area of natural significance, and the pH of the on-Site surficial soil, as measured during this investigation, is not less than 5 or greater than 9;
- The Site and the area within its 250 m radius are serviced by municipal water; and
- More than 1/3 of the soil at the site, measured by volume, consists of coarse textured soil (>75 µm), thus the SCSs for coarse texture soil applies.

## 5.0 INVESTIGATION RESULTS AND DISCUSSION

### 5.1 RESULTS

The soil and groundwater analytical results are summarized in Table D1 to Table D11 in Appendix D. The laboratory certificates of analysis are included in Appendix F.

#### 5.1.1 Subsurface Stratigraphy

Based on the soil data collected at the Site, the overburden material is shallow and consists of pavement or top soil followed by fill material of coarse texture in nature (sand and/or gravel with various amount of silt) to the limestone bedrock which was noted at depths ranging from 1.04m bgs (BHMW1) to 1.72m bgs (BHMW2) and was observed to the end of the boreholes. For details, refer to the borehole logs which are included in Appendix C.

#### 5.1.2 Field Screening – Soil and Groundwater

There was no visual or olfactory evidence of contamination observed during the field investigation other than the evidence of fill material (brick veneer fragments, glass, etc.) in soil.

Prior to groundwater sampling, static groundwater depths as well the possible presence of free product was recorded at each monitoring well locations using a Solinst (model 122) interface meter, as indicated in Table 5-1.

No sheens, film or free-phase liquid petroleum hydrocarbons were noted during the drilling and the subsequent groundwater sampling activities.

**Table 5-1 Depth to Groundwater – December 27, 2013**

Borehole/Monitoring Well ID	Depth to groundwater (m bgs)	Groundwater Elevation* (m)
B-91	2.78	96.33
B-95	2.95	97.00
BHMW1	1.92	96.40
BHMW2	3.12	96.84
BHMW3	3.35	96.57

Note: (\*) – Relative to an assumed elevation of 100.00 m for the ground surface at the southeast corner of the courtyard entrance, south of the gate opening



Based on the groundwater elevations, the inferred groundwater flow direction is towards the southwest, which is consistent with previous investigations.

### **5.1.3 Analytical Results - Soil**

#### **Federal Guidelines / Standards**

Based on the laboratory analytical results, soil samples collected at all three borehole locations met the CCME guidelines and/or standards for the VOC, SVOC (excluding PAH) and PHC parameters tested. However, elevated concentrations of PHC F2-F4 below the CCME CWS were detected at all sampling locations. The VOCs concentrations were all below the laboratory detection limits; however, the laboratory detection limit for trichloroethylene (0.05 µg/g) for all soil samples was above the applicable CCME SQG (0.01 µg/g). Detailed laboratory analytical results for PHC, VOCs and SVOCs (excluding PAHs) are included in Tables D3, D2 and D7, respectively, all included in Appendix D. Laboratory certificates of analysis are included in Appendix F.

Based on the laboratory analytical results, soil samples collected at two out of three borehole locations (BHMW2 and BHMW3) exceeded the CCME SQGs by up to 3.47X for one or more metal parameters including copper, lead and zinc. The highest exceeding concentration for metals relative to the guidelines was identified for copper at BHMW3-SS3 for 3.47X the applicable CCME SQG. A summary of the exceeding parameters/concentrations is included in Table 5-2 below. Detailed laboratory analytical results for metal parameters are included in Table D1, Appendix D. Laboratory certificate of analysis are included in Appendix F.

Based on the laboratory analytical results, soil samples collected at all three borehole locations exceeded the CCME SQGs for carcinogenic PAH parameters for human health direct contact (SQG<sub>PH</sub>). While some jurisdictions in Canada have adopted an “essentially negligible (Health Canada, 2012)” incremental lifetime cancer risk (ILCR)  $1 \times 10^{-5}$  (or 1 in 100,000) for managing risks of carcinogenic substances, other jurisdictions including Ontario use an ILCR of  $1 \times 10^{-6}$  (or 1 in 1,000,000). Benzo(a)pyrene total potency equivalents (B[a]P TPE) were calculated for all soil samples, which all exceeded both the soil quality guideline of 0.6 µg/g based on the ILCR target of 1 in 1,000,000 ( $10^{-6}$ , Ontario) and the soil quality guideline of 5.3 µg/g based on the accepted ILCR target of 1 in 100,000 ( $10^{-5}$ ). The highest B[a]P TPE was calculated for the soil sample BHMW3-SS3 (74.3 µg/g) exceeding the Ontario target for ILCR by two order of magnitude (123X). Please note that, the CCME guideline document for PAHs (2008, revised 2010) requires applying a safety factor of 3 to the calculated B[a]P TPE when the source of soil contamination is coal tar or creosote. Since the source of PAHs' impact to the soil on-site is likely the historical presence of a train yard (creosote) as well as imported fill material of unknown quality, the safety factor of 3 is applied to the calculated B[a]P TPE. Furthermore, soil samples collected at all three borehole locations exceeded the CCME SQG for human health effects of the carcinogenic PAH parameters for protection of potable water sources (SQG<sub>PW</sub>). Index of additive cancer risk (IACR) was

calculated for the analyzed soil samples, which all exceeded the soil quality guideline of 1.0 (unit-less). The calculated IACR were ranged from 28.76 (BHMW1 SS1) to 297.95 (BHMW3 SS3), which is two order of magnitude higher than the accepted value. A summary of the exceeding parameters/concentrations is included in Table 5-2 below. Detailed laboratory analytical results for carcinogenic PAHs parameters which pose a risk to human health is included in Table D4, Appendix D. Laboratory certificate of analysis are included in Appendix F.

Based on the laboratory analytical results, soil samples collected at all three borehole locations exceeded the CCME SQGs for protection of environmental health by up to two order of magnitude for one or more PAH parameters including acenaphthene, benzo[a]anthracene, benzo[b]fluoranthene, fluorine, Indeno[1 2 3-cd]pyrene, naphthalene and phenanthrene. The highest exceeding concentration for PAHs for environmental health relative to the guidelines were identified for phenanthrene for the duplicate of BHMW2-SS3B (Dup-1) for 188.91X and at BHMW3 SS3 for 155.22X the applicable CCME SQG of 0.046 µg/g. The utilized CCME SQG of 0.046 µg/g is the lowest exposure/pathway component value for phenanthrene and is derived for the protection of freshwater life (SQGFL). The concentrations measured for other exceeding PAH parameters ranged from 1.22X (Indeno[1 2 3-cd]pyrene at BHMW3 SS3) to 114.35X (phenanthrene at BHMW2 SS3B) the applicable SQGs. A summary of the exceeding parameters/concentrations is included in Table 5-2 below. Detailed laboratory analytical results for PAH parameters which pose a risk to environmental health is included in Table D5, Appendix D. Laboratory certificate of analysis are included in Appendix F.

**Table 5-2 Soil Samples Exceeding CCME Guidelines and/or Standards for Commercial Land Use**

Parameters Group	Parameter	Sample ID	Sample Depth (m bgs)	Concentration (µg/g)	CCME Guidelines/Standard (µg/g)	Exceeding Ratio (concentration/guideline)
Metals	Copper	BHMW2-SS3B	1.52-1.83	116	91	1.27X
		BHMW3-SS3	1.52-1.83	316		3.47X
	Lead	BHMW2-SS3B	1.52-1.83	264	260	1.30X
		Dup-1 (duplicate of BHMW2-SS3B)	1.52-1.83	286		1.1X
		BHMW3-SS3	1.22-1.47	300		1.15X
	Zinc	BHMW3-SS3	1.22-1.47	390	360	1.08X
PAH (protection of	ILCR	BHMW1-SS1	0.15-0.61	7.18	0.6 (Ontario)	11.97X
		BHMW2-SS1	0.15-0.61	13.57		22.62X

Parameters Group	Parameter	Sample ID	Sample Depth (m bgs)	Concentration (µg/g)	CCME Guidelines/Standard (µg/g)	Exceeding Ratio (concentration/guideline)
human health for carcinogenic effects)		BHMW2-SS3B	1.52-1.83	17.07	target based on ILCR: $10^{-6}$ ) 5.3 (Other jurisdictions based on ILCR: $10^{-5}$ )	28.45X
		Dup-1 (duplicate of BHMW2-SS3B)	1.52-1.83	24.66		41.10X
		BHMW3-SS1	0.15-0.61	13.74		22.90X
		BHMW3-SS3	1.22-1.47	74.30		123.83X
	IACR (protection of potable water)	BHMW1-SS1	0.15-0.61	28.76	1.0	28.76X
		BHMW2-SS1	0.15-0.61	54.12		54.12X
		BHMW2-SS3B	1.52-1.83	69.41		69.41X
		Dup-1 (duplicate of BHMW2-SS3B)	1.52-1.83	103.20		103.20X
		BHMW3-SS1	0.15-0.61	56.32		56.32X
		BHMW3-SS3	1.22-1.47	297.95		297.95X
PAH (protection of environmental health)	Acenaphthene	BHMW2-SS3B	1.52-1.83	0.306	0.28*	10.93X
		Dup-1 (duplicate of BHMW2-SS3B)	1.52-1.83	0.413		14.75X
		BHMW3-SS1	0.15-0.61	0.461		16.46X
	Benz[a]anthracene	BHMW3-SS3	1.22-1.47	13.2	10*	1.32X
	Benzo[b]fluoranthene	BHMW3-SS3	1.22-1.47	22.1	10*	2.21X
	Fluorene	BHMW2-SS3B	1.52-1.83	0.541	0.25*	2.16X
		Dup-1 (duplicate of BHMW2-SS3B)	1.52-1.83	0.879		3.52X
		BHMW3-SS1	0.15-0.61	0.500		2.00X
	Indeno[1 2 3-	BHMW3-SS3	1.22-1.47	12.2	10**	1.22X

Parameters Group	Parameter	Sample ID	Sample Depth (m bgs)	Concentration (µg/g)	CCME Guidelines/Standard (µg/g)	Exceeding Ratio (concentration/guideline)
	cd]pyrene					
	Naphthalene	BHMW1-SS1	0.15-0.61	0.044	0.013*	3.38X
		BHMW2-SS1	0.15-0.61	0.05		<3.85X
		BHMW2-SS3B	1.52-1.83	0.092		7.08X
		Dup-1 (duplicate of BHMW2-SS3B)	1.52-1.83	0.381		29.31X
		BHMW3-SS1	0.15-0.61	<0.07		<5.38X
		BHMW3-SS3	1.22-1.47	<0.1		<7.69X
	Phenanthrene	BHMW1-SS1	0.15-0.61	1.90	0.046*	41.30X
		BHMW2-SS1	0.15-0.61	2.98		64.78X
		BHMW2-SS3B	1.52-1.83	5.26		114.35X
		Dup-1 (duplicate of BHMW2-SS3B)	1.52-1.83	8.69		188.91X
		BHMW3-SS1	0.15-0.61	5.02		109.13X
		BHMW3-SS3	1.22-1.47	7.14		155.22X

**Notes:**

“\*” – The lowest value for all exposure/pathways which is for protection of freshwater life (SQG<sub>FL</sub>)

“\*\*” – Interim Soil Quality Criteria (CCME, 1991)

**Provincial Standards**

Although the Site is owned by federal government and thus federal guidelines/standards are considered applicable, the laboratory results are also compared to the Ontario provincial standards for information only.

Based on the laboratory analytical results, soil samples collected at all three borehole locations met the SCSs for PHC and VOC parameters (including BTEX) as outlined in the MOE Table 7, industrial/commercial/community land use, coarse textures soil. MOE Table 7 provides SCSs for shallow soil properties of non-potable groundwater use. Elevated concentrations of PHC F2-F4 below the MOE Table 7 SCSs were detected at all sampling locations. The VOCs concentrations were all below the

laboratory detection limits. Other tested parameters including metals, SVOCs/PAHs were exceeded for one or more parameters at one or more borehole locations. Detailed laboratory analytical results for VOCs and PHCs are included in Table D2 and Table D3, respectively, in Appendix D. Laboratory certificate of analysis are included in Appendix F.

Based on the laboratory analytical results, soil samples collected at all three borehole locations exceeded the MOE Table 7 SCSs by less than 2.50X for one or more metal parameters including copper, lead and zinc. The highest exceeding concentration for metals relative to the applicable SCSs was identified for lead at BHMW3-SS3 for 2.5X the applicable SCS. Detailed laboratory analytical results for metal parameters is included in Table D1, Appendix D. Laboratory certificate of analysis are included in Appendix F.

Based on the laboratory analytical results, soil samples collected at all three borehole locations exceeded the MOE Table 7 SCSs for most of the PAH parameters and for a few non-PAH SVOCs. The highest exceeding concentration for PAHs relative to the applicable SCSs was identified for benzo[a]pyrene at BHMW3-SS3 for 54.67X the applicable SCS. Detailed laboratory analytical results for SVOC/PAH parameters (compared to the provincial SCSs) is included in Table D6 Appendix D. Laboratory certificate of analysis are included in Appendix F.

#### **5.1.4 Analytical Results – Soil Leachate**

Based on the laboratory analytical results, the composite soil sample submitted for TCLP analysis met the standards outlined by Schedule 4 of the “Ontario Regulation 347 – Waste Management”. Thus, the impacted soil on-site is considered “non-hazardous solid waste” for disposal purposes. Laboratory certificate of analysis are included in Appendix F.

#### **5.1.5 Analytical Results – Groundwater**

##### **Federal Guidelines**

Based on the laboratory analytical results, groundwater samples collected at all five monitoring well locations met the federal IGQGs for the PHC F1-F2/VOC parameters tested excluding chloroform. Federal IGQGs do not provide numerical values for PHC F3-F4. The PHC and VOC parameters concentrations were all below the laboratory detection limits, excluding chloroform which was detected at BHMW1, BHMW2 and BHMW3. Chloroform was measured at 2.2 µg/L and 2.8 µg/L at BHMW2 and BHMW3, respectively, which are above the IGQG value of 1.8 µg/L. Detailed laboratory analytical results for PHCs and VOCs are included in Tables D11 and D9, respectively, in Appendix D. Laboratory certificate of analysis are included in Appendix F.

Based on the laboratory analytical results, groundwater samples collected at all five monitoring well locations exceeded the IGQGs by up to 70.59X for one or more metal parameters including barium, cadmium, copper, lead, molybdenum, selenium, silver and zinc. The highest exceeding concentration for

metals relative to the guidelines was identified for cadmium at BHMW2 for 70.59X the applicable IGQG. As a note, the laboratory detection limit for mercury was 0.02 µg/L, which is above the IGQG value of 0.016 µg/L and likely due to decimal digits. A summary of the exceeding parameters/concentrations is included in Table 5-3 below. Detailed laboratory analytical results for metal parameters is included in Table D8, Appendix D. Laboratory certificate of analysis are included in Appendix F.

Based on the laboratory analytical results, groundwater samples collected at all five monitoring well locations exceeded the federal IGQGs by up to 256.67X for most of PAH parameters and for one non-PAH SVOC parameter (Bis(2-ethylhexyl) Phthalate). The highest exceeding concentration for PAHs to the guidelines was identified for benzo[a]anthracene, benzo[a]pyrene, pyrene and fluoranthene at BHMW2 for approximately 180X-256X the applicable IGQG. As a note, the laboratory detection limit for a few PAH/SVOC parameters including anthracene, benzo[a]anthracene, dichlorophenol, 2,4- and pyrene were reported above the IGQGs. A summary of the exceeding parameters/concentrations is included in Table 5-3 below. Detailed laboratory analytical results for PAH/SVOC parameters is included in Table D10, Appendix D. Laboratory certificate of analysis are included in Appendix F.

**Table 5-3 Groundwater Samples Exceeding IGQGs for Commercial Land Use**

Parameters Group	Parameter	Sample ID	Concentration (µg/g)	IGQG (µg/L)	Exceeding Ratio (concentration/guideline)
VOCs	Chloroform	BHMW2	2.2	1.8	1.22X
		BHMW3	2.8		1.56X
Metals	Barium	BHMW1	526	500	1.05X
		BHMW2	959		1.92X
	Cadmium	BHMW1	0.180	0.017	10.59X
		BHMW2	1.20		70.59X
		BHMW3	0.809		47.59X
	Copper	B-91	2.3	2	1.15X
		BHMW1	17		8.50X
		BHMW2	16.9		8.45X
		BHMW3	19.9		9.95X
	Lead	BHMW2	1.02	1	1.02X
		BHMW3	1.84		1.84X
	Molybdenum	BHMW2	80.7	73	1.11X



Parameters Group	Parameter	Sample ID	Concentration (µg/g)	IGQG (µg/L)	Exceeding Ratio (concentration/guideline)
		BHMW3	391		5.36X
	Selenium	B-91	2	1	2.00X
		B-95	3		3.00X
		Dup-1 (duplicate of B-95)	2		2.00X
		BHMW1	8		8.00X
		BHMW2	4		4.00X
		BHMW3	10		10.00X
	Silver	BHMW2	0.17	0.1	1.70X
		BHMW3	0.14		1.40X
	Zinc	BHMW2	126	10	12.60X
SVOCs/ PAHs	Anthracene	BHMW2	1.11	0.012	91.67X
		BHMW3	0.15		12.5X
	Benz[a]anthracene	BHMW1	0.08	0.018	4.44X
		BHMW2	3.68		204.44X
		BHMW3	0.98		54.44X
	Benzo[a]pyrene	BHMW1	0.04	0.015	2.67X
		BHMW2	3.85		256.67X
		BHMW3	1.19		79.33X
	Benzo[b]fluoranthene	BHMW2	5.47	0.48	11.40X
		BHMW3	1.29		2.69X
	Benzo[ghi]perylene	BHMW2	2.62	0.17	15.41X
		BHMW3	0.78		4.59X
	Benzo[k]fluoranthene	BHMW2	1.89	0.48	3.94X
		BHMW3	0.52		1.08X
	Bis(2-ethylhexyl) Phthalate	B91	44	16	2.75X

Parameters Group	Parameter	Sample ID	Concentration (µg/g)	IGQG (µg/L)	Exceeding Ratio (concentration/guideline)
	Chrysene	BHMW2	3.86	1.4	2.75X
	Dibenzo[a h] anthracene	BHMW2	0.57	0.26	2.19X
	Fluoranthene	B-91	0.05	0.04	1.25X
		B-95	0.05		1.25X
		Dup-1 (duplicate of B-95)	0.05		1.25X
		BHMW1	0.19		4.75X
		BHMW2	7.21		180.25X
		BHMW3	1.55		38.75X
	Indeno[1 2 3-cd]pyrene	BHMW2	2.86	0.21	13.62X
		BHMW3	0.88		4.19X
	Phenanthrene	BHMW2	4.15	0.40	10.38X
		BHMW3	0.43		1.08X
	Pyrene	B-91	0.05	0.025	2.00X
		B-95	<0.05		1.00X
		Dup-1 (duplicate of B-95)	<0.05		1.00X
		BHMW1	0.15		6.00X
		BHMW2	6.34		253.60X
		BHMW3	1.48		59.20X

### **Provincial Standards**

Although the Site is owned by federal government and thus federal guidelines are considered applicable, the laboratory results are also compared to the Ontario provincial standards for information only.

Based on the laboratory analytical results, groundwater samples collected at all five monitoring well locations met the MOE Table 7 SCSs for metal, PHC and VOC parameters excluding chloroform. The PHC and VOC parameters concentrations were all below the laboratory detection limits, excluding

chloroform which was detected at BHMW1, BHMW2 and BHMW3. Chloroform was measured at 2.2 µg/L and 2.8 µg/L at BHMW2 and BHMW3, respectively, which are above the MOE Table 7 SCS of 2 µg/L. Detailed laboratory analytical results for metals, PHCs and VOCs are included in Tables D8, D11 and D10 respectively, in Appendix D. Laboratory certificate of analysis are included in Appendix F.

Based on the laboratory analytical results, groundwater samples collected at three out of five monitoring well locations met the MOE Table 7 SCSs for all SVOC parameters including PAHs. Bis(2-ethylhexyl) Phthalate was detected at monitoring well location B-91 at the concentration of 44 µg/L which is above the SCS of 30 µg/L for this parameter. The highest exceeding concentration for PAHs compared to the MOE Table 7 SCSs was identified for benzo[ghi]perylene and Indeno[1 2 3-cd]pyrene at BHMW2 for approximately 13X-14X the applicable SCSs. Detailed laboratory analytical results for SVOC/PAH parameters is included in Table D10, Appendix D. Laboratory certificate of analysis are included in Appendix F.

#### **5.1.6 Quality Assurance/Quality Control (QA/QC)**

The laboratory QA/QC program included reference standard and spike QC results, as well as duplicate QA results. The laboratory certificates of analyses indicate that all extraction, analysis and QC requirements and limits for holding time were met, and do not indicate any quality control issues that would materially affect the conclusions of this report.

WSP's QC program for the soil and groundwater samples included the collection and submission of one soil and one groundwater field duplicate samples. Relative percent difference (RPD) indicates the variation between the original and field duplicate sample results and is defined by the following equation:

$$\text{Relative Percent Difference (RPD)} = \frac{(\text{Sample Result} - \text{Duplicate Result})}{\frac{(\text{Sample Result} + \text{Duplicate Result})}{2}} \times 100$$

RPD can be calculated for a parameter when both sample concentrations (the original sample and the duplicate) are greater than ten times the laboratory reportable detection limit. The following values are used as the alert criteria:

- Inorganics: 100% for soil and 50% for groundwater; and
- Organics: 100% for soil and 80% for groundwater.

With one exception, all other calculable RPDs for the duplicate soil and groundwater samples submitted for analysis were below the alert limits. The RPD calculated for naphthalene in soil was 122% which is above the alert criteria of 100%, which can be due to the field homogeneity of the collected sample. In general, the RPDs calculated for the soil and groundwater analytical results indicate the results are comparable and the laboratory results are comparable.

Laboratory quality control data is included with the analytical reports in Appendix F. No quality control issues were identified by the laboratory that would materially affect the conclusions of this report.

## 5.2 DISCUSSIONS

### 5.2.1 Soil Quality

The laboratory analytical results for the soil samples submitted during the current investigation met the CCME SQGs and/or CCME CWS for VOCs, non-PAH SVOCs and PHCs, although elevated concentrations of PHC F2-F4 below the CCME CWS were detected at all sampling locations. The results for soil samples collected at two out of three borehole locations (BHMW2 and BHMW3) exceeded the CCME SQGs by up to 3.47X for one or more metal parameters including copper, lead, and zinc. The results for soil samples collected at all three borehole locations exceeded the CCME SQGs for carcinogenic PAH parameters for human health direct contact (SQG<sub>DH</sub>). B[a]P TPEs were calculated for all soil samples and all exceeded both the soil quality guideline of 0.6 µg/g based on the ILCR of 1 in 1,000,000 (Ontario target) and 5.3 µg/g based on the ILCR of 1 in 100,000 (target in other jurisdictions). The highest B[a]P TPE was calculated for the soil sample BHMW3-SS3 (74.3 µg/g) exceeding the Ontario target for ILCR by 123X. Furthermore, soil samples collected at all three borehole locations exceeded the CCME SQG for human health effects of the carcinogenic PAH parameters for protection of potable water sources (SQG<sub>PW</sub>). The calculated IACR exceeded the soil quality guideline of 1.0 (unit-less) and ranged from 28.76 (BHMW1 SS1) to 297.95 (BHMW3 SS3), which is almost 300X the accepted value. The laboratory results for soil samples collected at all three borehole locations also exceeded the CCME SQGs for protection of environmental health by up to 188.91X for one or more PAH parameters.

Jaques Whitford (Stantec, 2009) completed a review of the previous investigations and summarized the historical data for soil samples. The concept of “B[a]P TPE” calculation was introduced by CCME in 2008 (revised in 2010). Jaques Whitford calculated the B[a]P TPE for each historical sample analyzed for PAHs and compared the results to the CCME SQG of 5.3 µg/g based on the ILCR target of 10<sup>-5</sup>. IACRs were not calculated. Jaques Whitford (2009) prepared figures (drawings No. 2 through 4) illustrating the extent of impacts to the on-site soil above the federal guidelines/standards for various parameter groups including metals, PHCs (historical TPHs), and PAHs. Twenty out of 26 soil samples, which were historically analyzed for PAHs, produced B[a]P TPEs above the soil quality guideline of 5.3 µg/g corresponding to an ILCR of 10<sup>-5</sup>, as tabulated and calculated by Jaques Whitford (2009). Comparison of the calculated B[a]P TPEs for historical soil samples to the Ontario target of 0.6 µg/g based on the ILCR of 10<sup>-6</sup> adds four additional soil samples (out of 26) exceeding the federal soil quality guidelines and expands the areal extent of the impacted soil above the federal guidelines/standards. Specifically, the lateral extent of the impacted soil expands the one produced by Jaques Whitford (refer to Figure 3) and covers the historical soil sample locations A12-1, A20-3, A23-2, and A32-1 by accepting the Ontario target cancer risk of 10<sup>-6</sup>. In other words, 24 out of 26 soil samples that were historically collected across the Site and analyzed for PAHs resulted in B[a]P TPEs > 0.6 µg/g. The remaining two soil samples (CH-6

and B-83-1B), which did not exceed the soil quality guideline of 0.6 µg/g for B[a]P TPEs, were located between the impacted locations and thus are practically considered impacted. Referring to Figure 3 for the historical sample locations, neither of the soil samples collected from the northeast, northwest and southwest areas of the Site have been analyzed for PAHs. These included the following sampling locations: BH-53, BH-54, B-95, A-21, A-19, BH-48, A-13, B-83, and A-11. In summary, 30 out of 32 historical and recent (December 2013) soil samples, which were collected and analyzed for PAHs, have returned B[a]P TPEs exceeding 0.6 µg/g corresponding the Ontario target cancer risk of  $10^{-6}$ . Twenty six out of 32 historical and recent (December 2013) soil samples, which were collected and analyzed for PAHs, have returned B[a]P TPEs exceeding 5.3 µg/g corresponding the target cancer risk of  $10^{-5}$ . Thus, given the history of the Site uses and the laboratory results, it is reasonable to conservatively consider the soil within the entire exterior areas of the Site impacted above the federal soil quality guidelines/standards. The vertical extent of impacted soil extends from the ground surface to the shallow bedrock surface with an average depth of approximately 1.5 m bgs. It is our understanding that the on-Site building is constructed directly on the bedrock surface.

#### **5.2.2 Groundwater Quality**

Based on the laboratory analytical results, groundwater samples collected at all five monitoring well locations met the federal IGQGs and provincial MOE Table 7 SCSs for the PHC and VOC parameters tested excluding chloroform. Federal IGQGs do not provide numerical values for PHC F3-F4. The PHC and VOC parameters concentrations were all below the laboratory detection limits, excluding chloroform which was detected at concentrations marginally (up to 1.55X) above the IGQG at two out of five monitoring wells. Chloroform is a by-product of municipal water chlorination (disinfection) and is occasionally detected at minor concentrations within shallow groundwater in urban areas due to leaks in water distribution systems. Groundwater samples results for all five monitoring well locations exceeded the IGQGs by up to 70.59X for one or more metal parameters including barium, cadmium, copper, lead, molybdenum, selenium, silver and zinc. Further, groundwater samples collected at all five monitoring well locations exceeded the federal IGQGs by up to 256.67X for most of PAH parameters and for one non-PAH SVOC parameter (Bis(2-ethylhexyl) Phthalate). Bis(2-ethylhexyl) Phthalate (DEHP) was detected at 44 µg/L which exceeded the federal IGQG of 16 µg/L by 2.75X. DEHP is widely used as a plasticizer in manufacturing of articles made of PVC. It has also been used in adhesive and sealants production. Detection of DEHP at monitoring well B-91 can be due to a variety of reasons including the monitoring well construction (PVC screen and riser, potential use of adhesives, etc.).

The federal IGQGs were introduced in May 2010. Prior to 2010, provincial standards for groundwater or the federal guidelines for freshwater aquatic life were being used for comparison purposes. Historically, the laboratory results were reported to meet the provincial standards of the time. Introduction of the federal IGQGs (2010) and the revised provincial standards (MOE, 2011), which are both more stringent than the historically used standards, resulted in identification of impacts to groundwater in excess of the

current federal guidelines and provincial standards at all five monitoring well locations on-site. Given the distribution of the monitoring wells across the Site, the lateral extent of impacted groundwater can be conservatively considered to be through the entire Site.

### **5.2.3 *Extent of Soil Contamination***

Based on the discussion in Section 5.2.1, the lateral extent of impacted soil above the federal soil quality guidelines/standards is conservatively estimated to cover the entire exterior areas of the Site. This equals to a surface area of approximately 6,400 m<sup>2</sup>. Similarly, the vertical extent of the impacted soil above the federal soil quality guidelines/standards is estimated to be through the entire elevation from the ground surface to the shallow bedrock surface. This equals to an average depth of approximately 1.5m based on the investigation results. Thus, the impacted soil above the federal soil quality guidelines/standards is estimated at approximately 9,600 m<sup>3</sup> in volume or 19,200 metric tonnes assuming a density of two tonnes/cubic meter.

### **5.2.4 *Extent of Groundwater Contamination***

Based on the discussion in Section 5.2.2, the lateral extent of impacted groundwater above the federal groundwater quality guidelines (IGQGs) is estimated to cover the entire area of the Site. This equals to a surface area of approximately 11,200 m<sup>2</sup>.

## 6.0 CONTAMINATED SITE SUMMARY

### 6.1 IDENTIFICATION OF CONTAMINATED SITES

The current investigation evaluated and confirmed soil and groundwater quality in excess of the applicable CCME guidelines/standards. One contaminated site referred to as CS-58475-001 has been identified by previous investigations and the Site has been ranked (NCSCS) as a “Class 3 Site – Low Priority for Action”. The current Phase II ESA conservatively considered the entire Site contaminated. The coordinates for the centre of CS-58475-001 is: latitude 45.402893° and longitude: -75.705858°.

Based on all available laboratory results, the COCs that are present within the soil and/or groundwater on-site above the federal guidelines and/or standards include: metals, PHCs, SVOCs/PAHs and VOCs. There has been no evidence of free products identified during the current or previous investigations.

Based on all available laboratory results, the lateral extent of the on-Site contaminated soil extends to the entire exterior surface area of the Site, which is approximately 6,400 m<sup>2</sup>. The vertical extent of the on-Site contaminated soil extends from the ground surface to the surface of shallow bedrock, which is roughly assumed at 1.5m. This equals to a total volume of 9,600 m<sup>3</sup> in volume or 19,200 metric tonnes of contaminated soil exceeding the federal guidelines/standards. The contaminated site CS-58475-001 is presented in Figure 5, Appendix A.

Based on all available laboratory results, the lateral extent of the on-Site contaminated groundwater extends to the entire surface area of the Site, which is approximately 11,200 m<sup>2</sup>.

### 6.2 NATIONAL CLASSIFICATION SYSTEM

The CCME’s “National Classification System for Contaminated Sites” (1992, revised in 2008 and 2010), outlines a method for the evaluation of contaminated sites according to their current or potential adverse impact on human health and the environment.

A NCSCS spreadsheet was completed for the CS-58475-001, which resulted in a score of 67.9, representing a Class 2 which is described as “Medium Priority for Action”. The complete NCSCS evaluation form is included in Appendix E of this report.

**Table 6-1 Updated Contaminated Site Information**

Contaminated Site #	Contaminants of Concern	Supporting Information	NCSCS Score/ Class	Latitude, Longitude
CS-58475-001	Metals, PHCs, SVOCs, PAHs, VOCs	Current and previous investigations, refer to Section 1.3	Score: 67.9 Class 2 - Medium Priority for Action (Total NCSCS Score 50 - 69.9)	latitude 45.402893°, longitude -75.705858°

## 7.0 CONCLUSIONS

### 7.1 GENERAL

The field program was carried out in December and January 2013. Here is a summary of the activities completed:

- Completion of utility clearance for the specified borehole/monitoring well locations;
- Advancement of 3 exterior environmental boreholes to up to 4.64 m bgs; The boreholes were instrumented with monitoring wells and finished by flush mounts at the ground surface. The PVC screens and risers that were used were 50mm in diameter;
- Collection and screening of soil samples and selection of representative soil samples for laboratory analysis of the COCs including PHC F1-F4, BTEX, VOCs, PAHs/SVOCs, and metals. A total of six soil samples including two samples per borehole location (one sample for BHMW1 due to shallow depth) and one field duplicate soil sample were submitted to Caduceon. Additionally, one soil sample was submitted for pH analysis. One composite soil sample was submitted for TCLP analysis for disposal of the drilling cutting excess soil. The excess soil was picked up and disposed of by Veolia Environmental Inc. of Ottawa.
- Collection of groundwater samples from the two existing (B-91 and B-95) and the three proposed monitoring wells (BHMW1 to BHMW3). Groundwater samples were submitted for laboratory analysis of the COCs including PHC F1-F4, BTEX, VOCs, PAHs/SVOCs, and metals. A total of six groundwater samples including one sample per monitoring well and one field duplicate sample were submitted to Caduceon.
- The laboratory results were compared to the CCME SQG and/or CWS for soil and federal IGQGs for groundwater, as applicable. The laboratory results were also compared to the Ontario provincial MOE Table 7 SCSs. Guidelines/standards for commercial land use and coarse textured soil were used.
- An updated NCSCS score was prepared for the contaminated site;  
The Phase II ESA was completed to meet the requirements of the "CAN/CSA-Z769-00 (R2013) - Phase II Environmental Site Assessment".

### 7.2 SOIL

Based on the results of the Phase II ESA investigation and the analytical results, as documented in previous sections of this report, this assessment has identified soil contamination in excess of the federal guidelines/standards for commercial land uses and coarse textured soil. The following presents a summary of the findings.

- The overburden material on-site is shallow and consists of pavement or top soil followed by fill material of coarse texture in nature (sand and/or gravel with various amount of silt) to the limestone bedrock which was noted at depths ranging from 1.04m bgs (BHMW1) to 1.72m bgs



(BHMW2) and was observed to the end of the boreholes;

- There was no visual or olfactory evidence of contamination observed other than evidence of fill material (brick veneer fragments, glass, etc.). No sheens, film or free-phase liquid petroleum hydrocarbons were noted during the drilling and the subsequent groundwater sampling activities.
- The laboratory analytical results for the soil samples submitted during the current investigation met the applicable CCME SQGs and/or CCME CWS for VOCs, non-PAH SVOCs and PHCs, although elevated concentrations of PHC F2-F4 below the CCME CWS were detected at all sampling locations.
- The results for soil samples collected at two out of three borehole locations (BHMW2 and BHMW3) exceeded the CCME SQGs by up to 3.47X for one or more metal parameters including copper, lead, and zinc.
- The results for soil samples collected at all three borehole locations exceeded the CCME SQGs for carcinogenic PAH parameters for human health direct contact (SQG<sub>DH</sub>). B[a]P TPEs were calculated for all soil samples and all exceeded both the soil quality guideline of 0.6 µg/g based on the ILCR of 1 in 1,000,000 (Ontario target) and 5.3 µg/g based on the ILCR of 1 in 100,000 (target in other jurisdictions). The highest B[a]P TPE was calculated for the soil sample BHMW3-SS3 (74.3 µg/g) exceeding the Ontario target for ILCR by 123X. Furthermore, soil samples collected at all three borehole locations exceeded the CCME SQG for human health effects of the carcinogenic PAH parameters for protection of potable water sources (SQG<sub>PW</sub>). The calculated IACR exceeded the soil quality guideline of 1.0 (unit-less) and ranged from 28.76 (BHMW1 SS1) to 297.95 (BHMW3 SS3), which is almost 300X the accepted value. The laboratory results for soil samples collected at all three borehole locations also exceeded the CCME SQGs for protection of environmental health by up to 188.91X for one or more PAH parameters.
- Comparison of the calculated B[a]P TPEs for historical soil samples to the Ontario target of 0.6 µg/g based on the ILCR of 10<sup>-6</sup> indicates that 30 out of 32 historical and recent (December 2013) soil samples, which were collected and analyzed for PAHs, have returned B[a]P TPEs exceeding 0.6 µg/g corresponding the Ontario target cancer risk of 10<sup>-6</sup>. Twenty six out of 32 historical and recent (December 2013) soil samples, which were collected and analyzed for PAHs, have returned B[a]P TPEs exceeding 5.3 µg/g corresponding the target cancer risk of 10<sup>-5</sup>. Referring to Figure 5 for the historical sample locations, neither of the soil samples collected from the northeast, northwest or southwest areas of the Site (BH-44, BH-54, B-95, A-21, A-19, BH-48, and A-11) have been analyzed for PAHs. Thus, given the history of the Site uses and the laboratory results, it is reasonable to conservatively consider the soil within the entire exterior areas of the Site impacted above the federal soil quality guidelines/standards. The vertical extent of impacted soil extends from the ground surface to the shallow bedrock surface with an average depth of roughly 1.5 m bgs. It is our understanding that the on-Site building is constructed directly on the bedrock surface.
- The on-site impacted soil with concentrations of COCs above the federal soil quality

guidelines/standards is estimated at approximately 9,600 m<sup>3</sup> in volume or 19,200 metric tonnes assuming a density of two tonnes/cubic metres.

### 7.3 GROUNDWATER

Based on the results of the Phase II ESA investigation and the analytical results, as documented in previous sections of this report, this assessment has confirmed the groundwater quality does not meet the federal IGQGs for commercial land uses and coarse textured soil:

- Groundwater samples collected at all five monitoring well locations met the federal IGQGs and provincial MOE Table 7 SCSs for the PHC and VOC parameters tested excluding chloroform. Federal IGQGs do not provide numerical values for PHC F3-F4. The PHC and VOC parameters concentrations were all below the laboratory detection limits, excluding chloroform which was detected at concentrations marginally (up to 1.55X) above the IGQG at two out of five monitoring wells. Chloroform is a by-product of municipal water chlorination (disinfection) and is occasionally detected at minor concentrations within shallow groundwater in urban areas due to leaks in water distribution systems.
- Groundwater samples results for all five monitoring well locations exceeded the IGQGs by up to 70.59X for one or more metal parameters including barium, cadmium, copper, lead, molybdenum, selenium, silver and zinc.
- Groundwater samples collected at all five monitoring well locations exceeded the federal IGQGs by up to 256.67X for most of PAH parameters and for one non-PAH SVOC parameter (Bis(2-ethylhexyl) Phthalate). Bis(2-ethylhexyl) Phthalate (DEHP) was detected at 44 µg/L which exceeded the federal IGQG of 16 µg/L by 2.75X. DEHP is widely used as a plasticizer in manufacturing of articles made of PVC. It has also been used in adhesive and sealants production. Detection of DEHP at monitoring well B-91 can be due to a variety of reasons including the monitoring well construction (PVC screen and riser, potential use of adhesives, etc.).
- No sheens, film or free-phase liquid petroleum hydrocarbons were noted during the drilling and the subsequent groundwater sampling activities.
- The federal IGQGs were introduced in May 2010. Prior to 2010, provincial standards for groundwater or the federal guidelines for freshwater aquatic life were being used for comparison purposes. Historically, the laboratory results were reported to meet the provincial standards of the time. Introduction of the federal IGQGs (2010) and the revised provincial standards (MOE, 2011), which are both more stringent than the historically used standards, resulted in identification of impacts to groundwater in excess of the current federal guidelines and provincial standards at all five monitoring well locations on-site.
- Considering the distribution of the monitoring wells across the Site, and the presence of groundwater within fractured bedrock that facilitates the contaminants transport, the lateral extent

of impacted groundwater can be conservatively estimated to be across the entire Site, which is approximately 11,200 m<sup>2</sup>.

- Although contaminants were identified at all groundwater monitoring well locations, the highest number of contaminants and their level of contamination were detected at monitoring wells BHMW2 and BHMW3, which are located within the central portion of the Site (courtyard) and somehow the most down-gradient monitoring wells. This can be indicative of the main sources of impacts being on-Site, while impacts from off-Site up-gradient sources are possible to a lesser degree.
- The contaminated groundwater on-Site is flowing through fractured bedrock rather than through unconsolidated material (soil), which facilitates the contaminants transport. For this reason, off-site migration of impacts is likely.

#### **7.4 CONTAMINATED SITES**

Based on all available laboratory results the COCs that are present within the soil and/or groundwater on-site above the federal guidelines and/or standards include: metals, PHCs, SVOCs/PAHs and VOCs. There has been no evidence of free products identified during the current or previous investigations.

Based on all available laboratory results, the lateral extent of the on-Site contaminated soil extends to the entire exterior surface area of the Site, which is approximately 6,400 m<sup>2</sup>. The vertical extent of the on-Site contaminated soil extends from the ground surface to the surface of shallow bedrock, which is roughly assumed at 1.5m. This equals to a total volume of 9,600 m<sup>3</sup> in volume or 19,200 metric tonnes of contaminated soil exceeding the federal guidelines/standards.

Using an average cost of \$100-\$125/metric tonnes, the cost associated with the excavation and off-site disposal of impacted soil is estimated at approximately \$1,920,000-\$2,400,000, taxes excluded. The results of a TCLP test completed for a composite sample indicates that the impacted soil is considered non-hazardous solid waste for disposal purposes.

Based on all available laboratory results, the lateral extent of the on-Site contaminated groundwater extends to the entire surface area of the Site, which is approximately 11,200 m<sup>2</sup>.

#### **7.5 UPDATED NCSCS CLASSIFICATION**

A NCSCS spreadsheet was completed for the contaminated site CS-58475-001, which resulted in an updated score of 67.9, representing a Class 2 contaminated site with "Medium Priority for Action".

## 8.0 RECOMMENDATIONS

Based on the results of the Phase II ESA as well as the previous investigations completed for the Site, the following recommendations are made:

- Completion of a human health Preliminary Quantitative Risk Assessment (PQRA) and a Screening Level Ecological Risk Assessment (SLERA) are recommended. The liability cost for the completion of a PQRA and SLERA is approximately \$50,000, taxes excluded.
- Until such time that the aforementioned PQRA and SLERA are conducted, completion of an annual groundwater sampling event is recommended. Contaminants of concern include metals, PHCs, VOCs, and SVOCs/PAHs. It is also recommended to use low flow groundwater sampling technique to reduce any agitation or silt suspension.

## 9.0 SIGNATURES

Thank you for the opportunity to be of service.

We trust this provides you with the information requested. Should you have any questions or comments, please do not hesitate to contact the undersigned.

**WSP Canada Inc.,**

Kathryn Maton, C.E.T.  
Environmental Technologist

Vahid Arasteh, M.Eng., P.Eng., PMP  
Project Manager, Environmental Engineer

## 10.0 REFERENCES

Aqua Terre Solutions Inc. Spring 2003 Groundwater Sampling Program, NRCan Booth Street Complex, Ottawa, Ontario, June 2003.

Aqua Terre Solutions Inc. Winter 2006 Groundwater Sampling Program, NRCan Booth Street Complex, Ottawa, Ontario., March, 2006.

CCME, Canadian Environmental Quality Guidelines (CEQGs), Polycyclic Aromatic Hydrocarbons (PAHs), 2008, revised 2010: Canadian Soil Quality Guidelines (SQGs).

CCME, Canadian Environmental Quality Guidelines, Soil Quality Guidelines for the Protection of Environmental and Human Health. Accessed on-line, January 13, 2014.

CCME, Canadian Environmental Quality Guidelines (CEQG) Summary Table , Water Quality Guidelines for the Protection of Aquatic Life (2007, revised in 2012) for Freshwater, Long Term Concentration

CCME, Canada-Wide Standards for Petroleum Hydrocarbons (PHC) in Soil, 2001, Table 1 (revised 2008)

CCME, Guidance Document on the Management of Contaminated Sites in Canada, 1997, PN 1279.

CCME Guidance Manual on Sampling, Analysis, and Data Management for Contaminated Sites - Volume I/II, 1993, PN 1101 and 1103.

CCME, Subsurface Assessment Handbook for Contaminated Sites, 1994, PN 1144.

Canadian Standards Association. Phase II Environmental Site Assessment, CSA Z769-00 (R2013).

CSMWG (Contaminated Sites Management Working Group), 1999, A Federal Approach to Contaminated Sites Contaminated Sites Management Working Group.

Duke Engineering & Services. Environmental Site Assessment and Contaminated Sites Remedial Plan, Booth Street Complex, Ottawa, Ontario, March 23, 2001.

Environmental Protection Act, R.R.O 1990, Regulation 153/04, Record of Site Condition.

Environmental Protection Act, R.R.O 1990, Regulation 347, Waste Management.

Federal Interim Groundwater Quality Guidelines (IGQGs) for Federal Contaminated Sites, May 2010.

Jaques Whitford (Stantec) Limited. File Review, Historical Review and Gap Analysis, Northeast Quadrant, 555 Booth Street, Ottawa, Ontario, February 20, 2009.

Ministry of the Environment. Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act, 2011.

Raven Beck Environmental Ltd. NRCan Booth Street Complex Environmental Site Assessment, March 7, 1995

Treasury Board Secretariat, 2002, Policy on Accounting for Costs and Liabilities Related to Contaminated Sites.

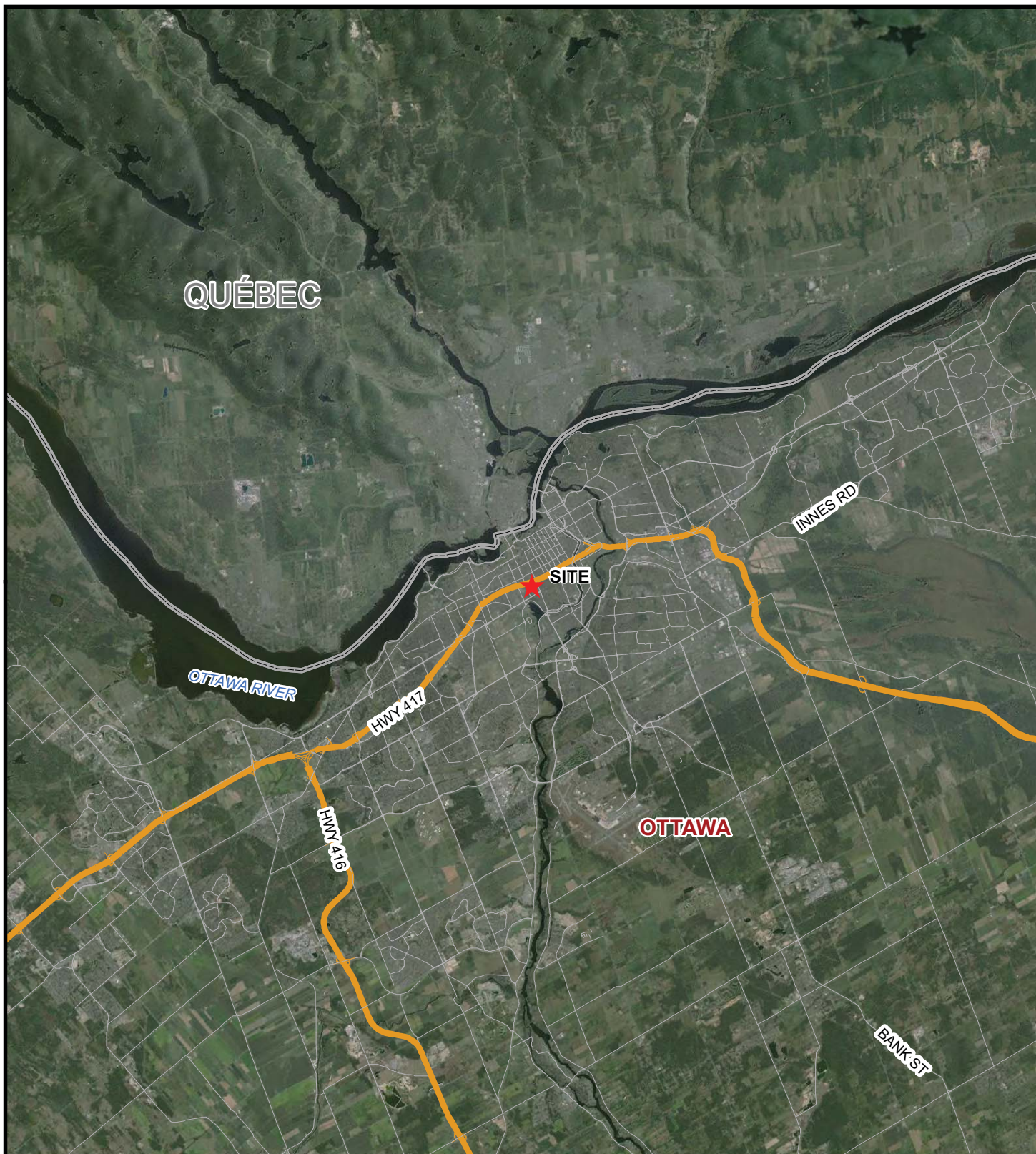
---

## Appendix A

### Site Figures

---





2611 QUEENSVIEW DRIVE, SUITE 300  
 OTTAWA ONTARIO  
 CANADA K2B 8K2  
 PHONE: 613-829-2800 FAX: 613-829-2899  
 WWW.GENIVAR.COM

PROJECT

LIMITED PHASE II ESA  
 555 BOOTH STREET  
 OTTAWA ONTARIO

TITLE

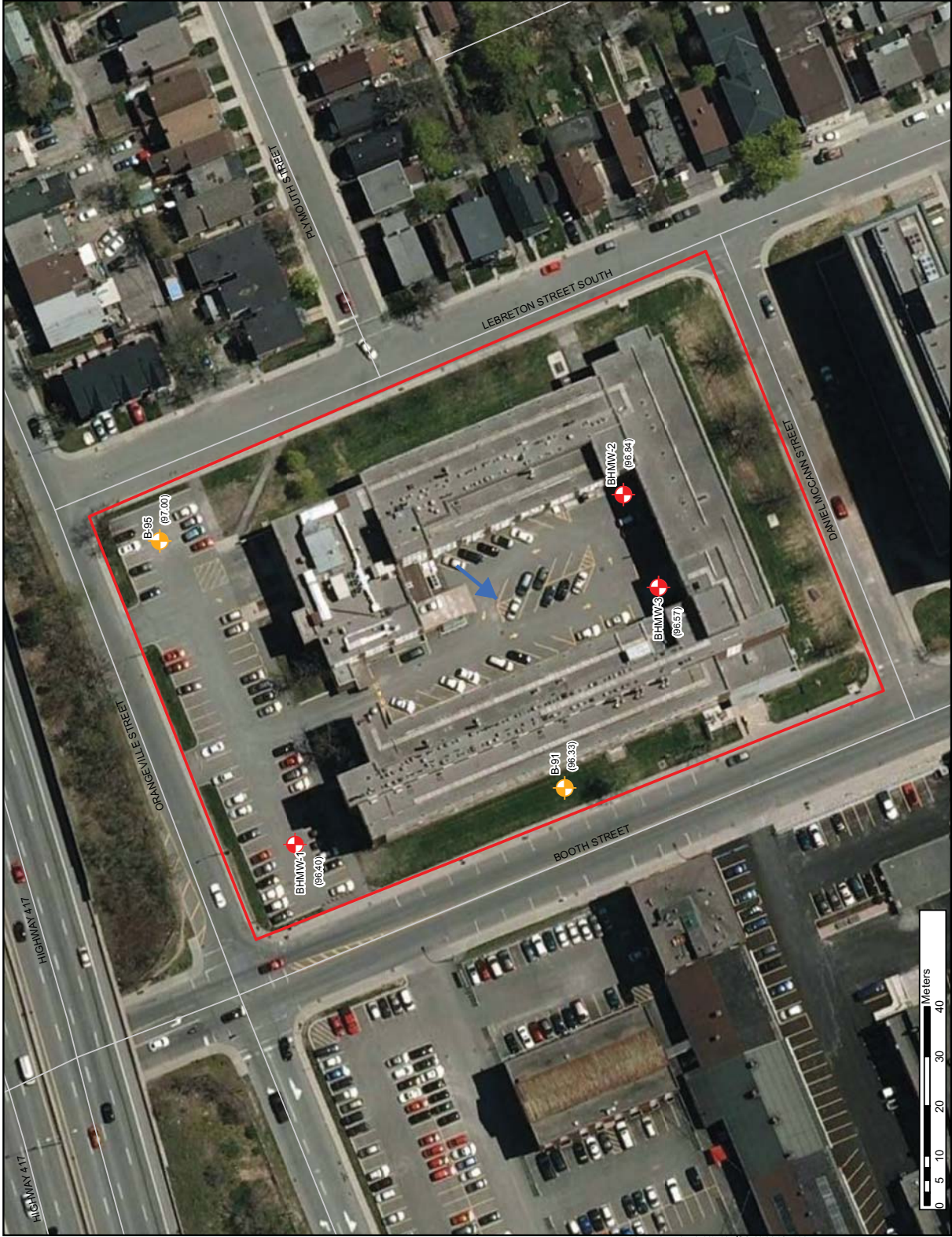
SITE LOCATION PLAN

scale	1:200,000
date	JANUARY 2014
drawn by	GR
job no.	131-20711-00

FIG. 1







#### LEGEND

 SITE BOUNDARY

 BOREHOLE/MONITORING WELL  
(WSP, DECEMBER 2013)

 MONITORING WELL INSTALLED  
BY OTHERS (PRE-2013)

 GROUNDWATER ELEVATIONS  
FROM DECEMBER 27, 2013

 INFERRED GROUNDWATER  
FLOW DIRECTION

Note: Groundwater elevations are relative to an assumed elevation of 100.00 m for the ground surface at the southeast corner of the county road entrance, south of the gate opening.

Figure No.

2

N



Scale

1:750

Drawn By

GR/CD

Job No.

131-20711-06

Date

JANUARY 2014

PROJECT

LIMITED PHASE II ESA  
555 BOOTH STREET,  
OTTAWA, ONTARIO

TITLE

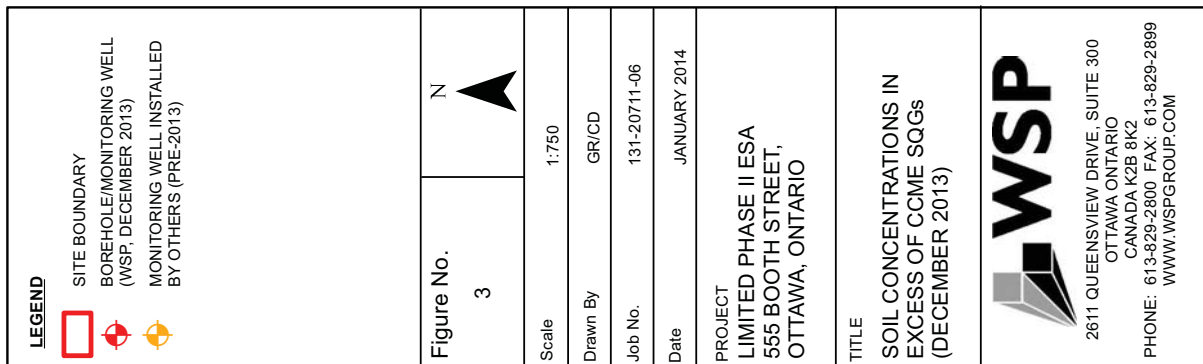
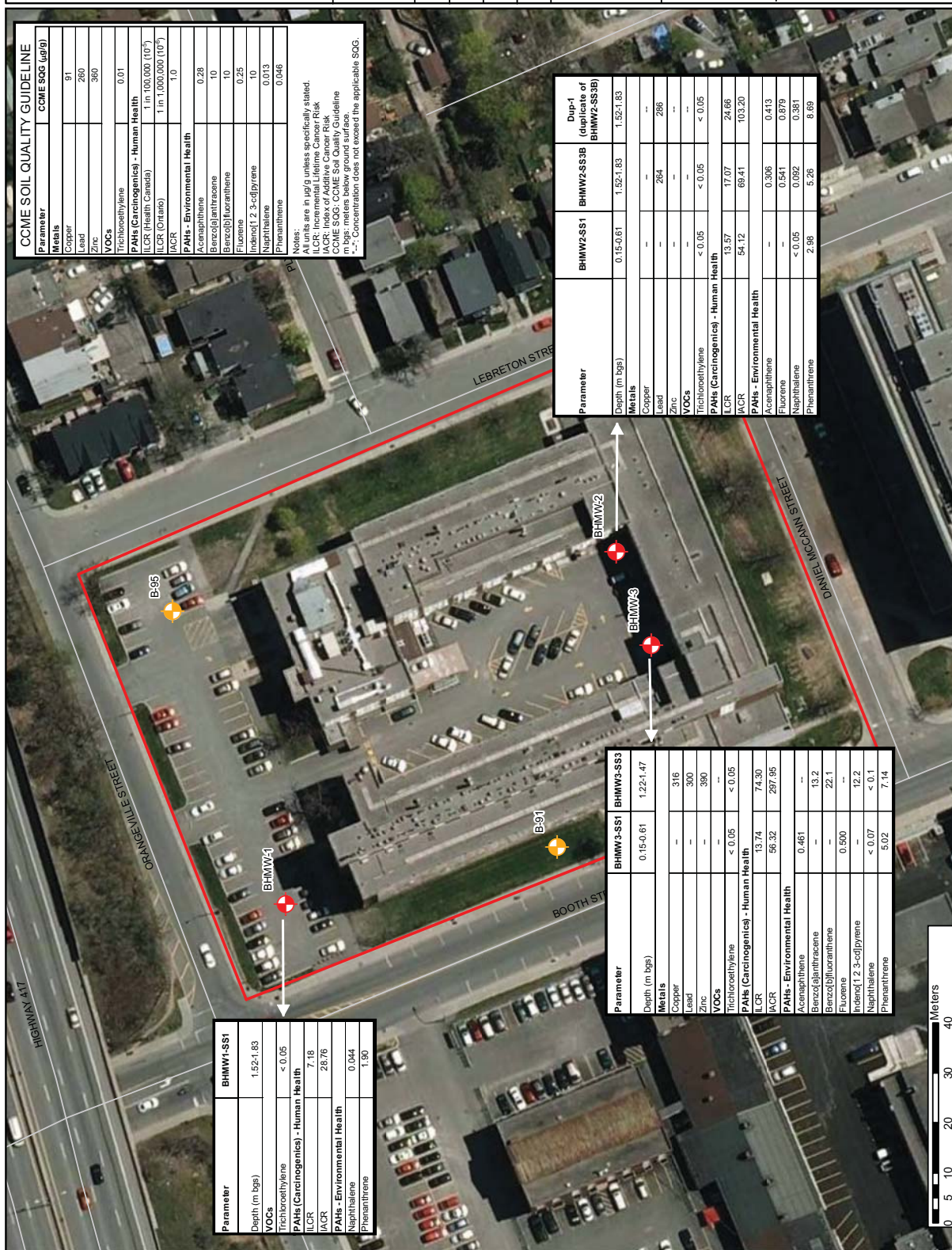
SITE PLAN AND INFERRED  
GROUNDWATER FLOW  
DIRECTION



2611 QUEENSVIEW DRIVE, SUITE 300  
OTTAWA ONTARIO  
CANADA K2B 8K2

PHONE: 613-829-2800 FAX: 613-829-2899  
WWW.WSPGROUP.COM

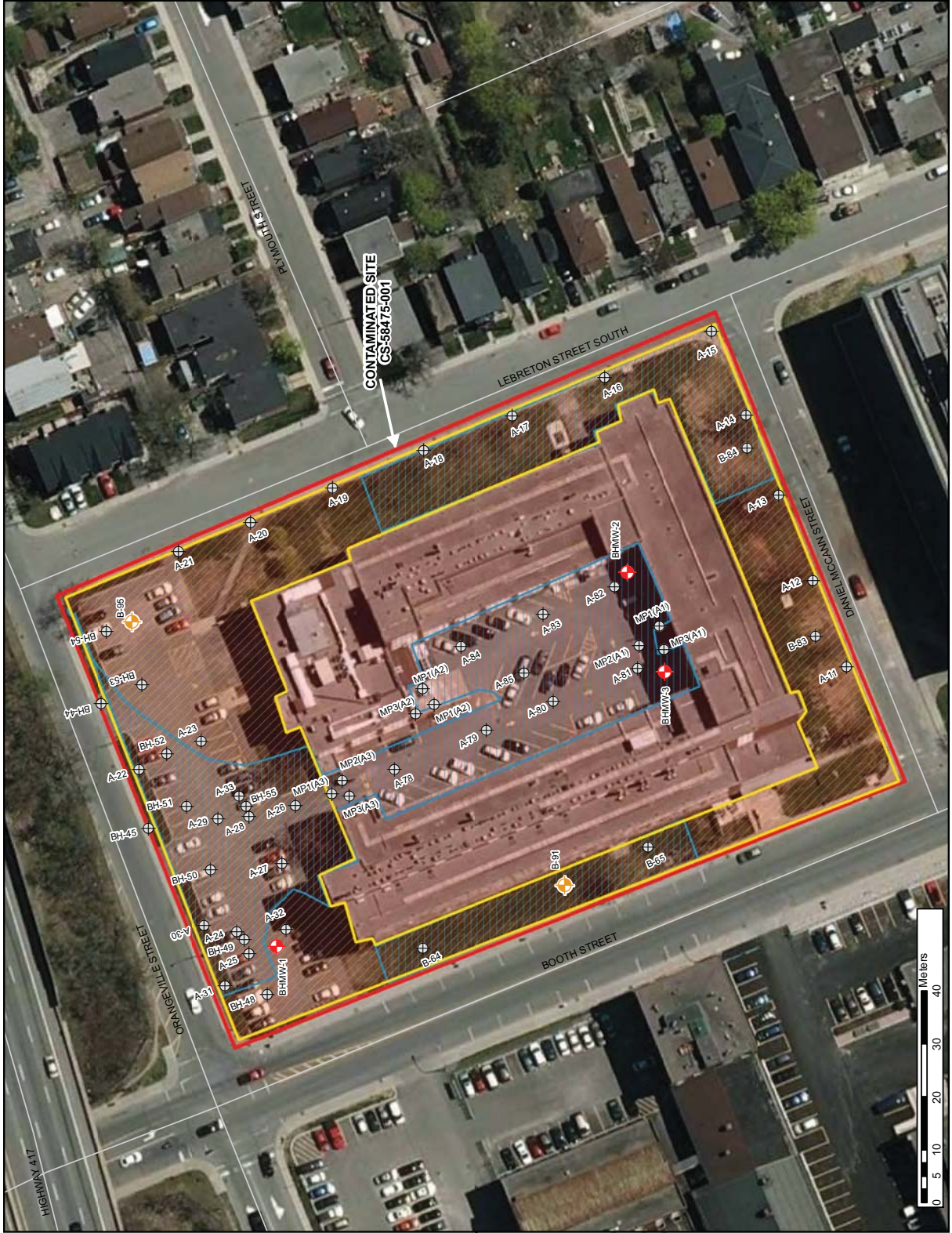












**LEGEND**

- SITE BOUNDARY
- BOREHOLE/MONITORING WELL (WSP, DECEMBER 2013)
- MONITORING WELL INSTALLED BY OTHERS (PRE-2013)
- BOREHOLES INSTALLED BY OTHERS (PRE-2013)
- EXTENT OF IMPACTED SOIL EXCEEDING CCME SGO/CWS AS DEFINED BY WSP
- EXTENT OF IMPACTED GROUNDWATER EXCEEDING FEDERAL IGQG AS DEFINED BY WSP
- EXTENT OF IMPACTED SOIL AS DEFINED BY JACQUES WHITFORD/STANTEC, 2008

Figure No.

5

N



Scale

1:700

Drawn By

GR/CD

Job No.

131-20711-06

Date

JANUARY 2014

PROJECT

LIMITED PHASE II ESA  
555 BOOTH STREET,  
OTTAWA, ONTARIO

TITLE

CONTAMINATED SITE  
CS-58475-001



2611 QUEENSVIEW DRIVE, SUITE 300  
OTTAWA ONTARIO  
CANADA K2B 8K2  
PHONE: 613-829-2800 FAX: 613-829-2899  
WWW.WSPGROUP.COM

---

## Appendix B

### Site Photographs

---

**Limited Phase II Environmental Site Assessment**

**555 Booth Street, Ottawa, Ontario**

**Site Photographs – December 2013**

---



**Photo 1. Location of B-95, facing north from the northeast corner of the building, November 27, 2013.**



**Photo 2. Location of B-91 (orange stake in ground) facing east towards the Site from Booth Street, November 27, 2013.**



Limited Phase II Environmental Site Assessment

555 Booth Street, Ottawa, Ontario

Site Photographs – December 2013

---



Photo 3. Drilling BHMW-1 facing east from the northwest corner of the Site, December 21, 2013.



Photo 4. BHMW-3 facing west towards the southwest corner of the courtyard, December 21, 2013.

Limited Phase II Environmental Site Assessment

555 Booth Street, Ottawa, Ontario

Site Photographs – December 2013

---



Photo 5. Set up for coring into bedrock. BHMW-1 facing east on the north portion of the Site, December 21, 2013.



Photo 6. Representative photograph of sand and gravel observed in boreholes, December 21 2013.

---

## Appendix C

### Borehole/Monitoring Well Logs

---





# BOREHOLE DRILLING RECORD : BHMW-1

Page 1 of 1

Prepared by: **Kathryn Maton**  
Reviewed by: **Vahid Arasteh**

Date (Start): **12/21/2013**  
Date (End): **12/21/2013**

Project Name: **LIMITED PHASE II ENVIRONMENTAL SITE ASSESSMENT**  
Site: **BOOTH STREET COMPLEX**  
Sector: **555 BOOTH STREET, OTTAWA, ONTARIO**  
Client: **NRCAN**

Project Number: **131-20711-06**  
Geographic Coordinates: X = 444712 mE  
Y = 5028001 mN  
Surface Elevation: **98.315 m (Relative)**

Drilling Company: **George Downing Drilling Ltd.**  
Drilling Equipment: **CME 55**  
Drilling Method: **Hollow Stem Auger / Carottier NQ**  
Borehole Diameter: **200 mm**  
Drilling Fluid: **Water**  
Sampling Method: **Split Spoon**

ODOUR  
F - Light  
M - Medium  
P - Persistent  
  
VISUAL  
D - Disseminated Product  
S - Saturated with Product

SAMPLE TYPE  
DC - Diamond Corer  
SS - Split Spoon  
MA - Manual Auger  
TR - Trowel  
ST - Shelby Tube  
TU - DT32 Liner

CHEMICAL ANALYSIS  
PHC F1-F4 **Petroleum Hydrocarbons F1-F4**  
BTEX **Benzene, Toluene, Ethylbenzene, Xylene**  
SVOC **Semi Volatile Organic Compounds**  
PAH **Polycyclic Aromatic Hydrocarbons**

ICP-MS Metals  
pH

An assumed elevation of 100.00 m is used for the southeast corner of the courtyard entrance, south of the gate opening.

DEPTH ELEVATION (m)	GEOLOGY / LITHOLOGY		OBSERVATIONS					SAMPLES					MONITORING WELL			REMARKS	
	LITHOLOGY	DESCRIPTION	VAPOR CONC. (ppm OR % LIE)	ODOUR				VISUAL SAMPLE TYPE	% RECUPERATION	N (Blow/6")	NUMBER	ANALYSIS	DUPLICATE	DIAGRAM	DESCRIPTION		
				F	M	P	D										S
		Ground surface.															
0.05		CRUSHED STONE with sand (fill)															Water level at 1.92 mbgs on December 27, 2013
0.15		ASPHALT	0					SS	50	14 17 7	BHMW-1 SS1	BTEX PHC F1-F4 SVOCs ICP-MS Metals PAH					
0.25		SAND, compact, dry, brown (fill)															0.5
98.07		SAND, silty with gravel, dense, dry, dark brown (fill)	0					SS	33	30 26 50-5"	BHMW-1 SS2						
0.5		Stone fragments															1.0
0.91		Bedrock (limestone)															
1.04																	1.5
97.28																	
1.5																	2.0
2.0																	2.5
2.5																	3.0
3.0																	3.5
3.5																	4.0
4.0																	4.5
4.5																	5.0
4.59		End of borehole at 4.59 m.															
93.73																	

0.05

0.15

0.25

98.07

0.5

0.91

1.04

97.28

1.5

2.0

2.5

3.0

3.5

4.0

4.5

4.59

93.73

CRUSHED STONE with sand (fill)

ASPHALT

SAND, compact, dry, brown (fill)

SAND, silty with gravel, dense, dry, dark brown (fill)

Stone fragments

Bedrock (limestone)

End of borehole at 4.59 m.

0

0

SS

SS

50

33

14  
17  
7

30  
26  
50-5"

BHMW-1  
SS1

BHMW-1  
SS2

BTEX  
PHC F1-F4  
SVOCs  
ICP-MS  
Metals  
PAH

Projet : BH LOGS - 555BOOTH STREET.GPJ Type rapport : GENIVAR-WELL-ENGLISH Data Template : GENIVAR-TEMPLATE\_GEOTECH.GDT 1/21/2014

SCREEN  
Diam. : 51 mm  
Open. : 0.25 mm  
Length : 3.05 m  
  
WATER  
Depth : 1.92 m  
Elev. : 96.40 m  
Date : 12/27/2013

BOREHOLE DRILLING RECORD : **BHMW-2**

Page 1 of 1

Prepared by: **Kathryn Maton**  
Reviewed by: **Vahid Arasteh**Date (Start): **12/21/2013**  
Date (End): **12/21/2013**Project Name: **LIMITED PHASE II ENVIRONMENTAL SITE ASSESSMENT**  
Site: **BOOTH STREET COMPLEX**  
Sector: **555 BOOTH STREET, OTTAWA, ONTARIO**  
Client: **NRCAN**Project Number: **131-20711-06**  
Geographic Coordinates: X = 444770 mE  
Y = 5027945 mN  
Surface Elevation: **99.964 m (Relative)**Drilling Company: **George Downing Drilling Ltd.**  
Drilling Equipment: **CME 55**  
Drilling Method: **Hollow Stem Auger / Carottier NQ**  
Borehole Diameter: **200 mm**  
Drilling Fluid: **Water**  
Sampling Method: **Split Spoon**ODOUR  
F - Light  
M - Medium  
P - Persistent  
  
VISUAL  
D - Disseminated Product  
S - Saturated with ProductSAMPLE TYPE  
DC - Diamond Corer  
SS - Split Spoon  
MA - Manual Auger  
TR - Trowel  
ST - Shelby Tube  
TU - DT32 LinerCHEMICAL ANALYSIS  
PHC F1-F4 **Petroleum Hydrocarbons F1-F4**  
BTEX **Benzene, Toluene, Ethylbenzene, Xylene**  
SVOC **Semi Volatile Organic Compounds**  
PAH **Polycyclic Aromatic Hydrocarbons**ICP-MS Metals  
pH

An assumed elevation of 100.00 m is used for the southeast corner of the courtyard entrance, south of the gate opening.

DEPTH ELEVATION (m)	GEOLOGY / LITHOLOGY		OBSERVATIONS					SAMPLES					MONITORING WELL		REMARKS	
	LITHOLOGY	DESCRIPTION	VAPOR CONC. (ppm OR % LIE)	ODOUR				VISUAL SAMPLE TYPE	% RECUPERATION	N (Blow/6")	NUMBER	ANALYSIS	DUPLICATE	DIAGRAM		DESCRIPTION
				F	M	P	D									
		Ground surface.														
0.05 0.15 99.81		ASPHALT														
		CRUSHED STONE, with sand (fill)	0						SS	50	35 38 44	BHMW-2 SS1	PHC F1-F4 ICP-MS Metals BTEX/VOC PAH SVOCs			
0.5		SAND, silty with crushed stone, compact to very dense, dry, dark brown (fill) ← pieces of brick veneer and glass	0						SS	62	6 6 6 6 6	BHMW-2 SS2				← Bentonite
1.0																
1.22 98.74 1.37 98.59		GRAVEL (fill)	0						SS	25	4 6 23 46	BHMW-2 SS3A				
1.5		SAND, with crushed stone, compact, moist, dark brown (fill)	0													
1.72 98.24		BEDROCK (limestone)														
2.0																
2.5																
3.0																
3.5																
4.0																
4.5																
4.64 95.32		End of borehole at 4.64 m.														
5.0																

Project : BH LOGS - 555BOOTH STREET.GPJ Type rapport : GENIVAR-WELL-ENGLISH Data Template : GENIVAR\_TEMPLATE\_GEOTECH.GDT 1/21/2014

Water level  
at 3.12  
mbgs on  
December  
27, 2013

0.5

1.0

1.5

2.0

2.5

3.0

3.5

4.0

4.5

5.0

Groundwater  
sample  
submitted  
for  
laboratory  
analysis of  
PHCs,  
BTEX,  
VOCs,  
ICP-MS  
Metals,  
PAHs and  
SVOCs on  
December  
28, 2013

3.5

4.0

4.5

5.0

SCREEN  
Diam. : 51 mm  
Open. : 0.25 m  
Length : 3.05 m  
WATER  
Depth : 3.12 m  
Elev. : 96.84 m  
Date : 12/27/2013

3.0

3.5

4.0

4.5

5.0

← Sand

← PVC Slotted Pipe

Projet : BH LOGS - 555BOOTH STREET.GPJ Type rapport : GENIVAR-WELL-ENGLISH Data Template : GENIVAR-TEMPLATE\_GEOTECH.GDT 1/21/2014

SCREEN  
Diam. : 51 mm  
Open. : 0.25 mm  
Length : 3.05 m  
  
WATER  
Depth : 3.12 m  
Elev. : 96.84 m  
Date : 12/27/2013  
  
Groundwater  
sample  
submitted  
for  
laboratory  
analysis of  
PHCs,  
BTEX,  
VOCs,  
ICP-MS  
Metals,  
PAHs and  
SVOCs on  
December  
28, 2013

BOREHOLE DRILLING RECORD : **BHMW-3**

Page 1 of 1

Prepared by: **Kathryn Maton**  
Reviewed by: **Vahid Arasteh**Date (Start): **12/21/2013**  
Date (End): **12/21/2013**Project Name: **LIMITED PHASE II ENVIRONMENTAL SITE ASSESSMENT**  
Site: **BOOTH STREET COMPLEX**  
Sector: **555 BOOTH STREET, OTTAWA, ONTARIO**  
Client: **NRCAN**Project Number: **131-20711-06**  
Geographic Coordinates: X = 444757 mE  
Y = 5027931 mN  
Surface Elevation: **99.913 m (Relative)**Drilling Company: **George Downing Drilling Ltd.**  
Drilling Equipment: **CME 55**  
Drilling Method: **Hollow Stem Auger / Carottier NQ**  
Borehole Diameter: **200 mm**  
Drilling Fluid: **Water**  
Sampling Method: **Split Spoon**ODOUR  
F - Light  
M - Medium  
P - Persistent  
  
VISUAL  
D - Disseminated Product  
S - Saturated with ProductSAMPLE TYPE  
DC - Diamond Corer  
SS - Split Spoon  
MA - Manual Auger  
TR - Trowel  
ST - Shelby Tube  
TU - DT32 LinerCHEMICAL ANALYSIS  
PHC F1-F4 **Petroleum Hydrocarbons F1-F4**  
BTEX **Benzene, Toluene, Ethylbenzene, Xylene**  
SVOC **Semi Volatile Organic Compounds**  
PAH **Polycyclic Aromatic Hydrocarbons**ICP-MS Metals  
pH

An assumed elevation of 100.00 m is used for the southeast corner of the courtyard entrance, south of the gate opening.

DEPTH ELEVATION (m)	GEOLOGY / LITHOLOGY		OBSERVATIONS					SAMPLES					MONITORING WELL		REMARKS	
	LITHOLOGY	DESCRIPTION	VAPOR CONC. (ppm OR % LIE)	ODOUR				SAMPLE TYPE	% RECUPERATION	N (Blow/6")	NUMBER	ANALYSIS	DUPLICATE	DIAGRAM		DESCRIPTION
				F	M	P	D									
		Ground surface.														
0.05 0.15 99.76		ASPHALT														Water level at 3.45 mbgs on December 27, 2013
		CRUSHED STONE	5					SS	46	36 40 24	BHMW-3 SS1	BTEX/VOC ICP-MS Metals PAH SVOCs PHC F1-F4				
0.5 0.61 99.30		SAND, silty with crushed stone, compact, wet, dark brown (fill) with brick fragments	10					SS	8	10 100 7	BHMW-3 SS2				← Bentonite	
		SAND, silty with crushed stone, compact, wet, dark brown (fill)														
1.47 98.44		BEDROCK (limestone)	0					SS	50	4 44 12	BHMW-3 SS3	BTEX/VOC ICP-MS Metals PAH SVOCs PHC F1-F4				← Sand
2.0																
2.5																
3.0																
3.5																
4.0																
4.31 95.60		End of borehole at 4.31 m.														
4.5																
5.0																

SCREEN  
Diam. : 51 mm  
Open. : 0.25 mm  
Length : 3.05 m

WATER  
Depth : 3.22 m  
Elev. : 96.46 m  
Date : 12/27/2013

PVC Slotted Pipe

Groundwater  
sample  
submitted  
for  
laboratory  
analysis of  
PHCs,  
BTEX,  
VOCs,  
ICP-MS  
Metals,  
PAHs and  
SVOCs on  
December  
28, 2013

Projet : BH LOGS - 555BOOTH STREET.GPJ Type rapport : GENIVAR-WELL-ENGLISH Data Template : GENIVAR\_TEMPLATE\_GEOTECH.GDT 1/21/2014

---

## Appendix D

### Summary of Laboratory Analytical Results

---

Client: NRCan  
Project number: 131-20711-06

Table D1: Metals Soil Analytical Results

Parameter	Units	CCME Guideline CEQG/SEQG - Commercial <sup>1</sup>	MOE 2011 <sup>2</sup> Table 7 <sup>3</sup>	BHMW1-SS1	BHMW2-SS1	BHMW2-SS3B	Dup-1 (duplicate of BHMW2- SS3B)	BHMW3-SS1	BHMW3-SS3
<b>Drilling Date</b>				<b>21-Dec-13</b>	<b>21-Dec-13</b>	<b>21-Dec-13</b>	<b>21-Dec-13</b>	<b>21-Dec-13</b>	<b>21-Dec-13</b>
<b>Depth (m)</b>	m			0.15-0.61	0.15-0.61	1.52-1.83	1.52-1.83	0.15-0.61	1.22-1.47
pH	NA	6 to 8	5 to 9	7.39	na	na	na	na	na
Antimony	µg/g	40	40	0.6	1.4	4.3	3.8	1.5	2.6
Arsenic	µg/g	12	18	3.5	7.9	7.4	6.9	7.2	10.9
Barium	µg/g	2000	670	147	157	300	307	131	335
Beryllium	µg/g	8	8	0.4	0.4	0.5	0.4	0.3	0.5
Boron (Hot Water Soluble)	µg/g	NC	2	0.09	0.38	0.52	0.50	0.34	0.56
Boron (Total)	µg/g	NC	120	6.2	9.4	9.4	9.8	7.8	8.9
Cadmium	µg/g	22	1.9	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Chromium	µg/g	87	160	15	22	18	20	22	33
Chromium (VI)	µg/g	1.4	8	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Cobalt	µg/g	300	80	8	8	6	6	7	8
Copper	µg/g	91	230	34	45	116	52	72	316
Lead	µg/g	260	120	191	116	264	286	118	300
Mercury	µg/g	24	3.9	0.188	0.177	0.220	0.219	0.173	0.596
Molybdenum	µg/g	40	40	2	3	3	3	4	6
Nickel	µg/g	50	270	16	30	19	19	21	17
Selenium	µg/g	2.9	5.5	0.6	0.9	0.9	0.9	0.7	1.5
Silver	µg/g	40	40	0.9	0.3	0.3	0.3	0.4	0.5
Thallium	µg/g	1	3.3	0.1	0.2	0.1	0.1	0.1	0.2
Tin	µg/g	300	NC	7	9	16	14	9	118
Uranium	µg/g	33	33	0.4	0.7	0.8	0.7	0.9	0.9
Vanadium	µg/g	130	86	18	18	18	18	17	23
Zinc	µg/g	360	340	127	115	222	224	111	390

**NOTES**

<sup>1</sup> CCME Canadian Environmental Quality Guidelines (CEQG) Summary Table , Soil Quality Guidelines (SQG) for the Protection of Environmental and Human Health for Commercial Property Use  
<sup>2</sup> MOE 2011: Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act (April 2011)

<sup>3</sup> Table 7: Generic Site Condition Standards for Shallow Soils in a Non-Potable Ground Water Condition for Commercial Property Use (Coarse Textured Soil)

na: Not Analyzed

NA: Not Applicable

NC: No Criteria

Value  
Value  
Yellow shading indicates parameter concentration exceeds CCME CEEQ/SQG - Commercial Land Use  
Bold and Underlined indicates parameter concentration exceeds MOE Table 7 Site Condition Standards

Client: NRCAN  
Project number: 131-20711-06

Table D2: VOC Soil Analytical Results

Parameter	Units	CCME Guideline CEQG/SEQG - Commercial <sup>1</sup>	MOE 2011 <sup>2</sup> Table 7 <sup>3</sup>	BHMW1-SS1	BHMW2-SS1	BHMW2-SS3B	Dup-1 (duplicate of BHMW2-SS3B)	BHMW3-SS1	BHMW3-SS3
Date Drilled				21-Dec-13	21-Dec-13	21-Dec-13	21-Dec-13	21-Dec-13	21-Dec-13
Depth (m)	m			0.15-0.61	0.15-0.61	1.52-1.83	1.52-1.83	0.15-0.61	1.22-1.47
Acetone	µg/g	NC	16	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Benzene	µg/g	0.03	0.32	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Bromodichloromethane	µg/g	NC	18	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Bromoform	µg/g	NC	0.61	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Bromomethane	µg/g	NC	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Carbon Tetrachloride	µg/g	50	0.21	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Chlorobenzene	µg/g	10	2.4	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Chloroform	µg/g	50	0.47	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Dibromochloromethane	µg/g	NC	13	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Dichlorobenzene, 1,2-	µg/g	10	6.8	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Dichlorobenzene, 1,3-	µg/g	10	9.6	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Dichlorobenzene, 1,4-	µg/g	10	0.2	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Dichlorodifluoromethane	µg/g	NC	16	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Dichloroethane, 1,1-	µg/g	50	17	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Dichloroethane, 1,2-	µg/g	50	0.05	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Dichloroethylene, 1,1-	µg/g	50	0.064	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Dichloroethene, 1,2-cis-	µg/g	50	55	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Dichloroethene, 1,2-trans-	µg/g	50	1.3	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Dichloropropane, 1,2-	µg/g	50	0.16	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Dichloropropene, 1,3-cis	µg/g	50	NC	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Dichloropropene, 1,3-trans	µg/g	50	NC	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Dichloropropene, 1,3-cis + trans	µg/g	50	0.2	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Ethylbenzene	µg/g	0.082	9.5	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Ethylene dibromide	µg/g	0.05	0.05	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Hexane	µg/g	6.5	46	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Methyl Ethyl Ketone	µg/g	NC	70	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Methyl Isobutyl Ketone	µg/g	NC	31	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Methyl tert-Butyl Ether (MTBE)	µg/g	NC	11	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Methylene Chloride	µg/g	50	1.6	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Styrene	µg/g	50	34	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Tetrachloroethane, 1,1,1,2-	µg/g	NC	0.087	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Tetrachloroethane, 1,1,2,2-	µg/g	50	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Tetrachloroethylene	µg/g	0.5	4.5	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Toluene	µg/g	0.37	68	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Trichlorobenzene, 1,2,4-	µg/g	10	3.2	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Trichloroethane, 1,1,1-	µg/g	50	6.1	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Trichloroethane, 1,1,2-	µg/g	50	0.05	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Trichloroethylene	µg/g	0.01	0.91	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Trichlorofluoromethane	µg/g	NC	4	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Vinyl Chloride	µg/g	NC	0.032	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
o-xylene	µg/g	NC	NC	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
m/p-xylene	µg/g	NC	NC	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Xylene Mixture	µg/g	11	26	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03

#### NOTES

<sup>1</sup> CCME Canadian Environmental Quality Guidelines (CEQG) Summary Table, Soil Quality Guidelines (SQG) for the Protection of Environmental and Human Health for Commercial Property

<sup>2</sup> MOE 2011: Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act (April 2011)

<sup>3</sup> Table 7: Generic Site Condition Standards for Shallow Soils in a Non-Potable Ground Water Condition for Commercial Property Use (Coarse Textured Soil)

na: Not Analyzed

N/A: Not Applicable

NC: No Criteria

**Value** Yellow shading indicates parameter concentration exceeds CCME CEGQ/SEQG - Commercial Land Use

**Value** Bold and Underlined indicates parameter concentration exceeds MOE Table 7 Site Condition Standards

Client: NRCan  
Project number: 131-20711-06

Table D3: Petroleum Hydrocarbons (PHC) Soil Analytical Result

Parameter	Units	CCME CWS <sup>1</sup> Table 1 Commercial, Coarse grained <sup>2</sup>	MOE 2011 <sup>3</sup> Table 7 <sup>4</sup>	BHMW1-SS1	BHMW2-SS1	BHMW2- SS3B	Dup-1 (duplicate of BHMW2- SS3B)	BHMW3-SS1	BHMW3-SS3
<b>Date Drilled</b>				<b>21-Dec-13</b>	<b>21-Dec-13</b>	<b>21-Dec-13</b>	<b>21-Dec-13</b>	<b>21-Dec-13</b>	<b>21-Dec-13</b>
<b>Depth (m)</b>	m			0.15-0.61	0.15-0.61	1.52-1.83	1.52-1.83	0.15-0.61	1.22-1.47
Petroleum Hydrocarbons F1	µg/g	240	55	< 10	< 10	< 10	< 10	< 10	< 10
Petroleum Hydrocarbons F2	µg/g	260	230	7	11	21	19	14	18
Petroleum Hydrocarbons F3	µg/g	1700	1700	101	186	621	584	300	906
Petroleum Hydrocarbons F4	µg/g	3300	3300	22	89	328	324	96	245

**NOTES**

<sup>1</sup> CCME, Canada-Wide Standards (CWS) for Petroleum Hydrocarbons (PHC) in Soil (2001, Table 1 revised 2008)

<sup>2</sup> Table 1 Summary of Tier 1 Levels (mg/kg) for Surface Soil for Commercial Land Use, Coarse Textured Soils

<sup>3</sup> MOE 2011: Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act (April 2011)

<sup>4</sup> Table 7: Generic Site Condition Standards for Shallow Soils in a Non-Potable Ground Water Condition for Commercial Property Use (Coarse Textured Soil)

na: Not Analyzed

N/A: Not Applicable

NC: No Criteria

**Value**

Yellow shading indicates parameter concentration exceeds CCME CWS Table 1, Commercial Land Use, Coarse Textured Soils Guidelines

**Value**

Bold and Underlined indicates parameter concentration exceeds MOE Table 7 Site Condition Standards

Client: NRCan  
Project number: 131-20711-06

Table D4: Polycyclic Aromatic Hydrocarbons (PAH) Soil Analytical Results - Comparison to CCME Guidelines for the Protection of Human Health based on Carcinogenic Effects of PAHs

Parameter	Guideline <sup>1</sup> : SQG <sub>OH</sub>	B[a]P PEF	Units	BHMW1-SS1	BHMW2-SS1	BHMW2-SS3B	Dup-1 (duplicate of BHMW2-SS3B)	BHMW3-SS1	BHMW3-SS3
<b>Date Drilled</b>				<b>21-Dec-13</b>	<b>21-Dec-13</b>	<b>21-Dec-13</b>	<b>21-Dec-13</b>	<b>21-Dec-13</b>	<b>21-Dec-13</b>
<b>Depth (m)</b>			m	0.15-0.61	0.15-0.61	1.52-1.83	1.52-1.83	0.15-0.61	1.22-1.47
Benz[a]anthracene	NC	0.1	µg/g	1.51	2.74	3.61	5.48	3.09	13.2
Benz[a]pyrene	NC	1	µg/g	1.55	2.94	3.74	5.43	3.03	16.4
Benz[b]fluoranthene	NC	0.1	µg/g	2.07	4.07	4.91	7.59	3.95	22.1
Benz[k]fluoranthene	NC	0.1	µg/g	0.744	1.27	1.97	2.72	1.57	8.41
Benz[ghi]perylene	NC	0.01	µg/g	0.747	1.34	1.77	2.33	1.45	7.85
Chrysene	NC	0.01	µg/g	1.42	2.61	3.33	5.08	2.91	12.8
Dibenz[a,h]anthracene	NC	1	µg/g	0.277	0.522	0.572	0.784	0.435	2.57
Indeno[1,2,3-cd]pyrene	NC	0.1	µg/g	1.13	2.13	2.77	3.53	2.09	12.2
B[a]P TPE			µg/g	2.39	4.52	5.69	8.22	4.58	24.77
B[a]P TPE based on likely coal tar / creosote contamination safety factor of 3)	0.6 (ILCR < 1 X 10 <sup>-6</sup> ) <sup>2</sup>		µg/g	7.18	13.57	17.07	24.66	13.74	74.30
ILCR (for protection of potable water - SQGpw)	5.3 (ILCR < 1 X 10 <sup>-5</sup> ) <sup>3</sup>		µg/g	7.18	13.57	17.07	24.66	13.74	74.30
	1.0		µg/g	28.76	54.12	69.41	103.20	56.32	297.95

#### NOTES

- <sup>1</sup> CCME, Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health, Polycyclic Aromatic Hydrocarbons, 2008, revised 2010
- <sup>2</sup> Soil quality guideline based on an ILCR of 1 in 1,000,000 (10<sup>-6</sup>), accepted target level for ILCR in Ontario (4)
- <sup>3</sup> Soil quality guideline based on an ILCR of 1 in 100,000 (10<sup>-5</sup>)
- <sup>4</sup> Reference: Health Canada, 2004. Federal Contaminated Site Risk Assessment in Canada, Part I: Guidance on Human Health Risk Preliminary Quantitative Risk
- B[a]P TPE: Benzo(a)pyrene Total Potency Equivalents
- B[a]P PEF: Potency Equivalence Factor

ILCR: Incremental Lifetime Cancer Risk

SQG<sub>OH</sub>: Soil quality guideline for the protection of human health, direct contact

SQGpw: Soil quality guideline for the protection of potable water

SQG<sub>E</sub>: Soil quality guideline for environmental health

IACR: Index of Additive Cancer Risk

m bgs: Metres below ground surface

NC: No Criteria

Yellow shading indicates laboratory results exceed the soil quality guideline based on an ILCR of 1 in 1,000,000 (10<sup>-6</sup>), which is the accepted target level for ILCR in Ontario

Green shading indicates laboratory results exceed the soil quality guideline based on an ILCR of 1 in 100,000 (10<sup>-5</sup>)

Orange shading indicates laboratory results exceed the soil quality guideline based on an IACR of 1.0 for the protection of potable water



Table D5: Polycyclic Aromatic Hydrocarbons (PAH) Soil Analytical Results - Comparison to CCME Guidelines for the Protection of Environmental Health

Parameter	Units	Canadian Soil Guidelines <sup>1</sup> Table 2 <sup>2</sup>	Reference	SOQ <sub>E</sub>	Soil Contact (SOQ <sub>SC</sub> )	Soil and Food Ingestion (SOQ <sub>I</sub> )	Protection of Freshwater Life (SOQ <sub>FL</sub> )	CCME, 1991 <sup>3</sup> or CCME SOQ <sub>E</sub> , 1997 <sup>4</sup>	BHWW1-SS1	BHWW2- SS3B	Dup-1 (duplicate of BHWW2- SS3B)	BHWW3-SS1	BHWW3-SS3
<b>Date Drilled</b>									<b>21-Dec-13</b>	<b>21-Dec-13</b>	<b>21-Dec-13</b>	<b>21-Dec-13</b>	<b>21-Dec-13</b>
<b>Depth (m)</b>	m								0.150-0.61	1.52-1.83	1.52-1.83	0.150-0.61	1.22-1.47
Acenaphthene	µg/g	0.28	SOQ <sub>FL</sub>	NC	NC	NC	0.28	no value	0.126	0.306	0.413	0.461	< 0.1
Acenaphthylene	µg/g	320	SOQ <sub>FL</sub>	NC	NC	NC	320	no value	0.192	0.490	1.07	0.092	2.83
Anthracene	µg/g	32	SOQ <sub>FL</sub>	32	32	NC	NA	no value	0.528	1.48	2.22	1.42	1.89
Benzo[a]anthracene	µg/g	10	CCME, 1991	NC	NC	NC	NA	10*	1.51	2.74	5.48	3.09	13.2
Benzo[a]pyrene	µg/g	72	SOQ <sub>FL</sub>	72	72	NC	8600	1.4**	1.55	2.94	5.43	3.03	16.4
Benzo[b]fluoranthene	µg/g	10	CCME, 1991	NC	NC	NC	NA	10*	2.07	4.07	7.59	3.95	22.1
Benzo[k]fluoranthene	µg/g	--	N/A	NC	NC	NC	NA	no value	0.747	1.77	2.33	1.45	7.85
Benzo[k]fluoranthene	µg/g	10	CCME, 1991	NC	NC	NC	NA	10*	0.744	1.27	2.72	1.57	8.41
Chrysene	µg/g	--	N/A	NC	NC	NC	NA	no value	1.42	3.33	5.08	2.91	12.8
Dibenz[a,h]anthracene	µg/g	10	CCME, 1991	NC	NC	NC	NA	10*	0.277	0.572	0.784	0.435	2.57
Fluoranthene	µg/g	180	SOQ <sub>FL</sub>	180	180	NC	NA	no value	3.32	6.30	13.4	7.16	26.6
Fluorene	µg/g	0.25	SOQ <sub>FL</sub>	NC	NC	NC	0.25	no value	0.182	0.234	0.879	0.500	0.236
Indeno[1,2,3-cd]pyrene	µg/g	10	CCME, 1991	NC	NC	NC	NA	10*	1.13	2.13	3.53	2.09	12.2
Naphthalene	µg/g	0.013	SOQ <sub>FL</sub>	NC	NC	NC	0.013	22**	0.044	< 0.05	0.092	< 0.07	< 0.1
Phenanthrene	µg/g	0.046	SOQ <sub>FL</sub>	NC	NC	NC	0.046	50*	1.90	2.98	8.69	5.02	7.14
Pyrene	µg/g	100	CCME, 1991	NC	NC	NC	NA	100*	2.66	5.28	11.2	5.90	21.8

#### NOTES

<sup>1</sup>Canadian Soil Guidelines for the Protection of Environmental and Human Health, Polycyclic Aromatic Hydrocarbons, 2008, revised 2010

<sup>2</sup>Table 2 Soil Quality Guidelines (SOQ) for Carcinogenic and Other PAH's

<sup>3</sup> or <sup>4</sup> \*\* CCME Interim Soil Quality Criteria, 1991

<sup>4</sup> or <sup>5</sup> \*\* CCME, Provisional Soil Quality Guideline for Environmental Health (SOQ<sub>E</sub>), 1997

SOQ<sub>E</sub>: Soil quality guideline for environmental health

SOQ<sub>SC</sub>: Soil quality guideline for the protection of human health, soil contact

SOQ<sub>I</sub>: Soil quality guideline for the protection of human health, soil and food ingestion

SOQ<sub>FL</sub>: Soil quality guideline for the protection of freshwater life

na: Not Analyzed

NA: Not Applicable

NC: No Criteria

Yellow Shading indicates parameter concentration exceeds Table 2 Soil Quality Guidelines for Carcinogenic and Other PAH's

Client: NRCAN  
Project number: 131-20711-06

Table D6: Polycyclic Aromatic Hydrocarbons (PAH) Soil Analytical Results - Comparison to Ontario Regulation 153/04

Parameter	MOE 2011 <sup>1</sup> Table 7 <sup>2</sup>	Units	BHMW1-SS1	BHMW2-SS1	BHMW2-SS3B	Dup-1 (duplicate of BHMW2-SS3B)	BHMW3-SS1	BHMW3-SS3
Date Drilled			21-Dec-13	21-Dec-13	21-Dec-13	21-Dec-13	21-Dec-13	21-Dec-13
Depth (m)		m	0.15-0.61	0.15-0.61	1.52-1.83	1.52-1.83	0.15-0.61	1.22-1.47
Acenaphthene	96	µg/g	0.126	0.128	0.306	0.413	0.461	< 0.1
Acenaphthylene	0.15	µg/g	0.192	0.351	0.490	1.07	0.092	2.83
Anthracene	0.67	µg/g	0.528	0.767	1.48	2.22	1.42	1.89
Benz[a]anthracene	0.96	µg/g	1.51	2.74	3.61	5.48	3.09	13.2
Benzo[a]pyrene	0.3	µg/g	1.55	2.94	3.74	5.43	3.03	16.4
Benzo[b]fluoranthene	0.96	µg/g	2.07	4.07	4.91	7.59	3.95	22.1
Benzo[ghi]perylene	9.6	µg/g	0.747	1.34	1.77	2.33	1.45	7.85
Benzo[k]fluoranthene	0.96	µg/g	0.744	1.27	1.97	2.72	1.57	8.41
Biphenyl, 1, 1'-	52	µg/g	< 0.05	< 0.2	< 0.2	< 0.2	< 0.3	< 0.6
Bis(2-Chloroethyl)ether	0.5	µg/g	< 0.05	< 0.2	< 0.2	< 0.2	< 0.3	< 0.6
Bis(2-Chloroisopropyl)ether	11	µg/g	< 0.05	< 0.2	< 0.2	< 0.2	< 0.3	< 0.6
Bis(2-ethylhexyl) Phthalate	28	µg/g	< 1	< 5	< 5	< 5	< 7	< 10
Chloroaniline, 4-	0.5	µg/g	< 0.05	< 0.2	< 0.2	< 0.2	< 0.3	< 0.6
Chlorophenol, 2-	3.1	µg/g	< 0.05	< 0.2	< 0.2	< 0.2	< 0.3	< 0.6
Chrysene	9.6	µg/g	1.42	2.61	3.33	5.08	2.91	12.8
Dibenz[a,h]anthracene	0.1	µg/g	0.277	0.522	0.572	0.784	0.435	2.57
Dichlorobenzene, 1,2-	6.8	µg/g	< 0.02	< 0.1	< 0.1	< 0.1	< 0.1	< 0.3
Dichlorobenzene, 1,3-	9.6	µg/g	< 0.02	< 0.1	< 0.1	< 0.1	< 0.1	< 0.3
Dichlorobenzene, 1,4-	0.2	µg/g	< 0.02	< 0.1	< 0.1	< 0.1	< 0.1	< 0.3
Dichlorobenzidine, 3,3'-	1	µg/g	< 0.1	< 0.5	< 0.5	< 0.5	< 0.7	< 1
Dichlorophenol, 2,4-	3.4	µg/g	< 0.05	< 0.2	< 0.2	< 0.2	< 0.3	< 0.6
Diethyl Phthalate	0.5	µg/g	< 0.2	< 1	< 1	< 1	< 1	< 3
Dimethylphenol, 2,4-	390	µg/g	< 0.2	< 1	< 1	< 1	< 1	< 3
Dimethyl Phthalate	0.5	µg/g	< 0.2	< 1	< 1	< 1	< 1	< 3
Dinitrophenol, 2,4-	59	µg/g	< 0.2	< 1	< 1	< 1	< 1	< 3
Dinitrotoluene, 2,4-	1.2	µg/g	< 0.05	< 0.2	< 0.2	< 0.2	< 0.3	< 0.6
Fluoranthene	9.6	µg/g	3.32	6.30	8.36	13.4	7.16	26.6
Fluorene	62	µg/g	0.182	0.234	0.541	0.879	0.500	0.236
Hexachlorobenzene	0.66	µg/g	< 0.02	< 0.1	< 0.1	< 0.1	< 0.1	< 0.3
Hexachlorobutadiene	0.031	µg/g	< 0.02	< 0.1	< 0.1	< 0.1	< 0.1	< 0.3
Hexachloroethane	0.21	µg/g	< 0.05	< 0.2	< 0.2	< 0.2	< 0.3	< 0.6
Indeno[1,2,3-cd]pyrene	0.76	µg/g	1.13	2.13	2.77	3.53	2.09	12.2
Methylnaphthalene, 1-	76	µg/g	< 0.01	< 0.05	0.082	0.138	< 0.07	< 0.1
Methylnaphthalene, 2-	76	µg/g	0.027	< 0.05	0.112	0.212	< 0.07	< 0.1
Naphthalene	9.6	µg/g	0.044	< 0.05	0.092	0.381	< 0.07	< 0.1
Pentachlorophenol	2.9	µg/g	< 0.05	< 0.2	< 0.2	< 0.2	< 0.3	< 0.6
Phenanthrene	12	µg/g	1.90	2.98	5.26	8.69	5.02	7.14
Phenol	9.4	µg/g	< 0.02	< 0.1	< 0.1	< 0.1	< 0.1	< 0.3
Pyrene	96	µg/g	2.66	5.28	7.03	11.2	5.90	21.8
Trichlorobenzene, 1,2,4-	3.2	µg/g	< 0.05	< 0.2	< 0.2	< 0.2	< 0.3	< 0.6
Trichlorophenol, 2,4,5-	10	µg/g	< 0.05	< 0.2	< 0.2	< 0.2	< 0.3	< 0.6
Trichlorophenol 2,4,6-	3.8	µg/g	< 0.05	< 0.2	< 0.2	< 0.2	< 0.3	< 0.6

**NOTES**

<sup>1</sup> MOE 2011: Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act (April 2011)

<sup>2</sup> Table 7: Generic Site Condition Standards for Shallow Soils in a Non-Potable Ground Water Condition for Commercial Property Use (Coarse Textured Soil)

Value Green Shading indicates parameter concentration exceeds MOE Table 7 Standards

Client: NRCan  
Project number: 131-20711-06

Table D7: Semi Volatile Organic Compounds (SVOCs) excluding Polycyclic Aromatic Hydrocarbons (PAH) Analytical Results - Comparison to CCME Guidelines

Parameter	CCME Guideline CEQG/SEQ - Commercial <sup>1</sup>	Units	BHMW1- SS1	BHMW2- SS1	BHMW2- SS3B	Dup-1 (duplicate of BHMW2- SS3B)	BHMW3-SS1	BHMW3- SS3
Date Drilled			21-Dec-13	21-Dec-13	21-Dec-13	21-Dec-13	21-Dec-13	21-Dec-13
Depth (m)		m	0.15-0.61	0.15-0.61	1.52-1.83	1.52-1.83	0.15-0.61	1.22-1.47
Biphenyl, 1, 1-	NC	µg/g	< 0.05	< 0.2	< 0.2	< 0.2	< 0.3	< 0.6
Bis(2-Chloroethyl)ether	NC	µg/g	< 0.05	< 0.2	< 0.2	< 0.2	< 0.3	< 0.6
Bis(2-Chloroisopropyl)ether	NC	µg/g	< 0.05	< 0.2	< 0.2	< 0.2	< 0.3	< 0.6
Bis(2-ethylhexyl) Phthalate	NC	µg/g	< 1	< 5	< 5	< 5	< 7	< 10
Chloroaniline, 4-	NC	µg/g	< 0.05	< 0.2	< 0.2	< 0.2	< 0.3	< 0.6
Chlorophenol, 2-	5	µg/g	< 0.05	< 0.2	< 0.2	< 0.2	< 0.3	< 0.6
Dichlorobenzene, 1,2-	10	µg/g	< 0.02	< 0.1	< 0.1	< 0.1	< 0.1	< 0.3
Dichlorobenzene, 1,3-	10	µg/g	< 0.02	< 0.1	< 0.1	< 0.1	< 0.1	< 0.3
Dichlorobenzene, 1,4-	10	µg/g	< 0.02	< 0.1	< 0.1	< 0.1	< 0.1	< 0.3
Dichlorobenzidine, 3,3'-	NC	µg/g	< 0.1	< 0.5	< 0.5	< 0.5	< 0.7	< 1
Dichlorophenol, 2,4-	5	µg/g	< 0.05	< 0.2	< 0.2	< 0.2	< 0.3	< 0.6
Diethyl Phthalate	NC	µg/g	< 0.2	< 1	< 1	< 1	< 1	< 3
Dimethylphenol, 2,4-	10	µg/g	< 0.2	< 1	< 1	< 1	< 1	< 3
Dimethyl Phthalate	NC	µg/g	< 0.2	< 1	< 1	< 1	< 1	< 3
Dinitrophenol, 2,4-	10	µg/g	< 0.2	< 1	< 1	< 1	< 1	< 3
Dinitrotoluene, 2,4-	NC	µg/g	< 0.05	< 0.2	< 0.2	< 0.2	< 0.3	< 0.6
Hexachlorobenzene	10	µg/g	< 0.02	< 0.1	< 0.1	< 0.1	< 0.1	< 0.3
Hexachlorobutadiene	NC	µg/g	< 0.02	< 0.1	< 0.1	< 0.1	< 0.1	< 0.3
Hexachloroethane	NC	µg/g	< 0.05	< 0.2	< 0.2	< 0.2	< 0.3	< 0.6
Methylnaphthalene, 1-	NC	µg/g	< 0.01	< 0.05	0.082	0.138	< 0.07	< 0.1
Methylnaphthalene, 2-	NC	µg/g	0.027	< 0.05	0.112	0.212	< 0.07	< 0.1
Pentachlorophenol	7.6	µg/g	< 0.05	< 0.2	< 0.2	< 0.2	< 0.3	< 0.6
Phenol	10	µg/g	< 0.02	< 0.1	< 0.1	< 0.1	< 0.1	< 0.3

#### NOTES

<sup>1</sup> CCME Canadian Environmental Quality Guidelines (CEQG) Summary Table , Soil Quality Guidelines (SQG) for the Protection of Environmental and Human Health for Commercial Property Use

<sup>2</sup> Guideline 2 = CEEG/SQG - Commercial

Value Yellow shading indicates parameter concentration exceeds CCME CEEG/SQG - Commercial Land Use

Client: NRCan  
Project number: 131-20711-06

Table D8: Metals Groundwater Analytical Results

Parameter	Units	CCME Guideline CEQG/WQG - PAL - Freshwater, Long Term <sup>1</sup>	Federal IGQG <sup>2</sup> Table 3, Tier 1 <sup>3</sup>	MOE 2011 <sup>4</sup> Table 7 <sup>5</sup>	B-91	B-95	DUP 1 (duplicate of B-95)	BHMM-1	BHMM-2	BHMM-3
Sample Date					27-Dec-13	27-Dec-13	27-Dec-13	27-Dec-13	27-Dec-13	27-Dec-13
Antimony	µg/L	NC	1600	16000	0.2	0.3	<0.1	1.7	1.6	1.8
Arsenic	µg/L	5	5	1500	0.4	0.2	0.4	1.7	<0.1	1.8
Barium	µg/L	NC	500	23000	127	100	97	526	959	287
Beryllium	µg/L	NC	5.3	53	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Boron	µg/L	1500	5000	36000	108	47	48	108	142	205
Cadmium	µg/L	0.09	0.017	2.1	<0.015	<0.015	<0.015	0.180	1.20	0.809
Chromium	µg/L	NC	8.9	640	<2	<2	<2	<2	<2	<2
Chromium (VI)	µg/L	1	NC	110	<2	<2	<2	<2	<2	<2
Cobalt	µg/L	NC	NC	52	4.8	3.8	0.8	4.3	11.0	6.8
Copper	µg/L	2	2	69	2.3	1.9	1.7	17.0	16.9	19.9
Lead	µg/L	1	1	20	0.02	0.46	0.12	0.43	1.02	1.84
Mercury	µg/L	0.026	0.016	0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Molybdenum	µg/L	73	73	7300	4.9	2.1	3.2	34.2	80.7	391
Nickel	µg/L	25	25	390	<10	<10	<10	10	10	20
Selenium	µg/L	1	1	50	2	3	2	8	4	10
Silver	µg/L	0.1	0.1	1.2	<0.02	<0.02	<0.02	0.07	0.17	0.14
Thallium	µg/L	0.8	0.8	400	<0.05	<0.05	<0.05	0.29	0.52	0.38
Uranium	µg/L	15	300	330	4.53	4.66	3.86	4.76	7.17	9.20
Vanadium	µg/L	NC	NC	200	1.0	1.1	1.6	4.8	2.1	1.3
Zinc	µg/L	30	10	890	<5	<5	<5	<5	126	9

#### NOTES

- <sup>1</sup> CCME Canadian Environmental Quality Guidelines (CEQG) Summary Table - Water Quality Guidelines (WQG) for the Protection of Aquatic Life (PAL) for Freshwater, Long Term Concentration
- <sup>2</sup> Guidance Document on Federal Interim Groundwater Quality Guidelines For Federal Contaminated Sites (May 2010)
- <sup>3</sup> Table 3 Federal Interim Groundwater Quality Guidelines (IGQGs) Generic Guidelines for Commercial and Industrial Land Uses for Tier 1 (Coarse Textured Soil)
- <sup>4</sup> MOE 2011: Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act (April 2011)
- <sup>5</sup> Table 7: Generic Site Condition Standards for Shallow Soils in a Non-Potable Ground Water Condition for Commercial Property Use (Coarse Textured Soil)
- NC: No Criteria
- Value* indicates parameter concentration exceeds CCME CEGQ/WQG for the Protection of Aquatic Life for Freshwater, Long Term Concentration
- Value** indicates parameter concentration exceeds Federal Guideline<sup>1</sup> Tier 1, coarse textured soil
- CEQG/WQG - PAL** indicates parameter concentration exceeds MOE Table 7 Site Condition Standards
- WQG-PAL is more stringent than IGQG.

Client: NRCAN  
Project number: 131-20711-06

Table D9: VOC Groundwater Analytical Results

Parameter	Units	CCME Guideline CEQG/WQG - PAL - Freshwater, Long Term <sup>1</sup>	Federal IQGQ <sup>2</sup> Table 3, Tier 1 <sup>3</sup>	MOE 2011 <sup>4</sup> Table 7 <sup>5</sup>	B-91	B-95	DUP 1 (duplicate of B-95)	BHWM-1	BHWM-2	BHWM-3
Sample Date					27-Dec-13	27-Dec-13	27-Dec-13	27-Dec-13	27-Dec-13	27-Dec-13
Acetone	µg/L	NC	330	100000	<2	<2	<2	<2	<2	<2
Benzene	µg/L	370	200	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Bromodichloromethane	µg/L	NC	67000	67000	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Bromolorm	µg/L	NC	840	5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Bromomethane	µg/L	NC	2	0.89	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Carbon Tetrachloride	µg/L	13.3	6.8	0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Chlorobenzene	µg/L	NC	1.3	140	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Chloroform	µg/L	NC	1.8	2	<0.3	<0.3	<0.3	1.0	2.2	2.8
Dibromochloromethane	µg/L	NC	10000	65000	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dichlorobenzene, 1,2-	µg/L	0.7	0.7	150	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dichlorobenzene, 1,3-	µg/L	150	42	7600	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dichlorobenzene, 1,4-	µg/L	26	26	0.5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Dichlorodifluoromethane	µg/L	NC	NC	3500	<1	<1	<1	<1	<1	<1
Dichloroethane, 1,1-	µg/L	NC	9000	11	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dichloroethane, 1,2-	µg/L	100	100	0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dichloroethene, 1,1-	µg/L	NC	490	0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dichloroethene, cis-1,2-	µg/L	NC	12000	1.6	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dichloroethene, trans-1,2-	µg/L	NC	12000	1.6	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dichloropropane, 1,2-	µg/L	NC	9.3	0.58	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dichloropropane, cis-1,3-	µg/L	NC	3.8	0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dichloropropane, trans-1,3-	µg/L	NC	3.8	0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dichloropropane 1,3: cis:trans	µg/L	NC	3.8	0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Ethylbenzene	µg/L	90	41000	54	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylene dibromide	µg/L	NC	3.3	0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Hexane	µg/L	NC	NC	5	<1	<1	<1	<1	<1	<1
Methyl Ethyl Ketone	µg/L	NC	120000	21000	<1	<1	<1	<1	<1	<1
Methyl Isobutyl Ketone	µg/L	NC	57000	5200	<1	<1	<1	<1	<1	<1
Methyl tert-Butyl Ether (MTBE)	µg/L	10000	4300	15	<1	<1	<1	<1	<1	<1
Methylene Chloride	µg/L	98.1	98	26	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Styrene	µg/L	72	72	43	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Tetrachloroethane, 1,1,1,2-	µg/L	NC	6	1.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Tetrachloroethane, 1,1,2,2-	µg/L	NC	22	0.5	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
Tetrachloroethylene	µg/L	110	110	0.5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	µg/L	2	83	320	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Trichloroethane, 1,1,1-	µg/L	NC	4200	23	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Trichloroethane, 1,1,2-	µg/L	NC	9400	0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Trichloroethylene	µg/L	21	29	0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Trichlorofluoromethane	µg/L	NC	NC	2000	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Vinyl Chloride	µg/L	NC	13	0.5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Xylene, o	µg/L	NC	NC	NC	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Xylene, m,p	µg/L	NC	NC	NC	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
Xylene, m,p,o	µg/L	NC	18000	72	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4

NOTES

- <sup>1</sup> CCME Canadian Environmental Quality Guidelines (CEQG) Summary Table , Water Quality Guidelines (WQG) for the Protection of Aquatic Life (PAL) for Freshwater, Long Term Concentration
- <sup>2</sup> Guidance Document on Federal Interim Groundwater Quality Guidelines For Federal Contaminated Sites (May 2010)
- <sup>3</sup> Table 3 Federal Interim Groundwater Quality Guidelines (IQGQs) Generic Guidelines for Commercial and Industrial Land Uses for Tier 1 (Coarse Textured Soil)
- <sup>4</sup> MOE 2011: Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act (April 2011)
- <sup>5</sup> Table 7: Generic Site Condition Standards for Shallow Soils in a Non-Potable Ground Water Condition for Commercial Property Use (Coarse Textured Soil)
- NC: No Criteria

Value  
Value  
Value  
CEQG/WQG - PAL

Italics indicates parameter concentration exceeds CCME CEGQ/WQG for the Protection of Aquatic Life for Freshwater, Long Term Concentration  
Yellow shading indicates parameter concentration exceeds Federal Guideline<sup>1</sup> Tier 1, coarse textured soil  
Bold and Underlined indicates parameter concentration exceeds MOE Table 7 Site Condition Standards  
WQG-PAL is more stringent than IQGQ.

Client: NRCan  
Project number: 131-20711-06

Table D10: Polycyclic Aromatic Hydrocarbons (PAH) Groundwater Analytical Result

Parameter	Units	CCME Guideline CEQG/WQG - PAL - Freshwater, Long Term <sup>1</sup>	Federal IQQG <sup>2</sup> Table 3, Tier 1 <sup>3</sup>	MOE 2011 <sup>4</sup> Table 7 <sup>5</sup>	B-91	B-95	DUP 1 (duplicate of B-95)	BHMMW-1	BHMMW-2	BHMMW-3
Sample Date					27-Dec-13	27-Dec-13	27-Dec-13	27-Dec-13	27-Dec-13	7-Jan-14
Acenaphthene	µg/L	5.8	5.8	17	< 0.05	< 0.05	< 0.05	< 0.07	0.25	< 0.05
Acenaphthylene	µg/L	NC	46	1	< 0.05	< 0.05	< 0.05	< 0.07	0.76	0.32
Anthracene	µg/L	0.012	0.012	1	< 0.05	< 0.05	< 0.05	< 0.07	1.11	0.15
Benz[a]anthracene	µg/L	0.018	0.018	1.8	< 0.05	< 0.05	< 0.05	0.08	3.68	0.98
Benz[a]pyrene	µg/L	0.015	0.015	0.81	< 0.01	< 0.01	< 0.01	0.040	3.85	1.19
Benz[b]fluoranthene	µg/L	NC	0.48	0.75	< 0.05	< 0.05	< 0.05	0.07	5.47	1.29
Benz[b]kiperylene	µg/L	NC	0.17	0.2	< 0.05	< 0.05	< 0.05	< 0.07	2.62	0.78
Benz[k]fluoranthene	µg/L	NC	0.48	0.4	< 0.05	< 0.05	< 0.05	< 0.07	1.89	0.52
Biphenyl, 1, 1-	µg/L	NC	NC	1000	< 0.2	< 0.2	< 0.2	< 0.3	< 0.2	< 0.2
Bis(2-Chloroisopropyl)ether	µg/L	NC	110	240000	< 0.2	< 0.2	< 0.2	< 0.3	< 0.2	< 0.2
Bis(2-Chloroisopropyl)ether	µg/L	NC	430	20000	< 0.2	< 0.2	< 0.2	< 0.3	< 0.2	< 0.2
Bis(2-ethylhexyl) Phthalate	µg/L	16	16	30	44	< 5	< 5	< 5	< 5	< 5
Chloroaniline, 4-	µg/L	NC	10	320	< 0.2	< 0.2	< 0.2	< 0.3	< 0.2	< 0.2
Chlorophenol, 2-	µg/L	7	4400	2600	< 0.2	< 0.2	< 0.2	< 0.3	< 0.2	< 0.2
Chrysene	µg/L	NC	1.4	0.7	< 0.05	< 0.05	< 0.05	0.08	3.86	0.96
Dibenz[a,h]anthracene	µg/L	NC	0.26	0.4	< 0.05	< 0.05	< 0.05	< 0.07	0.57	0.22
Dichlorobenzidine, 3,3'-	µg/L	NC	NC	500	< 0.5	< 0.5	< 0.5	< 0.7	< 0.5	< 0.5
Dichlorophenol, 2,4'-	µg/L	0.2	0.2	3700	< 0.2	< 0.2	< 0.2	< 0.3	< 0.2	< 0.2
Dibutyl Phthalate	µg/L	NC	3	30	< 1	< 1	< 1	< 1	< 1	< 1
Dimethylphenol, 2,4-	µg/L	NC	2100	31000	< 1	< 1	< 1	< 1	< 1	< 1
Dimethyl Phthalate	µg/L	NC	NC	30	< 1	< 1	< 1	< 1	< 1	< 1
Dinitrophenol, 2,4-	µg/L	NC	150	9000	< 1	< 1	< 1	< 1	< 1	< 1
Dinitrotoluene, 2,4-	µg/L	NC	230	2300	< 0.5	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Fluoranthene	µg/L	0.04	0.04	44	0.05	0.05	0.05	0.19	7.21	1.55
Fluorene	µg/L	3	3	290	< 0.05	< 0.05	< 0.05	< 0.07	0.42	< 0.05
Indeno[1,2,3-cd]pyrene	µg/L	NC	0.21	0.2	< 0.05	< 0.05	< 0.05	< 0.07	2.86	0.88
Methylnaphthalene, 1-	µg/L	NC	1500	1500	< 0.05	< 0.05	< 0.05	< 0.07	0.08	< 0.05
Methylnaphthalene, 2-	µg/L	NC	1500	1500	< 0.05	< 0.05	< 0.05	< 0.07	0.07	< 0.05
Naphthalene	µg/L	1.1	1.1	7	< 0.05	< 0.05	< 0.05	< 0.07	0.09	0.06
Pentachlorophenol	µg/L	0.5	0.5	50	< 0.2	< 0.2	< 0.2	< 0.3	< 0.2	< 0.2
Phenanthrene	µg/L	0.4	0.4	380	< 0.05	< 0.05	< 0.05	< 0.07	4.15	0.43
Phenol	µg/L	4	4	9600	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Pyrene	µg/L	0.025	0.025	6	0.05	< 0.05	< 0.05	0.15	6.34	1.48
Trichlorobenzene, 1,2,4-	µg/L	24	24	3	< 0.2	< 0.2	< 0.2	< 0.3	< 0.2	< 0.2
Trichlorophenol, 2,4,5-	µg/L	18	63	1300	< 0.2	< 0.2	< 0.2	< 0.3	< 0.2	< 0.2
Trichlorophenol 2,4,6'-	µg/L	18	18	180	< 0.2	< 0.2	< 0.2	< 0.3	< 0.2	< 0.2

NOTES

<sup>1</sup> CCME Canadian Environmental Quality Guidelines (CEQG) Summary Table, Water Quality Guidelines (WQG) for the Protection of Aquatic Life (PAL) for Freshwater, Long Term Concentration  
<sup>2</sup> Guidance Document on Federal Interim Groundwater Quality Guidelines For Federal Contaminated Sites (May 2010)

<sup>3</sup> Table 3 Federal Interim Groundwater Quality Guidelines (IGQGs) Generic Guidelines for Commercial and Industrial Land Uses for Tier 1 (Coarse Textured Soil)

<sup>4</sup> MOE 2011: Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act (April 2011)

<sup>5</sup> Table 7: Generic Site Condition Standards for Shallow Soils in a Non-Potable Ground Water Condition for Commercial Property Use (Coarse Textured Soil)

NC: No Criteria

Value indicates parameter concentration exceeds CCME CEGQ/WQG for the Protection of Aquatic Life for Freshwater, Long Term Concentration  
Yellow shading indicates parameter concentration exceeds Federal Guideline<sup>1</sup> Tier 1, coarse textured soil  
Bold and Underlined indicates parameter concentration exceeds MOE Table 7 Site Condition Standards  
CEQG/WQG-PAL is more stringent than IGQG.

Client: NRCan  
Project number: 131-20711-06

Table D11: Petroleum Hydrocarbons (PHC) Groundwater Analytical Result

Parameter	Units	CCME Guideline CEQG/WQG - PAL - Freshwater, Long Term <sup>1</sup>	Federal IQGQ <sup>2</sup> Table 3, Tier 1 <sup>3</sup>	MOE 2011 <sup>4</sup> Table 7 <sup>5</sup>	B-91	B-95	DUP 1 (duplicate of B-95)	BHMM-1	BHMM-2	BHMM-3
Sample Date										
Petroleum Hydrocarbons F1-BTEX	µg/L	NC	9100	420	27-Dec-13 < 10	27-Dec-13 < 10	27-Dec-13 < 10	27-Dec-13 < 10	27-Dec-13 < 10	27-Dec-13 < 10
Petroleum Hydrocarbons F2	µg/L	NC	1300	150	< 50	< 50	< 50	< 50	< 50	< 50
Petroleum Hydrocarbons F3	µg/L	NC	NC	500	< 400	< 400	< 400	< 400	< 400	< 400
Petroleum Hydrocarbons F4	µg/L	NC	NC	500	< 400	< 400	< 400	< 400	< 400	< 400

**NOTES**

- <sup>1</sup> CCME Canadian Environmental Quality Guidelines (CEQG) Summary Table, Water Quality Guidelines (WQG) for the Protection of Aquatic Life (PAL) for Freshwater, Long Term Concentration
- <sup>2</sup> Guidance Document on Federal Interim Groundwater Quality Guidelines For Federal Contaminated Sites (May 2010)
- <sup>3</sup> Table 3 Federal Interim Groundwater Quality Guidelines (IQGQs) Generic Guidelines for Commercial and Industrial Land Uses for Tier 1 (Coarse Textured Soil)
- <sup>4</sup> MOE 2011: Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act (April 2011)
- <sup>5</sup> Table 7: Generic Site Condition Standards for Shallow Soils in a Non-Potable Ground Water Condition for Commercial Property Use (Coarse Textured Soil)
- NC: No Criteria

Value Italics indicates parameter concentration exceeds CCME CEEQ/WQG for the Protection of Aquatic Life for Freshwater, Long Term Concentration

Value Yellow shading indicates parameter concentration exceeds Federal Guideline<sup>1</sup> Tier 1, coarse textured soil

Value Bold and Underlined indicates parameter concentration exceeds MOE Table 7 Site Condition Standards

---

## Appendix E

### NCSCS Detailed Evaluation Forms

---



**CCME National Classification System for Contaminated Sites (2008, 2010 v 1.2)**  
**Pre-Screening Checklist**

Question	Response (yes / no)	Comment
1. Are <b>Radioactive material, Bacterial contamination or Biological hazards</b> likely to be present at the site?	No	If yes, do not proceed through the NCSCS. Contact applicable regulatory agency immediately.
2. Are there <b>no contamination exceedances</b> (known or suspected)? Determination of exceedances may be based on: 1) CCME environmental quality guidelines; 2) equivalent provincial guidelines/standards if no CCME guideline exists for a specific chemical in a relevant medium; or 3) toxicity benchmarks derived from the literature for chemicals not covered by CCME or provincial guidelines/standards.	No	If yes (i.e., there are no exceedances), do not proceed through the NCSCS.
3. Have <b>partial/incompleted or no environmental site investigations</b> been conducted for the Site?	No	If yes, do not proceed through the NCSCS.
4. Is there direct and significant evidence of <b>impacts to humans</b> at the site, or off-site due to migration of contaminants from the site?	No	If yes, automatically rate the site as Class 1, a priority for remediation or risk management, regardless of the total score obtained should one be calculated (e.g., for comparison with other Class 1 sites).
5. Is there direct and significant evidence of <b>impacts to ecological receptors</b> at the site, or off-site due to migration of contaminants from the site?	No	Some low levels of impact to ecological receptors are considered acceptable, particularly on commercial and industrial land uses. However, if ecological effects are considered to be severe, the site may be categorized as Class 1, regardless of the numerical total NCSCS score. For the purpose of application of the NCSCS, effects that would be considered severe include observed effects on survival, growth or reproduction which could threaten the viability of a population of ecological receptors at the site. Other evidence that qualifies as severe adverse effects may be determined based on professional judgement and in consultation with the relevant jurisdiction.
6. Are there indicators of significant <b>adverse effects in the exposure zone</b> (i.e., the zone in which receptors may come into contact with contaminants)? Some examples are as follows: -Hydrocarbon sheen or NAPL in the exposure zone -Severely stressed biota or devoid of biota; -Presence of material at ground surface or sediment with suspected high concentration of contaminants such as ore tailings, sandblasting grit, slag, and coal tar.	No	If yes, automatically rate the site as Class 1, a priority for remediation or risk management, regardless of the total score obtained should one be calculated (e.g., for comparison with other Class 1 sites).
7. Do measured concentrations of volatiles or unexploded ordnances represent an <b>explosion hazard</b> ?	No	If yes, automatically rate the site as Class 1, a priority for remediation or risk management, and do not continue until the safety risks have been addressed. Consult your jurisdiction's occupational health and safety guidance or legislation on explosive hazards and measurement of lower explosive limits.

**If none of the above applies, proceed with the NCSCS scoring.**

**CCME National Classification System for Contaminated Sites (2008, 2010 v 1.2)**  
**Summary of Site Conditions**

Subject Site:	<b>555 Booth Street, Ottawa, Ontario</b>	
Civic Address: (or other description of location)	555 Booth Street, Ottawa, Ontario	
Site Common Name : (if applicable)	CANMET Mining and Mineral Laboratories	
Site Owner or Custodian: (Organization and Contact Person)	NRCan	
Legal description or metes and bounds:	"E M R BLDG Plan 40, Lot 1 to 4, Lot 7 to 18, Plan 23 Lot 30 PT Lot 27 BOOTH E LEBRETON W" and "E M R BLDG Plan 40, Lot 1 to 4, Lot 7 to 18, Plan 23 Lot 30 PT Lot 27 BOOTH E LEBRETON W (PIN:	
Approximate Site area:	1.1 hectares	
PID(s) : (or Parcel Identification Numbers [PIN] if untitled Crown land)	041040153 and 041040156	
Centre of site: (provide latitude/longitude or UTM coordinates)	Latitude:	___45___ degrees ___24___ min ___10.32___ secs
	Longitude:	___75___ degrees ___42___ min ___21.03___ secs
	UTM	Northing _____
	Coordinate:	Easting _____
Site Land Use:	Current:	Commercial
	Proposed:	N/A
<b>Site Plan</b>	<b>To delineate the bounds of the Site a site plan MUST be attached. The plan must be drawn to scale indicating the boundaries in relation to well-defined reference points and/or legal descriptions. Delineation of the contamination should also be indicated on the site plan.</b>	
Provide a brief description of the Site:	The Site is currently occupied by CANMET Mining and Mineral Laboratories, and contains a Radioactivity wing (east), a mineral dressing wing (west) and administrative offices (south). The Site building has a large courtyard accessed by the north gateway. The Site was developed for its current use in 1955, prior to that it was a railway yard and an auto wrecking and trimming facility. The Site is identified as the Northeast quadrant of the Booth Street Complex in prior reports, and has not undergone any remedial activities. The Site slopes southwest.	

**CCME National Classification System for Contaminated Sites (2008, 2010 v 1.2)**  
**Summary of Site Conditions**

Affected media and Contaminants of Potential Concern (COPC):	The known affected media are soil and groundwater, and the COPC are PHC, SVOCs/PAH's and Metals
--	---

Please fill in the "letter" that best describes the level of information available for the site being assessed:

Site Letter Grade

**C**

If letter grade is F, do not continue, you must have a minimum of a Phase I Environmental Site Assessment or equivalent.

Scoring Completed By:	Kathryn Maton, Reviewed by Vahid Arasteh
Date Scoring Completed:	21-Jan-14

CCME National Classification System (2008, 2010 v 1.2)  
 555 Booth Street, Ottawa, Ontario

Definition	Score	Rationale for Score (document any assumptions, reports, or site-specific information; provide references)	Method of Evaluation	Notes
<b>1. Residency Media (replaces physical state)</b>				
Which of the following residency media are known (or strongly suspected) to have one or more exceedances of the applicable CCME guidelines? <b>yes</b> = has an exceedance or strongly suspected to have an exceedance <b>no</b> = does not have an exceedance or strongly suspected not to have an exceedance			The overall score is calculated by adding the individual scores from each residency media (having one or more exceedance of the most conservative media specific and land-use appropriate CCME guideline).	An increasing number of residency media containing chemical exceedances often equates to a greater potential risk due to an increase in the number of potential exposure pathways.
A. Soil	Yes No Do Not Know		Summary tables of the Canadian Environmental Quality Guidelines for soil, water (aquatic life, non-potable groundwater environments, and agricultural water uses) and sediment are available on the CCME website at <a href="http://www.ccme.ca/publications/ceqg_cceq_cceq.html?category_id=124">http://www.ccme.ca/publications/ceqg_cceq_cceq.html?category_id=124</a> .	
B. Groundwater	Yes No Do Not Know		For potable groundwater environments, guidelines for Canadian Drinking Water Quality (for comparison with groundwater monitoring data) are available on the Health Canada website at <a href="http://www.hc-sc.gc.ca/ewh-semt/pubs/water-eau/doc_sub-appui/sum_guide_res_recom/index_e.html">http://www.hc-sc.gc.ca/ewh-semt/pubs/water-eau/doc_sub-appui/sum_guide_res_recom/index_e.html</a> .	
C. Surface water	Do Not Know			
D. Sediment	Yes No Do Not Know			
"Known" - score	4			
"Potential" - score	2			
<b>2. Chemical Hazard</b>				
What is the relative degree of chemical hazard of the contaminant in the list of hazard rankings proposed by the Federal Contaminated Sites Action Plan (FCSAP)?	High Medium Low Do Not Know	Current report: Soil Contained High Hazards of: Trichloroethylene, Lead, Benzo(a)anthracene, Brizo (b) fluoranthene and Indeno(1,2,3-cd)pyrene are all listed as exceeding the CCME SQG criteria. Groundwater Contained High Hazards of: Cadmium, Mercury, Lead, Benzo(a)anthracene, Benzo(a)pyrene, Benzo(g,h,i)perylene, Benzo(k)fluoranthene, benzo(a)anthracene, Indeno(1,2,3-cd)pyrene. Past report: Soil contained high hazards of: Arsenic, Mercury, Lead, and Nickel and PAHs similar to the current report.	The relative degree of chemical hazard should be selected based on the most hazardous contaminant known or suspected to be present at the site.  The degree of hazard has been defined by the Federal Contaminated Sites Action Plan (FCSAP) and a list of substances with their associated hazard (Low, Medium and High) has been provided as a separate sheet in this file.  See Attached Reference Material for Contaminant Hazard Rankings.	Hazard as defined in the revised NCS pertains to the physical properties of a chemical which can cause harm. Properties can include toxic potency, propensity to biomagnify, persistence in the environment, etc. Although there is some overlap between hazard and contaminant exceedance factor below, it will not be possible to derive contaminant exceedance factors for many substances which have a designated chemical hazard designation, but don't have a CCME guideline. The purpose of this category is to avoid missing a measure of toxic potential.
"Known" - score	8			
"Potential" - score	---			
<b>3. Contaminant Exceedance Factor</b>				
What is the ratio between the measured contaminant concentration and the applicable CCME guidelines (or other "standards")?	High (> 100x) Mobile NAPL High (>100x) Medium (10x to 100x) Low (1x to 10x) Do Not Know	BHWM3-SS3 had a ratio of 123.83X for PAH (Carcinogenic Human Health), Dup 1 (Duplicate of BH2-SS3B) had a ratio of 103.20 for IACR (protection of potable water), BHWM3-SS3 had a ratio of 297.95 for IACR, BHWM2-SS3B had a ratio of 114.35 for Phenanthrene, Duplicate 1 (Duplicate of BHWM2-SS3B) had a ratio of 188.91 for Phenanthrene. BHWM3-SS1 and BHWM3-SS3 had ratios of 109.13 and 155.22 for Phenanthrene.	Ranking of contaminant "exceedance" is determined by comparing contaminant concentrations with the most conservative media-specific and land-use appropriate CCME environmental quality guidelines. <b>Ranking should be based on contaminant with greatest exceedance of CCME guidelines.</b> Ranking of contaminant hazard as high, medium and low is as follows: High = One or more measured contaminant concentration is greater than 100 X appropriate CCME guidelines Medium = One or more measured contaminant concentration is 10 - 99.99 X appropriate CCME guidelines Low = One or more measured contaminant concentration is 1 - 9.99 X appropriate CCME guidelines Mobile NAPL = Contaminant is a non-aqueous phase liquid (i.e., due to its low solubility, it does not dissolve in water, but remains as a separate liquid) and is present at a sufficiently high saturation (i.e., greater than residual NAPL saturation) such that there is significant potential for mobility either downwards or laterally. Other standards may include local background concentration or published toxicity benchmarks.	In the event that elevated levels of a material with no associated CCME guidelines are present, check provincial and USEPA environmental criteria.  Hazard Quotients (sometimes referred to as a screening quotient in risk assessments) refer to the ratio of measured concentration to the concentration believed to be the threshold for toxicity. A similar calculation is used here to determine the contaminant exceedance factor (CEF). Concentrations greater than one times the applicable CCME guideline (i.e., CEF=>1) indicate that risks are possible. Mobile NAPL has the highest associated score (8) because of its highly concentrated nature and potential for increase in the size of the impacted zone.
"Known" - score	6			
"Potential" - score	---		Results of toxicity testing with site samples can be used as an alternative. This approach is only relevant for contaminants that do not biomagnify in the food web, since toxicity tests would not indicate potential effects at higher trophic levels. High = lethality observed. Medium = no lethality, but sub lethal effects observed. Low = neither lethal nor sub lethal effects observed.	

**CCME National Classification System (2008, 2010 v 1.2)**

**(I) Contaminant Characteristics**

555 Booth Street, Ottawa, Ontario

Definition	Score	Rationale for Score (document any assumptions, reports, or site-specific information; provide references)	Method of Evaluation	Notes
<b>4. Contaminant Quantity (known or strongly suspected)</b>				
What is the known or strongly suspected quantity of all contaminants? <div> <div>&gt;10 hectare (ha) or 5000 m<sup>3</sup></div> <div>&lt;2 to 10 ha or 1000 to 5000 m<sup>3</sup></div> <div>&lt;2 ha or 1000 m<sup>3</sup></div> <div>Do Not Know</div> </div>	<div> <div>&gt;10 hectare (ha) or 5000 m<sup>3</sup></div> <div>9</div> <div>---</div> </div>	The site surface area is approximately 1.1 ha, 0.47 ha of it is covered by the buildings which are constructed on the bedrock surface. The remaining soil is considered contaminated which is 0.63 ha X 1.5 m (average approximate depth of impacted soil from surface to bedrock)	Measure or estimate the area or quantity of total contamination (i.e., all contaminants known or strongly suspected to be present on the site). The "Area of Contamination" is defined as the area or volume of contaminated media (soil, sediment, groundwater, surface water) exceeding appropriate environmental criteria.	A larger quantity of a potentially toxic substance can result in a larger frequency of exposure as well as a greater probability of migration, therefore, larger quantities of these substances earn a higher score.
<b>5. Modifying Factors</b>				
Does the chemical fall in the class of persistent chemicals based on its behavior in the environment? <div> <div>Yes</div> <div>No</div> <div>Do Not Know</div> </div>	<div> <div>Yes</div> <div>5</div> </div>	Benzo(a)Pyrene exceedance in groundwater. Lead exceedances in Soil.	Persistent chemicals, e.g., PCBs, chlorinated pesticides etc. either do not degrade or take longer to degrade, and therefore may be available to cause effects for a longer period of time. Canadian Environmental Protection Act (CEPA) classifies a chemical as persistent when it has at least one of the following characteristics: (a) in air; (i) its half-life is equal to or greater than 2 days, or (ii) it is subject to atmospheric transport from its source to a remote area; (b) in water, its half-life is equal to or greater than 182 days; (c) in sediments, its half-life is equal to or greater than 365 days; or (d) in soil, its half-life is equal to or greater than 182 days.  This list does not include metals or metalloids, which in their elemental form do not degrade. However metals and metalloids form chemical species in the environment, many of which are not readily bioavailable.	Examples of Persistent Substances are provided in attached Reference Materials
Are there contaminants present that could cause damage to utilities and infrastructure, either now or in the future, given their location? <div> <div>Yes</div> <div>No</div> <div>Do Not Know</div> </div>	<div> <div>Do Not Know</div> <div>5</div> </div>	inorganic substances (metals), PAHs, - Heavy extractable petroleum hydrocarbons (F3-F4 in previous reports), halogenated methane, phthalate esters	Some contaminants may react or absorb into underground utilities and infrastructure. For example, organic solvents may degrade some plastics, and salts could cause corrosion of metal.	
How many different contaminant classes have representative CCME guideline exceedances? <div> <div>one</div> <div>two to four</div> <div>five or more</div> <div>Do Not Know</div> </div>	<div> <div>five or more</div> <div>5</div> </div>		For the purposes of the revised NCS ranking system, the following chemicals represent distinct chemical "classes": inorganic substances (including metals), volatile petroleum hydrocarbons, light extractable petroleum hydrocarbons, heavy extractable petroleum hydrocarbons, PAHs, phenolic substances, chlorinated hydrocarbons, halogenated methanes, phthalate esters, pesticides.	Refer to the Reference Material sheet for a list of example substances that fall under the various chemical classes.

**Contaminant Characteristic Total**

Raw Total Scores- "Known"	32
Raw Total Scores- "Potential"	3
Raw Combined Total Scores	35
<b>Total Score (Raw Combined / 40 * 33)</b>	<b>28.9</b>

## CCME National Classification System (2008, 2010 v 1.2)

Definition	Score	Rationale for Score (document any assumptions, reports, or site-specific information; provide references)	Method of Evaluation	Notes
1. Groundwater Movement				
i) For <b>potable groundwater environments</b> , 1) groundwater concentration exceed background concentrations and IX the Guideline for Canadian Drinking Water Quality (GCDWQ) or 2) there is known contact of contaminants with groundwater, based on physical evidence of groundwater contamination. For <b>non-potable environments</b> (typically urban environments with no known contact of contaminants with groundwater), if the applicable non-potable guidelines or modified generic guideline (which exclude ingestion of drinking water pathway) or 2) there is known contact of contaminants with groundwater, based on physical evidence of groundwater impacts.	12	Based on the current and historical investigations as described in the report.	Review chemical data and evaluate groundwater quality.  The evaluation method (concentrations on 1) a potable or non-potable groundwater environment, 2) the groundwater flow system and its potential to be an exposure pathway to known or potential receptors  An aquifer is defined as a geologic unit that yields groundwater in usable quantities and drinking water quality. The aquifer can currently be used as a portable water supply or could have the potential to be used as a portable water supply (e.g., through a well). A confined aquifer is one serviced with a reliable alternative water supply (most commonly provided in urban areas). The evaluation of a non-potable environment will be based on a site specific basis.  Physical evidence includes significant shears, liquid phase contamination, or contaminant saturated soils.  Steps and springs are considered part of the groundwater pathway.  In Arctic environments, the potability and evaluation of the seasonal active layer (above the permafrost) as a groundwater exposure pathway will be considered on a site-specific basis.	The 1992 NCS rationale evaluated the off-site migration as a regulatory issue. The exposure assessment and classification of hazards should be evaluated regardless of the property boundaries.  Someone experienced must provide a thorough description of the sources researched to determine the presence/absence of a groundwater supply source in the vicinity of the contaminated site. This information must be documented in the NCS Site Classification Worksheet including contact names, phone numbers, e-mail correspondence and/or reference maps/reports and other resources such as internet links.  Note that for potable groundwater that also daylight's into a nearby surface water body, the more stringent guidelines for both drinking water and protection of aquatic life should be considered.
ii) Same as i) except the information is not known but strongly suspected based on indirect observations.	9			<b>Selected References</b>  <b>Potable Environments</b>  Guidelines for Canadian Drinking Water Quality - www.bcc.gc.ca/en/water-safety/pubs/wat/qsguides_sudoc_sus_requisits_guidelin_resourcetes_e.html  <b>Non-Potable Environments</b>  Canadian Water Quality Guidelines for Protection of Aquatic Life, COME, 1999 www.come.ca  Compilation and Review of Canadian Remediation Guidelines, Standards and Regulations, Science Applications International Corporation (SAIC Canada), report to Environment Canada, January 4, 2002.
iii) Meets GCDWQ for <b>potable environments</b> ; meets non-potable criteria or modified generic criteria (excludes ingestion of drinking water pathway) for <b>non-potable environments</b> or Absence of groundwater exposure pathway (i.e., there is no aquifer between the aquifer and the contamination, and within 5 km of the site there are no aquifers receiving environments and the groundwater does not daylight).	0			
Score	12			
	12			
<b>NOTE: If a score is assigned here for Known COPC Exceedances, then you can skip Part B Potential for groundwater pathway and go to Section I (Surface Water Pathway)</b>				
B. Potential for groundwater pathway.				
a. Relative Mobility				
High			Organics Metals with higher mobility Metals with higher mobility at acidic conditions	Reference: US EPA Soil Screening Guidance (Part 5 – Table 39)  If a score of zero is assigned for relative mobility, it is still recommended that the following sections on potential for groundwater pathway be evaluated and scored. Although the risk of leaching from soil is low, it is still possible that contaminants may migrate to groundwater. In some cases, they could be enhanced mobility due to co-solvent effects. Therefore, the K <sub>oc</sub> cannot be relied on solely as a measure of mobility. An evaluation of other factors such as contaminant, thickness of confining layer, hydraulic conductivities and precipitation infiltration rate are still useful in predicting potential for groundwater migration, even if a contaminant is expected to have insignificant mobility based on its chemistry alone.
Moderate			K <sub>oc</sub> < 500 (i.e., log K <sub>oc</sub> < 2.7) pH < 5	
Low			K <sub>oc</sub> = 500 to 5000 (i.e., log K <sub>oc</sub> = 2.7 to 3.7) pH = 5 to 6	
Slight			K <sub>oc</sub> = 5000 to 100,000 (i.e., log K <sub>oc</sub> = 3.7 to 5) pH > 6	
Do Not Know	Do Not Know		K <sub>oc</sub> > 100,000 (i.e., log K <sub>oc</sub> > 5)	
Score	2			Review the existing engineered systems or natural attenuation processes for the site and determine if they are sufficient to contain contaminants. If not, consider the Full Containment is defined as an engineered system or natural attenuation processes, monitored as being effective, which provide for full capture and/or treatment of contaminants. All chemicals of concern must be contained for "Full Containment" scoring. Natural attenuation must have sufficient data, and reports cited with monitoring data to support steady state conditions and the attenuation processes. If there is no containment or insufficient natural attenuation processes, this category is assigned. If there is containment or sufficient natural attenuation processes, this category is assigned. In Arctic environments, permafrost will be evaluated, as appropriate, based on detailed evaluations, effectiveness and reliability to contain/control contaminant migration.
b. Presence of engineered sub-surface containment?				Someone experienced must provide a thorough description of the sources researched to determine the presence/absence of a groundwater supply source in the vicinity of the contaminated site. This information must be documented in the NCS Site Classification Worksheet including contact names, phone numbers, e-mail correspondence and/or reference maps, geotechnical reports or natural attenuation studies and other resources such as internet links.
No containment				
Partial containment				
Full containment				
Do Not Know	Do Not Know			<b>Selected Resources:</b>  Environmental Protection Agency (USEPA), 1989, Technical Protocol for Evaluating Natural Attenuation of Chlorinated Solvents in Groundwater, EPA/600/R-98/128,  Environment Canada – Ontario Region – Natural Attenuation Technical Assistance Bulletin (TABN) Number 19 –21.
Score	1.5			
c. Thickness of confining layer over aquifer of concern or groundwater exposure pathway				
3 m or less including no confining layer or discontinuous confining layer		1.5 metres of overburden to bedrock		
> 3 m				
> 10 m				
Do Not Know	Do Not Know			
Score	0.5			
d. Hydraulic conductivity of confining layer				
<10 <sup>-4</sup> cm/s or no confining layer				
10 <sup>-4</sup> to 10 <sup>-7</sup> cm/s				
<10 <sup>-7</sup> cm/s				
Do Not Know	Do Not Know			
Score	0.5			

**CCME National Classification System (2008, 2010 v 1.2)**  
**(i) Migration Potential (Evaluation of contaminant migration pathways)**  
555 Booth Street, Ottawa, Ontario

Definition	Score	Rationale for Score (document any assumptions, reports, or site-specific information; provide references)	Method of Evaluation	Notes
<b>B. Potential for groundwater pathway.</b>				
e. Precipitation infiltration rate (Annual precipitation factor x surface soil relative permeability factor) High Moderate Low Very Low None Do Not Know	Score 0.4 Do Not Know	0.27 precipitation infiltration rate (assuming 914 mm rainfall in 2013)	Precipitation Refer to Environment Canada precipitation records for relevant areas. Divide annual precipitation by 1000 and round to nearest tenth (e.g., 667 mm = 0.7 score).  Permeability For surface soil relative permeability (i.e., infiltration) assume: gravel (1), sand (0.6), loam (0.3) and pavement or clay (0).  Multiply the surface soil relative permeability factor with precipitation factor to obtain the score for precipitation infiltration rate.	
f. Hydraulic conductivity of aquifer >10 <sup>-2</sup> cm/s 10 <sup>-2</sup> to 10 <sup>-4</sup> cm/s <10 <sup>-4</sup> cm/s Do Not Know	Score 5.9 Do Not Know		Determine the nature of geologic materials and estimate hydraulic conductivity of all aquifers of concern from published material (refer to "Range of Values of Hydraulic Conductivity and Permeability" in the Reference Material sheet).	
<b>Groundwater pathway total</b>				
Potential groundwater pathway total Allowed Potential score	1 5.9 Do Not Know			
<b>2. Surface Water Movement</b>				
<b>A. Demonstrated migration of COPC in surface water above background conditions</b>				
Known concentrations of surface water: i) Concentrations exceed background concentrations and exceed COME CWQG for protection of aquatic life, livestock, water, and/or recreation (whichever uses are applicable at the site) by >1 X; or ii) There is known contact of contaminants with surface water based on site observations. In the absence of CWQG, chemicals have been proven to be toxic based on site specific testing (e.g. toxicity testing; or other indicator testing of exposure).	12		Collect all available information on quality of surface water near to site. Evaluate available data against Canadian Water Quality Guidelines (select appropriate guidelines based on local water use, e.g., recreation, irrigation, aquatic life, livestock watering, etc.). The evaluation method concentrates on the surface water flow system and its potential to be an exposure pathway. Contamination is present on the surface (above ground) and has the potential to impact surface water bodies. Surface water is defined as a water body that supports one of the following uses: recreation, irrigation, livestock watering, aquatic life.	General Notes: Someone experienced must provide a thorough description of the sources researched to classify the surface water body in the vicinity of the contaminated site. This information must be documented in the NCS Site Classification Worksheet including contact names, phone numbers, e-mail correspondence and/or reference maps/reports and other resource such as Internet links.  Selected References:  CCME, 1989, Canadian Water Quality Guidelines for the Protection of Aquatic Life www.ccme.ca  CCME, 1989, Canadian Water Quality Guidelines for the Protection of Agricultural Water Users (Irrigation and Livestock Water) www.ccme.ca  Health and Welfare Canada, 1992, Guidelines for Canadian Recreational Water Quality.
iii) Same as (i) except the information is not known but <u>strongly</u> suspected based on indirect observations.  iv) Meets CWQG or absence of surface water exposure pathway (i.e., Distance to nearest surface water is > 3 km.)	8  0			
<b>Surface Water Movement</b>				
Score Go to Potential	--- Go to Potential			
<b>NOTE: If a score is assigned here for Demonstrated Migration in Surface Water, then you can skip Part B (Potential for migration of COPCs in surface water) and go to Section 3 (Surface Soils)</b>				
<b>B. Potential for migration of COPCs in surface water</b>				
a. Full containment No containment Partial containment Full containment Do Not Know	3 Do Not Know		Review the existing engineered systems and relate these structures to site conditions and proximity to surface water and determine if full containment is achieved: score low if there is full containment such as capping, berms, dikes; score medium if there is partial containment such as natural barriers, trees, ditches, sedimentation ponds; score high if there are no intervening barriers between the site and nearby surface water. Full containment must include containment of all chemicals.	
b. Distance to Surface Water 0 to <100 m 100 - 300 m 300 - 500 m 500 - 1000 m Do Not Know	Score 3 Do Not Know	Dow's Lake 500 m south	Review available mapping and survey data to determine distance to nearest surface water bodies.	
Score	0.5 Do Not Know			



**CCME National Classification System (2008, 2010 v 1.2)**  
**(II) Migration Potential (Evaluation of contaminant migration pathways)**  
555 Booth Street, Ottawa, Ontario

Definition	Score	Rationale for Score (document any assumptions, reports, or site-specific information; provide references)	Method Of Evaluation	Notes
<p>c. Topography</p> <p>Contaminants above ground level and slope is steep</p> <p>Contaminants at or below ground level and slope is steep</p> <p>Contaminants above ground level and slope is intermediate</p> <p>Contaminants at or below ground level and slope is intermediate</p> <p>Contaminants above ground level and slope is flat</p> <p>Contaminants at or below ground level and slope is flat</p> <p>Do Not Know</p>	<p>Score</p> <p>0</p> <p>Below and flat</p>		<p>Review engineering documents on the topography of the site and the slope of surrounding terrain.</p> <p>Steep slope &gt;50%.</p> <p>Intermediate slope = between 5 and 50%.</p> <p>Flat slope = &lt; 5%.</p> <p>Note: Type of fill placement (e.g., trench, above ground, etc.).</p>	
<p>d. Run-off potential</p> <p>High (rainfall run-off score &gt; 0.6)</p> <p>Moderate (0.4 &lt; rainfall run-off score &lt; 0.6)</p> <p>Low (0.2 &lt; rainfall run-off score &lt; 0.4)</p> <p>Very Low (0 &lt; rainfall run-off score &lt; 0.2)</p> <p>None (rainfall run-off score = 0)</p> <p>Do Not Know</p>	<p>Score</p> <p>1</p> <p>High</p>	<p>914 mm rainfall (2013) and pavement (1). Approximately 90% of the Site is covered by buildings or pavements.</p>	<p>Refer to Environment Canada precipitation records for relevant areas. Divide rainfall by 1000 and round to nearest tenth (e.g., 667 mm = 0.7 score).</p> <p>Refer to the site plan and site visit notes to include the precipitation as snow. This minor adjustment has been made. This second modification was the inclusion of permeability of surface materials as an evaluation factor.</p> <p>Permeability</p> <p>For infiltration assume: gravel (0), sand (0.3), loam (0.6) and pavement or clay (1).</p> <p>Multiply the infiltration factor with precipitation factor to obtain rainfall run off score.</p>	<p>Selected Sources:</p> <p>Environment Canada web page link: <a href="http://www.msc.ec.gc.ca">www.msc.ec.gc.ca</a></p> <p>Show to rainfall conversion apply ratio of 15 (snow):1 (water)</p>
<p>e. Flood potential</p> <p>1 in 2 years</p> <p>1 in 10 years</p> <p>1 in 100 years</p> <p>Not in floodplain</p> <p>Do Not Know</p>	<p>Score</p> <p>5</p> <p>Do Not Know</p>		<p>Review published data such as: flood plain mapping or flood potential (e.g., spring or mountain runoff, etc.)</p> <p>Review site plan and site visit notes to include flood potential of nearby water courses both up and down gradient. Rate zero if site not in flood plain.</p>	
<p>Potential surface water pathway total</p> <p>Allowed Potential score</p> <p>5</p> <p>5</p> <p>Surface water pathway total</p>	<p>Score</p> <p>5</p> <p>5</p>	<p>Note: If a "known" score is provided, the "potential" score is disallowed.</p>		
3. Surface Soils (potential for dust, dermal and ingestion exposure)				
A. Demonstrated concentrations of COPCs in surface soils (top 1.5 m)		Based on the current and historical investigations as described in the report.		
<p>COPCs measured in surface soils exceed the CCME soil quality guideline.</p> <p>Strongly suspected that soils exceed guidelines</p> <p>COPCs in surface soils does not exceed the CCME soil quality guideline</p> <p>or is not present (i.e., bedrock).</p>	<p>Score</p> <p>12</p> <p>9</p> <p>0</p> <p>12</p>		<p>Collect all available information on quality of surface soils (i.e., top 1.5 metres) at the site. Evaluate available data against Canadian Soil Quality Guidelines. Select appropriate guidelines based on current (or proposed future) land use (i.e. agricultural, residential/parkland, commercial, or industrial), and soil texture if applicable (i.e., classes or fine).</p>	<p>Selected References:</p> <p>CCME, 1999, Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health</p> <p><a href="http://www.ccme.ca">www.ccme.ca</a></p>
NOTE: If a score is assigned here for Demonstrated Concentrations in Surface Soils, then you can skip Part B (Potential for a surface soils migration pathway) and go to Section 4 (Vapour)				
B. Potential for a surface soils (top 1.5 m) migration pathway				
<p>a. Are the soils in question covered?</p> <p>Exposed</p> <p>Vegetated</p> <p>Landscaped</p> <p>Paved</p> <p>Do Not Know</p>	<p>Score</p> <p>2</p> <p>Landscaped</p>	<p>Although approximately 90% of the site is paved or covered by the buildings, almost 10% of the areas are landscaped.</p>	<p>Consult engineering or risk assessment reports for the site. Alternatively, review photographs or maps of the site to determine if the site is landscaped.</p> <p>Landscaped surface soils must include a minimum of 0.5 m of topsoil.</p>	<p>The possibility of contaminants in blowing snow have not been included in the revised Migration Potential score. However, if the site is landscaped, blowing snow is not a concern. Secondly, spills to snow or ice are most efficiently mitigated while freezing conditions remain.</p>
<p>b. For what proportion of the year does the site remain covered by snow?</p> <p>0 to 10% of the year</p> <p>10 to 30% of the year</p> <p>More than 30% of the year</p> <p>Do Not Know</p>	<p>Score</p> <p>0</p> <p>&gt;30% of year</p>		<p>Consult climatic information for the site. The increments represent the full span from soils which are always wet or covered with snow (and therefore less likely to generate dust) to those soils which are predominantly dry and not covered by snow (and therefore are more likely to generate dust).</p>	
<p>Potential surface soil pathway total</p> <p>Allowed Potential score</p> <p>2</p> <p>...</p> <p>Soil pathway total</p>	<p>Score</p> <p>2</p> <p>...</p> <p>12</p>	<p>Note: If a "known" score is provided, the "potential" score is disallowed.</p>		

CCME National Classification System (2008, 2010 v 1.2)  
 (i) Migration Potential (Evaluation of contaminant migration pathways)  
 555 Booth Street, Ottawa, Ontario

Definition	Score	Rationale for Score (document any assumptions, reports, or site-specific information; provide references)	Method Of Evaluation	Notes
<b>4. Vapour</b>				
<b>A. Demonstrated COPCs in vapour.</b>				
Vapour has been measured (indoor or outdoor) in concentrations exceeding risk based concentrations.	12	Previous reports have demonstrated	Consult previous investigations, including human health risk assessments, for reports of vapours detected.	
Strongly suspected (based on observations and/or modelling)	9			
Vapour has not been measured and volatile hydrocarbons have not been found in site soils or groundwater.	0			
<b>Go to Potential</b>				
<b>NOTE: If a score is assigned here for Demonstrated COPCs in Vapour, then you can skip Part B (Potential for COPCs in vapour) and go to Section 5 (Sediment)</b>				
<b>B. Potential for COPCs in vapour.</b>				
<b>a. Relative Volatility based on Henry's Law Constant, H* (dimensionless)</b>				
High (H* > 1.0E-1)		Current - Acenaphthene 1.5E-04, Benzo(a)anthracene 3.35E-06, Benzo(b)fluoranthene 1.11E-04, Fluorene 1.61E-05, Indeno(123-cd)pyrene 1.60E-06, Naphthalene 4.83E-04, PAH reports: Mercury 1.14E-02, Benzo(d)pyrene 1.13E-06	Reference: US EPA Soil Screening Guidance (Part 5 - Table 36)  Provided in Attached Reference Materials	If the Henry's Law Constant for a substance indicates that it is not volatile, and a score of zero is assigned here for relative volatility, then the other three questions in this section on Potential for COPCs will be automatically assigned scores of zero and you can skip to section 5.
Moderate (H* = 1.0E-1 to 1.0E-3)				
Low (H* < 1.0E-3)				
Do Not Know				
<b>Score</b>				
<b>Moderate</b>				
<b>2.5</b>				
<b>b. What is the soil grain size?</b>				
Fine			Review soil permeability data in geotechnical reports. The greater the permeability of soils, the greater the possible movement of vapours.	
Coarse			Fine-grained soils are defined as those which contain greater than 50% by mass particles less than 75 µm mean diameter (D50 < 75 µm). Coarse-grained soils are defined as those which contain greater than 50% by mass particles greater than 75 µm mean diameter (D50 > 75 µm).	
Do Not Know				
<b>Score</b>				
<b>4</b>				
<b>c. Is the depth to the source less than 10m?</b>				
Yes			Review groundwater depths below grade for the site.	
No				
Do Not Know				
<b>Score</b>				
<b>2</b>				
<b>d. Are there any preferential pathways?</b>				
Yes		There is a utility trench running south, under Booth Street and to the property located Southwest of the Site	Visit the site during dry summer conditions and/or review available photographs. Where bedrock is present, fractures would likely act as preferential pathways.	Preferential pathways refer to areas where vapour migration is more likely to occur because there is lower resistance to flow than in the surrounding materials. For example, bedrock fractures such as those in the above example, or utility trenches that serve as preferential pathways. Forces of the building itself that may create preferential pathways include earthen floors, expansion joints, wall cracks, or foundation perforations for subsurface features such as utility pipes, sumps, and drains.
No				
Do Not Know				
<b>Score</b>				
<b>2</b>				
<b>Potential vapour pathway total</b>				
<b>Allowed Potential score</b>				
<b>Vapour pathway total</b>				
<b>10.5</b>				
<b>10.5</b>				
<b>NOTE: If a "known" score is provided, the "potential" score is disallowed.</b>				
<b>5. Sediment Movement</b>				
<b>A. Demonstrated migration of sediments containing COPCs</b>				
There is evidence to suggest that sediments originally deposited to the site (exceeding the CCME sediment quality guidelines) have migrated.	12	No sediments on-site	Review sediment assessment reports. Evidence of migration of contaminants in sediments must be reported by someone experienced in the area.	Usually not considered a significant concern in lakes/marine environments, but could be very important in rivers where transport downstream could be significant.
Strongly suspected (based on observations and/or modelling)	9			
Sediments have been contained and there is no indication that sediments will migrate in future.	0			
or				
Absence of sediment exposure pathway (i.e., within 5 km of the site there are no exposed aquatic receiving environments, and therefore no sediments).				
<b>Score</b>				
<b>0</b>				
<b>0</b>				
<b>NOTE: If a score is assigned here for Demonstrated Migration of Sediments, then you can skip Part B (Potential for Sediment Migration) and go to Section 6 (Modifying Factors)</b>				

Definition	Score	Rationale for Score (document any assumptions, reports, or site-specific information; provide references)	Method Of Evaluation	Notes
<b>B. Potential for sediment migration</b> a. Are the sediments having COWPC exceedances capped with sediments having no exceedances ("clean sediments")? Yes No Do Not Know	No 4		Review existing sediment assessments. If sediment capping has been completed, it may indicate that historically contaminated sediments have been covered over by newer "clean" sediments. This assessment will require that cores collected demonstrate a low concentration near the top and higher concentration with sediment depth.	
b. For lakes and marine habitats, are the contaminated sediments in shallow water and therefore likely to be affected by tidal action, wave action or propeller wash? Yes No Do Not Know	No 0		Review existing sediment assessments. If the sediments present at the site are in a river, select "no" for this question.	
c. For rivers, are the contaminated sediments in an area prone to sediment scouring? Yes No Do Not Know	No 0		Review existing sediment assessments. It is important that the assessment is made under worst case flows (high yearly flows). Under high yearly flows, areas which are commonly depositional	
Potential sediment pathway total Known Potential score Sediment pathway total	4 -- 0	Note: If a "known" score is provided, the "potential" score is disallowed.		
<b>6. Modifying Factors</b> Are there subsurface utility conduits in the area affected by contamination? Yes No Do Not Know	Yes 4 0	There is a utility trench running south, under Booth Street and to the property located Southwest of the Site	Consult existing engineering reports. Subsurface utilities can act as conduits for contaminant migration.	
Migration Potential Total Raw "known" total Raw "potential" total Raw combined total Total (max 39)	28 15.5 43.5 22.4	Note: If "Known" and "Potential" scores are provided, the checklist defaults to known. Therefore, the total "Potential" Score may not reflect the sum of the individual "Potential" scores.		

**CCME National Classification System (2008, 2010 v1.2)**  
**(II) Exposure** (Demonstrates the presence of an exposure pathway and receptors)  
555 Booth Street, Ottawa, Ontario

Definition	Score	Rationale for Score (document any assumptions, reports, or site-specific information; provide references)	Method Of Evaluation	Notes
<b>1. Human</b>				
<b>A. Known exposure</b>				
Documented adverse impact or high quantified exposure which has or will result in an adverse effect, injury or harm or impairment of the safety to humans as a result of the contaminated site (Class 1 Star)	22	Based on the identified contaminants and the level of contamination. Although a risk assessment is not completed, calculation of B[a]pyrene indicates a potential for cancer risk above both 1 in 100,000 and 1 in 1,000,000 (Ontario).	"Where adverse effects on humans are documented, the site should be automatically designated as a Class 1 site (i.e., action required). There is no need to proceed through the NCS in this case. Known adverse impacts or high quantified exposure (22) for B[a]pyrene for the site is still desired (e.g., for comparison with other Class 1 sites).	Known adverse impact includes domestic and traditional food sources. Adverse effects based on food chain transfer to humans and/or animals can be scored in this category. However, the weight of evidence must show a direct link of a contaminant to the exposure pathway and transfer to humans. Any associated adverse effects to the environment are scored separately later in this worksheet.
Same as above but "Strongly Suspected" based on observations or indirect evidence.	10		This category can be based on the outcomes of risk assessments and applies to studies which have reported Hazard Quotients >1 for non-carcinogenic chemicals and incremental cancer risks that exceed acceptable levels defined by the jurisdiction for carcinogenic chemicals (for most jurisdictions this is typically either >10 <sup>-6</sup> or >10 <sup>-5</sup> ). Known impacts can also be evaluated based on blood testing (e.g., blood lead >10 µg/dl) or other health based testing.	Someone experienced must provide a thorough description of the sources researched to evaluate and determine the quantified exposure/impact (adverse effect) in the vicinity of the contaminated site.
No quantified or suspected exposures/impacts in humans.	0			
	10			
Score	10			
<b>NOTE: If a score is assigned here for Known Exposure, then you can skip Part 1 (Potential for Human Exposure) and go to Section 2 (Human Exposure Modifying Factors)</b>				
<b>B. Potential for human exposure</b>				
a) Land use provides an indication of potential human exposure scenarios				
Agricultural Residential/ Parkland Commercial Industrial Do Not Know			Review zoning and land use maps over the distances indicated. If the proposed future land use is more sensitive than the current land use, evaluative factor assuming the proposed future use is in place. Consider the proximity of the site to other land uses, the nature of the land use, the productive capability of the land or facility (e.g., greenhouse) and are agricultural in nature, or activities related to the feeding and housing of animals as livestock. Residential/Parkland land uses are defined as uses of land on which dwelling on a permanent, temporary, or seasonal basis is the activity (residential), as well as uses on which the activities are recreational in nature and require the active (residential), as well as uses on which the activities are recreational in nature and require the active (residential) use of the land to sustain that activity (parkland). Commercial land uses are defined as uses of land on which the activities are related to the buying, selling, or trading of merchandise or services (commercial), as well as land uses which are related to the production, manufacture, or storage of materials (industrial).	
Score	1		Review location and structures and contaminants at the site and determine if there are intervening barriers between the site and humans. A low rating should be assigned to a (covered) site surrounded by a fence or in a remote location, whereas a high score should be assigned to a site that has no cover, fence, natural barriers or buffer.	This is the main "receptor" factor used in site scoring. A higher score implies a greater exposure and/or exposure of more sensitive human receptors (e.g., children).
b. Indicate the level of accessibility to the contaminated portion of the site (e.g., the potential for coming in contact with contamination)				
Limited barriers to prevent site access: contamination not covered				
Moderate access or no intervening barriers: contaminants are covered. Remote locations in which contaminants not covered.				
Controlled access or remote location and contaminants are covered				
Do Not Know				
Access, not covered	2			
Score	2			
<b>B. Potential for human exposure</b>				
c) Potential for intake of contaminated soil, water, sediment or foods for operable or potentially operable pathways, as identified in Worksheet II (Migration Potential).				
i) direct contact				
Is dermal contact with contaminated surface water, groundwater, sediments or soils anticipated?				
Yes				
No				
Do Not Know				
Score	0			
ii) Inhalation (i.e., inhalation of dust, vapour)				
Vapour: Are there inhabitable buildings on the site within 30 m of soils or groundwater with volatile contamination as determined in Worksheet I (Migration Potential)?				
Yes				
No				
Do Not Know				
Score	0			
Dust: If there is contaminated surface soil (e.g. top 1.5 m), indicate whether the soil is fine or coarse textured. If it is known that surface soil is not contaminated, enter a score of zero.				
Fine				
Coarse				
Surface soil is not contaminated or absent (bedrock)				
Do Not Know / unsure				
Score	Coarse			
	1			
Inhalation total	1			

## CCME National Classification System (2008, 2010 v 1.2)

[illegible]

**CCME National Classification System (2008, 2010 v1.2)**  
**(II) Exposure** (Demonstrates the presence of an exposure pathway and receptors)  
555 Booth Street, Ottawa, Ontario

Definition		Score	Rationale for Score (document any assumptions, reports, or site-specific information; provide references)	Method Of Evaluation	Notes	
B. Potential for ecological exposure (for the contaminated portion of the site)						
a) Terrestrial i) Land use Agricultural (or Wild lands) Residential/Parkland Commercial Industrial Do Not Know Score		Commercial 1		Review zoning and land use maps. If the proposed future land use is more "sensitive" than the current land use, evaluate this factor assuming the proposed future use is in place (indicate in the worksheet that future land use is the consideration).  Agricultural land use is defined as uses of land where the activities are related to the productive capability of the land or facility (e.g., greenhouse) and are agricultural in nature, or activities related to the feeding and housing of animals as livestock. Wild lands are grouped with agricultural land due to the similarities in receptors that would be expected to occur there (e.g., herbivorous mammals and birds) and the similar need for a high level of protection to ensure ecological functioning.  Residential/Parkland land uses are defined as uses of land on which dwelling on a permanent, temporary, or seasonal basis is the activity (residential), as well as uses on which the activities are recreational in nature and require the natural or human designed capability of the land to sustain that activity (parkland). Commercial/Industrial land uses are defined as land on which the activities are related to the buying, selling, or trading of merchandise or services (commercial), as well as land uses which are related to the production, manufacture, or storage of materials (industrial).		
ii) Uptake potential Direct Contact - Are plants and/or soil invertebrates likely exposed to contaminated soils at the site? Yes No Do Not Know Score		Yes 1		If contaminated soils are located within the top 1.5 m, it is assumed that direct contact of soils with plants and soil invertebrates is an operable exposure pathway. Exposure to soils deeper than 1.5 m is possible, but less likely.		
iii) Ingestion (i.e., wildlife or domestic animals ingesting contaminated food items, soils or water) Are terrestrial animals likely to be ingesting contaminated water at the site? Yes No Do Not Know Score Are terrestrial animals likely to be ingesting contaminated soils at the site? Yes No Do Not Know Score Can the contamination identified bioaccumulate? Yes No Do Not Know Score Distance to sensitive terrestrial ecological area 0 to 300 m 300 m to 1 km 1 to 5 km > 5 km Do Not Know Score		No 0  Yes 1  Yes 1   0.5 4.5	Various PAH parameters that exceed CCME SQGs can bioaccumulate. Examples are anthracene, benzo[a]anthracene etc.	Refer to an Ecological Risk Assessment for the site. If there is contaminated surface water at the site, assume that terrestrial organisms will ingest it.  Refer to an Ecological Risk Assessment report. Most animals will co-ingest some soil while eating plant matter or soil invertebrates.  Bioaccumulation of contaminants within food items is considered possible if: 1) The Log(Kow) of the contaminant is greater than 4 (see per the chemical characteristics work sheet) and concentrations in soils exceed the most conservative CCME soil quality guideline for the intended land use, or 2) The contaminant in collected tissue samples exceeds the Canadian Tissue Residue Guidelines.  It is considered that within 300 m of a site, there is a concern for contamination. Therefore an environmental receptor located within this area of the site will be subject to further evaluations. It is recommended that a site-specific assessment be conducted to determine the need for further evaluation. Review Conservation Authority mapping and literature including Canadian Council on Ecological Areas link: www.cceaa.org.	Environmental receptors include: local, regional or provincial species of interest or significance; arctic environments (on a site specific basis); nature preserves, habitats for species at risk, sensitive forests, natural parks or forests.	
B. Potential for ecological exposure (for the contaminated portion of the site)						
b) Aquatic i) Classification of aquatic environment Sensitive Typical Not Applicable (no aquatic environment present) Do Not Know Not Applicable (no aquatic environment) Score		Not Applicable (no aquatic environment) 0	Note if a "Known" Ecological Effects score is provided, the "Potential" score is disabled.	"Sensitive aquatic environments" include those in or adjacent to shellfish or fish harvesting areas, marine parks, ecological reserves and fish migration paths. Also includes those areas deemed to have ecological significance such as for fish food resources, spawning areas or having rare or endangered species.  "Typical aquatic environments" include those in areas other than those listed above.		
ii) Uptake potential Does groundwater daylighting to an aquatic environment exceed the CCME water quality guidelines for the protection of aquatic life at the point of contact? Yes No (or Not Applicable) Do Not Know Score Distance from the contaminated site to an important surface water resource 0 to 300 m 300 m to 1 km 1 to 5 km > 5 km Do Not Know Score		Do Not Know 0.5  300 m to 1 km 2	down's Lake - 500 m south	Groundwater concentrations of contaminants at the point of contact with an aquatic receiving environment can be estimated in three ways: 1) by comparing collected nearshore groundwater concentrations to the CCME water quality guidelines (this will be a conservative comparison, as contaminant concentrations in groundwater often decrease between nearshore wells and the point of discharge). 2) by conducting groundwater modeling to estimate the concentration of groundwater immediately before discharge. 3) by installing water samplers, "piezopes", in the sediments in the area of daylighting groundwater.  It is considered that within 300 m of a site, there is a concern for contamination. Therefore an environmental receptor or important water resource located within this area of the site will be subject to further evaluation. It is also considered that any environmental receptor located greater than 5 km away will not be a concern for evaluation. Review Conservation Authority mapping and literature including Canadian Council on Ecological Areas link: www.cceaa.org.  Bioaccumulation of food items is possible if:	Environmental receptors include: local, regional or provincial species of interest or significance; sensitive wetlands and rivers and other aquatic environments.	

**CCME National Classification System (2008, 2010 v1.2)**  
**(II) Exposure** (Demonstrates the presence of an exposure pathway and receptors)

555 Booth Street, Ottawa, Ontario

Definition	Score	Rationale for Score (document any assumptions, reports, or site-specific information; provide references)	Method Of Evaluation	Notes
Are aquatic species (i.e., forage fish, invertebrates or plants) that are consumed by predatory fish or wildlife consumers, such as humans and birds, likely to accumulate contaminants in their tissues? Yes No Do Not Know	Do Not Know 0.5 3	Note if a "Known" Ecological Effects score is provided, the "Potential" score is dashed.	1) The Log(K <sub>ow</sub> ) of the contaminant is greater than 4 (ie per the chemical characteristics work sheet) and concentrations in sediments exceed the CCME (SQDs). 2) The contaminant in collected tissue samples exceeds the CCME (issue quality guidelines).	
Raw Aquatic Total Potential Allowed Aquatic Total Potential	Score 3			
<b>4. Ecological Exposure Modifying Factors</b>				Species at risk include those that are extirpated, endangered, threatened, or of special concern. For a list of species at risk, consult Schedule 1 of the federal Species at Risk Act ( <a href="http://www.sarregistry.gc.ca/species/schedules_e.cfm?id=1">http://www.sarregistry.gc.ca/species/schedules_e.cfm?id=1</a> ). Many provincial governments may also provide lists of species at risk. For example, in British Columbia, consult: British Columbia Species at Risk Society, 2008. British Columbia Species at Risk List. Consulted 2010.04.20. URL: <a href="http://www.gov.bc.ca/risks/krad-blue.htm">http://www.gov.bc.ca/risks/krad-blue.htm</a>
a) Known occurrence of a species at risk. Is there a potential for a species at risk to be present at the site? Yes No Do Not Know	Do Not Know --- 1		Consult any ecological risk assessment reports. If information is not present, utilize on-line databases such as Eco Explorer, Regional, Provincial (Environment Ministries), or Federal staff (Fisheries and Oceans or Environment Canada) should be able to provide some guidance.	
b) Potential impact of aesthetics (e.g., enrichment of a lake or tainting of food flavor). Is there evidence of aesthetic impact to receiving water bodies? Yes No Do Not Know Is there evidence of olfactory impact (i.e., unpleasant smell)? Yes No Do Not Know Is there evidence of increase in plant growth in the lake or water body? Yes No Do Not Know Is there evidence that fish or meat taken from or adjacent to the site smells or tastes different? Yes No Do Not Know	Do Not Know --- 1 --- 1 --- 1 Do Not Know --- 1 --- 1 Do Not Know --- 1		Documentation may consist of environmental investigation reports, press articles, petitions or other records.  Examples of olfactory change can include the smell of a COPC or an increase in the rate of decay in an aquatic habitat.  A distinct increase of plant growth in an aquatic environment may suggest enrichment. Nutrients e.g., nitrogen or phosphorous releases to an aquatic body can act as a fertilizer.  Some contaminants can result in a distinctive change in the way food gathered from the site tastes or smells.	This item will require some level of documentation by user, including contact names, addresses, phone numbers, e-mail addresses. Evidence of changes must be documented, please attach copy of report containing relevant information.
<b>Ecological Modifying Factors Total - Known</b> <b>Ecological Modifying Factors Total - Potential</b> Raw Ecological Total - Known Raw Ecological Total - Potential Raw Ecological Total <b>Ecological Total (Max 16)</b>	--- 5 12.5 12.5 12.5			
<b>5. Other Potential Contaminant Receptors</b>				
a) Exposure of permafrost (leading to erosion and structural concerns) Are there improvements (roads, buildings) at the site dependant upon the permafrost for structural integrity? Yes No Do Not Know  Is there a physical pathway which can transport soils released by damaged permafrost to a nearby aquatic environment? Yes No Do Not Know	No 0 ---  No 0 ---		Consult engineering reports, site plans or air photos of the site. When permafrost melts, the stability of the soil decreases, leading to erosion. Human structures, such as roads and/or buildings are often dependent on the stability that the permafrost provides.  Melting permafrost leads to a decreased stability of underlying soils. Wind or surface run-off erosion can carry soils into nearby aquatic habitats. The increased soil loadings into a river can cause an increase in total dissolved solids and a resulting decrease in aquatic habitat quality. In addition, the erosion can bring contaminants from soils to aquatic environments.	Plants and lichens provide a natural insulating layer which will help prevent thawing of the permafrost during the summer. Plants and lichens may also absorb less solar radiation. Solar radiation is turned into heat which can also cause underlying permafrost to melt.
<b>Other Potential Receptors Total - Known</b> <b>Other Potential Receptors Total - Potential</b>	0 0			
<b>Exposure Total</b> Raw Human Health + Ecological Total - Known Raw Human Health + Ecological Total - Potential <b>Raw Total</b> <b>Exposure Total (max 34)</b>	10 12.5 22.5 16.6	Only includes "Allowed potential" - if a "Known" score was supplied under a given category then the "Potential" score was not included.		



CCME National Classification System (2008, 2010 v 1.2)  
Score Summary

Scores from individual worksheets are tallied in this worksheet.  
Refer to this sheet after filling out the revised NCS completely.

I. Contaminant Characteristics

	Known	Potential
1. Residency Media	4	2
2. Chemical Hazard	8	---
3. Contaminant Exceedance Factor	6	---
4. Contaminant Quantity	9	---
5. Modifying Factors	5	1
<b>Raw Total Score</b>	32	3
<b>Raw Total Score (Known + Potential)</b>	35	
<b>Adjusted Total Score (Raw Total / 40 * 33)</b>	28.9	(max 33)

II. Migration Potential

	Known	Potential
1. Groundwater Movement	12	---
2. Surface Water Movement	---	5
3. Soil	12	---
4. Vapour	---	10.5
5. Sediment Movement	0	---
6. Modifying Factors	4	0
<b>Raw Total Score</b>	28	15.5
<b>Raw Total Score (Known + Potential)</b>	43.5	
<b>Adjusted Total Score (Raw Total / 64 * 33)</b>	22.4	(max 33)

III. Exposure

	Known	Potential
1. Human Receptors		
A. Known Impact		10
B. Potential		---
a. Land Use		---
b. Accessibility		---
c. Exposure Route		
i. Direct Contact		---
ii. Inhalation		---
iii. Ingestion		---
2. Human Receptors Modifying Factors	0	---
<b>Raw Total Human Score</b>	10	0
<b>Raw Total Human Score (Known + Potential)</b>	10	(maximum 22)
<b>Adjusted Total Human Score</b>	10.0	
3. Ecological Receptors		
A. Known Impact		---
B. Potential		4.5
a. Terrestrial		3
b. Aquatic		5
4. Ecological Receptors Modifying Factors	---	---
<b>Raw Total Ecological Score</b>	0	12.5
<b>Raw Total Ecological Score (Known + Potential)</b>	12.5	(maximum 18)
<b>Adjusted Total Ecological Score</b>	12.5	
5. Other Receptors	0	0
<b>Total Other Receptors Score (Known + Potential)</b>	0	
<b>Total Exposure Score (Human + Ecological + Other)</b>	22.5	
<b>Adjusted Total Exposure Score (Total Exposure / 46 * 34)</b>	16.6	(max 34)

<b>Site Score</b>	555 Booth Street, Ottawa, Ontario
<b>Site Letter Grade</b>	C
<b>Certainty Percentage</b>	75%
<b>% Responses that are "Do Not Know"</b>	-3%
<b>Total NCS Score for site</b>	67.9
<b>Site Classification Category</b>	2

Site Classification Categories\*:

- Class 1 - High Priority for Action (Total NCS Score >70)
- Class 2 - Medium Priority for Action (Total NCS Score 50 - 69.9)
- Class 3 - Low Priority for Action (Total NCS Score 37 - 49.9)
- Class N - Not a Priority for Action (Total NCS Score <37)
- Class INS - Insufficient Information (>15% of responses are "Do Not Know")

\* NOTE: The term "action" in the above categories does not necessarily refer to remediation, but could also include risk assessment, risk management or further site characterization and data collection.

---

## Appendix F

### Laboratory Certificates of Analysis

---

C.O.C.: G37495

REPORT No. B13-32999 (i)

Rev. 1

**Report To:**

**WSP Canada Inc.**

300-2611 Queensway Drive,  
Ottawa ON K2B 8K2 Canada

**Attention:** Vahid Arasteh

**Caduceon Environmental Laboratories**

2378 Holly Lane  
Ottawa Ontario K1V 7P1  
Tel: 613-526-0123  
Fax: 613-526-1244

DATE RECEIVED: 23-Dec-13

JOB/PROJECT NO.: 131-20711-06

DATE REPORTED: 17-Jan-14

P.O. NUMBER:

SAMPLE MATRIX: Soil

WATERWORKS NO.

			Client I.D.	BHMW1-SS1	BHMW3-SS1	BHMW3-SS3	BHMW2-SS3B
			Sample I.D.	B13-32999-1	B13-32999-2	B13-32999-3	B13-32999-4
			Date Collected	21-Dec-13	21-Dec-13	21-Dec-13	21-Dec-13
Parameter	Units	M.D.L.	Reference Method	Date/Site Analyzed			
pH @25°C	pH Units		SM 4500H	30-Dec-13/O	7.39		
Antimony	µg/g	0.5	EPA 6020	24-Dec-13/O	0.6	1.5	2.6
Arsenic	µg/g	0.5	EPA 6020	24-Dec-13/O	3.5	7.2	10.9
Barium	µg/g	1	EPA 6010	30-Dec-13/O	147	131	335
Beryllium	µg/g	0.2	EPA 6010	30-Dec-13/O	0.4	0.3	0.5
Boron	µg/g	0.5	EPA 6010	30-Dec-13/O	6.2	7.8	8.9
Boron (HWS)	µg/g	0.02	MOE3470	30-Dec-13/O	0.09	0.34	0.56
Cadmium	µg/g	0.5	EPA 6010	30-Dec-13/O	< 0.5	< 0.5	< 0.5
Chromium	µg/g	1	EPA 6010	30-Dec-13/O	15	22	33
Chromium (VI)	µg/g	0.5	EPA7196A	30-Dec-13/O	< 0.5	< 0.5	< 0.5
Cobalt	µg/g	1	EPA 6010	30-Dec-13/O	8	7	8
Copper	µg/g	1	EPA 6010	30-Dec-13/O	34	72	316
Lead	µg/g	5	EPA 6010	30-Dec-13/O	191	118	300
Mercury	µg/g	0.005	EPA 7471A	24-Dec-13/O	0.188	0.173	0.596
Molybdenum	µg/g	1	EPA 6010	30-Dec-13/O	2	4	6
Nickel	µg/g	1	EPA 6010	30-Dec-13/O	16	21	17
Silver	µg/g	0.2	EPA 6010	30-Dec-13/O	0.9	0.4	0.5
Selenium	µg/g	0.5	EPA 6020	24-Dec-13/O	0.6	0.7	1.5
Thallium	µg/g	0.1	EPA 6020	24-Dec-13/O	0.1	0.1	0.2
Tin	µg/g	5	EPA 6010	30-Dec-13/O	7	9	118
Uranium	µg/g	0.1	EPA 6020	24-Dec-13/O	0.4	0.9	0.9
Vanadium	µg/g	1	EPA 6010	30-Dec-13/O	18	17	23
Zinc	µg/g	3	EPA 6010	30-Dec-13/O	127	111	390
Acenaphthene	µg/g	0.005	EPA 8270	30-Dec-13/K	0.126	0.461	< 0.1
Acenaphthylene	µg/g	0.005	EPA 8270	30-Dec-13/K	0.192	0.092	2.83
Anthracene	µg/g	0.005	EPA 8270	30-Dec-13/K	0.528	1.42	1.89
Benzo(a)anthracene	µg/g	0.005	EPA 8270	30-Dec-13/K	1.51	3.09	13.2
Benzo(a)pyrene	µg/g	0.005	EPA 8270	30-Dec-13/K	1.55	3.03	16.4

NOTE: Revision created upon request from client to change sample ID for B13-32999-4 to BHMW2-SS3B.



Greg Clarkin, BSc., C. Chem  
Lab Manager - Ottawa District

M.D.L. = Method Detection Limit

Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill

The analytical results reported herein refer to the samples as received. Reproduction of this analytical report in full or in part is prohibited without prior consent from Caduceon Environmental Laboratories.

C.O.C.: G37495

REPORT No. B13-32999 (i)

Rev. 1

**Report To:**

**WSP Canada Inc.**

300-2611 Queensway Drive,  
Ottawa ON K2B 8K2 Canada

**Attention:** Vahid Arasteh

**Caduceon Environmental Laboratories**

2378 Holly Lane  
Ottawa Ontario K1V 7P1  
Tel: 613-526-0123  
Fax: 613-526-1244

DATE RECEIVED: 23-Dec-13

JOB/PROJECT NO.: 131-20711-06

DATE REPORTED: 17-Jan-14

P.O. NUMBER:

SAMPLE MATRIX: Soil

WATERWORKS NO.

Client I.D.					BHMW1-SS1	BHMW3-SS1	BHMW3-SS3	BHMW2-SS3B
Sample I.D.					B13-32999-1	B13-32999-2	B13-32999-3	B13-32999-4
Date Collected					21-Dec-13	21-Dec-13	21-Dec-13	21-Dec-13
Parameter	Units	M.D.L.	Reference Method	Date/Site Analyzed				
Benzo(b)fluoranthene	µg/g	0.005	EPA 8270	30-Dec-13/K	2.07	3.95	22.1	4.91
Benzo(g,h,i)perylene	µg/g	0.005	EPA 8270	30-Dec-13/K	0.747	1.45	7.85	1.77
Benzo(k)fluoranthene	µg/g	0.005	EPA 8270	30-Dec-13/K	0.744	1.57	8.41	1.97
Biphenyl, 1, 1-	µg/g	0.02	EPA 8270	30-Dec-13/K	< 0.05	< 0.3	< 0.6	< 0.2
Bis(2-Chloroethyl)ether	µg/g	0.02	EPA 8270	30-Dec-13/K	< 0.05	< 0.3	< 0.6	< 0.2
Bis(2-Chloroisopropyl)ether	µg/g	0.02	EPA 8270	30-Dec-13/K	< 0.05	< 0.3	< 0.6	< 0.2
Bis(2-ethylhexyl) Phthalate	µg/g	0.5	EPA 8270	30-Dec-13/K	< 1	< 7	< 10	< 5
Chloroaniline, 4-	µg/g	0.02	EPA 8270	30-Dec-13/K	< 0.05	< 0.3	< 0.6	< 0.2
Chlorophenol, 2-	µg/g	0.02	EPA 8270	30-Dec-13/K	< 0.05	< 0.3	< 0.6	< 0.2
Chrysene	µg/g	0.005	EPA 8270	30-Dec-13/K	1.42	2.91	12.8	3.33
Dibenzo(a,h)anthracene	µg/g	0.005	EPA 8270	30-Dec-13/K	0.277	0.435	2.57	0.572
Dichlorobenzene, 1,2-	µg/g	0.01	EPA 8270	30-Dec-13/K	< 0.02	< 0.1	< 0.3	< 0.1
Dichlorobenzene, 1,3-	µg/g	0.01	EPA 8270	30-Dec-13/K	< 0.02	< 0.1	< 0.3	< 0.1
Dichlorobenzene, 1,4-	µg/g	0.01	EPA 8270	30-Dec-13/K	< 0.02	< 0.1	< 0.3	< 0.1
Dichlorobenzidine, 3,3'-	µg/g	0.05	EPA 8270	30-Dec-13/K	< 0.1	< 0.7	< 1	< 0.5
Dichlorophenol, 2,4-	µg/g	0.02	EPA 8270	30-Dec-13/K	< 0.05	< 0.3	< 0.6	< 0.2
Diethyl Phthalate	µg/g	0.1	EPA 8270	30-Dec-13/K	< 0.2	< 1	< 3	< 1
Dimethylphenol, 2,4-	µg/g	0.1	EPA 8270	30-Dec-13/K	< 0.2	< 1	< 3	< 1
Dimethyl Phthalate	µg/g	0.1	EPA 8270	30-Dec-13/K	< 0.2	< 1	< 3	< 1
Dinitrophenol, 2,4-	µg/g	0.1	EPA 8270	30-Dec-13/K	< 0.2	< 1	< 3	< 1
Dinitrotoluene, 2,4-	µg/g	0.02	EPA 8270	30-Dec-13/K	< 0.05	< 0.3	< 0.6	< 0.2
Fluoranthene	µg/g	0.005	EPA 8270	30-Dec-13/K	3.32	7.16	26.6	8.36
Fluorene	µg/g	0.005	EPA 8270	30-Dec-13/K	0.182	0.500	0.236	0.541
Hexachlorobenzene	µg/g	0.01	EPA 8270	30-Dec-13/K	< 0.02	< 0.1	< 0.3	< 0.1
Hexachlorobutadiene	µg/g	0.01	EPA 8270	30-Dec-13/K	< 0.02	< 0.1	< 0.3	< 0.1
Hexachloroethane	µg/g	0.02	EPA 8270	30-Dec-13/K	< 0.05	< 0.3	< 0.6	< 0.2
Indeno(1,2,3,-cd)pyrene	µg/g	0.005	EPA 8270	30-Dec-13/K	1.13	2.09	12.2	2.77
Methylnaphthalene, 1-	µg/g	0.005	EPA 8270	30-Dec-13/K	< 0.01	< 0.07	< 0.1	0.082

NOTE: Revision created upon request from client to change sample ID for B13-32999-4 to BHMW2-SS3B.



M.D.L. = Method Detection Limit

Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill

Greg Clarkin , BSc., C. Chem  
Lab Manager - Ottawa District

The analytical results reported herein refer to the samples as received. Reproduction of this analytical report in full or in part is prohibited without prior consent from Caduceon Environmental Laboratories.

C.O.C.: G37495

REPORT No. B13-32999 (i)

Rev. 1

**Report To:**

**WSP Canada Inc.**

300-2611 Queensway Drive,  
Ottawa ON K2B 8K2 Canada

**Attention:** Vahid Arasteh

**Caduceon Environmental Laboratories**

2378 Holly Lane  
Ottawa Ontario K1V 7P1  
Tel: 613-526-0123  
Fax: 613-526-1244

DATE RECEIVED: 23-Dec-13

JOB/PROJECT NO.: 131-20711-06

DATE REPORTED: 17-Jan-14

P.O. NUMBER:

SAMPLE MATRIX: Soil

WATERWORKS NO.

			Client I.D.		BHMW1-SS1	BHMW3-SS1	BHMW3-SS3	BHMW2-SS3B
			Sample I.D.		B13-32999-1	B13-32999-2	B13-32999-3	B13-32999-4
			Date Collected		21-Dec-13	21-Dec-13	21-Dec-13	21-Dec-13
Parameter	Units	M.D.L.	Reference Method	Date/Site Analyzed				
Methylnaphthalene,2-	µg/g	0.005	EPA 8270	30-Dec-13/K	0.027	< 0.07	< 0.1	0.112
Naphthalene	µg/g	0.005	EPA 8270	30-Dec-13/K	0.044	< 0.07	< 0.1	0.092
Pentachlorophenol	µg/g	0.02	EPA 8270	30-Dec-13/K	< 0.05	< 0.3	< 0.6	< 0.2
Phenanthrene	µg/g	0.005	EPA 8270	30-Dec-13/K	1.90	5.02	7.14	5.26
Phenol	µg/g	0.01	EPA 8270	30-Dec-13/K	< 0.02	< 0.1	< 0.3	< 0.1
Pyrene	µg/g	0.005	EPA 8270	30-Dec-13/K	2.66	5.90	21.8	7.03
Trichlorobenzene,1,2,4-	µg/g	0.02	EPA 8270	30-Dec-13/K	< 0.05	< 0.3	< 0.6	< 0.2
Trichlorophenol, 2,4,5-	µg/g	0.02	EPA 8270	30-Dec-13/K	< 0.05	< 0.3	< 0.6	< 0.2
Trichlorophenol 2,4,6-	µg/g	0.02	EPA 8270	30-Dec-13/K	< 0.05	< 0.3	< 0.6	< 0.2
Tribromophenol, 2,4,6- (SS)	% rec.	10	EPA 8270	30-Dec-13/K	97.0	95.0	140	97.0
Terphenyl-d14 (SS)	% rec.	10	EPA 8270	30-Dec-13/K	93.0	94.0	105	96.0

NOTE: Revision created upon request from client to change sample ID for B13-32999-4 to BHMW2-SS3B.



M.D.L. = Method Detection Limit

Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill

Greg Clarkin , BSc., C. Chem  
Lab Manager - Ottawa District

The analytical results reported herein refer to the samples as received. Reproduction of this analytical report in full or in part is prohibited without prior consent from Caduceon Environmental Laboratories.

C.O.C.: G37495

REPORT No. B13-32999 (i)

Rev. 1

**Report To:**

**WSP Canada Inc.**

300-2611 Queensway Drive,  
Ottawa ON K2B 8K2 Canada

**Attention:** Vahid Arasteh

**Caduceon Environmental Laboratories**

2378 Holly Lane  
Ottawa Ontario K1V 7P1  
Tel: 613-526-0123  
Fax: 613-526-1244

DATE RECEIVED: 23-Dec-13

JOB/PROJECT NO.: 131-20711-06

DATE REPORTED: 17-Jan-14

P.O. NUMBER:

SAMPLE MATRIX: Soil

WATERWORKS NO.

			Client I.D.	BHMW2-SS1	Dup-1		
			Sample I.D.	B13-32999-5	B13-32999-6		
			Date Collected	21-Dec-13	21-Dec-13		
Parameter	Units	M.D.L.	Reference Method	Date/Site Analyzed			
pH @25°C	pH Units		SM 4500H	30-Dec-13/O			
Antimony	µg/g	0.5	EPA 6020	24-Dec-13/O	1.4	3.8	
Arsenic	µg/g	0.5	EPA 6020	24-Dec-13/O	7.9	6.9	
Barium	µg/g	1	EPA 6010	30-Dec-13/O	157	307	
Beryllium	µg/g	0.2	EPA 6010	30-Dec-13/O	0.4	0.4	
Boron	µg/g	0.5	EPA 6010	30-Dec-13/O	9.4	9.8	
Boron (HWS)	µg/g	0.02	MOE3470	30-Dec-13/O	0.38	0.50	
Cadmium	µg/g	0.5	EPA 6010	30-Dec-13/O	< 0.5	< 0.5	
Chromium	µg/g	1	EPA 6010	30-Dec-13/O	22	20	
Chromium (VI)	µg/g	0.5	EPA7196A	30-Dec-13/O	< 0.5	< 0.5	
Cobalt	µg/g	1	EPA 6010	30-Dec-13/O	8	6	
Copper	µg/g	1	EPA 6010	30-Dec-13/O	45	52	
Lead	µg/g	5	EPA 6010	30-Dec-13/O	116	286	
Mercury	µg/g	0.005	EPA 7471A	24-Dec-13/O	0.177	0.219	
Molybdenum	µg/g	1	EPA 6010	30-Dec-13/O	3	3	
Nickel	µg/g	1	EPA 6010	30-Dec-13/O	30	19	
Silver	µg/g	0.2	EPA 6010	30-Dec-13/O	0.3	0.3	
Selenium	µg/g	0.5	EPA 6020	24-Dec-13/O	0.9	0.9	
Thallium	µg/g	0.1	EPA 6020	24-Dec-13/O	0.2	0.1	
Tin	µg/g	5	EPA 6010	30-Dec-13/O	9	14	
Uranium	µg/g	0.1	EPA 6020	24-Dec-13/O	0.7	0.7	
Vanadium	µg/g	1	EPA 6010	30-Dec-13/O	18	18	
Zinc	µg/g	3	EPA 6010	30-Dec-13/O	115	224	
Acenaphthene	µg/g	0.005	EPA 8270	30-Dec-13/K	0.128	0.413	
Acenaphthylene	µg/g	0.005	EPA 8270	30-Dec-13/K	0.351	1.07	
Anthracene	µg/g	0.005	EPA 8270	30-Dec-13/K	0.767	2.22	
Benzo(a)anthracene	µg/g	0.005	EPA 8270	30-Dec-13/K	2.74	5.48	
Benzo(a)pyrene	µg/g	0.005	EPA 8270	30-Dec-13/K	2.94	5.43	

NOTE: Revision created upon request from client to change sample ID for B13-32999-4 to BHMW2-SS3B.



M.D.L. = Method Detection Limit

Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill

Greg Clarkin , BSc., C. Chem  
Lab Manager - Ottawa District

The analytical results reported herein refer to the samples as received. Reproduction of this analytical report in full or in part is prohibited without prior consent from Caduceon Environmental Laboratories.



C.O.C.: G37495

REPORT No. B13-32999 (i)

Rev. 1

**Report To:**

**WSP Canada Inc.**

300-2611 Queensway Drive,  
Ottawa ON K2B 8K2 Canada

**Attention:** Vahid Arasteh

**Caduceon Environmental Laboratories**

2378 Holly Lane  
Ottawa Ontario K1V 7P1  
Tel: 613-526-0123  
Fax: 613-526-1244

DATE RECEIVED: 23-Dec-13

JOB/PROJECT NO.: 131-20711-06

DATE REPORTED: 17-Jan-14

P.O. NUMBER:

SAMPLE MATRIX: Soil

WATERWORKS NO.

			Client I.D.	BHMW2-SS1	Dup-1		
			Sample I.D.	B13-32999-5	B13-32999-6		
			Date Collected	21-Dec-13	21-Dec-13		
Parameter	Units	M.D.L.	Reference Method	Date/Site Analyzed			
Benzo(b)fluoranthene	µg/g	0.005	EPA 8270	30-Dec-13/K	4.07	7.59	
Benzo(g,h,i)perylene	µg/g	0.005	EPA 8270	30-Dec-13/K	1.34	2.33	
Benzo(k)fluoranthene	µg/g	0.005	EPA 8270	30-Dec-13/K	1.27	2.72	
Biphenyl, 1, 1-	µg/g	0.02	EPA 8270	30-Dec-13/K	< 0.2	< 0.2	
Bis(2-Chloroethyl)ether	µg/g	0.02	EPA 8270	30-Dec-13/K	< 0.2	< 0.2	
Bis(2-Chloroisopropyl)ether	µg/g	0.02	EPA 8270	30-Dec-13/K	< 0.2	< 0.2	
Bis(2-ethylhexyl) Phthalate	µg/g	0.5	EPA 8270	30-Dec-13/K	< 5	< 5	
Chloroaniline, 4-	µg/g	0.02	EPA 8270	30-Dec-13/K	< 0.2	< 0.2	
Chlorophenol, 2-	µg/g	0.02	EPA 8270	30-Dec-13/K	< 0.2	< 0.2	
Chrysene	µg/g	0.005	EPA 8270	30-Dec-13/K	2.61	5.08	
Dibenzo(a,h)anthracene	µg/g	0.005	EPA 8270	30-Dec-13/K	0.522	0.784	
Dichlorobenzene, 1,2-	µg/g	0.01	EPA 8270	30-Dec-13/K	< 0.1	< 0.1	
Dichlorobenzene, 1,3-	µg/g	0.01	EPA 8270	30-Dec-13/K	< 0.1	< 0.1	
Dichlorobenzene, 1,4-	µg/g	0.01	EPA 8270	30-Dec-13/K	< 0.1	< 0.1	
Dichlorobenzidine, 3,3'-	µg/g	0.05	EPA 8270	30-Dec-13/K	< 0.5	< 0.5	
Dichlorophenol, 2,4-	µg/g	0.02	EPA 8270	30-Dec-13/K	< 0.2	< 0.2	
Diethyl Phthalate	µg/g	0.1	EPA 8270	30-Dec-13/K	< 1	< 1	
Dimethylphenol, 2,4-	µg/g	0.1	EPA 8270	30-Dec-13/K	< 1	< 1	
Dimethyl Phthalate	µg/g	0.1	EPA 8270	30-Dec-13/K	< 1	< 1	
Dinitrophenol, 2,4-	µg/g	0.1	EPA 8270	30-Dec-13/K	< 1	< 1	
Dinitrotoluene, 2,4-	µg/g	0.02	EPA 8270	30-Dec-13/K	< 0.2	< 0.2	
Fluoranthene	µg/g	0.005	EPA 8270	30-Dec-13/K	6.30	13.4	
Fluorene	µg/g	0.005	EPA 8270	30-Dec-13/K	0.234	0.879	
Hexachlorobenzene	µg/g	0.01	EPA 8270	30-Dec-13/K	< 0.1	< 0.1	
Hexachlorobutadiene	µg/g	0.01	EPA 8270	30-Dec-13/K	< 0.1	< 0.1	
Hexachloroethane	µg/g	0.02	EPA 8270	30-Dec-13/K	< 0.2	< 0.2	
Indeno(1,2,3,-cd)pyrene	µg/g	0.005	EPA 8270	30-Dec-13/K	2.13	3.53	
Methylnaphthalene, 1-	µg/g	0.005	EPA 8270	30-Dec-13/K	< 0.05	0.138	

NOTE: Revision created upon request from client to change sample ID for B13-32999-4 to BHMW2-SS3B.



M.D.L. = Method Detection Limit

Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill

Greg Clarkin , BSc., C. Chem  
Lab Manager - Ottawa District

The analytical results reported herein refer to the samples as received. Reproduction of this analytical report in full or in part is prohibited without prior consent from Caduceon Environmental Laboratories.

**C.O.C.: G37495**

**REPORT No. B13-32999 (i)**

**Rev. 1**

**Report To:**

**WSP Canada Inc.**

300-2611 Queensway Drive,  
Ottawa ON K2B 8K2 Canada

**Attention:** Vahid Arasteh

**Caduceon Environmental Laboratories**

2378 Holly Lane  
Ottawa Ontario K1V 7P1  
Tel: 613-526-0123  
Fax: 613-526-1244

DATE RECEIVED: 23-Dec-13

JOB/PROJECT NO.: 131-20711-06

DATE REPORTED: 17-Jan-14

P.O. NUMBER:

SAMPLE MATRIX: Soil

WATERWORKS NO.

			Client I.D.	BHMW2-SS1	Dup-1		
			Sample I.D.	B13-32999-5	B13-32999-6		
			Date Collected	21-Dec-13	21-Dec-13		
Parameter	Units	M.D.L.	Reference Method	Date/Site Analyzed			
Methylnaphthalene,2-	µg/g	0.005	EPA 8270	30-Dec-13/K	< 0.05	0.212	
Naphthalene	µg/g	0.005	EPA 8270	30-Dec-13/K	< 0.05	0.381	
Pentachlorophenol	µg/g	0.02	EPA 8270	30-Dec-13/K	< 0.2	< 0.2	
Phenanthrene	µg/g	0.005	EPA 8270	30-Dec-13/K	2.98	8.69	
Phenol	µg/g	0.01	EPA 8270	30-Dec-13/K	< 0.1	< 0.1	
Pyrene	µg/g	0.005	EPA 8270	30-Dec-13/K	5.28	11.2	
Trichlorobenzene,1,2,4-	µg/g	0.02	EPA 8270	30-Dec-13/K	< 0.2	< 0.2	
Trichlorophenol, 2,4,5-	µg/g	0.02	EPA 8270	30-Dec-13/K	< 0.2	< 0.2	
Trichlorophenol 2,4,6-	µg/g	0.02	EPA 8270	30-Dec-13/K	< 0.2	< 0.2	
Tribromophenol, 2,4,6- (SS)	% rec.	10	EPA 8270	30-Dec-13/K	87.0	110	
Terphenyl-d14 (SS)	% rec.	10	EPA 8270	30-Dec-13/K	96.0	112	

NOTE: Revision created upon request from client to change sample ID for B13-32999-4 to BHMW2-SS3B.



M.D.L. = Method Detection Limit

Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill

Greg Clarkin , BSc., C. Chem  
Lab Manager - Ottawa District

The analytical results reported herein refer to the samples as received. Reproduction of this analytical report in full or in part is prohibited without prior consent from Caduceon Environmental Laboratories.

C.O.C.: G26679

REPORT No. B14-00396

Rev. 1

**Report To:**

**WSP Canada Inc.**

300-2611 Queensway Drive,  
Ottawa ON K2B 8K2 Canada

**Attention:** Vahid Arasteh

**Caduceon Environmental Laboratories**

2378 Holly Lane  
Ottawa Ontario K1V 7P1  
Tel: 613-526-0123  
Fax: 613-526-1244

DATE RECEIVED: 07-Jan-14

JOB/PROJECT NO.: 131-20711-06

DATE REPORTED: 17-Jan-14

P.O. NUMBER:

SAMPLE MATRIX: Groundwater

WATERWORKS NO.

			Client I.D.	BHMW-3			
			Sample I.D.	B14-00396-1			
			Date Collected	07-Jan-14			
Parameter	Units	M.D.L.	Reference Method	Date/Site Analyzed			
Acenaphthene	µg/L	0.05	EPA 8270	15-Jan-14/K	< 0.05		
Acenaphthylene	µg/L	0.05	EPA 8270	15-Jan-14/K	0.32		
Anthracene	µg/L	0.05	EPA 8270	15-Jan-14/K	0.15		
Benzo(a)anthracene	µg/L	0.05	EPA 8270	15-Jan-14/K	0.98		
Benzo(a)pyrene	µg/L	0.01	EPA 8270	15-Jan-14/K	1.19		
Benzo(b)fluoranthene	µg/L	0.05	EPA 8270	15-Jan-14/K	1.29		
Benzo(g,h,i)perylene	µg/L	0.05	EPA 8270	15-Jan-14/K	0.78		
Benzo(k)fluoranthene	µg/L	0.05	EPA 8270	15-Jan-14/K	0.52		
Biphenyl, 1, 1-	µg/L	0.2	EPA 8270	15-Jan-14/K	< 0.2		
Bis(2-Chloroethyl)ether	µg/L	0.2	EPA 8270	15-Jan-14/K	< 0.2		
Bis(2-Chloroisopropyl)ether	µg/L	0.2	EPA 8270	15-Jan-14/K	< 0.2		
Bis(2-ethylhexyl) Phthalate	µg/L	5	EPA 8270	15-Jan-14/K	< 5		
Chloroaniline, 4-	µg/L	0.2	EPA 8270	15-Jan-14/K	< 0.2		
Chlorophenol, 2-	µg/L	0.2	EPA 8270	15-Jan-14/K	< 0.2		
Chrysene	µg/L	0.05	EPA 8270	15-Jan-14/K	0.96		
Dibenzo(a,h)anthracene	µg/L	0.05	EPA 8270	15-Jan-14/K	0.22		
Dichlorobenzidine, 3,3'-	µg/L	0.5	EPA 8270	15-Jan-14/K	< 0.5		
Dichlorophenol, 2,4-	µg/L	0.2	EPA 8270	15-Jan-14/K	< 0.2		
Diethyl Phthalate	µg/L	1	EPA 8270	15-Jan-14/K	< 1		
Dimethyl Phthalate	µg/L	1	EPA 8270	15-Jan-14/K	< 1		
Dimethylphenol, 2,4-	µg/L	1	EPA 8270	15-Jan-14/K	< 1		
Dinitrophenol, 2,4-	µg/L	1	EPA 8270	15-Jan-14/K	< 1		
Dinitrotoluene, 2,4-	µg/L	0.2	EPA 8270	15-Jan-14/K	< 0.2		
Fluoranthene	µg/L	0.05	EPA 8270	15-Jan-14/K	1.55		
Fluorene	µg/L	0.05	EPA 8270	15-Jan-14/K	< 0.05		
Indeno(1,2,3,-cd)pyrene	µg/L	0.05	EPA 8270	15-Jan-14/K	0.88		
Methylnaphthalene, 1-	µg/L	0.05	EPA 8270	15-Jan-14/K	< 0.05		
Methylnaphthalene, 2-	µg/L	0.05	EPA 8270	15-Jan-14/K	< 0.05		

NOTE: Revision created upon request from client to change sample ID from BHMW-1 to BHMW-3.



Greg Clarkin , BSc., C. Chem  
Lab Manager - Ottawa District

M.D.L. = Method Detection Limit

Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill

The analytical results reported herein refer to the samples as received. Reproduction of this analytical report in full or in part is prohibited without prior consent from Caduceon Environmental Laboratories.

**C.O.C.: G26679**

**REPORT No. B14-00396**

**Rev. 1**

**Report To:**

**WSP Canada Inc.**

300-2611 Queensway Drive,  
Ottawa ON K2B 8K2 Canada

**Attention:** Vahid Arasteh

**Caduceon Environmental Laboratories**

2378 Holly Lane  
Ottawa Ontario K1V 7P1  
Tel: 613-526-0123  
Fax: 613-526-1244

DATE RECEIVED: 07-Jan-14

JOB/PROJECT NO.: 131-20711-06

DATE REPORTED: 17-Jan-14

P.O. NUMBER:

SAMPLE MATRIX: Groundwater

WATERWORKS NO.

			<b>Client I.D.</b>	BHMW-3			
			<b>Sample I.D.</b>	B14-00396-1			
			<b>Date Collected</b>	07-Jan-14			
<b>Parameter</b>	<b>Units</b>	<b>M.D.L.</b>	<b>Reference Method</b>	<b>Date/Site Analyzed</b>			
Naphthalene	µg/L	0.05	EPA 8270	15-Jan-14/K	0.06		
Pentachlorophenol	µg/L	0.2	EPA 8270	15-Jan-14/K	< 0.2		
Phenanthrene	µg/L	0.05	EPA 8270	15-Jan-14/K	0.43		
Phenol	µg/L	0.1	EPA 8270	15-Jan-14/K	< 0.1		
Pyrene	µg/L	0.05	EPA 8270	15-Jan-14/K	1.48		
Trichlorobenzene, 1,2,4-	µg/L	0.2	EPA 8270	15-Jan-14/K	< 0.2		
Trichlorophenol 2,4,6-	µg/L	0.2	EPA 8270	15-Jan-14/K	< 0.2		
Trichlorophenol, 2,4,5-	µg/L	0.2	EPA 8270	15-Jan-14/K	< 0.2		
Terphenyl-d14 (SS)	% rec.	10	EPA 8270	15-Jan-14/K	67.0		
Tribromophenol, 2,4,6- (SS)	% rec.	10	EPA 8270	15-Jan-14/K	68.0		

NOTE: Revision created upon request from client to change sample ID from BHMW-1 to BHMW-3.

M.D.L. = Method Detection Limit

Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill



Greg Clarkin , BSc., C. Chem  
Lab Manager - Ottawa District

The analytical results reported herein refer to the samples as received. Reproduction of this analytical report in full or in part is prohibited without prior consent from Caduceon Environmental Laboratories.

**C.O.C.: G37498**

**REPORT No. B13-33197**

**Report To:**

**WSP Canada Inc.**

300-2611 Queensway Drive,  
Ottawa ON K2B 8K2 Canada

**Attention:** Vahid Arasteh

**Caduceon Environmental Laboratories**

2378 Holly Lane  
Ottawa Ontario K1V 7P1  
Tel: 613-526-0123  
Fax: 613-526-1244

DATE RECEIVED: 30-Dec-13

JOB/PROJECT NO.: 131-20711-06

DATE REPORTED: 10-Jan-14

P.O. NUMBER:

SAMPLE MATRIX: Groundwater

WATERWORKS NO.

					Client I.D.	B-95	B-91	BHMW-1	BHMW-2
					Sample I.D.	B13-33197-1	B13-33197-2	B13-33197-3	B13-33197-4
					Date Collected	28-Dec-13	28-Dec-13	28-Dec-13	28-Dec-13
Parameter	Units	M.D.L.	Reference Method	Date/Site Analyzed					
Antimony	µg/L	0.1	EPA 200.8	07-Jan-14/O	0.3	0.2	1.7	1.6	
Arsenic	µg/L	0.1	EPA 200.8	07-Jan-14/O	0.2	0.4	1.7	< 0.1	
Barium	µg/L	1	SM 3120	31-Dec-13/O	100	127	526	959	
Beryllium	µg/L	0.1	EPA 200.8	07-Jan-14/O	< 0.1	< 0.1	< 0.1	< 0.1	
Boron	µg/L	5	SM 3120	31-Dec-13/O	47	108	108	142	
Cadmium	µg/L	0.02	EPA 200.8	07-Jan-14/O	< 0.015	< 0.015	0.180	1.20	
Chromium	µg/L	2	SM 3120	31-Dec-13/O	< 2	< 2	< 2	< 2	
Chromium (VI)	µg/L	2	MOEE 3056	31-Dec-13/O	< 2 <sup>1</sup>	< 2 <sup>1</sup>	< 2 <sup>1</sup>	< 2 <sup>1</sup>	
Cobalt	µg/L	0.1	EPA 200.8	07-Jan-14/O	3.8	4.8	4.3	11.0	
Copper	µg/L	0.1	EPA 200.8	07-Jan-14/O	1.9	2.3	17.0	16.9	
Lead	µg/L	0.02	EPA 200.8	07-Jan-14/O	0.46	0.02	0.43	1.02	
Mercury	µg/L	0.02	SM 3112 B	31-Dec-13/O	< 0.02	< 0.02	< 0.02	< 0.02	
Molybdenum	µg/L	0.1	EPA 200.8	07-Jan-14/O	2.1	4.9	34.2	80.7	
Nickel	µg/L	10	SM 3120	31-Dec-13/O	< 10	< 10	10	10	
Selenium	µg/L	1	EPA 200.8	07-Jan-14/O	3	2	8	4	
Silver	µg/L	0.02	EPA 200.8	07-Jan-14/O	< 0.02	< 0.02	0.07	0.17	
Thallium	µg/L	0.05	EPA 200.8	07-Jan-14/O	< 0.05	< 0.05	0.29	0.52	
Uranium	µg/L	0.05	EPA 200.8	07-Jan-14/O	4.66	4.53	4.76	7.17	
Vanadium	µg/L	0.1	EPA 200.8	07-Jan-14/O	1.1	1.0	4.8	2.1	
Zinc	µg/L	5	SM 3120	31-Dec-13/O	< 5	< 5	< 5	126	
Acenaphthene	µg/L	0.05	EPA 8270	03-Jan-14/K	< 0.05	< 0.05	< 0.07	0.25	
Acenaphthylene	µg/L	0.05	EPA 8270	03-Jan-14/K	< 0.05	< 0.05	< 0.07	0.76	
Anthracene	µg/L	0.05	EPA 8270	03-Jan-14/K	< 0.05	< 0.05	< 0.07	1.11	
Benzo(a)anthracene	µg/L	0.05	EPA 8270	03-Jan-14/K	< 0.05	< 0.05	0.08	3.68	
Benzo(a)pyrene	µg/L	0.01	EPA 8270	03-Jan-14/K	< 0.01	< 0.01	0.040	3.85	
Benzo(b)fluoranthene	µg/L	0.05	EPA 8270	03-Jan-14/K	< 0.05	< 0.05	0.07	5.47	
Benzo(g,h,i)perylene	µg/L	0.05	EPA 8270	03-Jan-14/K	< 0.05	< 0.05	< 0.07	2.62	
Benzo(k)fluoranthene	µg/L	0.05	EPA 8270	03-Jan-14/K	< 0.05	< 0.05	< 0.07	1.89	



Greg Clarkin, BSc., C. Chem  
Lab Manager - Ottawa District

M.D.L. = Method Detection Limit

Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill

The analytical results reported herein refer to the samples as received. Reproduction of this analytical report in full or in part is prohibited without prior consent from Caduceon Environmental Laboratories.

**C.O.C.: G37498**

**REPORT No. B13-33197**

**Report To:**

**WSP Canada Inc.**

300-2611 Queensway Drive,  
Ottawa ON K2B 8K2 Canada

**Attention:** Vahid Arasteh

**Caduceon Environmental Laboratories**

2378 Holly Lane  
Ottawa Ontario K1V 7P1  
Tel: 613-526-0123  
Fax: 613-526-1244

DATE RECEIVED: 30-Dec-13

JOB/PROJECT NO.: 131-20711-06

DATE REPORTED: 10-Jan-14

P.O. NUMBER:

SAMPLE MATRIX: Groundwater

WATERWORKS NO.

			Client I.D.	B-95	B-91	BHMW-1	BHMW-2
			Sample I.D.	B13-33197-1	B13-33197-2	B13-33197-3	B13-33197-4
			Date Collected	28-Dec-13	28-Dec-13	28-Dec-13	28-Dec-13
Parameter	Units	M.D.L.	Reference Method	Date/Site Analyzed			
Biphenyl, 1, 1-	µg/L	0.2	EPA 8270	03-Jan-14/K	< 0.2	< 0.2	< 0.3
Bis(2-Chloroethyl)ether	µg/L	0.2	EPA 8270	03-Jan-14/K	< 0.2	< 0.2	< 0.3
Bis(2-Chloroisopropyl)ether	µg/L	0.2	EPA 8270	03-Jan-14/K	< 0.2	< 0.2	< 0.3
Bis(2-ethylhexyl) Phthalate	µg/L	5	EPA 8270	03-Jan-14/K	< 5	44	< 5
Chloroaniline, 4-	µg/L	0.2	EPA 8270	03-Jan-14/K	< 0.2	< 0.2	< 0.3
Chlorophenol, 2-	µg/L	0.2	EPA 8270	03-Jan-14/K	< 0.2	< 0.2	< 0.3
Chrysene	µg/L	0.05	EPA 8270	03-Jan-14/K	< 0.05	< 0.05	0.08
Dibenzo(a,h)anthracene	µg/L	0.05	EPA 8270	03-Jan-14/K	< 0.05	< 0.05	< 0.07
Dichlorobenzidine, 3,3'-	µg/L	0.5	EPA 8270	03-Jan-14/K	< 0.5	< 0.5	< 0.7
Dichlorophenol, 2,4-	µg/L	0.2	EPA 8270	03-Jan-14/K	< 0.2	< 0.2	< 0.3
Diethyl Phthalate	µg/L	1	EPA 8270	03-Jan-14/K	< 1	< 1	< 1
Dimethyl Phthalate	µg/L	1	EPA 8270	03-Jan-14/K	< 1	< 1	< 1
Dimethylphenol, 2,4-	µg/L	1	EPA 8270	03-Jan-14/K	< 1	< 1	< 1
Dinitrophenol, 2,4-	µg/L	1	EPA 8270	03-Jan-14/K	< 1	< 1	< 1
Dinitrotoluene, 2,4-	µg/L	0.2	EPA 8270	03-Jan-14/K	< 0.2	< 0.2	< 0.3
Fluoranthene	µg/L	0.05	EPA 8270	03-Jan-14/K	0.05	0.05	0.19
Fluorene	µg/L	0.05	EPA 8270	03-Jan-14/K	< 0.05	< 0.05	< 0.07
Indeno(1,2,3,-cd)pyrene	µg/L	0.05	EPA 8270	03-Jan-14/K	< 0.05	< 0.05	< 0.07
Methylnaphthalene, 1-	µg/L	0.05	EPA 8270	03-Jan-14/K	< 0.05	< 0.05	< 0.07
Methylnaphthalene, 2-	µg/L	0.05	EPA 8270	03-Jan-14/K	< 0.05	< 0.05	< 0.07
Naphthalene	µg/L	0.05	EPA 8270	03-Jan-14/K	< 0.05	< 0.05	< 0.07
Pentachlorophenol	µg/L	0.2	EPA 8270	03-Jan-14/K	< 0.2	< 0.2	< 0.3
Phenanthrene	µg/L	0.05	EPA 8270	03-Jan-14/K	< 0.05	< 0.05	< 0.07
Phenol	µg/L	0.1	EPA 8270	03-Jan-14/K	< 0.1	< 0.1	< 0.1
Pyrene	µg/L	0.05	EPA 8270	03-Jan-14/K	< 0.05	0.05	0.15
Trichlorobenzene, 1,2,4-	µg/L	0.2	EPA 8270	03-Jan-14/K	< 0.2	< 0.2	< 0.3
Trichlorophenol 2,4,6-	µg/L	0.2	EPA 8270	03-Jan-14/K	< 0.2	< 0.2	< 0.3
Trichlorophenol, 2,4,5-	µg/L	0.2	EPA 8270	03-Jan-14/K	< 0.2	< 0.2	< 0.3



Greg Clarkin, BSc., C. Chem  
Lab Manager - Ottawa District

M.D.L. = Method Detection Limit

Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill

The analytical results reported herein refer to the samples as received. Reproduction of this analytical report in full or in part is prohibited without prior consent from Caduceon Environmental Laboratories.



C.O.C.: G37498

REPORT No. B13-33197

**Report To:**

**WSP Canada Inc.**

300-2611 Queensway Drive,  
Ottawa ON K2B 8K2 Canada

**Attention:** Vahid Arasteh

**Caduceon Environmental Laboratories**

2378 Holly Lane  
Ottawa Ontario K1V 7P1  
Tel: 613-526-0123  
Fax: 613-526-1244

DATE RECEIVED: 30-Dec-13

JOB/PROJECT NO.: 131-20711-06

DATE REPORTED: 10-Jan-14

P.O. NUMBER:

SAMPLE MATRIX: Groundwater

WATERWORKS NO.

			Client I.D.	B-95	B-91	BHMW-1	BHMW-2
			Sample I.D.	B13-33197-1	B13-33197-2	B13-33197-3	B13-33197-4
			Date Collected	28-Dec-13	28-Dec-13	28-Dec-13	28-Dec-13
Parameter	Units	M.D.L.	Reference Method	Date/Site Analyzed			
Terphenyl-d14 (SS)	% rec.	10	EPA 8270	03-Jan-14/K	104	103	105
Tribromophenol, 2,4,6- (SS)	% rec.	10	EPA 8270	03-Jan-14/K	87.0	82.0	118
Acetone	µg/L	2	EPA 8260	30-Dec-13/O	< 2	< 2	< 2
Benzene	µg/L	0.5	EPA 8260	30-Dec-13/O	< 0.5	< 0.5	< 0.5
Bromodichloromethane	µg/L	0.1	EPA 8260	30-Dec-13/O	< 0.1	< 0.1	< 0.1
Bromoform	µg/L	0.1	EPA 8260	30-Dec-13/O	< 0.1	< 0.1	< 0.1
Bromomethane	µg/L	0.3	EPA 8260	30-Dec-13/O	< 0.3	< 0.3	< 0.3
Carbon Tetrachloride	µg/L	0.2	EPA 8260	30-Dec-13/O	< 0.2	< 0.2	< 0.2
Monochlorobenzene (Chlorobenzene)	µg/L	0.2	EPA 8260	30-Dec-13/O	< 0.2	< 0.2	< 0.2
Chloroform	µg/L	0.3	EPA 8260	30-Dec-13/O	< 0.3	< 0.3	1.0
Dibromochloromethane	µg/L	0.1	EPA 8260	30-Dec-13/O	< 0.1	< 0.1	< 0.1
Dibromoethane, 1,2- (Ethylene Dibromide)	µg/L	0.1	EPA 8260	30-Dec-13/O	< 0.1	< 0.1	< 0.1
Dichlorobenzene, 1,2-	µg/L	0.1	EPA 8260	30-Dec-13/O	< 0.1	< 0.1	< 0.1
Dichlorobenzene, 1,3-	µg/L	0.1	EPA 8260	30-Dec-13/O	< 0.1	< 0.1	< 0.1
Dichlorobenzene, 1,4-	µg/L	0.2	EPA 8260	30-Dec-13/O	< 0.2	< 0.2	< 0.2
Dichlorodifluoromethane	µg/L	1	EPA 8260	30-Dec-13/O	< 1	< 1	< 1
Dichloroethane, 1,1-	µg/L	0.1	EPA 8260	30-Dec-13/O	< 0.1	< 0.1	< 0.1
Dichloroethane, 1,2-	µg/L	0.1	EPA 8260	30-Dec-13/O	< 0.1	< 0.1	< 0.1
Dichloroethene, 1,1-	µg/L	0.1	EPA 8260	30-Dec-13/O	< 0.1	< 0.1	< 0.1
Dichloroethene, cis-1,2-	µg/L	0.1	EPA 8260	30-Dec-13/O	< 0.1	< 0.1	< 0.1
Dichloroethene, trans-1,2-	µg/L	0.1	EPA 8260	30-Dec-13/O	< 0.1	< 0.1	< 0.1
Dichloropropane, 1,2-	µg/L	0.1	EPA 8260	30-Dec-13/O	< 0.1	< 0.1	< 0.1
Dichloropropene, cis-1,3-	µg/L	0.1	EPA 8260	30-Dec-13/O	< 0.1	< 0.1	< 0.1
Dichloropropene, trans-1,3-	µg/L	0.1	EPA 8260	30-Dec-13/O	< 0.1	< 0.1	< 0.1
Dichloropropene 1,3-cis+trans	µg/L	0.1	EPA 8260	30-Dec-13/O	< 0.1	< 0.1	< 0.1
Ethylbenzene	µg/L	0.5	EPA 8260	30-Dec-13/O	< 0.5	< 0.5	< 0.5



Greg Clarkin, BSc., C. Chem  
Lab Manager - Ottawa District

M.D.L. = Method Detection Limit

Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill

The analytical results reported herein refer to the samples as received. Reproduction of this analytical report in full or in part is prohibited without prior consent from Caduceon Environmental Laboratories.

C.O.C.: G37498

REPORT No. B13-33197

**Report To:**

**WSP Canada Inc.**

300-2611 Queensway Drive,  
Ottawa ON K2B 8K2 Canada

**Attention:** Vahid Arasteh

**Caduceon Environmental Laboratories**

2378 Holly Lane  
Ottawa Ontario K1V 7P1  
Tel: 613-526-0123  
Fax: 613-526-1244

DATE RECEIVED: 30-Dec-13

JOB/PROJECT NO.: 131-20711-06

DATE REPORTED: 10-Jan-14

P.O. NUMBER:

SAMPLE MATRIX: Groundwater

WATERWORKS NO.

			Client I.D.	B-95	B-91	BHMW-1	BHMW-2
			Sample I.D.	B13-33197-1	B13-33197-2	B13-33197-3	B13-33197-4
			Date Collected	28-Dec-13	28-Dec-13	28-Dec-13	28-Dec-13
Parameter	Units	M.D.L.	Reference Method	Date/Site Analyzed			
Hexane	µg/L	1	EPA 8260	30-Dec-13/O	< 1	< 1	< 1
Dichloromethane (Methylene Chloride)	µg/L	0.3	EPA 8260	30-Dec-13/O	< 0.3	< 0.3	< 0.3
Methyl Ethyl Ketone	µg/L	1	EPA 8260	30-Dec-13/O	< 1	< 1	< 1
Methyl Isobutyl Ketone	µg/L	1	EPA 8260	30-Dec-13/O	< 1	< 1	< 1
Methyl-t-butyl Ether	µg/L	1	EPA 8260	30-Dec-13/O	< 1	< 1	< 1
Styrene	µg/L	0.5	EPA 8260	30-Dec-13/O	< 0.5	< 0.5	< 0.5
Tetrachloroethane,1,1,1,2-	µg/L	0.1	EPA 8260	30-Dec-13/O	< 0.1	< 0.1	< 0.1
Tetrachloroethane,1,1,2,2-	µg/L	0.4	EPA 8260	30-Dec-13/O	< 0.4	< 0.4	< 0.4
Tetrachloroethylene	µg/L	0.2	EPA 8260	30-Dec-13/O	< 0.2	< 0.2	< 0.2
Toluene	µg/L	0.5	EPA 8260	30-Dec-13/O	< 0.5	< 0.5	< 0.5
Trichloroethane,1,1,1-	µg/L	0.1	EPA 8260	30-Dec-13/O	< 0.1	< 0.1	< 0.1
Trichloroethane,1,1,2-	µg/L	0.1	EPA 8260	30-Dec-13/O	< 0.1	< 0.1	< 0.1
Trichloroethylene	µg/L	0.1	EPA 8260	30-Dec-13/O	< 0.1	< 0.1	< 0.1
Trichlorofluoromethane	µg/L	0.1	EPA 8260	30-Dec-13/O	< 0.1	< 0.1	< 0.1
Vinyl Chloride	µg/L	0.2	EPA 8260	30-Dec-13/O	< 0.2	< 0.2	< 0.2
Xylene, m,p-	µg/L	0.4	EPA 8260	30-Dec-13/O	< 0.4	< 0.4	< 0.4
Xylene, o-	µg/L	0.1	EPA 8260	30-Dec-13/O	< 0.1	< 0.1	< 0.1
Xylene, m,p,o-	µg/L	0.4	EPA 8260	30-Dec-13/O	< 0.4	< 0.4	< 0.4
Dichloroethane-d4,1,2-(SS)	%		EPA 8260	30-Dec-13/O	80.0	81.2	95.0
Toluene-d8 (SS)	%		EPA 8260	30-Dec-13/O	98.4	99.6	95.3
Bromofluorobenzene,4(SS)	%		EPA 8260	30-Dec-13/O	103	94.1	101
PHC F1 (C6-C10)	µg/L	10	MOE E3421	02-Jan-14/O	< 10	< 10	< 10
PHC F2 (>C10-C16)	µg/L	50	MOE E3421	06-Jan-14/O	< 50	< 50	< 50
PHC F3 (>C16-C34)	µg/L	400	MOE E3421	06-Jan-14/O	< 400	< 400	< 400
PHC F4 (>C34-C50)	µg/L	400	MOE E3421	06-Jan-14/O	< 400	< 400	< 400

1 Chromium (VI) result is based on total chromium



Greg Clarkin , BSc., C. Chem  
Lab Manager - Ottawa District

M.D.L. = Method Detection Limit

Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill

The analytical results reported herein refer to the samples as received. Reproduction of this analytical report in full or in part is prohibited without prior consent from Caduceon Environmental Laboratories.

C.O.C.: G37498

REPORT No. B13-33197

**Report To:**

**WSP Canada Inc.**

300-2611 Queensway Drive,  
Ottawa ON K2B 8K2 Canada

**Attention:** Vahid Arasteh

**Caduceon Environmental Laboratories**

2378 Holly Lane  
Ottawa Ontario K1V 7P1  
Tel: 613-526-0123  
Fax: 613-526-1244

DATE RECEIVED: 30-Dec-13

JOB/PROJECT NO.: 131-20711-06

DATE REPORTED: 10-Jan-14

P.O. NUMBER:

SAMPLE MATRIX: Groundwater

WATERWORKS NO.

			Client I.D.	BHMW-3	DUP 1		
			Sample I.D.	B13-33197-5	B13-33197-6		
			Date Collected	28-Dec-13	28-Dec-13		
Parameter	Units	M.D.L.	Reference Method	Date/Site Analyzed			
Antimony	µg/L	0.1	EPA 200.8	07-Jan-14/O	1.8	< 0.1	
Arsenic	µg/L	0.1	EPA 200.8	07-Jan-14/O	1.8	0.4	
Barium	µg/L	1	SM 3120	31-Dec-13/O	287	97	
Beryllium	µg/L	0.1	EPA 200.8	07-Jan-14/O	< 0.1	< 0.1	
Boron	µg/L	5	SM 3120	31-Dec-13/O	205	48	
Cadmium	µg/L	0.02	EPA 200.8	07-Jan-14/O	0.809	< 0.015	
Chromium	µg/L	2	SM 3120	31-Dec-13/O	< 2	< 2	
Chromium (VI)	µg/L	2	MOEE 3056	31-Dec-13/O	< 2 <sup>1</sup>	< 2 <sup>1</sup>	
Cobalt	µg/L	0.1	EPA 200.8	07-Jan-14/O	6.8	0.8	
Copper	µg/L	0.1	EPA 200.8	07-Jan-14/O	19.9	1.7	
Lead	µg/L	0.02	EPA 200.8	07-Jan-14/O	1.84	0.12	
Mercury	µg/L	0.02	SM 3112 B	31-Dec-13/O	< 0.02	< 0.02	
Molybdenum	µg/L	0.1	EPA 200.8	07-Jan-14/O	391	3.2	
Nickel	µg/L	10	SM 3120	31-Dec-13/O	20	< 10	
Selenium	µg/L	1	EPA 200.8	07-Jan-14/O	10	2	
Silver	µg/L	0.02	EPA 200.8	07-Jan-14/O	0.14	< 0.02	
Thallium	µg/L	0.05	EPA 200.8	07-Jan-14/O	0.38	< 0.05	
Uranium	µg/L	0.05	EPA 200.8	07-Jan-14/O	9.20	3.86	
Vanadium	µg/L	0.1	EPA 200.8	07-Jan-14/O	1.3	1.6	
Zinc	µg/L	5	SM 3120	31-Dec-13/O	9	< 5	
Acenaphthene	µg/L	0.05	EPA 8270	03-Jan-14/K		< 0.05	
Acenaphthylene	µg/L	0.05	EPA 8270	03-Jan-14/K		< 0.05	
Anthracene	µg/L	0.05	EPA 8270	03-Jan-14/K		< 0.05	
Benzo(a)anthracene	µg/L	0.05	EPA 8270	03-Jan-14/K		< 0.05	
Benzo(a)pyrene	µg/L	0.01	EPA 8270	03-Jan-14/K		< 0.01	
Benzo(b)fluoranthene	µg/L	0.05	EPA 8270	03-Jan-14/K		< 0.05	
Benzo(g,h,i)perylene	µg/L	0.05	EPA 8270	03-Jan-14/K		< 0.05	
Benzo(k)fluoranthene	µg/L	0.05	EPA 8270	03-Jan-14/K		< 0.05	



Greg Clarkin, BSc., C. Chem  
Lab Manager - Ottawa District

M.D.L. = Method Detection Limit

Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill

The analytical results reported herein refer to the samples as received. Reproduction of this analytical report in full or in part is prohibited without prior consent from Caduceon Environmental Laboratories.

C.O.C.: G37498

REPORT No. B13-33197

**Report To:**

**WSP Canada Inc.**

300-2611 Queensway Drive,  
Ottawa ON K2B 8K2 Canada

**Attention:** Vahid Arasteh

**Caduceon Environmental Laboratories**

2378 Holly Lane  
Ottawa Ontario K1V 7P1  
Tel: 613-526-0123  
Fax: 613-526-1244

DATE RECEIVED: 30-Dec-13

JOB/PROJECT NO.: 131-20711-06

DATE REPORTED: 10-Jan-14

P.O. NUMBER:

SAMPLE MATRIX: Groundwater

WATERWORKS NO.

			Client I.D.	BHMW-3	DUP 1		
			Sample I.D.	B13-33197-5	B13-33197-6		
			Date Collected	28-Dec-13	28-Dec-13		
Parameter	Units	M.D.L.	Reference Method	Date/Site Analyzed			
Biphenyl, 1, 1-	µg/L	0.2	EPA 8270	03-Jan-14/K	< 0.2		
Bis(2-Chloroethyl)ether	µg/L	0.2	EPA 8270	03-Jan-14/K	< 0.2		
Bis(2-Chloroisopropyl)ether	µg/L	0.2	EPA 8270	03-Jan-14/K	< 0.2		
Bis(2-ethylhexyl) Phthalate	µg/L	5	EPA 8270	03-Jan-14/K	< 5		
Chloroaniline, 4-	µg/L	0.2	EPA 8270	03-Jan-14/K	< 0.2		
Chlorophenol, 2-	µg/L	0.2	EPA 8270	03-Jan-14/K	< 0.2		
Chrysene	µg/L	0.05	EPA 8270	03-Jan-14/K	< 0.05		
Dibenzo(a,h)anthracene	µg/L	0.05	EPA 8270	03-Jan-14/K	< 0.05		
Dichlorobenzidine, 3,3'-	µg/L	0.5	EPA 8270	03-Jan-14/K	< 0.5		
Dichlorophenol, 2,4-	µg/L	0.2	EPA 8270	03-Jan-14/K	< 0.2		
Diethyl Phthalate	µg/L	1	EPA 8270	03-Jan-14/K	< 1		
Dimethyl Phthalate	µg/L	1	EPA 8270	03-Jan-14/K	< 1		
Dimethylphenol, 2,4-	µg/L	1	EPA 8270	03-Jan-14/K	< 1		
Dinitrophenol, 2,4-	µg/L	1	EPA 8270	03-Jan-14/K	< 1		
Dinitrotoluene, 2,4-	µg/L	0.2	EPA 8270	03-Jan-14/K	< 0.2		
Fluoranthene	µg/L	0.05	EPA 8270	03-Jan-14/K	0.05		
Fluorene	µg/L	0.05	EPA 8270	03-Jan-14/K	< 0.05		
Indeno(1,2,3,-cd)pyrene	µg/L	0.05	EPA 8270	03-Jan-14/K	< 0.05		
Methylnaphthalene, 1-	µg/L	0.05	EPA 8270	03-Jan-14/K	< 0.05		
Methylnaphthalene, 2-	µg/L	0.05	EPA 8270	03-Jan-14/K	< 0.05		
Naphthalene	µg/L	0.05	EPA 8270	03-Jan-14/K	< 0.05		
Pentachlorophenol	µg/L	0.2	EPA 8270	03-Jan-14/K	< 0.2		
Phenanthrene	µg/L	0.05	EPA 8270	03-Jan-14/K	< 0.05		
Phenol	µg/L	0.1	EPA 8270	03-Jan-14/K	< 0.1		
Pyrene	µg/L	0.05	EPA 8270	03-Jan-14/K	< 0.05		
Trichlorobenzene, 1,2,4-	µg/L	0.2	EPA 8270	03-Jan-14/K	< 0.2		
Trichlorophenol 2,4,6-	µg/L	0.2	EPA 8270	03-Jan-14/K	< 0.2		
Trichlorophenol, 2,4,5-	µg/L	0.2	EPA 8270	03-Jan-14/K	< 0.2		



Greg Clarkin, BSc., C. Chem  
Lab Manager - Ottawa District

M.D.L. = Method Detection Limit

Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill

The analytical results reported herein refer to the samples as received. Reproduction of this analytical report in full or in part is prohibited without prior consent from Caduceon Environmental Laboratories.

C.O.C.: G37498

REPORT No. B13-33197

**Report To:**

**WSP Canada Inc.**

300-2611 Queensway Drive,  
Ottawa ON K2B 8K2 Canada

**Attention:** Vahid Arasteh

**Caduceon Environmental Laboratories**

2378 Holly Lane  
Ottawa Ontario K1V 7P1  
Tel: 613-526-0123  
Fax: 613-526-1244

DATE RECEIVED: 30-Dec-13

JOB/PROJECT NO.: 131-20711-06

DATE REPORTED: 10-Jan-14

P.O. NUMBER:

SAMPLE MATRIX: Groundwater

WATERWORKS NO.

			Client I.D.	BHMW-3	DUP 1		
			Sample I.D.	B13-33197-5	B13-33197-6		
			Date Collected	28-Dec-13	28-Dec-13		
Parameter	Units	M.D.L.	Reference Method	Date/Site Analyzed			
Terphenyl-d14 (SS)	% rec.	10	EPA 8270	03-Jan-14/K		107	
Tribromophenol, 2,4,6- (SS)	% rec.	10	EPA 8270	03-Jan-14/K		94.0	
Acetone	µg/L	2	EPA 8260	30-Dec-13/O	< 2	< 2	
Benzene	µg/L	0.5	EPA 8260	30-Dec-13/O	< 0.5	< 0.5	
Bromodichloromethane	µg/L	0.1	EPA 8260	30-Dec-13/O	< 0.1	< 0.1	
Bromoform	µg/L	0.1	EPA 8260	30-Dec-13/O	< 0.1	< 0.1	
Bromomethane	µg/L	0.3	EPA 8260	30-Dec-13/O	< 0.3	< 0.3	
Carbon Tetrachloride	µg/L	0.2	EPA 8260	30-Dec-13/O	< 0.2	< 0.2	
Monochlorobenzene (Chlorobenzene)	µg/L	0.2	EPA 8260	30-Dec-13/O	< 0.2	< 0.2	
Chloroform	µg/L	0.3	EPA 8260	30-Dec-13/O	2.8	< 0.3	
Dibromochloromethane	µg/L	0.1	EPA 8260	30-Dec-13/O	< 0.1	< 0.1	
Dibromoethane, 1,2- (Ethylene Dibromide)	µg/L	0.1	EPA 8260	30-Dec-13/O	< 0.1	< 0.1	
Dichlorobenzene, 1,2-	µg/L	0.1	EPA 8260	30-Dec-13/O	< 0.1	< 0.1	
Dichlorobenzene, 1,3-	µg/L	0.1	EPA 8260	30-Dec-13/O	< 0.1	< 0.1	
Dichlorobenzene, 1,4-	µg/L	0.2	EPA 8260	30-Dec-13/O	< 0.2	< 0.2	
Dichlorodifluoromethane	µg/L	1	EPA 8260	30-Dec-13/O	< 1	< 1	
Dichloroethane, 1,1-	µg/L	0.1	EPA 8260	30-Dec-13/O	< 0.1	< 0.1	
Dichloroethane, 1,2-	µg/L	0.1	EPA 8260	30-Dec-13/O	< 0.1	< 0.1	
Dichloroethene, 1,1-	µg/L	0.1	EPA 8260	30-Dec-13/O	< 0.1	< 0.1	
Dichloroethene, cis-1,2-	µg/L	0.1	EPA 8260	30-Dec-13/O	< 0.1	< 0.1	
Dichloroethene, trans-1,2-	µg/L	0.1	EPA 8260	30-Dec-13/O	< 0.1	< 0.1	
Dichloropropane, 1,2-	µg/L	0.1	EPA 8260	30-Dec-13/O	< 0.1	< 0.1	
Dichloropropene, cis-1,3-	µg/L	0.1	EPA 8260	30-Dec-13/O	< 0.1	< 0.1	
Dichloropropene, trans-1,3-	µg/L	0.1	EPA 8260	30-Dec-13/O	< 0.1	< 0.1	
Dichloropropene 1,3-cis+trans	µg/L	0.1	EPA 8260	30-Dec-13/O	< 0.1	< 0.1	
Ethylbenzene	µg/L	0.5	EPA 8260	30-Dec-13/O	< 0.5	< 0.5	



Greg Clarkin , BSc., C. Chem  
Lab Manager - Ottawa District

M.D.L. = Method Detection Limit

Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill

The analytical results reported herein refer to the samples as received. Reproduction of this analytical report in full or in part is prohibited without prior consent from Caduceon Environmental Laboratories.

**C.O.C.: G37498**

**REPORT No. B13-33197**

**Report To:**

**WSP Canada Inc.**

300-2611 Queensway Drive,  
Ottawa ON K2B 8K2 Canada

**Attention:** Vahid Arasteh

**Caduceon Environmental Laboratories**

2378 Holly Lane  
Ottawa Ontario K1V 7P1  
Tel: 613-526-0123  
Fax: 613-526-1244

DATE RECEIVED: 30-Dec-13

JOB/PROJECT NO.: 131-20711-06

DATE REPORTED: 10-Jan-14

P.O. NUMBER:

SAMPLE MATRIX: Groundwater

WATERWORKS NO.

			Client I.D.	BHMW-3	DUP 1		
			Sample I.D.	B13-33197-5	B13-33197-6		
			Date Collected	28-Dec-13	28-Dec-13		
Parameter	Units	M.D.L.	Reference Method	Date/Site Analyzed			
Hexane	µg/L	1	EPA 8260	30-Dec-13/O	< 1	< 1	
Dichloromethane (Methylene Chloride)	µg/L	0.3	EPA 8260	30-Dec-13/O	< 0.3	< 0.3	
Methyl Ethyl Ketone	µg/L	1	EPA 8260	30-Dec-13/O	< 1	< 1	
Methyl Isobutyl Ketone	µg/L	1	EPA 8260	30-Dec-13/O	< 1	< 1	
Methyl-t-butyl Ether	µg/L	1	EPA 8260	30-Dec-13/O	< 1	< 1	
Styrene	µg/L	0.5	EPA 8260	30-Dec-13/O	< 0.5	< 0.5	
Tetrachloroethane,1,1,1,2-	µg/L	0.1	EPA 8260	30-Dec-13/O	< 0.1	< 0.1	
Tetrachloroethane,1,1,2,2-	µg/L	0.4	EPA 8260	30-Dec-13/O	< 0.4	< 0.4	
Tetrachloroethylene	µg/L	0.2	EPA 8260	30-Dec-13/O	< 0.2	< 0.2	
Toluene	µg/L	0.5	EPA 8260	30-Dec-13/O	< 0.5	< 0.5	
Trichloroethane,1,1,1-	µg/L	0.1	EPA 8260	30-Dec-13/O	< 0.1	< 0.1	
Trichloroethane,1,1,2-	µg/L	0.1	EPA 8260	30-Dec-13/O	< 0.1	< 0.1	
Trichloroethylene	µg/L	0.1	EPA 8260	30-Dec-13/O	< 0.1	< 0.1	
Trichlorofluoromethane	µg/L	0.1	EPA 8260	30-Dec-13/O	< 0.1	< 0.1	
Vinyl Chloride	µg/L	0.2	EPA 8260	30-Dec-13/O	< 0.2	< 0.2	
Xylene, m,p-	µg/L	0.4	EPA 8260	30-Dec-13/O	< 0.4	< 0.4	
Xylene, o-	µg/L	0.1	EPA 8260	30-Dec-13/O	< 0.1	< 0.1	
Xylene, m,p,o-	µg/L	0.4	EPA 8260	30-Dec-13/O	< 0.4	< 0.4	
Dichloroethane-d4,1,2-(SS)	%		EPA 8260	30-Dec-13/O	93.1	92.9	
Toluene-d8 (SS)	%		EPA 8260	30-Dec-13/O	96.8	96.6	
Bromofluorobenzene,4(SS)	%		EPA 8260	30-Dec-13/O	103	105	
PHC F1 (C6-C10)	µg/L	10	MOE E3421	02-Jan-14/O	< 10	< 10	
PHC F2 (>C10-C16)	µg/L	50	MOE E3421	06-Jan-14/O	< 50	< 50	
PHC F3 (>C16-C34)	µg/L	400	MOE E3421	06-Jan-14/O	< 400	< 400	
PHC F4 (>C34-C50)	µg/L	400	MOE E3421	06-Jan-14/O	< 400	< 400	

1 Chromium (VI) result is based on total chromium



Greg Clarkin , BSc., C. Chem  
Lab Manager - Ottawa District

M.D.L. = Method Detection Limit

Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill

The analytical results reported herein refer to the samples as received. Reproduction of this analytical report in full or in part is prohibited without prior consent from Caduceon Environmental Laboratories.



C.O.C.: G37495

REPORT No. B13-32999 (ii)

Rev. 1

**Report To:**

**WSP Canada Inc.**

300-2611 Queensway Drive,  
Ottawa ON K2B 8K2 Canada

**Attention:** Vahid Arasteh

**Caduceon Environmental Laboratories**

2378 Holly Lane  
Ottawa Ontario K1V 7P1  
Tel: 613-526-0123  
Fax: 613-526-1244

DATE RECEIVED: 23-Dec-13

JOB/PROJECT NO.: 131-20711-06

DATE REPORTED: 17-Jan-14

P.O. NUMBER:

SAMPLE MATRIX: Soil

WATERWORKS NO.

			Client I.D.		BHMW1-SS1	BHMW3-SS1	BHMW3-SS3	BHMW2-SS3B
			Sample I.D.		B13-32999-1	B13-32999-2	B13-32999-3	B13-32999-4
			Date Collected		21-Dec-13	21-Dec-13	21-Dec-13	21-Dec-13
Parameter	Units	M.D.L.	Reference Method	Date/Site Analyzed				
% moisture	%	0.1		24-Dec-13/O	16.4	12.2	22.1	12.8
Acetone	µg/g	0.5	EPA 8260	24-Dec-13/R	< 0.5	< 0.5	< 0.5	< 0.5
Benzene	µg/g	0.02	EPA 8260	24-Dec-13/R	< 0.02	< 0.02	< 0.02	< 0.02
Bromodichloromethane	µg/g	0.02	EPA 8260	24-Dec-13/R	< 0.02	< 0.02	< 0.02	< 0.02
Bromoform	µg/g	0.02	EPA 8260	24-Dec-13/R	< 0.02	< 0.02	< 0.02	< 0.02
Bromomethane	µg/g	0.05	EPA 8260	24-Dec-13/R	< 0.05	< 0.05	< 0.05	< 0.05
Carbon Tetrachloride	µg/g	0.05	EPA 8260	24-Dec-13/R	< 0.05	< 0.05	< 0.05	< 0.05
Monochlorobenzene (Chlorobenzene)	µg/g	0.02	EPA 8260	24-Dec-13/R	< 0.02	< 0.02	< 0.02	< 0.02
Chloroform	µg/g	0.02	EPA 8260	24-Dec-13/R	< 0.02	< 0.02	< 0.02	< 0.02
Dibromochloromethane	µg/g	0.02	EPA 8260	24-Dec-13/R	< 0.02	< 0.02	< 0.02	< 0.02
Dichlorobenzene,1,2-	µg/g	0.05	EPA 8260	24-Dec-13/R	< 0.05	< 0.05	< 0.05	< 0.05
Dichlorobenzene,1,3-	µg/g	0.05	EPA 8260	24-Dec-13/R	< 0.05	< 0.05	< 0.05	< 0.05
Dichlorobenzene,1,4-	µg/g	0.05	EPA 8260	24-Dec-13/R	< 0.05	< 0.05	< 0.05	< 0.05
Dichlorodifluoromethane	µg/g	0.05	EPA 8260	24-Dec-13/R	< 0.05	< 0.05	< 0.05	< 0.05
Dichloroethane,1,1-	µg/g	0.02	EPA 8260	24-Dec-13/R	< 0.02	< 0.02	< 0.02	< 0.02
Dichloroethane,1,2-	µg/g	0.02	EPA 8260	24-Dec-13/R	< 0.02	< 0.02	< 0.02	< 0.02
Dichloroethylene,1,1-	µg/g	0.02	EPA 8260	24-Dec-13/R	< 0.02	< 0.02	< 0.02	< 0.02

NOTE: Revision created upon request from client to change sample ID for B13-32999-4 to BHMW2-SS3B.

M.D.L. = Method Detection Limit

Site Analyzed: K-Kingston, W-Windsor, O-Ottawa, R-Richmond Hill



Greg Clarkin, BSc., C. Chem

Lab Manager - Ottawa District

The analytical results reported herein refer to the samples as received. Reproduction of this analytical report in full or in part is prohibited without prior consent from Caduceon Environmental Laboratories.

C.O.C.: G37495

REPORT No. B13-32999 (ii)

Rev. 1

**Report To:**

**WSP Canada Inc.**

300-2611 Queensway Drive,  
Ottawa ON K2B 8K2 Canada

**Attention:** Vahid Arasteh

**Caduceon Environmental Laboratories**

2378 Holly Lane  
Ottawa Ontario K1V 7P1  
Tel: 613-526-0123  
Fax: 613-526-1244

DATE RECEIVED: 23-Dec-13

JOB/PROJECT NO.: 131-20711-06

DATE REPORTED: 17-Jan-14

P.O. NUMBER:

SAMPLE MATRIX: Soil

WATERWORKS NO.

			Client I.D.	BHMW1-SS1	BHMW3-SS1	BHMW3-SS3	BHMW2-SS3B
			Sample I.D.	B13-32999-1	B13-32999-2	B13-32999-3	B13-32999-4
			Date Collected	21-Dec-13	21-Dec-13	21-Dec-13	21-Dec-13
Parameter	Units	M.D.L.	Reference Method	Date/Site Analyzed			
Dichloroethene, cis-1,2-	µg/g	0.02	EPA 8260	24-Dec-13/R	< 0.02	< 0.02	< 0.02
Dichloroethene, trans-1,2-	µg/g	0.02	EPA 8260	24-Dec-13/R	< 0.02	< 0.02	< 0.02
Dichloropropane, 1,2-	µg/g	0.02	EPA 8260	24-Dec-13/R	< 0.02	< 0.02	< 0.02
Dichloropropene, cis-1,3-	µg/g	0.02	EPA 8260	24-Dec-13/R	< 0.02	< 0.02	< 0.02
Dichloropropene, trans-1,3-	µg/g	0.02	EPA 8260	24-Dec-13/R	< 0.02	< 0.02	< 0.02
Dichloropropene 1,3-cis+trans	µg/g	0.02	EPA 8260	24-Dec-13/R	< 0.02	< 0.02	< 0.02
Ethylbenzene	µg/g	0.05	EPA 8260	24-Dec-13/R	< 0.05	< 0.05	< 0.05
Dibromoethane, 1,2-(Ethylene Dibromide)	µg/g	0.02	EPA 8260	24-Dec-13/R	< 0.02	< 0.02	< 0.02
Hexane	µg/g	0.02	EPA 8260	24-Dec-13/R	< 0.02	< 0.02	< 0.02
Methyl Ethyl Ketone	µg/g	0.5	EPA 8260	24-Dec-13/R	< 0.5	< 0.5	< 0.5
Methyl Isobutyl Ketone	µg/g	0.5	EPA 8260	24-Dec-13/R	< 0.5	< 0.5	< 0.5
Methyl-t-butyl Ether	µg/g	0.05	EPA 8260	24-Dec-13/R	< 0.05	< 0.05	< 0.05
Dichloromethane (Methylene Chloride)	µg/g	0.05	EPA 8260	24-Dec-13/R	< 0.05	< 0.05	< 0.05
Styrene	µg/g	0.05	EPA 8260	24-Dec-13/R	< 0.05	< 0.05	< 0.05
Tetrachloroethane, 1,1,1,2-	µg/g	0.02	EPA 8260	24-Dec-13/R	< 0.02	< 0.02	< 0.02
Tetrachloroethane, 1,1,2,2-	µg/g	0.05	EPA 8260	24-Dec-13/R	< 0.05	< 0.05	< 0.05

NOTE: Revision created upon request from client to change sample ID for B13-32999-4 to BHMW2-SS3B.

M.D.L. = Method Detection Limit

Site Analyzed: K-Kingston, W-Windsor, O-Ottawa, R-Richmond Hill



Greg Clarkin, BSc., C. Chem

Lab Manager - Ottawa District

The analytical results reported herein refer to the samples as received. Reproduction of this analytical report in full or in part is prohibited without prior consent from Caduceon Environmental Laboratories.

**C.O.C.: G37495**

**REPORT No. B13-32999 (ii)**

**Rev. 1**

**Report To:**

**WSP Canada Inc.**

300-2611 Queensway Drive,  
Ottawa ON K2B 8K2 Canada

**Attention:** Vahid Arasteh

**Caduceon Environmental Laboratories**

2378 Holly Lane  
Ottawa Ontario K1V 7P1  
Tel: 613-526-0123  
Fax: 613-526-1244

DATE RECEIVED: 23-Dec-13

JOB/PROJECT NO.: 131-20711-06

DATE REPORTED: 17-Jan-14

P.O. NUMBER:

SAMPLE MATRIX: Soil

WATERWORKS NO.

			Client I.D.	BHMW1-SS1	BHMW3-SS1	BHMW3-SS3	BHMW2-SS3B
			Sample I.D.	B13-32999-1	B13-32999-2	B13-32999-3	B13-32999-4
			Date Collected	21-Dec-13	21-Dec-13	21-Dec-13	21-Dec-13
Parameter	Units	M.D.L.	Reference Method	Date/Site Analyzed			
Tetrachloroethylene	µg/g	0.05	EPA 8260	24-Dec-13/R	< 0.05	< 0.05	< 0.05
Toluene	µg/g	0.2	EPA 8260	24-Dec-13/R	< 0.2	< 0.2	< 0.2
Trichlorobenzene,1,2,4-	µg/g	0.05	EPA 8260	24-Dec-13/R	< 0.05	< 0.05	< 0.05
Trichloroethane,1,1,1-	µg/g	0.02	EPA 8260	24-Dec-13/R	< 0.02	< 0.02	< 0.02
Trichloroethane,1,1,2-	µg/g	0.02	EPA 8260	24-Dec-13/R	< 0.02	< 0.02	< 0.02
Trichloroethylene	µg/g	0.05	EPA 8260	24-Dec-13/R	< 0.05	< 0.05	< 0.05
Trichlorofluoromethane	µg/g	0.02	EPA 8260	24-Dec-13/R	< 0.02	< 0.02	< 0.02
Vinyl Chloride	µg/g	0.02	EPA 8260	24-Dec-13/R	< 0.02	< 0.02	< 0.02
Xylene, m,p-	µg/g	0.03	EPA 8260	24-Dec-13/R	< 0.03	< 0.03	< 0.03
Xylene, o-	µg/g	0.03	EPA 8260	24-Dec-13/R	< 0.03	< 0.03	< 0.03
Xylene, m,p,o-	µg/g	0.03	EPA 8260	24-Dec-13/R	< 0.03	< 0.03	< 0.03
Dibromofluoromethane (SS)	% rec.		EPA 8260	24-Dec-13/R	93.4	90.3	90.5
Toluene-d8 (SS)	% rec.		EPA 8260	24-Dec-13/R	102	97.5	100
Bromofluorobenzene,4(SS)	% rec.		EPA 8260	24-Dec-13/R	96.7	97.1	96.3
PHC F1 (C6-C10)	µg/g	10	CWS Tier 1	24-Dec-13/R	< 10	< 10	< 10
PHC F2 (>C10-C16)	µg/g	3	MOE E3398	02-Jan-14/O	7	14	18
PHC F3 (>C16-C34)	µg/g	9	MOE E3398	02-Jan-14/O	101	300	906

NOTE: Revision created upon request from client to change sample ID for B13-32999-4 to BHMW2-SS3B.

M.D.L. = Method Detection Limit

Site Analyzed: K-Kingston, W-Windsor, O-Ottawa, R-Richmond Hill



Greg Clarkin, BSc., C. Chem

Lab Manager - Ottawa District

The analytical results reported herein refer to the samples as received. Reproduction of this analytical report in full or in part is prohibited without prior consent from Caduceon Environmental Laboratories.

**C.O.C.: G37495**

**REPORT No. B13-32999 (ii)**

**Rev. 1**

**Report To:**

**WSP Canada Inc.**

300-2611 Queensway Drive,  
Ottawa ON K2B 8K2 Canada

**Attention:** Vahid Arasteh

**Caduceon Environmental Laboratories**

2378 Holly Lane  
Ottawa Ontario K1V 7P1  
Tel: 613-526-0123  
Fax: 613-526-1244

DATE RECEIVED: 23-Dec-13

JOB/PROJECT NO.: 131-20711-06

DATE REPORTED: 17-Jan-14

P.O. NUMBER:

SAMPLE MATRIX: Soil

WATERWORKS NO.

			Client I.D.		BHMW1-SS1	BHMW3-SS1	BHMW3-SS3	BHMW2-SS3B
			Sample I.D.		B13-32999-1	B13-32999-2	B13-32999-3	B13-32999-4
			Date Collected		21-Dec-13	21-Dec-13	21-Dec-13	21-Dec-13
Parameter	Units	M.D.L.	Reference Method	Date/Site Analyzed				
PHC F4 (>C34-C50)	µg/g	8	MOE E3398	02-Jan-14/O	22	96	245	328

NOTE: Revision created upon request from client to change sample ID for B13-32999-4 to BHMW2-SS3B.

M.D.L. = Method Detection Limit

Site Analyzed: K-Kingston, W-Windsor, O-Ottawa, R-Richmond Hill



Greg Clarkin, BSc., C. Chem

Lab Manager - Ottawa District

The analytical results reported herein refer to the samples as received. Reproduction of this analytical report in full or in part is prohibited without prior consent from Caduceon Environmental Laboratories.

**C.O.C.: G37495**

**REPORT No. B13-32999 (ii)**

**Rev. 1**

**Report To:**

**WSP Canada Inc.**

300-2611 Queensway Drive,  
Ottawa ON K2B 8K2 Canada

**Attention:** Vahid Arasteh

**Caduceon Environmental Laboratories**

2378 Holly Lane  
Ottawa Ontario K1V 7P1  
Tel: 613-526-0123  
Fax: 613-526-1244

DATE RECEIVED: 23-Dec-13

JOB/PROJECT NO.: 131-20711-06

DATE REPORTED: 17-Jan-14

P.O. NUMBER:

SAMPLE MATRIX: Soil

WATERWORKS NO.

			Client I.D.	BHMW2-SS1	Dup-1		
			Sample I.D.	B13-32999-5	B13-32999-6		
			Date Collected	21-Dec-13	21-Dec-13		
Parameter	Units	M.D.L.	Reference Method	Date/Site Analyzed			
% moisture	%	0.1		24-Dec-13/O	9.5	11.5	
Acetone	µg/g	0.5	EPA 8260	24-Dec-13/R	< 0.5	< 0.5	
Benzene	µg/g	0.02	EPA 8260	24-Dec-13/R	< 0.02	< 0.02	
Bromodichloromethane	µg/g	0.02	EPA 8260	24-Dec-13/R	< 0.02	< 0.02	
Bromoform	µg/g	0.02	EPA 8260	24-Dec-13/R	< 0.02	< 0.02	
Bromomethane	µg/g	0.05	EPA 8260	24-Dec-13/R	< 0.05	< 0.05	
Carbon Tetrachloride	µg/g	0.05	EPA 8260	24-Dec-13/R	< 0.05	< 0.05	
Monochlorobenzene (Chlorobenzene)	µg/g	0.02	EPA 8260	24-Dec-13/R	< 0.02	< 0.02	
Chloroform	µg/g	0.02	EPA 8260	24-Dec-13/R	< 0.02	< 0.02	
Dibromochloromethane	µg/g	0.02	EPA 8260	24-Dec-13/R	< 0.02	< 0.02	
Dichlorobenzene,1,2-	µg/g	0.05	EPA 8260	24-Dec-13/R	< 0.05	< 0.05	
Dichlorobenzene,1,3-	µg/g	0.05	EPA 8260	24-Dec-13/R	< 0.05	< 0.05	
Dichlorobenzene,1,4-	µg/g	0.05	EPA 8260	24-Dec-13/R	< 0.05	< 0.05	
Dichlorodifluoromethane	µg/g	0.05	EPA 8260	24-Dec-13/R	< 0.05	< 0.05	
Dichloroethane,1,1-	µg/g	0.02	EPA 8260	24-Dec-13/R	< 0.02	< 0.02	
Dichloroethane,1,2-	µg/g	0.02	EPA 8260	24-Dec-13/R	< 0.02	< 0.02	
Dichloroethylene,1,1-	µg/g	0.02	EPA 8260	24-Dec-13/R	< 0.02	< 0.02	

NOTE: Revision created upon request from client to change sample ID for B13-32999-4 to BHMW2-SS3B.

M.D.L. = Method Detection Limit

Site Analyzed: K-Kingston, W-Windsor, O-Ottawa, R-Richmond Hill



Greg Clarkin, BSc., C. Chem

Lab Manager - Ottawa District

The analytical results reported herein refer to the samples as received. Reproduction of this analytical report in full or in part is prohibited without prior consent from Caduceon Environmental Laboratories.

C.O.C.: G37495

REPORT No. B13-32999 (ii)

Rev. 1

**Report To:**

**WSP Canada Inc.**

300-2611 Queensway Drive,  
Ottawa ON K2B 8K2 Canada

**Attention:** Vahid Arasteh

**Caduceon Environmental Laboratories**

2378 Holly Lane  
Ottawa Ontario K1V 7P1  
Tel: 613-526-0123  
Fax: 613-526-1244

DATE RECEIVED: 23-Dec-13

JOB/PROJECT NO.: 131-20711-06

DATE REPORTED: 17-Jan-14

P.O. NUMBER:

SAMPLE MATRIX: Soil

WATERWORKS NO.

			Client I.D.	BHMW2-SS1	Dup-1		
			Sample I.D.	B13-32999-5	B13-32999-6		
			Date Collected	21-Dec-13	21-Dec-13		
Parameter	Units	M.D.L.	Reference Method	Date/Site Analyzed			
Dichloroethene, cis-1,2-	µg/g	0.02	EPA 8260	24-Dec-13/R	< 0.02	< 0.02	
Dichloroethene, trans-1,2-	µg/g	0.02	EPA 8260	24-Dec-13/R	< 0.02	< 0.02	
Dichloropropane, 1,2-	µg/g	0.02	EPA 8260	24-Dec-13/R	< 0.02	< 0.02	
Dichloropropene, cis-1,3-	µg/g	0.02	EPA 8260	24-Dec-13/R	< 0.02	< 0.02	
Dichloropropene, trans-1,3-	µg/g	0.02	EPA 8260	24-Dec-13/R	< 0.02	< 0.02	
Dichloropropene 1,3-cis+trans	µg/g	0.02	EPA 8260	24-Dec-13/R	< 0.02	< 0.02	
Ethylbenzene	µg/g	0.05	EPA 8260	24-Dec-13/R	< 0.05	< 0.05	
Dibromoethane, 1,2-(Ethylene Dibromide)	µg/g	0.02	EPA 8260	24-Dec-13/R	< 0.02	< 0.02	
Hexane	µg/g	0.02	EPA 8260	24-Dec-13/R	< 0.02	< 0.02	
Methyl Ethyl Ketone	µg/g	0.5	EPA 8260	24-Dec-13/R	< 0.5	< 0.5	
Methyl Isobutyl Ketone	µg/g	0.5	EPA 8260	24-Dec-13/R	< 0.5	< 0.5	
Methyl-t-butyl Ether	µg/g	0.05	EPA 8260	24-Dec-13/R	< 0.05	< 0.05	
Dichloromethane (Methylene Chloride)	µg/g	0.05	EPA 8260	24-Dec-13/R	< 0.05	< 0.05	
Styrene	µg/g	0.05	EPA 8260	24-Dec-13/R	< 0.05	< 0.05	
Tetrachloroethane, 1,1,1,2-	µg/g	0.02	EPA 8260	24-Dec-13/R	< 0.02	< 0.02	
Tetrachloroethane, 1,1,2,2-	µg/g	0.05	EPA 8260	24-Dec-13/R	< 0.05	< 0.05	

NOTE: Revision created upon request from client to change sample ID for B13-32999-4 to BHMW2-SS3B.

M.D.L. = Method Detection Limit

Site Analyzed: K-Kingston, W-Windsor, O-Ottawa, R-Richmond Hill



Greg Clarkin, BSc., C. Chem

Lab Manager - Ottawa District

The analytical results reported herein refer to the samples as received. Reproduction of this analytical report in full or in part is prohibited without prior consent from Caduceon Environmental Laboratories.



**C.O.C.: G37495**

**REPORT No. B13-32999 (ii)**

**Rev. 1**

**Report To:**

**WSP Canada Inc.**

300-2611 Queensway Drive,  
Ottawa ON K2B 8K2 Canada

**Attention:** Vahid Arasteh

**Caduceon Environmental Laboratories**

2378 Holly Lane  
Ottawa Ontario K1V 7P1  
Tel: 613-526-0123  
Fax: 613-526-1244

DATE RECEIVED: 23-Dec-13

JOB/PROJECT NO.: 131-20711-06

DATE REPORTED: 17-Jan-14

P.O. NUMBER:

SAMPLE MATRIX: Soil

WATERWORKS NO.

			Client I.D.	BHMW2-SS1	Dup-1		
			Sample I.D.	B13-32999-5	B13-32999-6		
			Date Collected	21-Dec-13	21-Dec-13		
Parameter	Units	M.D.L.	Reference Method	Date/Site Analyzed			
Tetrachloroethylene	µg/g	0.05	EPA 8260	24-Dec-13/R	< 0.05	< 0.05	
Toluene	µg/g	0.2	EPA 8260	24-Dec-13/R	< 0.2	< 0.2	
Trichlorobenzene,1,2,4-	µg/g	0.05	EPA 8260	24-Dec-13/R	< 0.05	< 0.05	
Trichloroethane,1,1,1-	µg/g	0.02	EPA 8260	24-Dec-13/R	< 0.02	< 0.02	
Trichloroethane,1,1,2-	µg/g	0.02	EPA 8260	24-Dec-13/R	< 0.02	< 0.02	
Trichloroethylene	µg/g	0.05	EPA 8260	24-Dec-13/R	< 0.05	< 0.05	
Trichlorofluoromethane	µg/g	0.02	EPA 8260	24-Dec-13/R	< 0.02	< 0.02	
Vinyl Chloride	µg/g	0.02	EPA 8260	24-Dec-13/R	< 0.02	< 0.02	
Xylene, m,p-	µg/g	0.03	EPA 8260	24-Dec-13/R	< 0.03	< 0.03	
Xylene, o-	µg/g	0.03	EPA 8260	24-Dec-13/R	< 0.03	< 0.03	
Xylene, m,p,o-	µg/g	0.03	EPA 8260	24-Dec-13/R	< 0.03	< 0.03	
Dibromofluoromethane (SS)	% rec.		EPA 8260	24-Dec-13/R	92.8	93.1	
Toluene-d8 (SS)	% rec.		EPA 8260	24-Dec-13/R	102	103	
Bromofluorobenzene,4(SS)	% rec.		EPA 8260	24-Dec-13/R	95.1	95.8	
PHC F1 (C6-C10)	µg/g	10	CWS Tier 1	24-Dec-13/R	< 10	< 10	
PHC F2 (>C10-C16)	µg/g	3	MOE E3398	02-Jan-14/O	11	19	
PHC F3 (>C16-C34)	µg/g	9	MOE E3398	02-Jan-14/O	186	584	

NOTE: Revision created upon request from client to change sample ID for B13-32999-4 to BHMW2-SS3B.

M.D.L. = Method Detection Limit

Site Analyzed: K-Kingston, W-Windsor, O-Ottawa, R-Richmond Hill



Greg Clarkin, BSc., C. Chem

Lab Manager - Ottawa District

The analytical results reported herein refer to the samples as received. Reproduction of this analytical report in full or in part is prohibited without prior consent from Caduceon Environmental Laboratories.

**C.O.C.: G37495**

**REPORT No. B13-32999 (ii)**

**Rev. 1**

**Report To:**

**WSP Canada Inc.**

300-2611 Queensway Drive,  
Ottawa ON K2B 8K2 Canada

**Attention:** Vahid Arasteh

**Caduceon Environmental Laboratories**

2378 Holly Lane  
Ottawa Ontario K1V 7P1  
Tel: 613-526-0123  
Fax: 613-526-1244

DATE RECEIVED: 23-Dec-13

JOB/PROJECT NO.: 131-20711-06

DATE REPORTED: 17-Jan-14

P.O. NUMBER:

SAMPLE MATRIX: Soil

WATERWORKS NO.

			<b>Client I.D.</b>	BHMW2-SS1	Dup-1		
			<b>Sample I.D.</b>	B13-32999-5	B13-32999-6		
			<b>Date Collected</b>	21-Dec-13	21-Dec-13		
Parameter	Units	M.D.L.	Reference Method	Date/Site Analyzed			
PHC F4 (>C34-C50)	µg/g	8	MOE E3398	02-Jan-14/O	89	324	

NOTE: Revision created upon request from client to change sample ID for B13-32999-4 to BHMW2-SS3B.

µg/g = micrograms per gram (parts per million) and is equal to mg/Kg

F1 C6-C10 hydrocarbons in µg/g, (F1-btex if requested)

F2 C10-C16 hydrocarbons in µg/g, (F2-naph if requested)

F3 C16-C34 hydrocarbons in µg/g, (F3-pah if requested)

F4 C34-C50 hydrocarbons in µg/g

This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.

Any deviations from the method are noted and reported for any particular sample.

nC6 and nC10 response factor is within 30% of response factor for toluene:

nC10, nC16 and nC34 response factors within 10% of each other:

C50 response factors within 70% of nC10+nC16+nC34 average:

Linearity is within 15%:

All results expressed on a dry weight basis.

Unless otherwise noted all chromatograms returned to baseline by the retention time of nC50.

Unless otherwise noted all extraction, analysis, QC requirements and limits for holding time were met. If analyzed for F4 and F4G they are not to be summed but the greater of the two numbers are to be used in application to the CWS PHC QC will be made available upon request.

M.D.L. = Method Detection Limit

Site Analyzed: K-Kingston, W-Windsor, O-Ottawa, R-Richmond Hill



Greg Clarkin, BSc., C. Chem

Lab Manager - Ottawa District

The analytical results reported herein refer to the samples as received. Reproduction of this analytical report in full or in part is prohibited without prior consent from

---

## Appendix G

### Health and Safety Plan and Underground Utility Locates

---

Subject: <b>HEALTH AND SAFETY PLAN (HASP) (SITE/PROJECT SPECIFIC)</b>			
To: <i>All GENIVAR employees</i>		No: <b>G-EHS-FOR-63-15</b>	Rev:
Revised by:	Approved by:	First issue date:	October 05, 2010
Nicole TMJ Stoker	Marc Rivard	Revision date:	January 03, 2011

**PROJECT PARTICULARS**

DATE: December 17, 2013	
PROJECT NUMBER: <u>131-20711-06</u>	PROJECT TITLE: <u>Phase II ESA / Geo Investigation</u>
CLIENT: <u>NRCan</u>	PROJECT LOCATION: <u>(Township Municipality etc...) 555 Booth St. Ottawa ON</u>
IS GENIVAR THE "CONSTRUCTOR" YES <input checked="" type="checkbox"/> NO <input type="checkbox"/> If "NO" who is? _____	
<b>H&amp;S PLAN</b> The purpose of the plan is to list the safety requirements for this project.	
<b>SCOPE OF WORK:</b> The scope of work includes the following: -retain a contractor to complete the utility locates -retain a drilling contractor to drill 4 exterior monitoring wells to an approximate depth of 4.5 m -collect and screen soil and groundwater samples at regular intervals for PHC/BTEX/VOC/PAHs -submit soil and GW sample for lab analysis	
<b>SPECIAL INSTRUCTIONS:</b>	
Ottawa Valley Locate is responsible to complete the utility locates. George Downing Estate Drilling has been retained by GENIVAR to drill the boreholes and install the monitoring wells.	
<b>SITE DESCRIPTION:</b> (include map if applicable) The site is located at 555 Booth St Ottawa The site is currently occupied by NRCan for office activities.	
DOES THE PROJECT REQUIRE TECHNICAL FIELD STAFF TO WORK EVENINGS OR OVERNIGHT? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	
SERVICE LOCATES REQUIRED: <b>1-800-400-2256</b> ON1CALL <input type="checkbox"/>	
Water <input checked="" type="checkbox"/>	Gas <input checked="" type="checkbox"/> Cable <input checked="" type="checkbox"/> Other <input checked="" type="checkbox"/>
Hydro <input checked="" type="checkbox"/>	Telephone <input checked="" type="checkbox"/> Storm/Sanitary <input checked="" type="checkbox"/> Private services/utilities
(attach a copy of each clearance certificate as required and obtained)	
<b>SUB-CONTRACTOR REQUIRED DOCUMENTATION ATTACHED:</b>	
WSIB Clearance Certificate <input checked="" type="checkbox"/>	General Liability Insurance <input type="checkbox"/> Form 100 <input type="checkbox"/> (50K + see conditions)
Training Certificates <input checked="" type="checkbox"/>	H&S Policy Statement <input type="checkbox"/> Other <input type="checkbox"/>
<b>POSTED INFORMATION REQUIRED:</b>	
WSIB Clearance Certificate <input type="checkbox"/>	Training Certificates (first aid, whmis,others) <input type="checkbox"/>
General Liability Insurance <input type="checkbox"/>	Confined Space Entry Plan/Permit <input type="checkbox"/>
Form 1000 (see conditions) <input type="checkbox"/>	Confined Space Hazard Assessment <input type="checkbox"/>
Notice of Project (NOP)(see conditions) <input type="checkbox"/>	Confined Space Coordination <input type="checkbox"/>
Map to nearest HOSPITAL <input checked="" type="checkbox"/>	Traffic Control Plan <input type="checkbox"/>
Emergency Contact List <input checked="" type="checkbox"/>	Lock/Tag out <input type="checkbox"/>
Health And Safety Plan (HASP) <input checked="" type="checkbox"/>	Other <input type="checkbox"/>
** NOTE: for Form 1000 and Notice of Project (NOP) requirements see conditions on "Information sheet"	

**HAZARD ASSESSMENT:**

Note: As a Constructor a Hazard Assessment must be completed !

See attached.

**SANITATION REQUIREMENTS**

Available		Approved Alternate Provisions for Sanitation	
Washrooms	<input checked="" type="checkbox"/> yes <input type="checkbox"/> no	01	
Potable Water	<input checked="" type="checkbox"/> yes <input type="checkbox"/> no	02	Bring potable water
Hand Sanitizer	<input checked="" type="checkbox"/> yes <input type="checkbox"/> no	03	

**PERSONAL PROTECTIVE EQUIPMENT REQUIRED:**

- ☒ Safety Footwear (steel toe/shank)
- ☒ Hard Hat
- ☒ Hearing Protection (>85 decibels)
- ☒ Hi-Vis Clothing
- ☒ Eye Protection (glasses, goggles, shields)
- ☒ Gloves (Work)
- ☐ Coveralls (Work)
- ☐ Harness
- ☐ Lanyard
- ☐ Respirator
- ☐ Fire Retardant Clothing
- ☐ Chemical Suit
- ☐ Other \_\_\_\_\_
- ☐ Other \_\_\_\_\_
- ☐ Other \_\_\_\_\_

**SAFETY EQUIPMENT REQUIRED:**

- ☒ Cell phone / Two way radio
- ☐ Airhorn / Whistle
- ☐ Signage
- ☒ First Aid Kit / Eye Wash bottle
- ☒ Fire Extinguisher
- ☐ Flashlight / Headlamp
- ☐ Gas Monitor (O<sub>2</sub>, H<sub>2</sub>S, Cl<sub>2</sub> and CO)
- ☐ Tripod
- ☐ Winch
- ☐ Vehicle Beacon
- ☐ Traffic Cones
- ☐ Traffic Signs
- ☐ Lock/Tag Out (Locks, Hasps, Tags)
- ☐ Other \_\_\_\_\_
- ☐ Other \_\_\_\_\_

**SAFETY TRAINING REQUIRED:**

- |                 |                                     |                 |                          |                           |                          |
|-----------------|-------------------------------------|-----------------|--------------------------|---------------------------|--------------------------|
| WHMIS           | <input checked="" type="checkbox"/> | Confined Space  | <input type="checkbox"/> | Surface Miner Common Core | <input type="checkbox"/> |
| Fall Protection | <input checked="" type="checkbox"/> | Traffic Control | <input type="checkbox"/> | OSHA (HAZWOPER)           | <input type="checkbox"/> |
| First Aid / CPR | <input checked="" type="checkbox"/> | Lock/Tag Out    | <input type="checkbox"/> | Other                     | <input type="checkbox"/> |

**EMERGENCY PLAN****COMMUNICATION REQUIREMENTS:**

- ☒ Cell Phone / Two Way Radio
- ☐ Whistle/Air Horn
  - 3 short blast – pause – repeat = Evacuate site
  - 2 short blast – pause – repeat = Fire on site
  - 1 long blast – pause – repeat = Man down on site
- ☒ All emergency phone numbers posted on site
- ☐ Evacuation meeting area is communicated and indicated on H&S Plan
- ☐ Other \_\_\_\_\_

**EMERGENCY MEDICAL CARE:**

- ☒ First Aid Kit available in the following location: In Kathryn Maton's Field Bag
- ☒ In the Field Vehicle
- ☒ Hospital (Map, Address and Contact immediately following this section)
- ☐ Other \_\_\_\_\_



**BASIC EMERGENCY PROCEDURES: to be reviewed/revised based on applicability!**

The following standard emergency procedures will be used by onsite personnel. The Project Manager must be notified immediately of any onsite emergencies and be responsible for ensuring that the appropriate procedures are followed.

At all times, there will be a competent supervisor on-site as per the OHSA.

**Injury/Incident/Accident/Near Miss:**Injury/Incident/Accident:

- The site Team Leader shall be notified immediately. Upon notification of an injury the site Team Leader shall assess and address the situation and determine the level of response.
- If required, appropriate first aid or medical aid shall be provided to the injured worker in an expedient fashion. Work in the immediate vicinity of the incident/accident shall be immediately suspended and the scene preserved
- until such a time as a complete investigation has been conducted and the area has been released by authorized authorities.
- Work in the general area may continue if:
  - immediate situation is under control and being addressed
  - there is no potential to interfere with the immediate situation
  - continuing work will not endanger people property or environment

Near Miss:

- Shall be reported to Team Leader immediately for correction and prevention.

**Fire/Explosion:**

- In the event of a fire or an explosion on the site, the emergency signal shall be sounded and "FIRE" "FIRE" "FIRE") shall be yelled.
- The site Team Leader shall be notified immediately. Upon notification of an injury the site Team Leader shall assess and address the situation and determine the level of response.
- If the fire department is called, the team leader shall assign persons to direct the Fire Department upon arrival.
- All personnel will be moved to a safe distance from the involved area.

**Evacuation:**

- The designated emergency signal **3 airhorn/whistle blasts** shall be sounded.
- All personnel shall meet at the designated **Evacuation Meeting Area** located:  
As per 555 Booth St Bld rules, to be confirmed with the site contact.

**Personal Protective Equipment (PPE) Failure:**

- In the event of a failure or alteration of protective equipment that decreases the protection factor, a worker shall:
  - immediately stop work and
  - change out affected equipment and
  - tag and take out of service the defective equipment prior to resuming work
  - report defective equipment to supervisor

**Other Equipment Failure:**

- In the event of a failure or alteration of equipment that decreases the protection factor, a worker shall:
- immediately stop work and
  - change out affected equipment and
  - tag and take out of service the defective equipment prior to resuming work
  - report defective equipment to supervisor

**Occupational Health and Safety Reporting and Notifications**

Please reference attached documents:

- GENIVAR (Rev. January 3, 2012) Roles and Responsibilities Procedure
- GENIVAR (Rev. January 3, 2012) Notification Guide



**EMERGENCY CONTACT INFORMATION:**Is **911** available ☒ yes ☐ no (911 is not available everywhere! ie: Pearson Airport, some Federal sites)

Fire Department	<b>911</b>	Local No:	(non emergency)
Ambulance	<b>911</b>	Local No:	(non emergency)
Police	<b>911</b>	Local No:	(non emergency)
Poison Control			n/a 1-800-268-9017
Water Utility		Local No:	311 1-800-400-2256 ON1Call
Electrical Utility		Local No:	(613) 738-6400
Gas Utility		Local No:	1-877-969-0999 1-800-400-2256 ON1Call
Ministry of Labour H&S Contact Centre		Local No:	1-877-202-0008
Environmental		Local No:	1-800-268-6060
Spill Action Center (SAC)			416-325-3000 1-800-268-6060
Other			

HOSPITAL NAME	Ottawa Hospital	HOSPITAL NAME	
Address:	1053 Carling Avenue	Address:	
City:	Ottawa, ON	City:	
Postal Code:	K1Y 4E9	Postal Code:	
Telephone Number:	613-722-7000	Telephone Number:	
GPS coodinates:		GPS coodinates:	
(if available)		(if available)	
Distance From Site	2 km 3 min.	Distance From Site	
HOSPITAL NAME		HOSPITAL NAME	
Address:		Address:	
City:		City:	
Postal Code:		Postal Code:	
Telephone Number:		Telephone Number:	
GPS coodinates:		GPS coodinates:	
(if available)		(if available)	
Distance From Site		Distance From Site	

**Please see attached Maps to Hospitals****PROJECT PERSONNEL CONTACT INFORMATION**

PROJECT MANAGER:	Vahid Arasteh	CONTACT NUMBER:	613-291-8308
GENIVAR EHS:	Nicole TMJ Stoker	CONTACT NUMBER:	647-922-7356
TEAM LEADER:	Vahid Arasteh	CONTACT NUMBER:	613-291-8308
FIELD STAFF 1:	Kathryn Maton	CONTACT NUMBER:	613-617-9237
FIELD STAFF 2:		CONTACT NUMBER:	
FIELD STAFF 3:		CONTACT NUMBER:	
SUB-CONTRACTOR		CONTACT NUMBER:	
SUB-CONTRACTOR		CONTACT NUMBER:	

**SITE SAFETY PRE-JOB MEETING**

Prior to job start, all project personnel shall meet to discuss site conditions, final instructions and to review and sign off on the Health And Safety Plan (HASP) Site, Project Specific.

**Reviewed, Prepared and Approved by Project Manager**

December 11, 2013

Vahid Arasteh

Date

Printed Name

Signature

**Reviewed by Team Leader (Supervisor)**

December 11, 2013

Vahid Arasteh

Date

Printed Name

Signature

**Reviewed by Project Team Members**

December 11, 2013

Kathryn Maton

Date

Printed Name

Signature

Date

Printed Name

Signature

Date

Printed Name

Signature

Date

Printed Name

Signature

**Reviewed by Subcontractor Members**

December 17, 2013

Date

Printed Name

Signature

Date

Printed Name

Signature

Date

Printed Name

Signature

Date

Printed Name

Signature

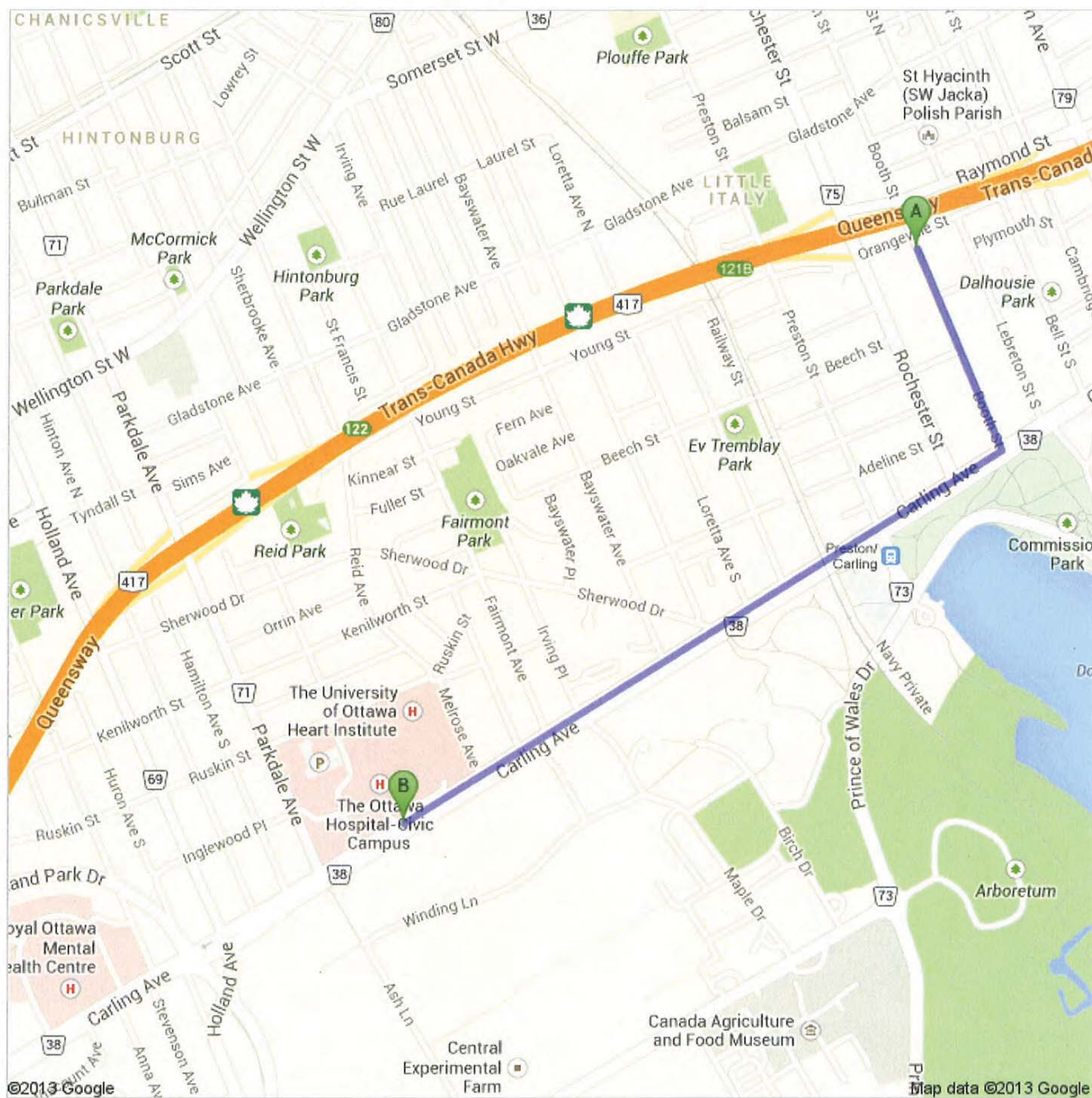
Note: A signed and completed copy of the HASP MUST be:

- Included in the project file
- Posted at the work site and/or included with project field book



**Directions to The Ottawa Hospital-Civic Campus**

1053 Carling Ave, Ottawa, ON K1Y 4E9

**2.0 km – about 3 mins**



555 Booth St, Ottawa, ON K1S

1. Head **southeast** on **Booth St** toward **Daniel McCann St**  
About 47 secs

go 450 m  
total 450 m



2. Turn right onto **Carling Ave**  
*Destination will be on the right*  
About 2 mins

go 1.5 km  
total 2.0 km



**The Ottawa Hospital-Civic Campus**  
1053 Carling Ave, Ottawa, ON K1Y 4E9

These directions are for planning purposes only. You may find that construction projects, traffic, weather, or other events may cause conditions to differ from the map results, and you should plan your route accordingly. You must obey all signs or notices regarding your route.

Map data ©2013 Google

Directions weren't right? Please find your route on [maps.google.ca](https://maps.google.ca) and click "Report a problem" at the bottom left.

1-Call: 13 49 15 44  
Rogers: 11



# Locate Sketch

(not to scale)

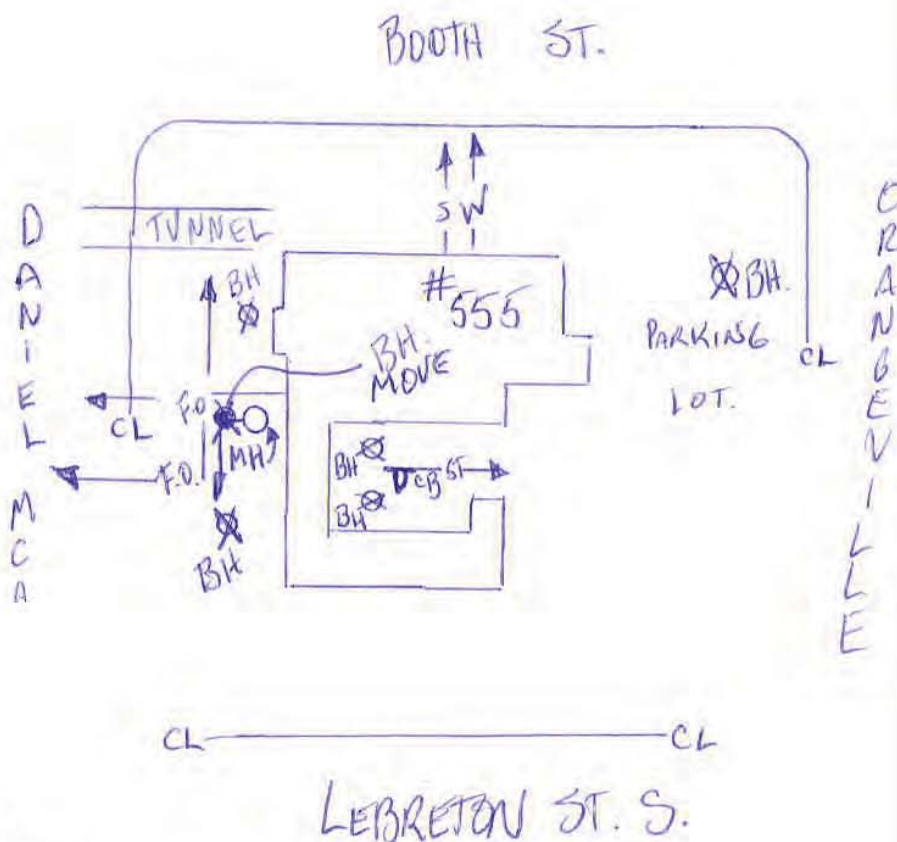
Customer GENIVAR Date Dec 13, 2013

Property Description, Address, City, Work Area:

555 BOOTH ST.

On-Site Contact: KELLY STONE / SNC Attended Locate: Y / N As Built or Site Plan Provided: Y / N

**LOCATES ONLY VALID FOR 30 DAYS & ONLY FOR WORK AREA INDICATED**



**CAUTION: HAND DIG WITHIN 1.5 METERS OF ALL UTILITY MARKINGS**

## Legend of Located Utilities

-C- Cable, -H- Hydro, -G- Gas, -FO- Fibre Optic, -B- Phone (Bell)

-W- Water, -S- Sewer, -ST- Storm Sewer, -E- Electrical

BL=Building Line, CB=Catch Basin, CL=Curb Line, FH=Fire Hydrant, FL=Fence Line

MH=Man Hole, LS=Light Standard, WV=Water Valve, X=Hydro Pole





2013491544\_BCOE01

Page 1 of 3

Primary Locate Street 1-877-966-0996

UNION GAS EMERGENCY #

Phone: 613-723-9888

Fax: 613-723-9277

Toll free: 1-800-371-8866

Email:

Request #2013491544

NORMAL

Utilities Located: <input checked="" type="radio"/> Bell <input checked="" type="radio"/> Gas <input checked="" type="radio"/> Hydro Ottawa <input type="checkbox"/> Street Lighting <input type="checkbox"/> Videotron <input type="checkbox"/> Peel Fibre <input type="checkbox"/> Veridian Connections	Revised Excavation Date: N/A mm/dd/yyyy	Excavation Date: 12/13/2013 08:00:00 mm/dd/yyyy	Status: STANDARD
Requested by: KEVIN DONNELLY	Company: OTTAWA VALLEY LOCATE	Phone: (613)-829-8118 ext.	Homeowner: <input type="checkbox"/>
		Fax/email: (613)-383-0129 ext.	Contractor: <input checked="" type="radio"/>
Appt Date: N/A mm/dd/yyyy	Received Date: 12/03/2013 mm/dd/yyyy	Locate Address: 555, BOOTH ST	Project: <input type="checkbox"/>

Type of work:  
BORE HOLES

1st Inters.: DANIEL MCCANN ST

2nd Inters.:

City:  
OTTAWA

Caller's Remarks:

MACH. DIG

AREA WILL BE MARKED WITH STAKES &amp; PAINT - OR MARK &amp; EMAIL - ASAP - ENTIRE PROPERTY - CORNER LOT - SKETCH AVAILABLE

\*\*SND HYDRO OTTAWA &amp; GMOBILE\*\*\*CA\*\*\*.75.708400, 45.402590, NB\_SEGMENTS:1, NO\_PLAN:813 567, HOT1, BCOE01, TELUSON3, ENOE01, ROGOTT01

Bell Mark   Clear 1	Enbridge Gas Mark   Clear 1	Hydro Ottawa Mark   Clear 1	Street Lighting Mark   Clear	Peel Fibre Mark   Clear	Blink Mark   Clear	Veridian Mark   Clear	Union Gas Mark   Clear	Videotron Mark   Clear
------------------------	--------------------------------	--------------------------------	------------------------------	-------------------------	--------------------	-----------------------	------------------------	------------------------

LOCATED AREA: EXCAVATOR SHALL NOT WORK OUTSIDE THE LOCATED AREA WITHOUT OBTAINING ANOTHER LOCATE.

Records Reference: ☐ Proviver☒ LAC Multiviewer ☒ Gmobile☒ Datapak #P10-10

Atlas Plate: NE185

Field Notes/As-Laid: 6N117B.4

☐ Third Party Notification

N/A

DPT Remarks: #

Apply Sticker Here if Required

Excavator shall notify &amp; receive a clearance from Utility prior to excavation for the following:

Telecon ☐ High Priority Cable ☐ Central Office Vicinity

N/A

METHOD OF FIELD MARKING: ☒ PAINT ☐ FLAGS ☐ OFFSET FLAGS ☐ OTHER (TELECOM-ORANGE, GAS-YELLOW, HYDRO-RED)

Caution: Locates are VOID after 30 days. See Disclaimer on reverse side for the specific Facility Owner's Guidelines.

Caution: Any changes to location or nature of work require new locate. The Excavator must not work outside the Located Area without a new locate. Privately owned services within the located area have not been marked - check with service/property owner. For all Locate requests including remarks contact:

Ontario One Call at 1-800-400-2255 or www.on1call.com.

Locator Name: WINTER PAT	Start Time: 9:45	<input checked="" type="radio"/> Mark & Fax <input type="checkbox"/> Left on Site <input type="checkbox"/> Emailed
ID #: 1425	End Time: 10:30	Print: _____
Date: 12/10/13	Total Hours: .75	Signature: _____

A copy of this Primary Locate Sheet and Auxillary Locate Sheet(s) must be on site and in the hands of the machine operator during work operations. If sketch and markings do not coincide, the Excavator must obtain a new locate

This form revised January 2010



**PR MARK**  
**TELECOM**

2013491544 BCOE01  
Auxiliary Locate Sheet

Union Gas Emergency #  
1-877-969-0999

Phone:  
613-723-9888

Fax:  
613-723-9277

Toll free:  
1-800-371-8866

Email

Utilities Located: ☒ Bell ☒ Gas ☐ Hydro Ottawa ☐ Videotron ☐ Peel Fibre ☐ Veridian connections

Date Located:  
mm/dd/yyyy 12/10/13

Request # 2013491544 ✓

Number of Services marked: (Specify building/house numbers) 1 @ #555 BOOTH

LOCATED AREA: EXCAVATOR SHALL NOT WORK OUTSIDE THE LOCATED AREA WITHOUT OBTAINING ANOTHER LOCATE

FROM: S.FC ORANGEVILLE

TO: N.FC DANIEL MCCANN

FROM: E.FC BOOTH

TO: E.BL #555 BOOTH

**LEGEND**

Building Line — BL—  
Fence Line — FL—  
Face of Curb — FC—  
Road Edge — RE—  
Property Line — PL—

Driveway — DRWY—

Catch Basin 

Sidewalk — SDWK—

Demarcation 

Railway 

Pole 


Flush to Grade Pedestal 

Pedestal 

Buried Cable — B—

Conduit — C—

Buried Service Wire — BSW—

Manhole 

Fibre Optic Cable — FOC—

Gas Main — GM—


Gas Service — GS—

Gas Valve 


Hydrant 

Transformer 

Hydro Ottawa — H—

Hydro Pole 

Street Light Cable — SL—

Street Light 

North N.

South S.

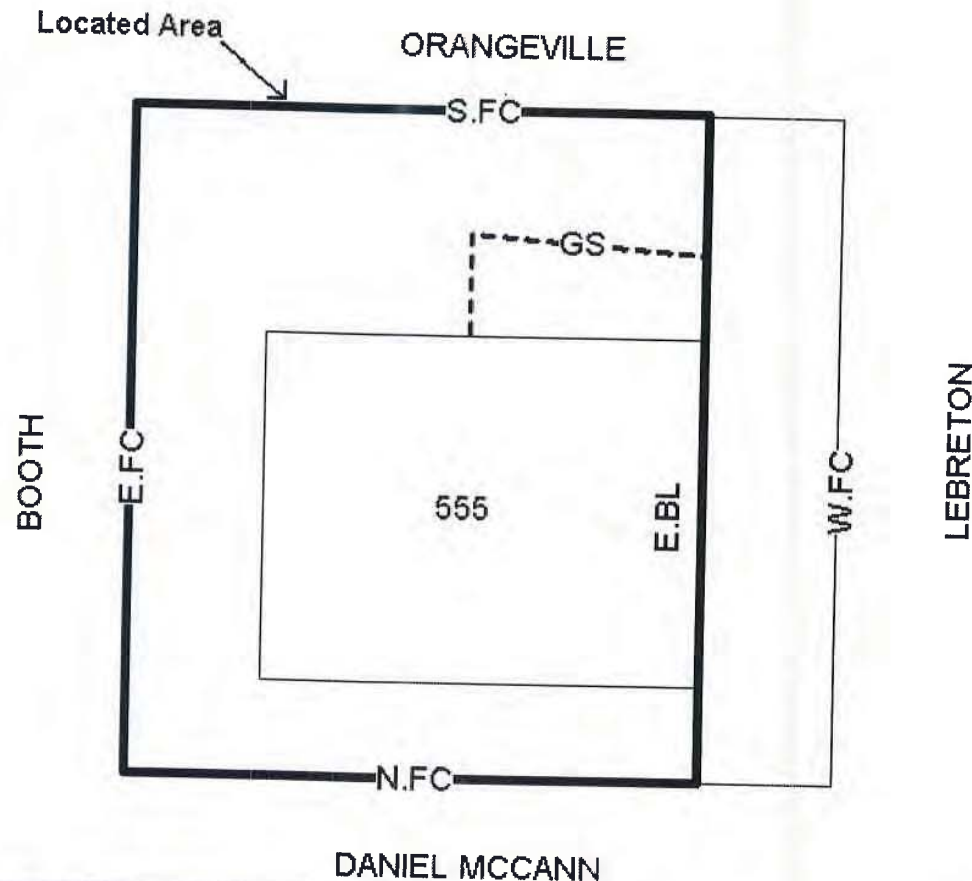
East E.

West W.



CAUTION: HAND DIG WITHIN 1M (GAS/BELL/VTL) 1.5M (HYDRO) AS MEASURED HORIZONTALLY FROM THE FIELD MARKINGS TO AVOID DAMAGING THE UNDERGROUND UTILITIES. IF YOU DAMAGE THE PLANT, YOU MAY BE HELD LIABLE. IF YOU DAMAGE UNDERGROUND PLANT, CONTACT THE FACILITY OWNER IMMEDIATELY. DEPTH VARIES AND MUST BE VERIFIED BY HAND DIGGING OR VACUUM EXCAVATION. LOCATED AREA ALTERED AS PER:  
LEGEND--TREE LINE --TL-- RETAINING WALL --RW-- VIDEOTRON --VTL--

GS-1 1/4" PE, BELL CABLES IN CUSTOMER OWNED TUNNEL



THIS FORM VALID ONLY WITH Primary Locate Form. This sketch is not to scale.  
Any privately owned services within the located area have not been marked- check with service/property owner.

A copy of this Auxiliary Locate Sheet(s) and the Primary Locate Sheet must be on site and in the hands of the machine operator during work operations. If sketch and markings do not coincide, the Excavator must obtain a new locate.

Phone:  
613-723-9888

Fax:  
613-723-9277

Toll free:  
1-800-371-8866

Email

Utilities Located: ☐ Bell ☐ Gas ☒ Hydro Ottawa ☐ Videotron ☐ Peel Fibre ☐ Veridian connections

Date Located:  
mm/dd/yyyy 12/10/13

Request # 2013491544 ✓

Number of Services marked: (Specify building/house numbers) 1 @ #555 BOOTH

LOCATED AREA: EXCAVATOR SHALL NOT WORK OUTSIDE THE LOCATED AREA WITHOUT OBTAINING ANOTHER LOCATE

FROM: S.FC ORANGEVILLE

TO: N.FC DANIEL MCCANN

FROM: E.FC BOOTH

TO: E.BL #555 BOOTH

## LEGEND

Building Line — BL —  
Fence Line — FL —  
Face of Curb — FC —  
Road Edge — RE —  
Property Line — PL —

Driveway — DRWY —

Catch Basin [CB]

Sidewalk — SDWK —

Demarcation (DM)

Railway [Grid]

Pole [O]

Flush to Grade Pedestal [Box]

Pedestal [X]

Buried Cable — B —

Conduit — C —

Buried Service Wire — BSW —

Manhole [M/H]

Fibre Optic Cable — FOC —

Gas Main — GM —

Gas Service — GS —

Gas Valve [Valve]

Hydrant [Hydrant]

Transformer [Transformer]

Hydro Ottawa — H —

Hydro Pole [Dot]

Street Light Cable — SL —

Street Light [O]

North N.

South S.

East E.

West W.



CAUTION: HAND DIG WITHIN 1M (GAS/BELL/VTL) 1.5M (HYDRO) AS MEASURED HORIZONTALLY FROM THE FIELD MARKINGS TO AVOID DAMAGING THE UNDERGROUND UTILITIES. IF YOU DAMAGE THE PLANT, YOU MAY BE HELD LIABLE. IF YOU DAMAGE UNDERGROUND PLANT, CONTACT THE FACILITY OWNER IMMEDIATELY. DEPTH VARIES AND MUST BE VERIFIED BY HAND DIGGING OR VACUUM EXCAVATION. LOCATED AREA ALTERED AS PER:  
LEGEND--TREE LINE --TL-- RETAINING WALL --RW-- VIDEOTRON --VTL--

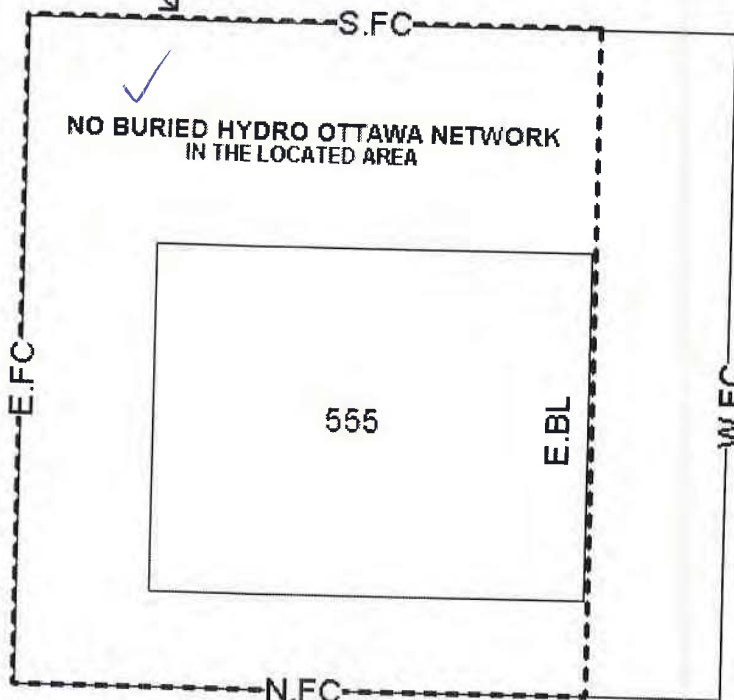
## caution

- Privately owned hydro in LOCATED AREA not marked.
- ☐ HYDRO SHOWN as reference only please contact site developer.
- ☐ EMPTY CONDUITS shown as reference only, unable to locate.

\*\*\* If you require a Private Locate we can provide that service within 48 hours please contact our office at 1-888-883-6273 ext.2 \*\*\*

Located Area

ORANGEVILLE



DANIEL MCCANN

THIS FORM VALID ONLY WITH Primary Locate Form. This sketch is not to scale.  
Any privately owned services within the located area have not been marked- check with service/property owner.

A copy of this Auxiliary Locate Sheet(s) and the Primary Locate Sheet must be on site and in the hands of the machine operator during work operations. If sketch and markings do not coincide, the Excavator must obtain a new locate.

## DISCLAIMER

### Warning!

**The Excavator must have a copy of this locate on the job site during excavation.**

**Located Area:** The Excavator must not work outside the area indicated by the Located Area in the Diagram without a further locate by the Company

**Locate the plant:** The plant location information provided is the best we have available but constitutes only an estimate. Depth of underground plant varies and the exact location must be determined by hand digging prior to excavation with mechanical equipment.

Mechanical equipment must not be used within one metre of the estimated location of the plant.

**\*Hydro Ottawa must be notified prior to excavation and inspector on site\***

**Expose the plant:** Once the plant has been located by hand digging, it must be exposed along its length adjacent to or in the immediate vicinity of the proposed excavation. For this purpose, mechanical equipment must not be used within 0.5 metres of the plant.

**Digging around the exposed plant:** When the plant has been exposed, any further excavation within 0.3 metres, must only be done by hand digging and not with mechanical equipment.

**Support Requirements:** If the underground plant is exposed over a distance of more than 1.25 metres, the Facility Owner must be notified. Underground plant must be supported at all times

---

### O. Reg. 210/01 Oil and Gas Pipeline systems EXCERPTS

9. (1) No person shall dig, bore, trench, grade, excavate or break ground with mechanical equipment or explosives without first ascertaining the location of any pipeline that may be interfered with.

10. No person shall interfere with or damage any pipeline without authority to do so.

### Technical Standards & Safety Act 2000 EXCERPT

37 (1) Every person who contravenes or fails to comply with any provision of this act or the regulations; etc... is guilty of an offense and on conviction is liable to a fine of not more than \$50,000 or to imprisonment for a term of not more than one year, or to both.

---

**Caution:** The markings may disappear or be misplaced. Should sketch and markings not coincide, Excavator must obtain a new locate. This is based on information given at the time. Any changes to location or nature of work require a new locate. The Excavator must not work outside the indicated Located Area without a further locate. Privately owned services within the located area have not been marked - check with service/property owner.

**Locate is VOID after 30 days.**

For remarks contact Ontario One Call 1-800-400-2255.  
or [www.on1call.com](http://www.on1call.com)







CITY OF OTTAWA  
LOCATES & OPERATIONAL SUPPORT  
UNDERGROUND LOCATE / WATER / SEWER  
3-1-1 or (613) 580-2400

Date: Dec 11 / 13  
Time: \_\_\_\_\_

LOCATION OF WORK: 555 Booth St ☐ ARCVIEW ATTACHED

TYPE OF WORK: Bore holes ☐ DEMOLITION

CONTRACTOR: Ottawa Valley Locates FAX: ( )

SKETCH NOT TO SCALE

613 - 983 - 8628

KDONNELLY@OTTAWAVALLEYLOCATES.COM

# 4 Bore Hole Cleared for work.



ALL 3 OTHER Green Bore Holes Cleared.

METHOD OF MARKING: \_\_\_\_\_ FLAGS: \_\_\_\_\_ PAINT: \_\_\_\_\_ OTHER: \_\_\_\_\_

CONTRACTOR: \_\_\_\_\_ (Signature) LOCATOR: Guy Maillette

REMARKS: \_\_\_\_\_

No indication that Com Sewer & W Work  
ARE A

WORK ORDER#: \_\_\_\_\_

Contractor Copy (1) White

File Copy (2) Yellow

April 2013

Duration of Locate: The duration of this locate will be for thirty (30) days.

**Kevin Donnelly**

**From:** TELUS.Locate.Request@telus.com  
**Sent:** December-03-13 12:38 PM  
**To:** kdonnelly@ottawavalleylocate.com  
**Subject:** TELUS Facility Locate Request: Results/Information

=====

To: OTTAWA VALLEY LOCATE Attn: KEVIN DONNELLY  
Voice: 6138298118 Fax: 6133830129  
Re: TELUS Facility Locate Request: Results/Information

\*\*PLEASE REVIEW THIS ENTIRE MESSAGE\*\* NOTE: This message was generated by an automated system. Please DO NOT reply back to this automated email. \*This is an important Safety Message from TELUS Communications. We are responding to your request to locate TELUS underground facilities in the specific area of excavation listed on this One Call ticket. Your locate request has been reviewed and its status is explained below\*:

=====

Ticket: 2013491544  
County: ONTARIO Place: OTTAWA  
Address: 555 BOOTH ST

TELUSON3:

Upon review of the information and the work area specified on this locate request, we will not be marking TELUS lines at this time for the following reason: Additional information below \*NOTE\* TELUS N/R, OUR RECORDS SHOW NO TELUS FACILITIES LOCATED AT THE LOCATION LISTED ON YOUR LOCATE REQUEST. If you have any questions or concerns please call YOLANDA @ 780 508-1718

=====

If you have any questions or concerns regarding this response, please call the TELUS Cable Screening Department for AB, SK, MB & ON, by calling, 1-800-980-0030 or TELUS Cable Screening Department for BC @ 1-877-453-2322 for clarification. Any damage to TELUS facilities MUST be reported as a "Dig Up" to your provincial One Call Center ASAP. We ask, that while excavating, you dig with caution. Thank You for using your local dial / click before you dig process!

=====

This message was generated by an automated system. Please do not reply to this email.

**ROGERS** ✓

ROGERS LOCATE SERVICE

**CLEAR TO DIG** ✓

8200 Dixie Rd  
East Bldg, 2nd Flr  
Brampton, Ontario, L6T 0C1  
Tel.: (855) 232-0342  
Fax.: (905) 780-7379

TICKET#: 2013491544 ✓  
CLEARANCE#: A1798135  
DATE: 02/12/2013 3:32:46 PM

Requested By: Company: OTTAWA VALLEY LOCATE

Contact name: KEVIN DONNELLY Ph: (613)-829-8118 ext. Fax: (613)-383-0129 ext.

Dig Site Location :

Municipality : OTTAWA

Call Date: 02/12/2013 2:04:00 PM

Address : 555. BOOTH ST

Intersection : DANIEL MCCANN ST

Remarks (Additional Dig Info)

AREA WILL BE MARKED WITH STAKES & PAINT - OR MARK & EMAIL - ASAP - ENTIRE  
PROPERTY - CORNER LOT - SKETCH AVAILABLE

ROGOTT01 PRO-TECH FOR ROGERS

**ALL CLEAR HAS BEEN GIVEN FOR THE WORK AREA DESCRIBED ABOVE.**

YOU WILL BE LIABLE FOR ANY DAMAGES TO ROGERS FACILITIES IF EXCAVATING / DIGGING PRIOR  
TO RECEIVING A COMPLETED LOCATE OR CLEARANCE NUMBER FROM ROGERS OR IT'S AGENTS.

PLEASE CALL ROGERS LOCATE SERVICES AT (800) 738-7893, IF THERE ARE ANY CHANGES TO THIS  
LOCATE REQUEST. LOCATES AND CLEARANCES ARE VALID FOR 30 DAYS ONLY.

CAUTION: Stakes and or markings may disappear or be displaced. Should the sketches and  
markings not coincide, a new stake out must be obtained.

**FOR ALL CUT CABLES CALL  
1-800-265-9501**



**Kevin Donnelly**

**From:** solutions@on1call.com  
**Sent:** December-02-13 2:08 PM  
**To:** kdonnelly@ottawavalleylocate.com  
**Subject:** Request 2013491544

ONTARIO ONE CALL  
Locate Request Confirmation

Ticket #: 2013491544 Reason Code: STANDARD  
Work to Begin Date: 12/09/2013 Time: 08:00:00 AM  
WAP No:

CALLER INFORMATION

KEVIN DONNELLY  
Contractor ID: 137429 Tel.: (613) 829-8118  
OTTAWA VALLEY LOCATE Cell: (613) 983-5628  
WORK BEING DONE FOR: GENIVAR Fax: (613) 383-0129  
kdonnelly@ottawavalleylocate.com  
ALT CONTACT: Tel.:

DIG LOCATION

City: OTTAWA , OTTAWA  
Community: OTTAWA  
Address : 555 To: Lot/Unit#:  
Street : BOOTH ST  
Nearest Intersecting Street :  
DANIEL MCCANN ST  
Second Intersecting Street :  
Nb of Segments: 5

Type of Work: BORE HOLES

Max Depth: 50.00 FT

Machine Dig: X

Hand Dig: X

Public Property:

Private Property: X

Mark & Fax: X

Site Meet Req.:

Area is Not Marked:

Area is Marked: X

Directional Drilling:

Work Extent/Location:

AREA WILL BE MARKED WITH STAKES & PAINT - OR MARK & EMAIL - ASAP - ENTIRE PROPERTY -  
CORNER LOT -  
SKETCH AVAILABLE

Remarks:

The following utility owners have been notified of your proposed excavation site:  
BCOE01 ✓ PROMARK FOR BELL CAN ENOE01 ✓ PROMARK FOR ENBRIDGE  
HOT1 ✓ HYDRO OTTAWA (HOT1) ROGOTT01 ✓ PRO-TECH FOR ROGERS  
TELUSON3 ✓ TELUS (TELUSON3)