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Solicitation No. - N° de l'invitation EP067-151608/A	**Amendment No. - N° modif.** 005
Client Reference No. - N° de référence du client 20151608	**Date** 2015-01-30
GETS Reference No. - N° de référence de SEAG PW-$$FG-340-66385	
File No. - N° de dossier fg340.EP067-151608	**CCC No./N° CCC - FMS No./N° VME**
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Canada

LE BUT DE CETTE MODIFICATION 5 EST POUR AJOUTER ADDENDA 3 ET 4 ET POUR AJOUTER LES DOCUMENTS GEOTECHNIQUE QUI SONT DISPONIBLE EN ANGLAIS SEULEMENT

TOUS LES CLAUSES ET CONDITIONS DEMURE LES MÊMES

555/601/615 CHEMIN BOOTH
CHAUFFAGE AUTONOME

PROJET N^{O} R.060128.002 DATE : le 26 janvier, 2015

Les modifications suivantes aux documents de soumission entrent en vigueur immédiatement. Cet addenda fait partie des documents de soumission.

DEVIS

1. SECTION 31 00 99 - TERRASSEMENT - TRAVAUX DE PETITE ENVERGURE

.1 AJOUTER Item 3.1.1.3 :

.3 Se référer au plan des services utilitaires F-10-14 de la Ville D'Ottawa pour l'emplacement approximatif des services existants de Bell situer dans la zone des travaux effectués. Les travaux existant comportent sept (7) conduits de câbles de 75 mm de diamètre et un (1) conduit de câble fibre de 25 mm de diamètre. Protéger l'intégrité des services existant afin d'accommoder les nouveaux travaux jusqu'à l'approbation de l'autorité appropriée. Suivant la découverte des conditions souterraines, allouer deux (2) semaines pour l'examen des conditions par les autorités et le représentant du ministère. Le représentant du ministère doit assumer les couts de relocalisation si nécessaire.

.2 RÉVISER Item 3.1.2.1 :

.1 Prendre les dispositions nécessaires, auprès des autorités compétentes, pour réacheminer les canalisations enfouies susceptibles de nuire à l'exécution des travaux, et assumer les coûts de ces travaux **à moins qu'autrement indique**.

En attachement: Villes d'Ottawa plan de l'utilité F-10-14

555/601/615 CHEMIN BOOTH
CHAUFFAGE AUTONOME

PROJET N^{O} R.060128.002 DATE : le 28 janvier, 2015

Les modifications suivantes aux documents de soumission entrent en vigueur immédiatement. Cet addenda fait partie des documents de soumission.

DEVIS

1. **SECTION 01 14 26 - ÉVALUATION ENVIRONNEMENTALE DE SITE,PHASE II, 555, RUE BOOTH, OTTAWA**

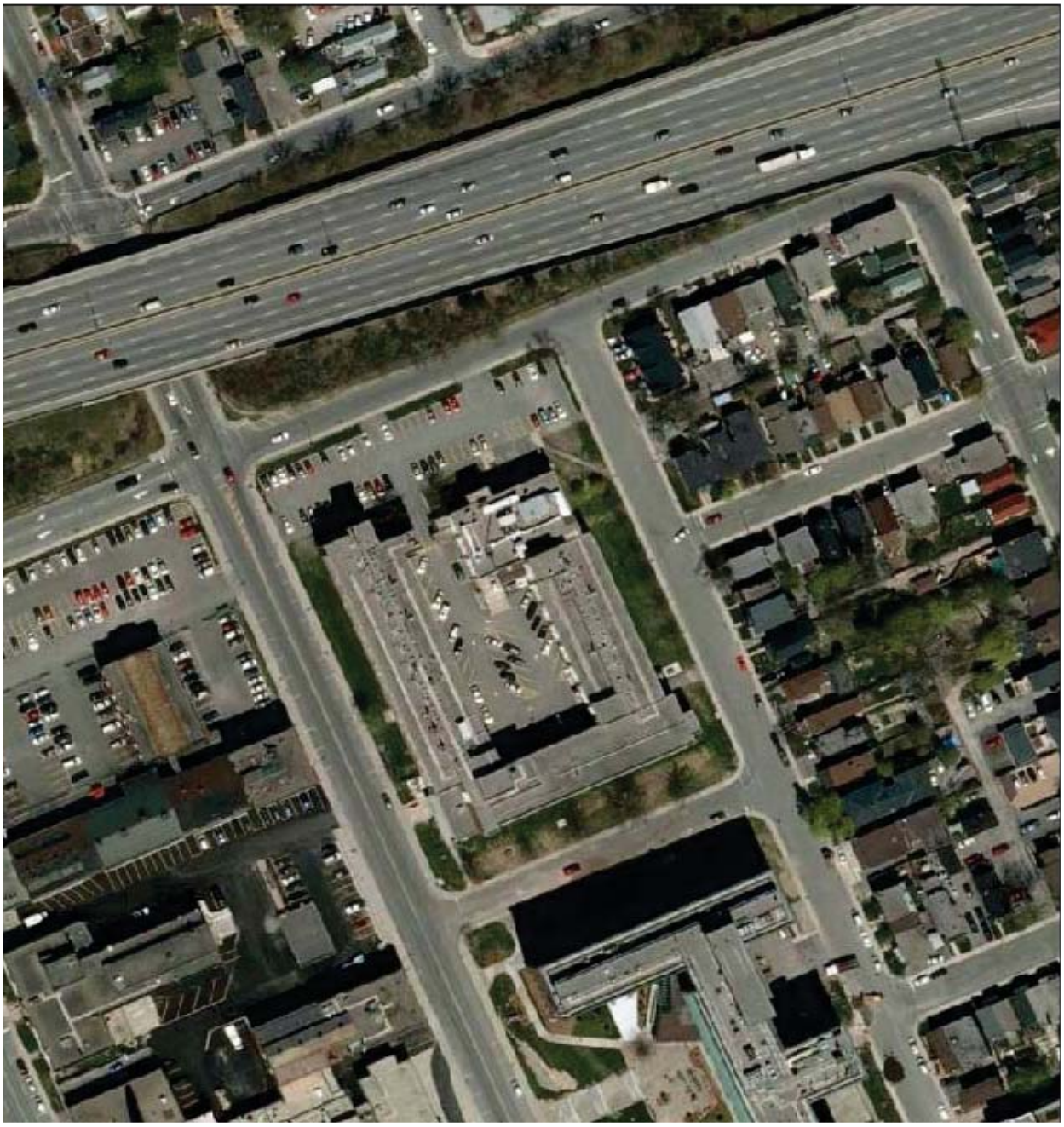
   .1 RÉVISER Item 1.1.3 :

   « **.3 Le site est actuellement inscrit comme une « classe 2 - Priorité d'intervention moyenne » en vertu de l'inventaire des lieux contaminés fédéraux.** »

   .2 AJOUTER Item 1.2.2 :

   « **.2 Basé sur la dernière évaluation environnementale disponible menée au 555, rue Booth (c.-à-dire le rapport de vérification environnementale phase II préparé par WSP limitée et daté January 21st 2014), les contaminants qui sont présents dans le sol et / ou des eaux souterraines sur le site sont au-dessus les lignes directrices fédérales et / ou normes applicables et ils comprennent: des métaux, des produits d'hydrocarbures de pétrole, les matières volatiles et des composés aromatiques polycycliques.** »

En attachement: Phase II ESA – rue 555 Booth – le 21 janvier, 2014



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

131-20711-06
January 21, 2014

2611 Queensview Drive, Suite 300
Ottawa ON K2B 8K2
Telephone: 613.829.2800 Fax: 613.829.8299
www.wspgroup.com

DRAFT

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^2.
- 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^2. 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^3 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.

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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, naphalene, phenathrene, benzo(a)anthracene, benzo(b)flouranthene, benzo(k)flouranthene, 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 17th and 21st, 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^{TM} 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 27th, 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_{DH}). While some jurisdictions in Canada have adopted an “essentially negligible (Health Canada, 2012)” incremental lifetime cancer risk (ILCR) 1×10^{-5} (or 1 in 100,000) for managing risks of carcinogenic substances, other jurisdictions including Ontario use an ILCR of 1×10^{-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_{PW}). 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_{FL})*

*"**" – 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:

$$\text{Relative Percent Difference (RPD)} = \frac{(\text{Sample Result} - \text{Duplicate Result})}{\frac{(\text{SampleResult} + \text{Duplicate Result})}{2}} X100$$

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_{DH}). 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_{PW}). 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^{-5}. 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^{-5}, 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^{-6} 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^{-6}. 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^2. 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^3 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^2.

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 45.402893º and longitude: -75.705858º.

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^2. 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^3 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^2.

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 45.402893º, longitude -75.705858º

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_{DH}). 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_{PW}). 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^{-6} 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^{-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}. 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 m3 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^2.

- 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^2. 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^3 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^2.

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

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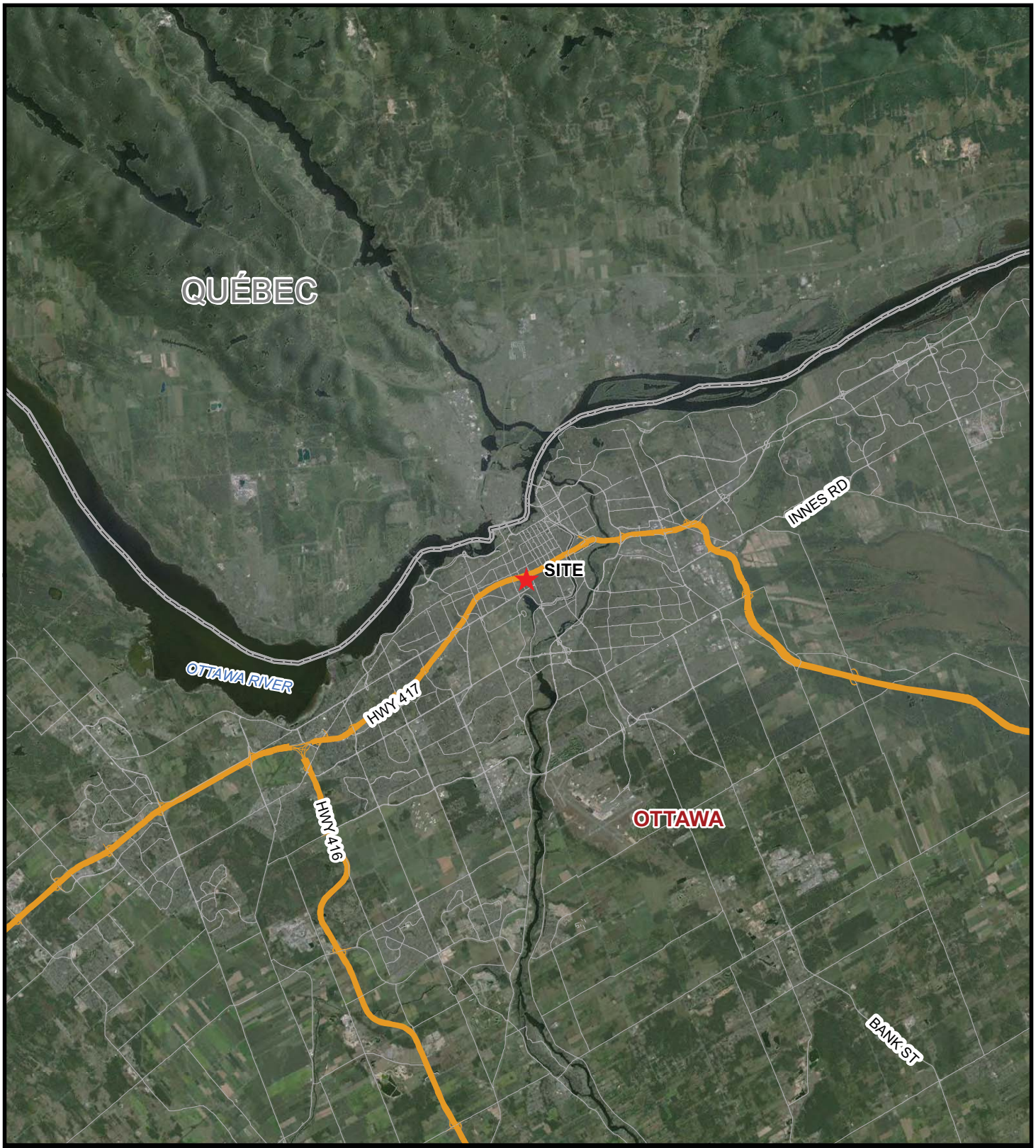
Appendix A

Site Figures



WSP
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

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

TITLE
SITE LOCATION PLAN

FIG. 1

N

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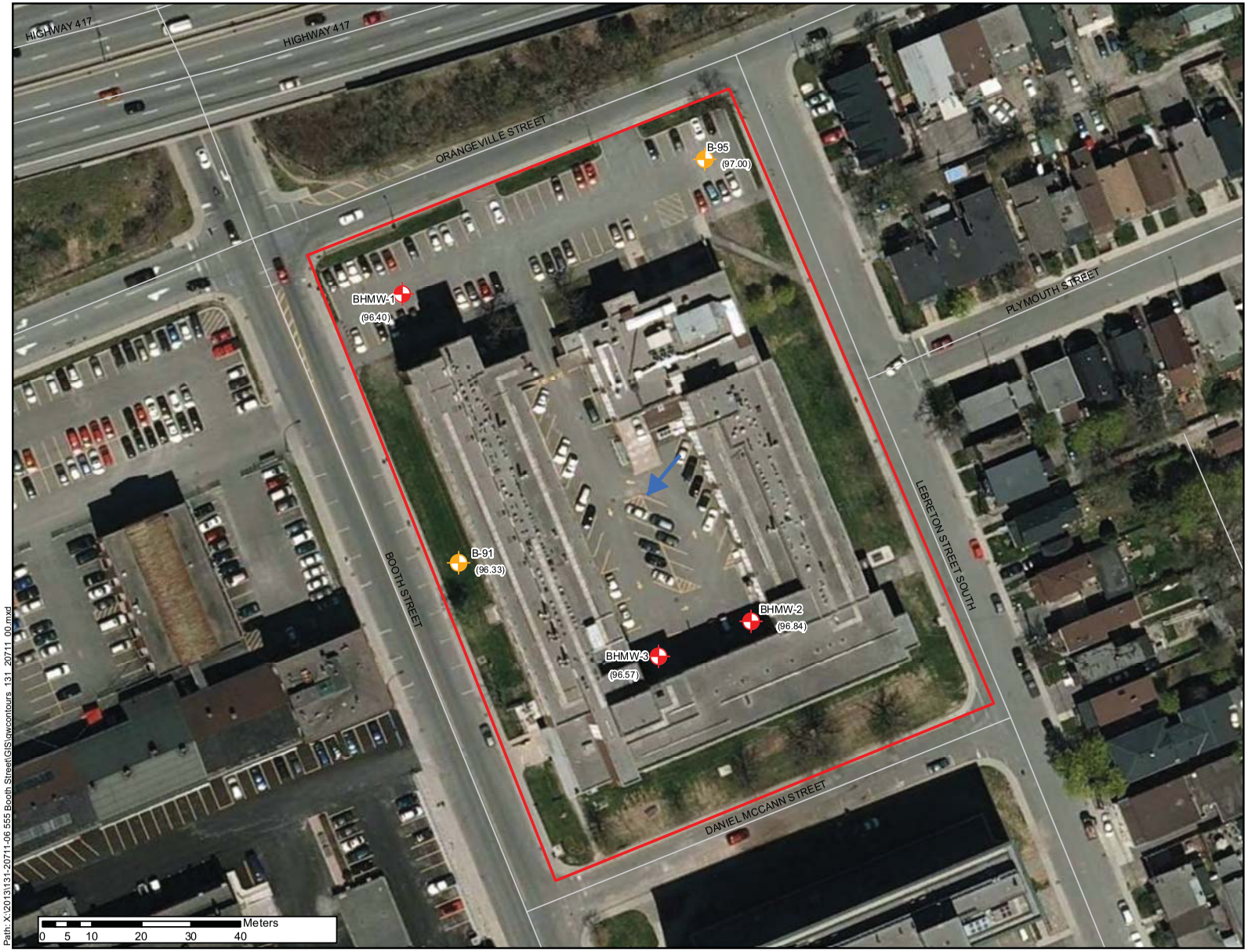


Path: X:\2013\131-20711-06 555 Booth Street\GIS\wcontours_131_20711_00.mxd

LEGEND

- SITE BOUNDARY
- BOREHOLE/MONITORING WELL (WSP, DECEMBER 2013)
- MONITORING WELL INSTALLED BY OTHERS (PRE-2013)
- (97.00) 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 thecourtyard entrance, south of the gate opening.

Figure No.	N
2	

Scale	1:750
Drawn By	GR/CD
Job No.	131-20711-06
Date	JANUARY 2014

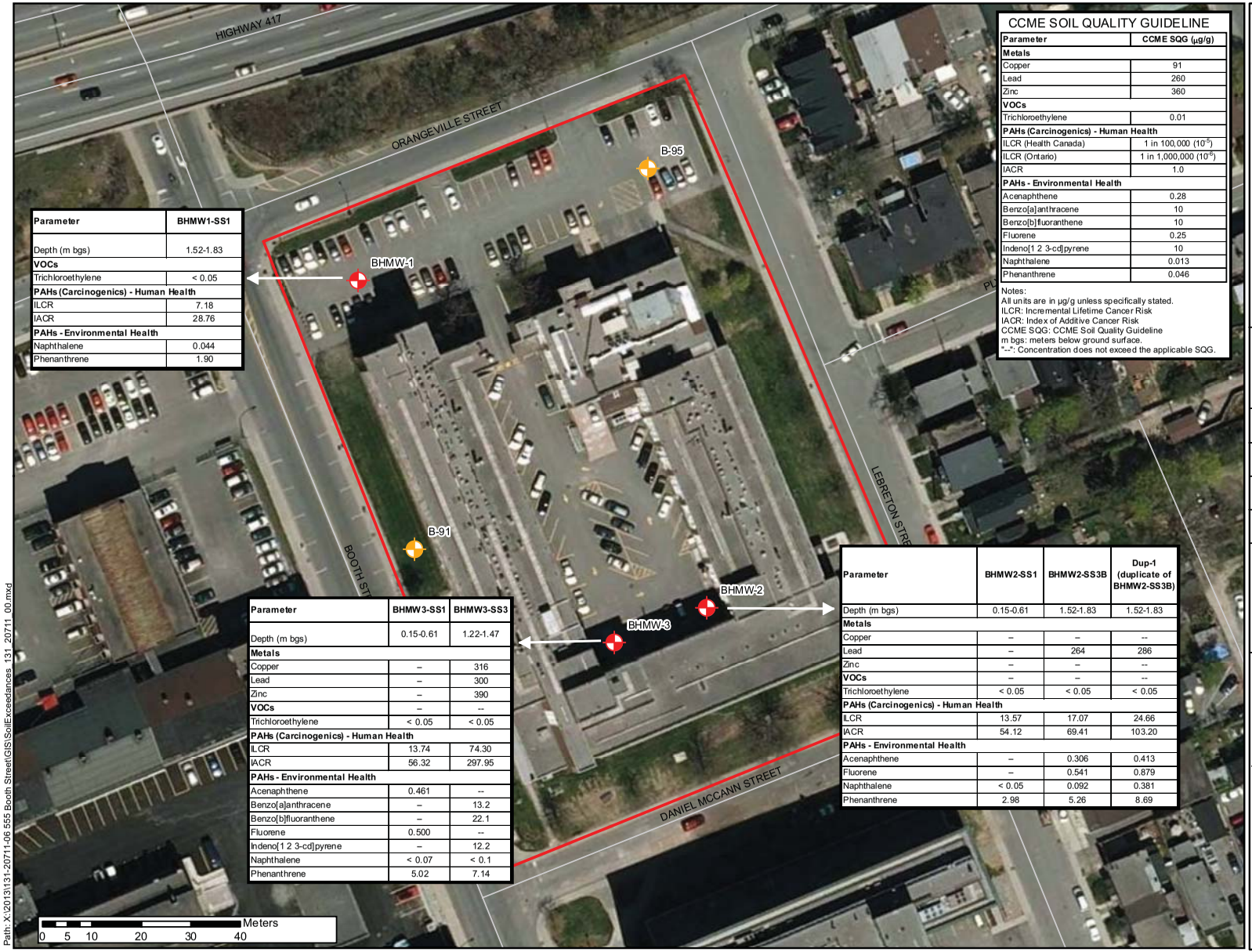
PROJECT

LIMITED PHASE II ESA
555 BOOTH STREET,
OTTAWA, ONTARIO

TITLE

SITE PLAN AND INFERRED GROUNDWATER FLOW DIRECTION

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



Parameter	BHMW1-SS1
Depth (m bgs)	1.52-1.83
VOCs	
Trichloroethylene	< 0.05
PAHs (Carcinogenics) - Human Health	
ILCR	7.18
IACR	28.76
PAHs - Environmental Health	
Naphthalene	0.044
Phenanthrene	1.90

Parameter	BHMW3-SS1	BHMW3-SS3
Depth (m bgs)	0.15-0.61	1.22-1.47
Metals		
Copper	–	316
Lead	–	300
Zinc	–	390
VOCs	–	--
Trichloroethylene	< 0.05	< 0.05
PAHs (Carcinogenics) - Human Health		
ILCR	13.74	74.30
IACR	56.32	297.95
PAHs - Environmental Health		
Acenaphthene	0.461	--
Benzo[a]anthracene	–	13.2
Benzo[b]fluoranthene	–	22.1
Fluorene	0.500	--
Indeno[1 2 3-cd]pyrene	–	12.2
Naphthalene	< 0.07	< 0.1
Phenanthrene	5.02	7.14

Parameter	BHMW2-SS1	BHMW2-SS3B	Dup-1 (duplicate of BHMW2-SS3B)
Depth (m bgs)	0.15-0.61	1.52-1.83	1.52-1.83
Metals			
Copper	–	–	--
Lead	–	264	286
Zinc	–	–	--
VOCs	–	–	--
Trichloroethylene	< 0.05	< 0.05	< 0.05
PAHs (Carcinogenics) - Human Health			
ILCR	13.57	17.07	24.66
IACR	54.12	69.41	103.20
PAHs - Environmental Health			
Acenaphthene	–	0.306	0.413
Fluorene	–	0.541	0.879
Naphthalene	< 0.05	0.092	0.381
Phenanthrene	2.98	5.26	8.69

CCME SOIL QUALITY GUIDELINE

Parameter	CCME SQG (µg/g)
Metals	
Copper	91
Lead	260
Zinc	360
VOCs	
Trichloroethylene	0.01
PAHs (Carcinogenics) - Human Health	
ILCR (Health Canada)	1 in 100,000 (10^{-5})
ILCR (Ontario)	1 in 1,000,000 (10^{-6})
IACR	1.0
PAHs - Environmental Health	
Acenaphthene	0.28
Benzo[a]anthracene	10
Benzo[b]fluoranthene	10
Fluorene	0.25
Indeno[1 2 3-cd]pyrene	10
Naphthalene	0.013
Phenanthrene	0.046

Notes:
All units are in µg/g unless specifically stated.
ILCR: Incremental Lifetime Cancer Risk
IACR: Index of Additive Cancer Risk
CCME SQG: CCME Soil Quality Guideline
m bgs: meters below ground surface.
"--": Concentration does not exceed the applicable SQG.

LEGEND

- SITE BOUNDARY
- BOREHOLE/MONITORING WELL (WSP, DECEMBER 2013)
- MONITORING WELL INSTALLED BY OTHERS (PRE-2013)

Figure No. 3

N

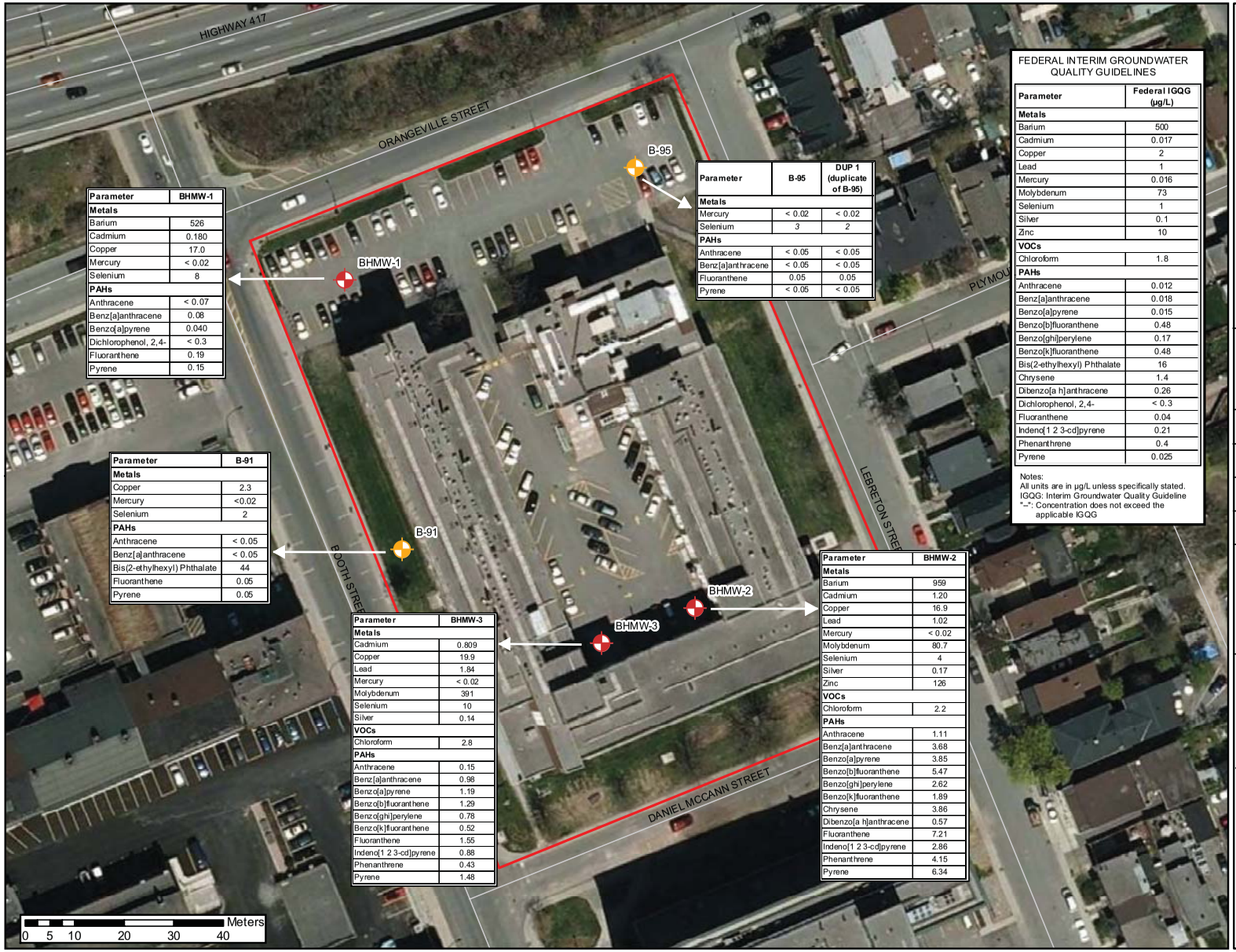
Scale	1:750
Drawn By	GR/CD
Job No.	131-20711-06
Date	JANUARY 2014

PROJECT
LIMITED PHASE II ESA
555 BOOTH STREET,
OTTAWA, ONTARIO

TITLE
SOIL CONCENTRATIONS IN EXCESS OF CCME SQGs (DECEMBER 2013)

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

Path: X:\2013\131-20711-06 555 Booth Street\GIS\SoilExceedances_131_20711_00.mxd



Parameter	BHMW-1
Metals	
Barium	526
Cadmium	0.180
Copper	17.0
Mercury	< 0.02
Selenium	8
PAHs	
Anthracene	< 0.07
Benz[a]anthracene	0.08
Benzo[a]pyrene	0.040
Dichlorophenol, 2,4-	< 0.3
Fluoranthene	0.19
Pyrene	0.15

Parameter	B-95	DUP 1 (duplicate of B-95)
Metals		
Mercury	< 0.02	< 0.02
Selenium	3	2
PAHs		
Anthracene	< 0.05	< 0.05
Benz[a]anthracene	< 0.05	< 0.05
Fluoranthene	0.05	0.05
Pyrene	< 0.05	< 0.05

Parameter	B-91
Metals	
Copper	2.3
Mercury	<0.02
Selenium	2
PAHs	
Anthracene	< 0.05
Benz[a]anthracene	< 0.05
Bis(2-ethylhexyl) Phthalate	44
Fluoranthene	0.05
Pyrene	0.05

Parameter	BHMW-3
Metals	
Cadmium	0.809
Copper	19.9
Lead	1.84
Mercury	< 0.02
Molybdenum	391
Selenium	10
Silver	0.14
VOCs	
Chloroform	2.8
PAHs	
Anthracene	0.15
Benz[a]anthracene	0.98
Benzo[a]pyrene	1.19
Benzo[b]fluoranthene	1.29
Benzo[ghi]perylene	0.78
Benzo[k]fluoranthene	0.52
Fluoranthene	1.55
Indeno[1 2 3-cd]pyrene	0.88
Phenanthrene	0.43
Pyrene	1.48

Parameter	BHMW-2
Metals	
Barium	959
Cadmium	1.20
Copper	16.9
Lead	1.02
Mercury	< 0.02
Molybdenum	80.7
Selenium	4
Silver	0.17
Zinc	126
VOCs	
Chloroform	2.2
PAHs	
Anthracene	1.11
Benz[a]anthracene	3.68
Benzo[a]pyrene	3.85
Benzo[b]fluoranthene	5.47
Benzo[ghi]perylene	2.62
Benzo[k]fluoranthene	1.89
Chrysene	3.86
Dibenzo[a h]anthracene	0.57
Fluoranthene	7.21
Indeno[1 2 3-cd]pyrene	2.86
Phenanthrene	4.15
Pyrene	6.34

FEDERAL INTERIM GROUNDWATER QUALITY GUIDELINES

Parameter	Federal IGQG (µg/L)
Metals	
Barium	500
Cadmium	0.017
Copper	2
Lead	1
Mercury	0.016
Molybdenum	73
Selenium	1
Silver	0.1
Zinc	10
VOCs	
Chloroform	1.8
PAHs	
Anthracene	0.012
Benz[a]anthracene	0.018
Benzo[a]pyrene	0.015
Benzo[b]fluoranthene	0.48
Benzo[ghi]perylene	0.17
Benzo[k]fluoranthene	0.48
Bis(2-ethylhexyl) Phthalate	16
Chrysene	1.4
Dibenzo[a h]anthracene	0.26
Dichlorophenol, 2,4-	< 0.3
Fluoranthene	0.04
Indeno[1 2 3-cd]pyrene	0.21
Phenanthrene	0.4
Pyrene	0.025

Notes:
All units are in µg/L unless specifically stated.
IGQG: Interim Groundwater Quality Guideline
"-": Concentration does not exceed the applicable IGQG

LEGEND

- SITE BOUNDARY
- BOREHOLE/MONITORING WELL (WSP, 2013)
- MONITORING WELLS INSTALLED BY OTHERS (PRE-2013)

Figure No. 4

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
GROUNDWATER CONCENTRATIONS IN EXCESS OF FEDERAL IGQGs (DECEMBER 2013)

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

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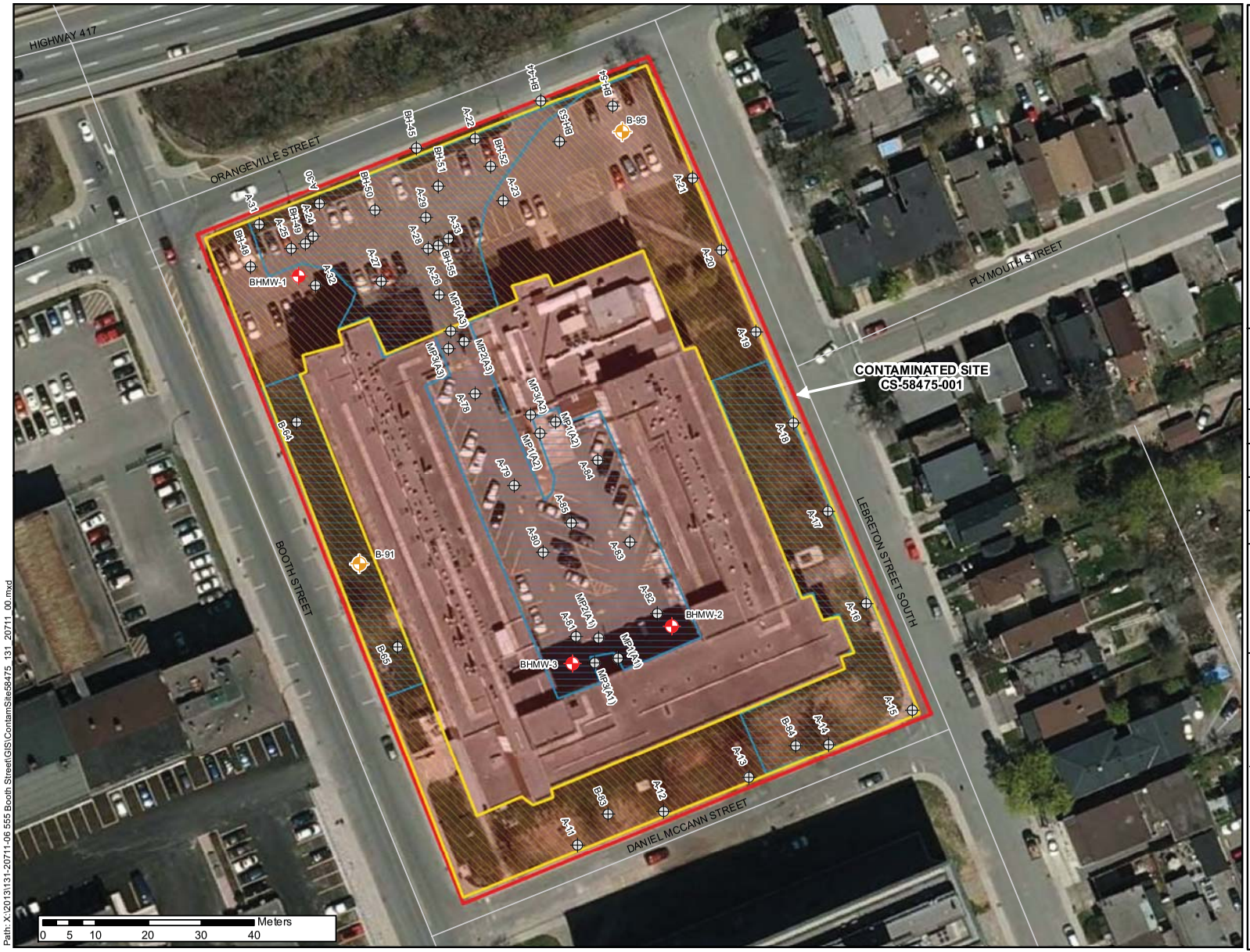

Path: X:\2013\131-20711-06 555 Booth Street\GIS\ContamSite58475_131_20711_00.mxd

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 SGQ/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, 2009

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

WSP
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

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.

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.

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**

Prepared by: **Kathryn Maton** Date (Start): **12/21/2013**
Reviewed by: **Vahid Arasteh** 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 / Polyaromatic Hydrocarbons; ICP-MS Metals; pH

Water Level ▽ Free Phase ▼

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)	LITHOLOGY	DESCRIPTION	VAPOR CONC. (ppm OR % LIE)	ODOUR F	ODOUR M	ODOUR P	VISUAL D	VISUAL S	SAMPLE TYPE	% RECUPERATION	N (Blow/6")	NUMBER	ANALYSIS	DUPLICATE	MONITORING WELL DIAGRAM	MONITORING WELL DESCRIPTION	REMARKS
		Ground surface.															
0.05 / 0.15		CRUSHED STONE with sand (fill)															
0.25 / *98.07*		ASPHALT	0						SS	50	14 17 7	BHMW-1 SS1	BTEX PHC F1-F4 SVOCs ICP-MS Metals PAH				Water level at 1.92 mbgs on December 27, 2013
		SAND, compact, dry, brown (fill)															
		SAND, silty with gravel, dense, dry, dark brown (fill)	0						SS	33	30 26 50-5"	BHMW-1 SS2				Bentonite	
0.91 / 1.04 / *97.28*		Stone fragments															
		Bedrock (limestone)														PVC Slotted Pipe	Groundwater sample submitted for laboratory analysis of PHCs, BTEX, VOCs, ICP-MS Metals, PAHs and SVOCs on December 28, 2013
																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	
4.59 / *93.73*		End of borehole at 4.59 m.														Sand	

BOREHOLE DRILLING RECORD : **BHMW-2**

Prepared by: **Kathryn Maton** Date (Start): **12/21/2013**
Reviewed by: **Vahid Arasteh** 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 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 / Polyaromatic Hydrocarbons
ICP-MS Metals
pH

Water Level ▽ Free Phase ▼

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)	LITHOLOGY	DESCRIPTION	VAPOR CONC. (ppm OR % LIE)	ODOUR F	ODOUR M	ODOUR P	VISUAL D	VISUAL S	SAMPLE TYPE	% RECUPERATION	N (Blow/6")	NUMBER	ANALYSIS	DUPLICATE	MONITORING WELL DIAGRAM	MONITORING WELL DESCRIPTION	REMARKS
		Ground surface.															
0.05 / 99.81		ASPHALT (0.15) / CRUSHED STONE, with sand (fill)	0						SS	50	55 38 44	BHMW-2 SS1	PHC F1-F4 ICP-MS Metals BTEX/VOC PAH SVOCs				Water level at 3.12 mbgs on December 27, 2013
		SAND, silty with crushed stone, compact to very dense, dry, dark brown (fill) *pieces of brick veneer and glass*	0						SS	62	6 4 6 6	BHMW-2 SS2				Bentonite	
1.22 / 98.74		GRAVEL (fill) (1.37 / 98.59)	0						SS	25	4 6 23 46	BHMW-2 SS3A					
		SAND, with crushed stone, compact, moist, dark brown (fill)	0									BHMW-2 SS3B	PHC F1-F4 ICP-MS Metals BTEX/VOC PAH SVOCs	DUP1			
1.72 / 98.24		BEDROCK (limestone)														Sand; 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
4.64 / 95.32		End of borehole at 4.64 m.														PVC Slotted Pipe	

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

BOREHOLE DRILLING RECORD : **BHMW-3**

Prepared by: **Kathryn Maton** Date (Start): **12/21/2013**
Reviewed by: **Vahid Arasteh** 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 Product

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

▽ Water Level ▼ Free Phase

CHEMICAL ANALYSIS
PHC F1-F4 Petroleum Hydrocarbons F1-F4
BTEX Benzene, Toluene, Ethylbenzene, Xylene
SVOC Semi Volatile Organic Compounds
PAH Polycyclic Aromatic Hydrocarbons / Polyaromatic 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)	LITHOLOGY	DESCRIPTION	VAPOR CONC. (ppm OR % LIE)	ODOUR F	ODOUR M	ODOUR P	VISUAL D	VISUAL S	SAMPLE TYPE	% RECUPERATION	N (Blow/6")	NUMBER	ANALYSIS	DUPLICATE	MONITORING WELL DIAGRAM	MONITORING WELL DESCRIPTION	REMARKS
		Ground surface.															
0.05 / 0.15 / *99.76*		ASPHALT															
		CRUSHED STONE	5						SS	46	36 40 24	BHMW-3 SS1	BTEX/VOC ICP-MS Metals PAH SVOCs PHC F1-F4				
0.61 / *99.30*		SAND, silty with crushed stone, compact, wet, dark brown (fill) *with brick fragments*	10						SS	8	10 8 6 7	BHMW-3 SS2					
		SAND, silty with crushed stone, compact, wet, dark brown (fill)	0						SS	50	4 4 2 12	BHMW-3 SS3	BTEX/VOC ICP-MS Metals PAH SVOCs PHC F1-F4				
1.47 / *98.44*		BEDROCK (limestone)															
4.31 / *95.60*		End of borehole at 4.31 m.															

Bentonite
Sand
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

Water level at 3.45 mbgs on December 27, 2013

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

Table D1: Metals Soil Analytical Results

Parameter	Units	CCME Guideline CEQG/SQG - Commercial[1]	MOE 2011[2] Table 7[3]	BHMW1-SS1	BHMW2-SS1	BHMW2-SS3B	Dup-1 (duplicate of BHMW2-SS3B)	BHMW3-SS1	BHMW3-SS3
Drilling Date				**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
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

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

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

[3] 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 — Yellow shading indicates parameter concentration exceeds CCME CEQG/SQG - Commercial Land Use

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

Table D2: VOC Soil Analytical Results

Parameter	Units	CCME Guideline CEQG/SQG - Commercial[1]	MOE 2011[2] Table 7[3]	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

[1] CCME Canadian Environmental Quality Guidelines (CEQG) Summary Table , Soil Quality Guidelines (SQG) for the Protection of Environmental and Human Health for Commercial Property
[2] MOE 2011: Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act (April 2011)
[3] 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 CEQG/SQG - Commercial Land Use
Value — Bold and Underlined indicates parameter concentration exceeds MOE Table 7 Site Condition Standards

Table D3: Petroleum Hydrocarbons (PHC) Soil Analytical Result

Parameter	Units	CCME CWS[1] Table 1 Commercial, Coarse grained[2]	MOE 2011[3] Table 7[4]	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
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

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

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

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

[4] 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

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[1]: SQG_{DH}	B[a]P PEF	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
Benz[a]anthracene	NC	0.1	µg/g	1.51	2.74	3.61	5.48	3.09	13.2
Benzo[a]pyrene	NC	1	µg/g	1.55	2.94	3.74	5.43	3.03	16.4
Benzo[b]fluoranthene	NC	0.1	µg/g	2.07	4.07	4.91	7.59	3.95	22.1
Benzo[k]fluoranthene	NC	0.1	µg/g	0.744	1.27	1.97	2.72	1.57	8.41
Benzo[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				2.39	4.52	5.69	8.22	4.58	24.77
B[a]P TPE based on likely coal tar / cresote contamination safety factor of 3)	0.6 (ILCR < 1 X 10^{-6})[2]		µg/g	7.18	13.57	17.07	24.66	13.74	74.30
	5.3 (ILCR < 1 X 10^{-5})[3]		µg/g	7.18	13.57	17.07	24.66	13.74	74.30
IACR (for protection of potable water - SQGpw)	1.0		µg/g	28.76	54.12	69.41	103.20	56.32	297.95

NOTES

[1] CCME, Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health, Polycyclic Aromatic Hydrocarbons, 2008, revised 2010

[2] Soil quality guideline based on an ILCR of 1 in 1,000,000 (10^{-6}), accepted target level for ILCR in Ontario (4)

[3] Soil quality guideline based on an ILCR of 1 in 100,000 (10^{-5})

[4] 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_{DH}: Soil quality guideline for the protection of human health, direct contact

SQGpw: Soil quality guideline for the protection of potable water

SQG_E: 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^{-6}), 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^{-5})

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[1] Table 2[2]	Reference	SQG_E	Soil Contact (SQG_{SC})	Soil and Food Ingestion (SQG_I)	Protection of Freshwater Life (SQG_{FL})	CCME, 1991[3] or CCME SQG_E, 1997[4]	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	µg/g	0.28	SQG_{FL}	NC	NC	NC	0.28	no value	0.126	0.128	0.306	0.413	0.461	< 0.1
Acenaphthylene	µg/g	320	SQG_{FL}	NC	NC	NC	320	no value	0.192	0.351	0.490	1.07	0.092	2.83
Anthracene	µg/g	32	SQG_E	32	32	NC	NA	no value	0.528	0.767	1.48	2.22	1.42	1.89
Benz[a]anthracene	µg/g	10	CCME, 1991	NC	NC	NC	NA	10*	1.51	2.74	3.61	5.48	3.09	13.2
Benzo[a]pyrene	µg/g	72	SQG_E	72	72	NC	8800	1.4**	1.55	2.94	3.74	5.43	3.03	16.4
Benzo[b]fluoranthene	µg/g	10	CCME, 1991	NC	NC	NC	NA	10*	2.07	4.07	4.91	7.59	3.95	22.1
Benzo[ghi]perylene	µg/g	--	N/A	NC	NC	NC	NA	no value	0.747	1.34	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	1.97	2.72	1.57	8.41
Chrysene	µg/g	--	N/A	NC	NC	NC	NA	no value	1.42	2.61	3.33	5.08	2.91	12.8
Dibenz[a h]anthracene	µg/g	10	CCME, 1991	NC	NC	NC	NA	10*	0.277	0.522	0.572	0.784	0.435	2.57
Fluoranthene	µg/g	180	SQG_E	180	180	NC	NA	no value	3.32	6.30	8.36	13.4	7.16	26.6
Fluorene	µg/g	0.25	SQG_{FL}	NC	NC	NC	0.25	no value	0.182	0.234	0.541	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	2.77	3.53	2.09	12.2
Naphthalene	µg/g	0.013	SQG_{FL}	NC	NC	NC	0.013	22**	0.044	< 0.05	0.092	0.381	< 0.07	< 0.1
Phenanthrene	µg/g	0.046	SQG_{FL}	NC	NC	NC	0.046	50*	1.90	2.98	5.26	8.69	5.02	7.14
Pyrene	µg/g	100	CCME, 1991	NC	NC	NC	NA	100*	2.66	5.28	7.03	11.2	5.90	21.8

NOTES

[1]Canadian Soil Guidelines for the Protection of Environmental and Human Health, Polycyclic Aromatic Hydrocarbons, 2008, revised 2010

[2]Table 2 Soil Quality Guidelines (SQG) for Carcinogenic and Other PAH's

[3 or *] CCME Interim Soil Quality Criteria, 1991

[4 or **] CCME, Provisional Soil Quality Guideline for Environmental Health (SQG_E), 1997

SQG_E: Soil quality guideline for environmental health

SQG_{SC}: Soil quality guideline for the protection of human health, soil contact

SQG_I: Soil quality guideline for the protection of human health, soil and food ingestion

SQG_{FL}: Soil quality guideline for the protection of freshwater life

na: Not Analyzed

NA: Not Applicable

NC: No Criteria

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

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

Parameter	MOE 2011[1] Table 7[2]	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
Methlynaphthalene, 1-	76	µg/g	< 0.01	< 0.05	0.082	0.138	< 0.07	< 0.1
Methlynaphthalene, 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

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

[2] 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

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

Parameter	CCME Guideline CEQG/SQG - Commercial[1]	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
Methlynaphthalene, 1-	NC	µg/g	< 0.01	< 0.05	0.082	0.138	< 0.07	< 0.1
Methlynaphthalene, 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

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

[2] Guideline 2 = CEQG/SQG - Commercial

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

Table D8: Metals Groundwater Analytical Results

Parameter	Units	CCME Guideline CEQG/WQG - PAL - Freshwater, Long Term[1]	Federal IGQG[2] Table 3, Tier 1 [3]	MOE 2011[4] Table 7[5]	B-91	B-95	DUP 1 (duplicate of B-95)	BHMW-1	BHMW-2	BHMW-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

[1] CCME Canadian Environmental Quality Guidelines (CEQG) Summary Table , Water Quality Guidelines (WQG) for the Protection of Aquatic Life (PAL) for Freshwater, Long Term Concentration

[2] Guidance Document on Fedral Interim Groundwater Quality Guidelines For Federal Contaminated Sites (May 2010)

[3] Table 3 Federal Interim Groundwater Quality Guidelines (IGQGs) Generic Guidelines for Commercial and Industrial Land Uses for Tier 1 (Coarse Textured Soil)

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

[5] 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 CEQG/WQG for the Protection of Aquatic Life for Freshwater, Long Term Concentration
Value	Yellow shading indicates parameter concentration exceeds Federal Guideline1 Tier 1, coarse textured soil
Value	Bold and Underlined indicates parameter concentration exceeds MOE Table 7 Site Condition Standards
CEQG/WQG - PAL	WQG-PAL is more stringent than IGQG.

Table D9: VOC Groundwater Analytical Results

Parameter	Units	CCME Guideline CEQG/WQG - PAL - Freshwater, Long Term[1]	Federal IGQG[2] Table 3, Tier 1 [3]	MOE 2011[4] Table 7[5]	B-91	B-95	DUP 1 (duplicate of B-95)	BHMW-1	BHMW-2	BHMW-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
Bromoform	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
Dichloropropene, cis-1,3-	µg/L	NC	3.8	0.5	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Dichloropropene, trans-1,3-	µg/L	NC	3.8	0.5	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Dichloropropene 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, mp	µg/L	NC	NC	NC	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4
Xylene, mp,o	µg/L	NC	18000	72	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4

NOTES

[1] CCME Canadian Environmental Quality Guidelines (CEQG) Summary Table , Water Quality Guidelines (WQG) for the Protection of Aquatic Life (PAL) for Freshwater, Long Term Concentration

[2] Guidance Document on Fedral Interim Groundwater Quality Guidelines For Federal Contaminated Sites (May 2010)

[3] Table 3 Federal Interim Groundwater Quality Guidelines (IGQGs) Generic Guidelines for Commercial and Industrial Land Uses for Tier 1 (Coarse Textured Soil)

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

[5] 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 CEQG/WQG for the Protection of Aquatic Life for Freshwater, Long Term Concentration
Value	Yellow shading indicates parameter concentration exceeds Federal Guideline1 Tier 1, coarse textured soil
Value	Bold and Underlined indicates parameter concentration exceeds MOE Table 7 Site Condition Standards
CEQG/WQG - PAL	WQG-PAL is more stringent than IGQG.

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

Parameter	Units	CCME Guideline CEQG/WQG - PAL - Freshwater, Long Term[1]	Federal IGQG[2] Table 3, Tier 1 [3]	MOE 2011[4] Table 7[5]	B-91	B-95	DUP 1 (duplicate of B-95)	BHMW-1	BHMW-2	BHMW-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*
Benzo[a]pyrene	µg/L	0.015	0.015	0.81	< 0.01	< 0.01	< 0.01	*0.040*	***3.85***	***1.19***
Benzo[b]fluoranthene	µg/L	NC	0.48	0.75	< 0.05	< 0.05	< 0.05	0.07	**5.47**	**1.29**
Benzo[ghi]perylene	µg/L	NC	0.17	0.2	< 0.05	< 0.05	< 0.05	< 0.07	**2.62**	**0.78**
Benzo[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-Chloroethyl)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**
Dibenzo[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
Diethyl 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	< 0.2	< 0.2	< 0.2	< 0.3	< 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**
Methlynaphthalene, 1-	µg/L	NC	1500	1500	< 0.05	< 0.05	< 0.05	< 0.07	0.08	< 0.05
Methlynaphthalene, 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

[1] CCME Canadian Environmental Quality Guidelines (CEQG) Summary Table , Water Quality Guidelines (WQG) for the Protection of Aquatic Life (PAL) for Freshwater, Long Term Concentration
[2] Guidance Document on Fedral Interim Groundwater Quality Guidelines For Federal Contaminated Sites (May 2010)
[3] Table 3 Federal Interim Groundwater Quality Guidelines (IGQGs) Generic Guidelines for Commercial and Industrial Land Uses for Tier 1 (Coarse Textured Soil)
[4] MOE 2011: Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act (April 2011)
[5] 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 CEQG/WQG for the Protection of Aquatic Life for Freshwater, Long Term Concentration
Value	Yellow shading indicates parameter concentration exceeds Federal Guideline1 Tier 1, coarse textured soil
Value	Bold and Underlined indicates parameter concentration exceeds MOE Table 7 Site Condition Standards
CEQG/WQG - PAL	CEQG/WQG-PAL is more stringent than IGQG.

Table D11: Petroleum Hydrocarbons (PHC) Groundwater Analytical Result

Parameter	Units	CCME Guideline CEQG/WQG - PAL - Freshwater, Long Term[1]	Federal IGQG[2] Table 3, Tier 1 [3]	MOE 2011[4] Table 7[5]	B-91	B-95	DUP 1 (duplicate of B-95)	BHMW-1	BHMW-2	BHMW-3
Sample Date					**27-Dec-13**	**27-Dec-13**	**27-Dec-13**	**27-Dec-13**	**27-Dec-13**	**27-Dec-13**
Petroleum Hydrocarbons F1-BTEX	µg/L	NC	9100	420	< 10	< 10	< 10	< 10	< 10	< 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

[1] CCME Canadian Environmental Quality Guidelines (CEQG) Summary Table , Water Quality Guidelines (WQG) for the Protection of Aquatic Life (PAL) for Freshwater, Long Term Concentration
[2] Guidance Document on Fedral Interim Groundwater Quality Guidelines For Federal Contaminated Sites (May 2010)
[3] Table 3 Federal Interim Groundwater Quality Guidelines (IGQGs) Generic Guidelines for Commercial and Industrial Land Uses for Tier 1 (Coarse Textured Soil)
[4] MOE 2011: Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act (April 2011)
[5] 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 CEQG/WQG for the Protection of Aquatic Life for Freshwater, Long Term Concentration
Value	Yellow shading indicates parameter concentration exceeds Federal Guideline1 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 **Radioactive material**, **Bacterial contamination** or **Biological hazards** likely to be present at the site?	No	If yes, do not proceed through the NCSCS. Contact applicable regulatory agency immediately.
2. Are there **no contamination exceedances** (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 **partial/incompleted or no environmental site investigations** been conducted for the Site?	No	If yes, do not proceed through the NCSCS.
4. Is there direct and signficant evidence of **impacts to humans** 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 **impacts to ecological receptors** 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 **adverse effects in the exposure zone** (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 **explosion hazard**?	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 exposive 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:	**555 Booth Street, Ottawa, Ontario**	
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: Longitude:	____45__ degrees ___24___ min ___10.32___ secs ___75___ degrees ___42___ min ___21.03___ secs
	UTM Coordinate:	Northing _____ Easting _____
Site Land Use:	Current:	Commercial
	Proposed:	N/A
Site Plan	**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.**	
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)

(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
1. Residency Media (replaces physical state)				
Which of the following residency media are known (or strongly suspected) to have one or more exceedances of the applicable CCME guidelines? **yes** = has an exceedance or strongly suspected to have an exceedance **no** = 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). 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 http://www.ccme.ca/publications/ceqg_rcqe.html?category_id=124. For potable groundwater environments, guidelines for Canadian Drinking Water Quality (for comparison with groundwater monitoring data) are available on the Health Canada website at http://www.hc-sc.gc.ca/ewh-semt/pubs/water-eau/doc_sup-appui/sum_guide-res_recom/index_e.html.	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			
Yes No Do Not Know				
B. Groundwater	Yes			
Yes No Do Not Know				
C. Surface water	Do Not Know			
Yes No Do Not Know				
D. Sediment	Do Not Know			
Yes No Do Not Know				
"Known" -score	4			
"Potential" - score	2			
2. Chemical Hazard				
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	Current report: Soil Contained High Hazards of: Trichloroethylene, Lead, Benzo(a)anthracene, Bnzo (b) flouranthene 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(ghi)perylene, Benzo(k)flouranthene, benzo(ah)anthracene, Indeno(123-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.
High Medium Low Do Not Know				
"Known" -score	8			
"Potential" - score	---			
3. Contaminant Exceedence Factor				
What is the ratio between the measured contaminant concentration and the applicable CCME guidelines (or other "standards")?	High (>100x)	BHMW3-SS3 had a radio 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), BHMW3-SS3 had a ratio of 297.95 for IACR, BHMW2-SS3B had a ratio of 114.35 for Phenanthrene, Duplicate 1 (Duplicate of BHMW2-SS3B) had a ratio of 188.91 for Phenanthrene. BHMW3-SS1 and BHMW3-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. **Ranking should be based on contaminant with greatest exceedance of CCME guidelines.** 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. 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.	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.
Mobile NAPL High (>100x) Medium (10x to 100x) Low (1x to 10x) Do Not Know				
"Known" -score	6			
"Potential" - score	---			

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
4. Contaminant Quantity (known or strongly suspected)				
What is the known or strongly suspected quantity of all contaminants? >10 hectare (ha) or 5000 m^3 2 to 10 ha or 1000 to 5000 m^3 <2 ha or 1000 m^3 Do Not Know	>10 hectare (ha) or 5000 m3	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.
"Known" -score	9			
"Potential" - score	---			
5. Modifying Factors				
Does the chemical fall in the class of persistent chemicals based on its behavior in the environment? Yes No Do Not Know	Yes	Benzo(a)Pyrene exceedence in groundwater. Lead exceedences 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? Yes No Do Not Know	Do Not Know			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? one two to four five or more Do Not Know	five or more	inorganic substances (metals), PAH's, - Heavy extractable petroleum hydrocarbons (F3-F4 in previous reports), halogenated methane, phathalate esters	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.*
"Known" - Score	5			
"Potential" - Score	1			

Contaminant Characteristic Total

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

(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
1. Groundwater Movement				
A. Known COPC exceedances and an operable groundwater pathway within and/or beyond the property boundary.		Based on the current and historical investigations as described in the report.	Review chemical data and evaluate groundwater quality. The evaluation method concentrates 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 potable water supply or could have the potential for use in the future. Non-potable groundwater environments are defined as areas that are 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 sheens, liquid phase contamination, or contaminant saturated soils. Seeps 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 daylights into a nearby surface water body, the more stringent guidelines for both drinking water and protection of aquatic life should be considered. **Selected References** Potable Environments Guidelines for Canadian Drinking Water Quality: www.hc-sc.gc.ca/ewh-semt/pubs/water-eau/doc_sup-appui/sum_guide-res_recom/index_e.html Non-Potable Environments Canadian Water Quality Guidelines for Protection of Aquatic Life. CCME. 1999 www.ccme.ca Compilation and Review of Canadian Remediation Guidelines, Standards and Regulations. Science Applications International Corporation (SAIC Canada), report to Environment Canada, January 4, 2002.
i) For **potable groundwater environments**, 1) groundwater concentrations exceed background concentrations and 1X 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 **non-potable environments** (typically urban environments with municipal services), 1) groundwater concentrations exceed 1X the applicable non potable guidelines or modified generic guidelines (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			
ii) Same as (i) except the information is not known but strongly suspected based on indirect observations.	9			
iii) Meets GCDWQ for **potable environments**; meets non-potable criteria or modified generic criteria (excludes ingestion of drinking water pathway) for **non-potable environments**				
or				
Absence of groundwater exposure pathway (i.e., there is no aquifer (see definition at right) at the site or there is an adequate isolating layer between the aquifer and the contamination, and within 5 km of the site there are no aquatic receiving environments and the groundwater does not daylight).	0			
	12			
Score	12			
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 2 (Surface Water Pathway)				
B. Potential for groundwater pathway.				
a. Relative Mobility			Organics Koc (L/kg) / Metals with higher mobility at acidic conditions / Metals with higher mobility at alkaline conditions Koc < 500 (i.e., log Koc < 2.7) — pH < 5 — pH > 8.5 Koc = 500 to 5000 (i.e., log Koc = 2.7 to 3.7) — pH = 5 to 6 — pH = 7.5 to 8.5 Koc = 5,000 to 100,000 (i.e., log Koc = 3.7 to 5) — pH > 6 — pH < 7.5 Koc > 100,000 (i.e., log Koc > 5)	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 Koc of an individual contaminant may suggest that it will be relatively immobile, it is possible that, with complex mixtures, there could be enhanced mobility due to co-solvent effects. Therefore, the Koc cannot be relied on solely as a measure of mobility. An evaluation of other factors such as containment, 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.
High Moderate Low Insignificant Do Not Know				
	Do Not Know			
Score	2			
b. Presence of engineered sub-surface containment? No containment Partial containment Full containment Do Not Know			Review the existing engineered systems or natural attenuation processes for the site and determine if full or partial containment is achieved. 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 process, this category is evaluated as high. If there is less than full containment or if uncertain, then evaluate as medium. In Arctic environments, permafrost will be evaluated, as appropriate, based on detailed evaluations, effectiveness and reliability to contain/control contaminant migration.	Someone experienced must provide a thorough description of the sources researched to determine the containment of the source at 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. **Selected Resources:** United States Environmental Protection Agency (USEPA) 1998. Technical Protocol for Evaluating Natural Attenuation of Chlorinated Solvents in Groundwater. EPA/600/R-98/128. Environment Canada – Ontario Region – Natural Attenuation Technical Assistance Bulletins (TABS) Number 19 –21.
	Do Not Know			
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 3 to 10 m > 10 m Do Not Know		1.5 metres of overburden to bedrock	The term "confining layer" refers to geologic material with little or no permeability or hydraulic conductivity (such as unfractured clay); water does not pass through this layer or the rate of movement is extremely slow. Measure the thickness and extent of materials that will impede the migration of contaminants to the groundwater exposure pathway. The evaluation of this category is based on: 1) The presence and thickness of saturated subsurface materials that impede the vertical migration of contaminants to lower aquifer units which can or are used as drinking water sources or 2) The presence and thickness of unsaturated subsurface materials that impede the vertical migration of contaminants from the source location to the saturated zone (e.g., water table aquifer, first hydrostratigraphic unit or other groundwater pathway).	
	Do Not Know			
Score	0.5			
d. Hydraulic conductivity of confining layer >10^{-4} cm/s or no confining layer 10^{-4} to 10^{-6} cm/s <10^{-6} cm/s Do Not Know			Determine the nature of geologic materials and estimate hydraulic conductivity from published material (or use "Range of Values of Hydraulic Conductivity and Permeability" figure in the Reference Material sheet). Unfractured clays should be scored low. Silts should be scored medium. Sand, gravel should be scored high. The evaluation of this category is based on: 1) The presence and hydraulic conductivity ("K") of saturated subsurface materials that impede the vertical migration of contaminants to lower aquifer units which can or are used as a drinking water source, groundwater exposure pathway or 2) The presence and permeability ("k") of unsaturated subsurface materials that impede the vertical migration of contaminants from the source location to the saturated water table aquifer, first hydrostratigraphic unit or other groundwater pathway.	
	Do Not Know			
Score	0.5			

Definition	Score	Rationale for Score (document any assumptions, reports, or site-specific information; provide references)	Method Of Evaluation	Notes
B. Potential for groundwater pathway.				
e. Precipitation infiltration rate (Annual precipitation factor x surface soil relative permeability factor) High Moderate Low Very Low None Do Not Know	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.	
Score	0.4			
f. Hydraulic conductivity of aquifer $>10^{-2}$ cm/s 10^{-2} to 10^{-4} cm/s $<10^{-4}$ cm/s Do Not Know	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).	
Score	1			
Potential groundwater pathway total	5.9			
Allowed Potential score	---	Note: If a "known" score is provided, the "potential" score is disallowed.		
Groundwater pathway total	**12**			
2. Surface Water Movement				
A. Demonstrated migration of COPC in surface water above background conditions				
Known concentrations of surface water: i) Concentrations exceed background concentrations and exceed CCME CWQG for protection of aquatic life, irrigation, livestock water, and/or recreation (whichever uses are applicable at the site) by >1 X; or There is known contact of contaminants with surface water based on site observations. or 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. 1999. Canadian Water Quality Guidelines for the Protection of Aquatic Life www.ccme.ca CCME. 1999. Canadian Water Quality Guidelines for the Protection of Agricultural Water Uses (Irrigation and Livestock Water) www.ccme.ca Health and Welfare Canada. 1992. Guidelines for Canadian Recreational Water Quality.
ii) Same as (i) except the information is not known but strongly suspected based on indirect observations.	8			
iii) Meets CWQG or absence of surface water exposure pathway (i.e., Distance to nearest surface water is > 5 km.)	0			
Score	Go to Potential ---			
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. Potential for migration of COPCs in surface water				
a. Presence of containment No containment Partial containment Full containment Do Not Know	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.	
Score	3			
b. Distance to Surface Water 0 to <100 m 100 - 300 m >300 m Do Not Know	>300 m	Dow's Lake 500 m south	Review available mapping and survey data to determine distance to nearest surface water bodies.	
Score	0.5			

(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
c. Topography Contaminants above ground level and slope is steep Contaminants at or below ground level and slope is steep Contaminants above ground level and slope is intermediate Contaminants at or below ground level and slope is intermediate Contaminants above ground level and slope is flat Contaminants at or below ground level and slope is flat Do Not Know	At/below and flat		Review engineering documents on the topography of the site and the slope of surrounding terrain. Steep slope = >50% Intermediate slope = between 5 and 50% Flat slope = < 5% Note: Type of fill placement (e.g., trench, above ground, etc.).	
Score	0			
d. Run-off potential High (rainfall run-off score > 0.6) Moderate (0.4 < rainfall run-off score <0.6) Low (0.2 < rainfall run-off score <0.4) Very Low (0 < rainfall run-off score < 0.2) None (rainfall run-off score = 0) Do Not Know	High	914 mm rainfall (2013) and pavement (1). Approximately 90% of the Site is covered by buildings or pavements.	Rainfall 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). The former definition of "annual rainfall" did not include the precipitation as snow. This minor adjustment has been made. The second modification was the inclusion of permeability of surface materials as an evaluation factor. Permeability For infiltration assume: gravel (0), sand (0.3), loam (0.6) and pavement or clay (1). Multiply the infiltration factor with precipitation factor to obtain rainfall run off score.	Selected Sources: Environment Canada web page link: www.msc.ec.gc.ca Snow to rainfall conversion apply ratio of 15 (snow):1(water)
Score	1			
e. Flood potential 1 in 2 years 1 in 10 years 1 in 50 years Not in floodplain Do Not Know	Do Not Know		Review published data such as flood plain mapping or flood potential (e.g., spring or mountain run-off) and Conservation Authority records to evaluate flood potential of nearby water courses both up and down gradient. Rate zero if site not in flood plain.	
Score	0.5			
Potential surface water pathway total	5			
Allowed Potential score	5	Note: If a "known" score is provided, the "potential" score is disallowed.		
Surface water pathway total	**5**			
3. Surface Soils (potential for dust, dermal and ingestion exposure)				
A. Demonstrated concentrations of COPC in surface soils (top 1.5 m)				
COPCs measured in surface soils exceed the CCME soil quality guideline.	12	Based on the current and historical investigations as described in the report.	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., coarse or fine).	Selected References: CCME. 1999. Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health www.ccme.ca
Strongly suspected that soils exceed guidelines	9			
COPCs in surface soils does not exceed the CCME soil quality guideline or is not present (i.e., bedrock).	0			
	12			
Score	12			
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				
a. Are the soils in question covered? Exposed Vegetated Landscaped Paved Do Not Know	Landscaped	Although approximately 90% of the site is paved or covered by the buildings, almost 10% of the areas are landscaped.	Consult engineering or risk assessment reports for the site. Alternatively, review photographs or perform a site visit. Landscaped surface soils must include a minimum of 0.5 m of topsoil.	The possibility of contaminants in blowing snow have not been included in the revised NCS as it is difficult to assess what constitutes an unacceptable concentration and secondly, spills to snow or ice are most efficiently mitigated while freezing conditions remain.
Score	2			
b. For what proportion of the year does the site remain covered by snow? 0 to 10% of the year 10 to 30% of the year More than 30% of the year Do Not Know	>30% of year		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).	
Score	0			
Potential surface soil pathway total	2			
Allowed Potential score	---	**Note: If a "known" score is provided, the "potential" score is disallowed.**		
Soil pathway total	**12**			

(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
4. Vapour				
A. Demonstrated COPCs in vapour.				
Vapour has been measured (indoor or outdoor) in concentrations exceeding risk based concentrations.	12	Previous reports have demonstarted	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			
	Go to Potential			
Score	---			
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. Potential for COPCs in vapour				
a. Relative Volatility based on Henry's Law Constant, H' (dimensionless) High (H' > 1.0E-1) Moderate (H' = 1.0E-1 to 1.0E-3) Low (H' < 1.0E-3) Not Volatile Do Not Know		Current - Acenaphthene 1.55E-04, Benzo(a)anthracene 3.35E-06, Benzo(b)flouranthene 1.11E-04, Flourene 1.61E-05, Indeno(123-cd)pyrene 1.60E-06, Naphalene 4.83E-04. Past reports: Mercury 1.14E-02, Benzo(a)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			
Score	2.5			
b. What is the soil grain size? Fine Coarse Do Not Know			Review soil permeability data in engineering reports. The greater the permeability of soils, the greater the possible movement of vapours. 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).	
	Coarse			
Score	4			
c. Is the depth to the source less than 10m? Yes No Do Not Know			Review groundwater depths below grade for the site.	
	Yes			
Score	2			
d. Are there any preferential pathways? Yes No Do Not Know		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 pathyways.	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, underground conduits such as sewer and utility lines, drains, or septic systems may serve as preferential pathways. Features of the building itself that may also be preferential pathways include earthen floors, expansion joints, wall cracks, or foundation perforations for subsurface features such as utility pipes, sumps, and drains.
	Yes			
Score	2			
Potential vapour pathway total	10.5			
Allowed Potential score	10.5	Note: If a "known" score is provided, the "potential" score is disallowed.		
Vapour pathway total	**10.5**			
5. Sediment Movement				
A. Demonstrated migration of sediments containing COPCs				
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 this 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. **or** Absence of sediment exposure pathway (i.e., within 5 km of the site there are no aquatic receiving environments, and therefore no sediments).	0			
	0			
Score	0			
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)				

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(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
B. Potential for sediment migration				
a. Are the sediments having COPC exceedances capped with sediments having no exceedances ("clean sediments")?	No		Review existing sediment assessments. If sediment coring 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.	
Yes				
No				
Do Not Know	4			
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?	No		Review existing sediment assessments. If the sediments present at the site are in a river, select "no" for this question.	
Yes				
No				
Do Not Know	0			
c. For rivers, are the contaminated sediments in an area prone to sediment scouring?	No		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	
Yes				
No				
Do Not Know	0			
Potential sediment pathway total	4			
Allowed Potential score	---	Note: If a "known" score is provided, the "potential" score is disallowed.		
Sediment pathway total	**0**			
6. Modifying Factors				
Are there subsurface utility conduits in the area affected by contamination?	Yes	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.	
Yes				
No				
Do Not Know				
Known	4			
Potential	0			

Migration Potential Total		
Raw "known" total	28	
Raw "potential" total	15.5	
Raw combined total	43.5	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.
Total (max 33)	**22.4**	

(III) 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
1. Human				
A. Known exposure				
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 Site*)	22	Based on the identified contaminants and the level of contamination. Although a risk assessment is not completed, calculation of B[a]pyrene TPE is indicative of presence of cancer risks 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. However, a scoring guideline (22) is provided in case a numerical score for the site is still desired (e.g., for comparison with other Class 1 sites). This category can be based on the outcomes of risk assessments and applies to studies which have reported Hazard Quotients >1 for noncarcinogenic chemicals and incremental cancer risks that exceed acceptable levels defined by the jurisdiction for carcinogenic chemicals (for most jurisdictions this is typically either $>10^{-5}$ or $>10^{-6}$). Known impacts can also be evaluated based on blood testing (e.g. blood lead >10 ug/dL) or other health based testing. This category can be based on the outcomes of risk assessments and applies to studies which have reported Hazard Quotients of less than 0.2 for non-carcinogenic chemicals and incremental lifetime cancer risks for carcinogenic chemicals that are within acceptable levels as defined by the jurisdiction (for most jurisdictions this is less than either 10^{-6} or 10^{-5}).	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 contaminated food source/supply and subsequent ingestion/transfer to humans. Any associated adverse effects to the environment are scored separately later in this worksheet. 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. **Selected References:** Health Canada – Federal Contaminated Site Risk Assessment in Canada Parts 1 and 2 Guidance on Human Heath Screening Level Risk Assessments (www.hc-sc.gc.ca/ewh-semt/pubs/contamsite/index_e.html) United States Environmental Protection Agency, Integrated Risk Information System (IRIS) – http://toxnet.nml.nih.gov
Same as above, but "Strongly Suspected" based on observations or indirect evidence.	10			
No quantified or suspected exposures/impacts in humans.	0			
	10			
Score	10			
NOTE: If a score is assigned here for Known Exposure, then you can skip Part B (Potential for Human Exposure) and go to Section 2 (Human Exposure Modifying Factors)				
B. Potential for human exposure				
a) Land use (provides an indication of potential human exposure scenarios) Agricultural Residential / Parkland Commercial Industrial Do Not Know	Commercial		Review zoning and land use maps over the distances indicated. 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. 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. 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).	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).
Score	1			
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	Contaminants are covered by asphalt and grassed areas. The grassed area of the site are accessible by public.	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.	
Score	2			
B. Potential for human exposure				
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	No	Surface is covered with Aphalt and grass	If soils or potable groundwater are present exceeding their respective CCME guidelines, dermal contact is assumed. Exposure to surface water, non-potable groundwater or sediments exceeding their respective CCME guidelines will depend on the site. Select "Yes" if dermal exposure to surface water, non-potable groundwater or sediments is expected. For instance, dermal contact with sediments would not be expected in an active port. Only soils in the top 1.5 m are defined by CCME (2003) as surface soils. If contaminated soils are only located deeper than 1.5 m, direct contact with soils is not anticipated to be an operable contaminant exposure pathway.	Exposure via the skin is generally believed to be a minor exposure route. However for some organic contaminants, skin exposure can play a very important component of overall exposure. Dermal exposure can occur while swimming in contaminated waters, bathing with contaminated surface water/groundwater and digging in contaminated dirt, etc.
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 II (Migration Potential)? Yes No Do Not Know	No		If inhabitable buildings are on the site within 30 m of soils or groundwater exceeding their respective guidelines for volatile chemicals, there is a potential of risk to human health (Health Canada, 2004). Review site investigations for location of soil samples (having exceedances of volatile substances) relative to buildings. Refer to (II) Migration Potential worksheet, 4B.a), *Potential for COPCs in Vapour* for a definition of volatility.	Exposure via the lungs (inhalation) can be a very important exposure pathway. Inhalation can be via both particulates (dust) and gas (vapours). Vapours can be a problem where buildings have been built on former industrial sites or where volatile contaminants have migrated below buildings resulting in the potential for vapour intrusion. Assesses the potential for humans to be exposed to vapours originating from site soils. The closer the receptor is to a source of volatile chemicals in soil, the greater the potential of exposure. Also, coarser-grained soil will convey vapour much more efficiently in the soil than finer grained material such as clays and silts. General Notes; Someone experienced must provide a thorough description of the sources researched to determine the presence/absence of a vapour migration and/or dust generation 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; Canadian Council of Ministers of the Environment (CCME). 2006. Protocol for the Derivation of Environmental and Human Health Soil Quality Guidelines. PN 1332. www.ccme.ca Golder, 2004. Soil Vapour Intrusion Guidance for Health Canada Screening Level Risk Assessment (SLRA) Submitted to Health Canada, Burnaby, BC
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 Texture	Coarse		Consult grain size data for the site. If soils (containing exceedances of the CCME soil quality guidelines) predominantly consist of fine material (having a median grain size of 75 microns; as defined by CCME (2006)) then these soils are more likely to generate dusts.	
Score	1			
inhalation total	1			

(III) 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 human exposure				
iii) Ingestion (i.e., ingestion of food items, water and soils [for children]), including traditional foods.		City of Ottawa Municipal Drinking water	Review available site data to determine if drinking water (groundwater, surface water, private, commercial or municipal supply) is known or suspected to be contaminated above Guidelines for Canadian Drinking Water Quality. If drinking water supply is known to be contaminated, some immediate action (e.g., provision of alternate drinking water supply) should be initiated to reduce or eliminate exposure. The evaluation of significant potential for exceedances of the water supply in the future may be based on the capture zones of the drinking water wells; contaminant travel times; computer modelling of flow and contaminant transport.	**Selected References:** Guidelines for Canadian Drinking Water Quality: www.hc-sc.gc.ca/hecs-sesc/water/publications/drinking_water_quality_guidelines/toc.htm Drinking water can be an extremely important exposure pathway to humans. If site groundwater or surface water is not used for drinking, then this pathway is considered to be inoperable. Consider both wild foods such as salmon, venison, caribou, as well as agricultural sources of food items if the contaminated site is on or adjacent to agricultural land uses.
Drinking Water: Choose a score based on the proximity to a drinking water supply, to indicate the potential for contamination (present or future).				
0 to 100 m				
100 to 300 m				
300 m to 1 km				
1 to 5 km				
No drinking water present				
Do Not Know				
	No drinking water present			
Score	0			
Is an alternative water supply readily available?				
Yes				
No				
Do Not Know	Yes			
Score	0			
Is human ingestion of contaminated soils possible?		top 1.5 m of soil	If contaminated soils are located within the top 1.5 m, it is assumed that ingestion of soils is an operable exposure pathway. Exposure to soils deeper than 1.5 m is possible, but less likely, and the duration is shorter. Refer to human health risk assessment reports for the site in question.	
Yes				
No				
Do Not Know	Yes			
Score	3			
Are food items consumed by people, such as plants, domestic animals or wildlife harvested from the contaminated land and its surroundings?			Use human health risk assessment reports (or others) to determine if there is significant reliance on traditional food sources associated with the site. Is the food item in question going to spend a large proportion of its time at the site (e.g., large mammals may spend a very small amount of time at a small contaminated site)? Human health risk assessment reports for the site in question will also provide information on potential bioaccumulation of the COPC in question.	
Yes				
No				
Do Not Know	No			
Score	0			
Ingestion total	3			
Human Health Total "Potential" Score	7	Note if a "Known" Human Health score is provided, the "Potential" score is disallowed.		
Allowed "Potential" Score	---			
2. Human Exposure Modifying Factors				
a) Strong reliance of local people on natural resources for survival (i.e., food, water, shelter, etc.)	No	Downtown Ottawa - minimal natural resources		
Yes				
No				
Do Not Know				
Known	0			
Potential	---			
Raw Human "known" total	10			
Raw Human "potential" total	0			
Raw Human Exposure Total Score	10			
Human Health Total (max 22)	**10.0**			
3. Ecological				
A. Known exposure				
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 terrestrial or aquatic organisms as a result of the contaminated site.	18		Some low levels of impact to ecological receptors are considered acceptable, particularly on commercial and industrial land uses. However, if ecological effects are deemed to be severe, the site may be categorized as class one (i.e., a priority for remediation or risk management), regardless of the numerical total NCS score. For the purpose of application of the NCS, 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. If ecological effects are determined to be severe and an automatic Class 1 is assigned, there is no need to proceed through the NCS. However, a scoring guideline (18) is provided in case a numerical score for the site is still desired (e.g., for comparison with other Class 1 sites). This category can be based on the outcomes of risk assessments and applies to studies which have reported Hazard Quotients >1. Alternatively, known impacts can also be evaluated based on a weight of evidence assessment involving a combination of site observations, tissue testing, toxicity testing and quantitative community assessments. Scoring of adverse effects on individual rare or endangered species will be completed on a case-by-case basis with full scientific justification.	CCME, 1999: Canadian Water Quality Guidelines for the Protection of Aquatic Life. www.ccme.ca CCME, 1999: Canadian Water Quality Guidelines for the Protection of Agricultural Water Uses. www.ccme.ca Sensitive receptors- review: Canadian Council on Ecological Areas; www.ccea.org. Ecological effects should be evaluated at a population or community level, as opposed to at the level of individuals. For example, population-level effects could include reduced reproduction, growth or survival in a species. Community-level effects could include reduced species diversity or relative abundances. Further discussion of ecological assessment endpoints is provided in *A Framework for Ecological Risk Assessment: General Guidance* (CCME 1996). Notes: Someone experienced must provide a thorough description of the sources researched to classify the environmental receptors 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.
Same as above, but "Strongly Suspected" based on observations or indirect evidence.	12		This category can be based on the outcomes of risk assessments and applies to studies which have reported Hazard Quotients of less than 1 and no other observable or measurable sign of impacts. Alternatively, it can be based on a combination of other lines of evidence showing no adverse effects, such as site observations, tissue testing, toxicity testing and quantitative community assessments.	
No quantified or suspected exposures/impacts in terrestrial or aquatic organisms	0			
	Go to Potential			
Score	---			
NOTE: If a score is assigned here for Known Exposure, then you can skip Part B (Potential for Ecological Exposure) and go to Section 4 (Ecological Exposure Modifying Factors)				

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(III) 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			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).	
i) Land use				
Agricultural (or Wild lands) Residential/Parkland Commercial Industrial Do Not Know	Commercial		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).	
Score	1			
ii) Uptake potential				
Direct Contact - Are plants and/or soil invertebrates likely exposed to contaminated soils at the site?	Yes		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.	
Yes No Do Not Know				
Score	1			
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?			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.	
Yes No Do Not Know	No			
Score	0			
Are terrestrial animals likely to be ingesting contaminated soils at the site?			Refer to an Ecological Risk Assessment report. Most animals will co-ingest some soil while eating plant matter or soil invertebrates.	
Yes No Do Not Know	Yes			
Score	1			
Can the contamination identified bioaccumulate?		Varoius PAH parameters that exceed CCME SQGs can bioaccumulate. Examples are anthracene, benz[a]anthracene, etc.	Bioaccumulation of contaminants within food items is considered possible if: 1) The Log(Kow) of the contaminant is greater than 4 (as 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.	
Yes No Do Not Know	Yes			
Score	1			
Distance to sensitive terrestrial ecological area			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 also considered that any environmental receptor located greater than 5 km will not be a concern for evaluation. Review Conservation Authority mapping and literature including Canadian Council on Ecological Areas link: www.ccea.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.
0 to 300 m 300 m to 1 km 1 to 5 km > 5 km Do Not Know	> 5 km			
Score	0.5			
Raw Terrestrial Total Potential	4.5	Note if a "Known" Ecological Effects score is provided, the "Potential" score is disallowed.		
Allowed Terrestrial Total Potential	4.5			
B. Potential for ecological exposure (for the contaminated portion of the site)				
b) Aquatic			"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.	
i) Classification of aquatic environment				
Sensitive Typical Not Applicable (no aquatic environment present) Do Not Know	Not Applicable (no aquatic environm		"Typical aquatic environments" include those in areas other than those listed above.	
Score	0			
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?			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, "peepers", in the sediments in the area of daylighting groundwater.	
Yes No (or Not Applicable) Do Not Know	Do Not Know			
Score	0.5			
Distance from the contaminated site to an important surface water resource		dow's Lake - 500 m south	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.ccea.org.	Environmental receptors include: local, regional or provincial species of interest or significance, sensitive wetlands and fens and other aquatic environments.
0 to 300 m 300 m to 1 km 1 to 5 km > 5 km Do Not Know	300 m to 1 km			
Score	2		Bioaccumulation of food items is possible if:	

(III) 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 mammals and birds, likely to accumulate contaminants in their tissues?			1) The Log(Kow) of the contaminant is greater than 4 (as per the chemical characteristics work sheet) and concentrations in sediments exceed the CCME ISQGs. 2) The contaminant in collected tissue samples exceeds the CCME tissue quality guidelines.	
Yes				
No				
Do Not Know	Do Not Know			
Score	0.5			
Raw Aquatic Total Potential	3	Note if a "Known" Ecological Effects score is provided, the "Potential" score is disallowed.		
Allowed Aquatic Total Potential	3			
4. Ecological Exposure Modifying Factors				
a) Known occurrence of a species at risk.			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.	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 (http://www.sararegistry.gc.ca/species/schedules_e.cfm?id=1). Many provincial governments may also provide regionally applicable lists of species at risk. For example, in British Columbia, consult: BCMWLAP. 2005. Endangered Species and Ecosystems in British Columbia. Provincial red and blue lists. Ministry of Sustainable Resource Management and Water, Land and Air Protection. http://srmwww.gov.bc.ca/atrisk/red-blue.htm
Is there a potential for a species at risk to be present at the site?				
Yes				
No				
Do Not Know	Do Not Know			

Score	1			
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?	Do Not Know		Documentation may consist of environmental investigation reports, press articles, petitions or other records.	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.
Yes				
No	---			
Do Not Know	1			
Is there evidence of olfactory impact (i.e., unpleasant smell)?	Do Not Know		Examples of olfactory change can include the smell of a COPC or an increase in the rate of decay in an aquatic habitat.	
Yes				
No	---			
Do Not Know	1			
Is there evidence of increase in plant growth in the lake or water body?	Do Not Know		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.	
Yes				
No	---			
Do Not Know	1			
Is there evidence that fish or meat taken from or adjacent to the site smells or tastes different?	Do Not Know		Some contaminants can result in a distinctive change in the way food gathered from the site tastes or smells.	
Yes	---			
No	1			
Do Not Know				
Ecological Modifying Factors Total - Known	**---**			
Ecological Modifying Factors Total - Potential	**5**			
Raw Ecological Total - Known	0			
Raw Ecological Total - Potential	12.5			
Raw Ecological Total	12.5			
Ecological Total (Max 18)	**12.5**			
5. Other Potential Contaminant Receptors				
a) Exposure of permafrost (leading to erosion and structural concerns)				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.
Are there improvements (roads, buildings) at the site dependant upon the permafrost for structural integrity?	No		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.	
Yes				
No	0			
Do Not Know	---			
Is there a physical pathway which can transport soils released by damaged permafrost to a nearby aquatic environment?	No		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.	
Yes				
No	0			
Do Not Know	---			
Other Potential Receptors Total - Known	**0**			
Other Potential Receptors Total - Potential	**0**			

Exposure Total	
Raw Human Health + Ecological Total - Known	10
Raw Human Health + Ecological Total - Potential	12.5
Raw Total	22.5
Exposure Total (max 34)	**16.6**

Only includes "Allowed potential" - if a "Known" score was supplied under a given category then the "Potential" score was not included.

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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
Raw Total Score	32	3
Raw Total Score (Known + Potential)	35	
Adjusted Total Score (Raw Total / 40 *33)	**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
Raw Total Score	28	15.5
Raw Total Score (Known + Potential)	43.5	
Adjusted Total Score (Raw Total / 64 * 33)	**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	---
Raw Total Human Score	10	0
Raw Total Human Score (Known + Potential)	10	
Adjusted Total Human Score	10.0	(maximum 22)
3. Ecological Receptors		
A. Known Impact	---	
B. Potential		
a. Terrestrial		4.5
b. Aquatic		3
4. Ecological Receptors Modifying Factors	---	5
Raw Total Ecological Score	0	12.5
Raw Total Ecological Score (Known + Potential)	12.5	
Adjusted Total Ecological Score	12.5	(maximum 18)
5. Other Receptors	0	0
Total Other Receptors Score (Known + Potential)	0	
Total Exposure Score (Human + Ecological + Other)	**22.5**	
Adjusted Total Exposure Score (Total Exposure / 46 * 34)	**16.6**	(max 34)

Site Score

555 Booth Street, Ottawa, Ontario

Site Letter Grade	**C**
Certainty Percentage	**75%**
% Responses that are "Do Not Know"	**-3%**
Total NCSCS Score for site	**67.9**
Site Classification Category	**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

CADUCEON ENVIRONMENTAL LABORATORIES
Client committed. Quality assured.

CERTIFICATE OF ANALYSIS

Final Report

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
DATE REPORTED: 17-Jan-14
SAMPLE MATRIX: Soil

JOB/PROJECT NO.: 131-20711-06
P.O. NUMBER:
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	4.3
Arsenic	µg/g	0.5	EPA 6020	24-Dec-13/O	3.5	7.2	10.9	7.4
Barium	µg/g	1	EPA 6010	30-Dec-13/O	147	131	335	300
Beryllium	µg/g	0.2	EPA 6010	30-Dec-13/O	0.4	0.3	0.5	0.5
Boron	µg/g	0.5	EPA 6010	30-Dec-13/O	6.2	7.8	8.9	9.4
Boron (HWS)	µg/g	0.02	MOE3470	30-Dec-13/O	0.09	0.34	0.56	0.52
Cadmium	µg/g	0.5	EPA 6010	30-Dec-13/O	< 0.5	< 0.5	< 0.5	< 0.5
Chromium	µg/g	1	EPA 6010	30-Dec-13/O	15	22	33	18
Chromium (VI)	µg/g	0.5	EPA7196A	30-Dec-13/O	< 0.5	< 0.5	< 0.5	< 0.5
Cobalt	µg/g	1	EPA 6010	30-Dec-13/O	8	7	8	6
Copper	µg/g	1	EPA 6010	30-Dec-13/O	34	72	316	116
Lead	µg/g	5	EPA 6010	30-Dec-13/O	191	118	300	264
Mercury	µg/g	0.005	EPA 7471A	24-Dec-13/O	0.188	0.173	0.596	0.220
Molybdenum	µg/g	1	EPA 6010	30-Dec-13/O	2	4	6	3
Nickel	µg/g	1	EPA 6010	30-Dec-13/O	16	21	17	19
Silver	µg/g	0.2	EPA 6010	30-Dec-13/O	0.9	0.4	0.5	0.3
Selenium	µg/g	0.5	EPA 6020	24-Dec-13/O	0.6	0.7	1.5	0.9
Thallium	µg/g	0.1	EPA 6020	24-Dec-13/O	0.1	0.1	0.2	0.1
Tin	µg/g	5	EPA 6010	30-Dec-13/O	7	9	118	16
Uranium	µg/g	0.1	EPA 6020	24-Dec-13/O	0.4	0.9	0.9	0.8
Vanadium	µg/g	1	EPA 6010	30-Dec-13/O	18	17	23	18
Zinc	µg/g	3	EPA 6010	30-Dec-13/O	127	111	390	222
Acenaphthene	µg/g	0.005	EPA 8270	30-Dec-13/K	0.126	0.461	< 0.1	0.306
Acenaphthylene	µg/g	0.005	EPA 8270	30-Dec-13/K	0.192	0.092	2.83	0.490
Anthracene	µg/g	0.005	EPA 8270	30-Dec-13/K	0.528	1.42	1.89	1.48
Benzo(a)anthracene	µg/g	0.005	EPA 8270	30-Dec-13/K	1.51	3.09	13.2	3.61
Benzo(a)pyrene	µg/g	0.005	EPA 8270	30-Dec-13/K	1.55	3.03	16.4	3.74

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

CADUCEON ENVIRONMENTAL LABORATORIES
Client committed. Quality assured.

CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: G37495

REPORT No. B13-32999 (i)

Rev. 1

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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
DATE REPORTED: 17-Jan-14
SAMPLE MATRIX: Soil

JOB/PROJECT NO.: 131-20711-06
P.O. NUMBER:
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

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CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: G37495

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Rev. 1

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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
DATE REPORTED: 17-Jan-14
SAMPLE MATRIX: Soil

JOB/PROJECT NO.: 131-20711-06
P.O. NUMBER:
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

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Tel: 613-526-0123
Fax: 613-526-1244

DATE RECEIVED: 23-Dec-13
DATE REPORTED: 17-Jan-14
SAMPLE MATRIX: Soil

JOB/PROJECT NO.: 131-20711-06
P.O. NUMBER:
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.

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

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

DATE RECEIVED: 23-Dec-13
DATE REPORTED: 17-Jan-14
SAMPLE MATRIX: Soil

JOB/PROJECT NO.: 131-20711-06
P.O. NUMBER:
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.

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

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Tel: 613-526-0123
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DATE RECEIVED: 23-Dec-13
DATE REPORTED: 17-Jan-14
SAMPLE MATRIX: Soil

JOB/PROJECT NO.: 131-20711-06
P.O. NUMBER:
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

CADUCEON ENVIRONMENTAL LABORATORIES
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CERTIFICATE OF ANALYSIS

Final Report

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
DATE REPORTED: 17-Jan-14
SAMPLE MATRIX: Groundwater

JOB/PROJECT NO.: 131-20711-06
P.O. NUMBER:
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

CADUCEON ENVIRONMENTAL LABORATORIES
Client committed. Quality assured.

CERTIFICATE OF ANALYSIS

Final Report

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
DATE REPORTED: 17-Jan-14
SAMPLE MATRIX: Groundwater

JOB/PROJECT NO.: 131-20711-06
P.O. NUMBER:
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**				
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

CADUCEON ENVIRONMENTAL LABORATORIES
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CERTIFICATE OF ANALYSIS

Final Report

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
DATE REPORTED: 10-Jan-14
SAMPLE MATRIX: Groundwater

JOB/PROJECT NO.: 131-20711-06
P.O. NUMBER:
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 1	< 2 1	< 2 1	< 2 1
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
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CADUCEON ENVIRONMENTAL LABORATORIES
Client committed. Quality assured.

CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: G37498 **REPORT No. B13-33197**

Report To:

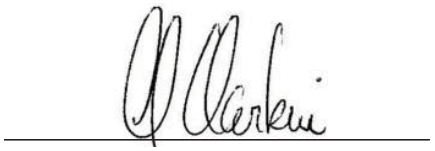
WSP Canada Inc.
300-2611 Queensway Drive,
Ottawa ON K2B 8K2 Canada
Attention: Vahid Arasteh

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

DATE RECEIVED: 30-Dec-13
DATE REPORTED: 10-Jan-14
SAMPLE MATRIX: Groundwater

JOB/PROJECT NO.: 131-20711-06
P.O. NUMBER:
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	< 0.2
Bis(2-Chloroethyl)ether	µg/L	0.2	EPA 8270	03-Jan-14/K	< 0.2	< 0.2	< 0.3	< 0.2
Bis(2-Chloroisopropyl)ether	µg/L	0.2	EPA 8270	03-Jan-14/K	< 0.2	< 0.2	< 0.3	< 0.2
Bis(2-ethylhexyl) Phthalate	µg/L	5	EPA 8270	03-Jan-14/K	< 5	44	< 5	< 5
Chloroaniline, 4-	µg/L	0.2	EPA 8270	03-Jan-14/K	< 0.2	< 0.2	< 0.3	< 0.2
Chlorophenol, 2-	µg/L	0.2	EPA 8270	03-Jan-14/K	< 0.2	< 0.2	< 0.3	< 0.2
Chrysene	µg/L	0.05	EPA 8270	03-Jan-14/K	< 0.05	< 0.05	0.08	3.86
Dibenzo(a,h)anthracene	µg/L	0.05	EPA 8270	03-Jan-14/K	< 0.05	< 0.05	< 0.07	0.57
Dichlorobenzidine, 3,3'-	µg/L	0.5	EPA 8270	03-Jan-14/K	< 0.5	< 0.5	< 0.7	< 0.5
Dichlorophenol, 2,4-	µg/L	0.2	EPA 8270	03-Jan-14/K	< 0.2	< 0.2	< 0.3	< 0.2
Diethyl Phthalate	µg/L	1	EPA 8270	03-Jan-14/K	< 1	< 1	< 1	< 1
Dimethyl Phthalate	µg/L	1	EPA 8270	03-Jan-14/K	< 1	< 1	< 1	< 1
Dimethylphenol, 2,4-	µg/L	1	EPA 8270	03-Jan-14/K	< 1	< 1	< 1	< 1
Dinitrophenol, 2,4-	µg/L	1	EPA 8270	03-Jan-14/K	< 1	< 1	< 1	< 1
Dinitrotoluene, 2,4-	µg/L	0.2	EPA 8270	03-Jan-14/K	< 0.2	< 0.2	< 0.3	< 0.2
Fluoranthene	µg/L	0.05	EPA 8270	03-Jan-14/K	0.05	0.05	0.19	7.21
Fluorene	µg/L	0.05	EPA 8270	03-Jan-14/K	< 0.05	< 0.05	< 0.07	0.42
Indeno(1,2,3,-cd)pyrene	µg/L	0.05	EPA 8270	03-Jan-14/K	< 0.05	< 0.05	< 0.07	2.86
Methylnaphthalene,1-	µg/L	0.05	EPA 8270	03-Jan-14/K	< 0.05	< 0.05	< 0.07	0.08
Methylnaphthalene,2-	µg/L	0.05	EPA 8270	03-Jan-14/K	< 0.05	< 0.05	< 0.07	0.07
Naphthalene	µg/L	0.05	EPA 8270	03-Jan-14/K	< 0.05	< 0.05	< 0.07	0.09
Pentachlorophenol	µg/L	0.2	EPA 8270	03-Jan-14/K	< 0.2	< 0.2	< 0.3	< 0.2
Phenanthrene	µg/L	0.05	EPA 8270	03-Jan-14/K	< 0.05	< 0.05	< 0.07	4.15
Phenol	µg/L	0.1	EPA 8270	03-Jan-14/K	< 0.1	< 0.1	< 0.1	< 0.1
Pyrene	µg/L	0.05	EPA 8270	03-Jan-14/K	< 0.05	0.05	0.15	6.34
Trichlorobenzene,1,2,4-	µg/L	0.2	EPA 8270	03-Jan-14/K	< 0.2	< 0.2	< 0.3	< 0.2
Trichlorophenol 2,4,6-	µg/L	0.2	EPA 8270	03-Jan-14/K	< 0.2	< 0.2	< 0.3	< 0.2
Trichlorophenol, 2,4,5-	µg/L	0.2	EPA 8270	03-Jan-14/K	< 0.2	< 0.2	< 0.3	< 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

CADUCEON ENVIRONMENTAL LABORATORIES
Client committed. Quality assured.

CERTIFICATE OF ANALYSIS

Final Report

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
DATE REPORTED: 10-Jan-14
SAMPLE MATRIX: Groundwater

JOB/PROJECT NO.: 131-20711-06
P.O. NUMBER:
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	94.0
Tribromophenol, 2,4,6- (SS)	% rec.	10	EPA 8270	03-Jan-14/K	87.0	82.0	118	112
Acetone	µg/L	2	EPA 8260	30-Dec-13/O	< 2	< 2	< 2	< 2
Benzene	µg/L	0.5	EPA 8260	30-Dec-13/O	< 0.5	< 0.5	< 0.5	< 0.5
Bromodichloromethane	µg/L	0.1	EPA 8260	30-Dec-13/O	< 0.1	< 0.1	< 0.1	< 0.1
Bromoform	µg/L	0.1	EPA 8260	30-Dec-13/O	< 0.1	< 0.1	< 0.1	< 0.1
Bromomethane	µg/L	0.3	EPA 8260	30-Dec-13/O	< 0.3	< 0.3	< 0.3	< 0.3
Carbon Tetrachloride	µg/L	0.2	EPA 8260	30-Dec-13/O	< 0.2	< 0.2	< 0.2	< 0.2
Monochlorobenzene (Chlorobenzene)	µg/L	0.2	EPA 8260	30-Dec-13/O	< 0.2	< 0.2	< 0.2	< 0.2
Chloroform	µg/L	0.3	EPA 8260	30-Dec-13/O	< 0.3	< 0.3	1.0	2.2
Dibromochloromethane	µg/L	0.1	EPA 8260	30-Dec-13/O	< 0.1	< 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	< 0.1
Dichlorobenzene,1,2-	µg/L	0.1	EPA 8260	30-Dec-13/O	< 0.1	< 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	< 0.1
Dichlorobenzene,1,4-	µg/L	0.2	EPA 8260	30-Dec-13/O	< 0.2	< 0.2	< 0.2	< 0.2
Dichlorodifluoromethane	µg/L	1	EPA 8260	30-Dec-13/O	< 1	< 1	< 1	< 1
Dichloroethane,1,1-	µg/L	0.1	EPA 8260	30-Dec-13/O	< 0.1	< 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	< 0.1
Dichloroethene, 1,1-	µg/L	0.1	EPA 8260	30-Dec-13/O	< 0.1	< 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	< 0.1
Dichloroethene, trans-1,2-	µg/L	0.1	EPA 8260	30-Dec-13/O	< 0.1	< 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	< 0.1
Dichloropropene, cis-1,3-	µg/L	0.1	EPA 8260	30-Dec-13/O	< 0.1	< 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	< 0.1
Dichloropropene 1,3- cis+trans	µg/L	0.1	EPA 8260	30-Dec-13/O	< 0.1	< 0.1	< 0.1	< 0.1
Ethylbenzene	µg/L	0.5	EPA 8260	30-Dec-13/O	< 0.5	< 0.5	< 0.5	< 0.5

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

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CERTIFICATE OF ANALYSIS

Final Report

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Report To:

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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
DATE REPORTED: 10-Jan-14
SAMPLE MATRIX: Groundwater

JOB/PROJECT NO.: 131-20711-06
P.O. NUMBER:
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	< 1
Dichloromethane (Methylene Chloride)	µg/L	0.3	EPA 8260	30-Dec-13/O	< 0.3	< 0.3	< 0.3	< 0.3
Methyl Ethyl Ketone	µg/L	1	EPA 8260	30-Dec-13/O	< 1	< 1	< 1	< 1
Methyl Isobutyl Ketone	µg/L	1	EPA 8260	30-Dec-13/O	< 1	< 1	< 1	< 1
Methyl-t-butyl Ether	µg/L	1	EPA 8260	30-Dec-13/O	< 1	< 1	< 1	< 1
Styrene	µg/L	0.5	EPA 8260	30-Dec-13/O	< 0.5	< 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	< 0.1
Tetrachloroethane,1,1,2,2-	µg/L	0.4	EPA 8260	30-Dec-13/O	< 0.4	< 0.4	< 0.4	< 0.4
Tetrachloroethylene	µg/L	0.2	EPA 8260	30-Dec-13/O	< 0.2	< 0.2	< 0.2	< 0.2
Toluene	µg/L	0.5	EPA 8260	30-Dec-13/O	< 0.5	< 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	< 0.1
Trichloroethane,1,1,2-	µg/L	0.1	EPA 8260	30-Dec-13/O	< 0.1	< 0.1	< 0.1	< 0.1
Trichloroethylene	µg/L	0.1	EPA 8260	30-Dec-13/O	< 0.1	< 0.1	< 0.1	< 0.1
Trichlorofluoromethane	µg/L	0.1	EPA 8260	30-Dec-13/O	< 0.1	< 0.1	< 0.1	< 0.1
Vinyl Chloride	µg/L	0.2	EPA 8260	30-Dec-13/O	< 0.2	< 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	< 0.4
Xylene, o-	µg/L	0.1	EPA 8260	30-Dec-13/O	< 0.1	< 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	< 0.4
Dichloroethane-d4,1,2-(SS)	%		EPA 8260	30-Dec-13/O	80.0	81.2	95.0	99.0
Toluene-d8 (SS)	%		EPA 8260	30-Dec-13/O	98.4	99.6	95.3	96.2
Bromofluorobenzene,4(SS)	%		EPA 8260	30-Dec-13/O	103	94.1	101	101
PHC F1 (C6-C10)	µg/L	10	MOE E3421	02-Jan-14/O	< 10	< 10	< 10	< 10
PHC F2 (>C10-C16)	µg/L	50	MOE E3421	06-Jan-14/O	< 50	< 50	< 50	< 50
PHC F3 (>C16-C34)	µg/L	400	MOE E3421	06-Jan-14/O	< 400	< 400	< 400	< 400
PHC F4 (>C34-C50)	µg/L	400	MOE E3421	06-Jan-14/O	< 400	< 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

CADUCEON ENVIRONMENTAL LABORATORIES
Client committed. Quality assured.

CERTIFICATE OF ANALYSIS

Final Report

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
DATE REPORTED: 10-Jan-14
SAMPLE MATRIX: Groundwater

JOB/PROJECT NO.: 131-20711-06
P.O. NUMBER:
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 [1]	< 2 [1]		
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

CADUCEON ENVIRONMENTAL LABORATORIES
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CERTIFICATE OF ANALYSIS

Final Report

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
DATE REPORTED: 10-Jan-14
SAMPLE MATRIX: Groundwater

JOB/PROJECT NO.: 131-20711-06
P.O. NUMBER:
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

CADUCEON ENVIRONMENTAL LABORATORIES
Client committed. Quality assured.

CERTIFICATE OF ANALYSIS

Final Report

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
DATE REPORTED: 10-Jan-14
SAMPLE MATRIX: Groundwater

JOB/PROJECT NO.: 131-20711-06
P.O. NUMBER:
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

CADUCEON ENVIRONMENTAL LABORATORIES
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CERTIFICATE OF ANALYSIS

Final Report

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
DATE REPORTED: 10-Jan-14
SAMPLE MATRIX: Groundwater

JOB/PROJECT NO.: 131-20711-06
P.O. NUMBER:
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

CADUCEON ENVIRONMENTAL LABORATORIES
Client committed. Quality assured.

CERTIFICATE OF ANALYSIS

Final Report

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
DATE REPORTED: 17-Jan-14
SAMPLE MATRIX: Soil

JOB/PROJECT NO.: 131-20711-06
P.O. NUMBER:
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

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

DATE RECEIVED: 23-Dec-13
DATE REPORTED: 17-Jan-14
SAMPLE MATRIX: Soil

JOB/PROJECT NO.: 131-20711-06
P.O. NUMBER:
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	< 0.02
Dichloroethene, trans-1,2-	µg/g	0.02	EPA 8260	24-Dec-13/R	< 0.02	< 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	< 0.02
Dichloropropene, cis-1,3-	µg/g	0.02	EPA 8260	24-Dec-13/R	< 0.02	< 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	< 0.02
Dichloropropene 1,3-cis+trans	µg/g	0.02	EPA 8260	24-Dec-13/R	< 0.02	< 0.02	< 0.02	< 0.02
Ethylbenzene	µg/g	0.05	EPA 8260	24-Dec-13/R	< 0.05	< 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	< 0.02
Hexane	µg/g	0.02	EPA 8260	24-Dec-13/R	< 0.02	< 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	< 0.5
Methyl Isobutyl Ketone	µg/g	0.5	EPA 8260	24-Dec-13/R	< 0.5	< 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	< 0.05
Dichloromethane (Methylene Chloride)	µg/g	0.05	EPA 8260	24-Dec-13/R	< 0.05	< 0.05	< 0.05	< 0.05
Styrene	µg/g	0.05	EPA 8260	24-Dec-13/R	< 0.05	< 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	< 0.02
Tetrachloroethane,1,1,2,2-	µg/g	0.05	EPA 8260	24-Dec-13/R	< 0.05	< 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

CADUCEON ENVIRONMENTAL LABORATORIES
Client committed. Quality assured.

CERTIFICATE OF ANALYSIS

Final Report

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
DATE REPORTED: 17-Jan-14
SAMPLE MATRIX: Soil

JOB/PROJECT NO.: 131-20711-06
P.O. NUMBER:
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	< 0.05
Toluene	µg/g	0.2	EPA 8260	24-Dec-13/R	< 0.2	< 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	< 0.05
Trichloroethane,1,1,1-	µg/g	0.02	EPA 8260	24-Dec-13/R	< 0.02	< 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	< 0.02
Trichloroethylene	µg/g	0.05	EPA 8260	24-Dec-13/R	< 0.05	< 0.05	< 0.05	< 0.05
Trichlorofluoromethane	µg/g	0.02	EPA 8260	24-Dec-13/R	< 0.02	< 0.02	< 0.02	< 0.02
Vinyl Chloride	µg/g	0.02	EPA 8260	24-Dec-13/R	< 0.02	< 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	< 0.03
Xylene, o-	µg/g	0.03	EPA 8260	24-Dec-13/R	< 0.03	< 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	< 0.03
Dibromofluoromethane (SS)	% rec.		EPA 8260	24-Dec-13/R	93.4	90.3	90.5	89.7
Toluene-d8 (SS)	% rec.		EPA 8260	24-Dec-13/R	102	97.5	100	101
Bromofluorobenzene,4(SS)	% rec.		EPA 8260	24-Dec-13/R	96.7	97.1	96.3	94.9
PHC F1 (C6-C10)	µg/g	10	CWS Tier 1	24-Dec-13/R	< 10	< 10	< 10	< 10
PHC F2 (>C10-C16)	µg/g	3	MOE E3398	02-Jan-14/O	7	14	18	21
PHC F3 (>C16-C34)	µg/g	9	MOE E3398	02-Jan-14/O	101	300	906	621

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

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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
DATE REPORTED: 17-Jan-14
SAMPLE MATRIX: Soil

JOB/PROJECT NO.: 131-20711-06
P.O. NUMBER:
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

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Lab Manager - Ottawa District

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DATE RECEIVED: 23-Dec-13
DATE REPORTED: 17-Jan-14
SAMPLE MATRIX: Soil

JOB/PROJECT NO.: 131-20711-06
P.O. NUMBER:
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

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DATE RECEIVED: 23-Dec-13
DATE REPORTED: 17-Jan-14
SAMPLE MATRIX: Soil

JOB/PROJECT NO.: 131-20711-06
P.O. NUMBER:
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

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			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

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			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**				
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-napth 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

Appendix G

Health and Safety Plan and Underground Utility Locates

GENIVAR

FORM - Health and Safety

Subject:	*HEALTH AND SAFETY PLAN (HASP) (SITE/PROJECT SPECIFIC)*		
To:	*All GENIVAR employees*	No: **G-EHS-FOR-63-15**	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: 131-20711-06

PROJECT TITLE: Phase II ESA / Geo Investigation

CLIENT: NRCan

PROJECT LOCATION: (Township Municipality etc...) 555 Booth St. Ottawa ON

IS GENIVAR THE "CONSTRUCTOR" YES ☑ NO ☐ If "NO" who is?

H&S PLAN The purpose of the plan is to list the safety requirements for this project.

SCOPE OF WORK: 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

SPECIAL INSTRUCTIONS:

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.

SITE DESCRIPTION: (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? ☐ YES ☑ NO

SERVICE LOCATES REQUIRED: **1-800-400-2256** ON1CALL ☐

Water	☑	Gas	☑	Cable	☑	Other	☑
Hydro	☑	Telephone	☑	Storm/Sanitary	☑	Private services/utilities	

(attach a copy of each clearance certificate as required and obtained)

SUB-CONTRACTOR REQUIRED DOCUMENTATION ATTACHED:

WSIB Clearance Certificate	☑	General Liability Insurance	☐	Form 1000	☐	(50K + see conditions)
Training Certificates	☑	H&S Policy Statement	☐	Other	☐	

POSTED INFORMATION REQUIRED:

WSIB Clearance Certificate	☐	Training Certificates (first aid, whmis,others)	☐
General Liability Insurance	☐	Confined Space Entry Plan/Permit	☐
Form 1000 (see conditions)	☐	Confined Space Hazard Assessment	☐
Notice of Project (NOP)(see conditions)	☐	Confined Space Coordination	☐
Map to nearest HOSPITAL	☑	Traffic Control Plan	☐
Emergency Contact List	☑	Lock/Tag out	☐
Health And Safety Plan (HASP)	☑	Other	☐

** 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	☑ yes ☐ no	01
Potable Water	☑ yes ☐ no	02 Bring potable water
Hand Sanitizer	☑ yes ☐ no	03

PERSONAL PROTECTIVE EQUIPMENT REQUIRED:	SAFETY EQUIPMENT REQUIRED:
☑ Safety Footwear (steel toe/shank)	☑ Cell phone / Two way radio
☑ Hard Hat	☐ Airhorn / Whistle
☑ Hearing Protection (>85 decibels)	☐ Signage
☑ Hi-Vis Clothing	☑ First Aid Kit / Eye Wash bottle
☑ Eye Protection (glasses, goggles, shields)	☑ Fire Extinguisher
☑ Gloves (Work)	☐ Flashlight / Headlamp
☐ Coveralls (Work)	☐ Gas Monitor (O_2, H_2S, Cl_2 and CO)
☐ Harness	☐ Tripod
☐ Lanyard	☐ Winch
☐ Respirator	☐ Vehicle Beacon
☐ Fire Retardant Clothing	☐ Traffic Cones
☐ Chemical Suit	☐ Traffic Signs
☐ Other _____	☐ Lock/Tag Out (Locks, Hasps, Tags)
☐ Other _____	☐ Other _____
☐ Other _____	☐ Other _____

SAFETY TRAINING REQUIRED:

WHMIS	☑	Confined Space	☐	Suface Miner Common Core	☐
Fall Protection	☑	Traffic Control	☐	OSHA (HAZWOPER)	☐
First Aid / CPR	☑	Lock/Tag Out	☐	_____ Other	☐

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, Adress and Contact immediately following this section)
- ☐ Other _____

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

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 Responsibilites 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	**911**	Local No:	(non emergency)
Ambulance	**911**	Local No:	(non emergency)
Police	**911**	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: (if available)		GPS coodinates: (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: (if available)		GPS coodinates: (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.

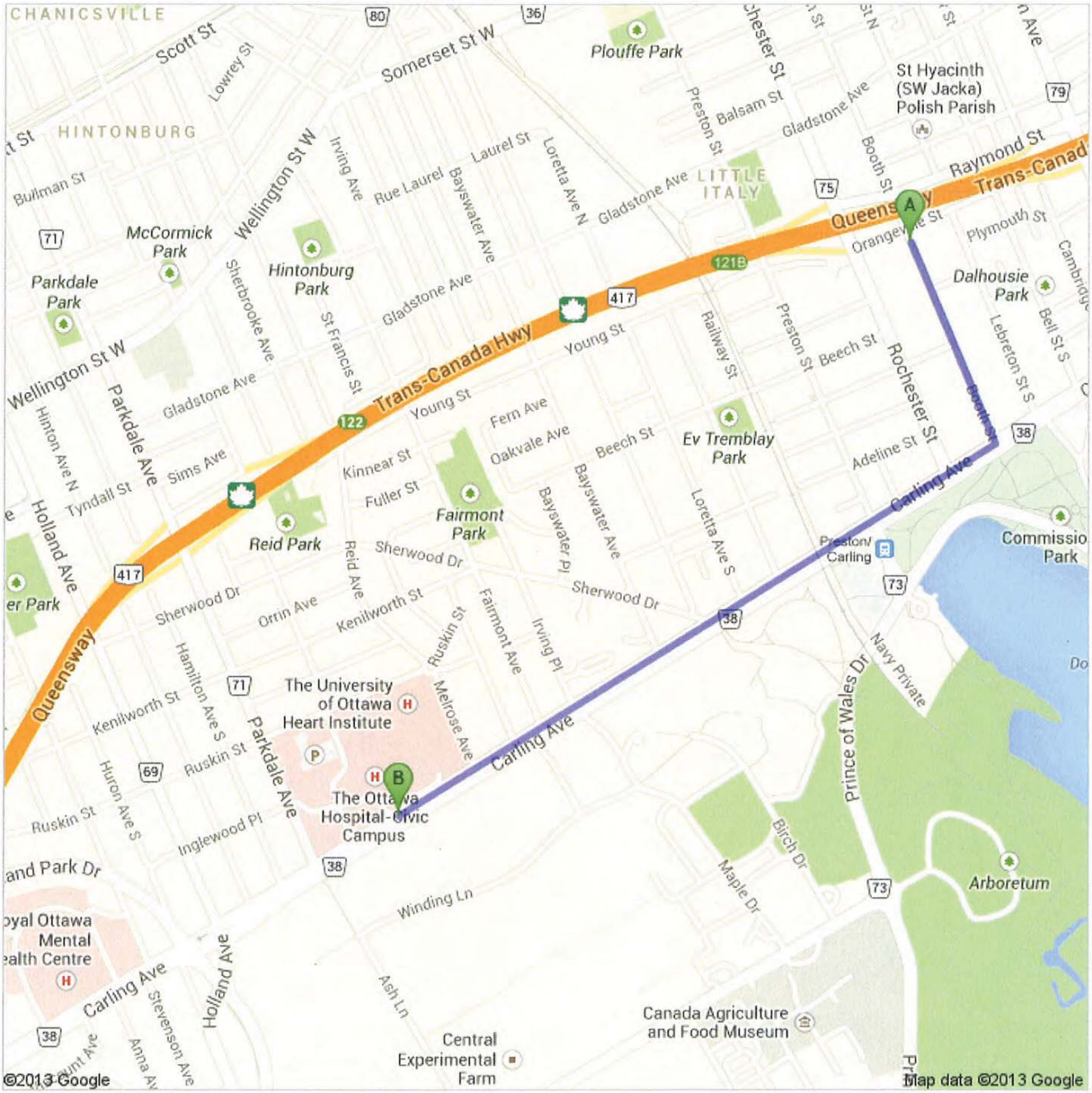
Reviewed, Prepared and Approved by Project Manager		
December 11, 2013	Vahid Arasteh	
Date	Printed Name	Signature
Reviewed by Team Leader (Supervisor)		
December 11, 2013	Vahid Arasteh	
Date	Printed Name	Signature
Reviewed by Project Team Members		
December 11, 2013	Kathryn Maton	
Date	Printed Name	Signature
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

Google

Directions to The Ottawa Hospital-Civic Campus
1053 Carling Ave, Ottawa, ON K1Y 4E9
2.0 km – about **3 mins**



A 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

B 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.

Directions weren't right? Please find your route on maps.google.ca and click "Report a problem" at the bottom left.

1-Call: 13 49 15 44

Rogers: 11

Ottawa Valley Locate
Contact, Locate, Dig

Locate Sketch

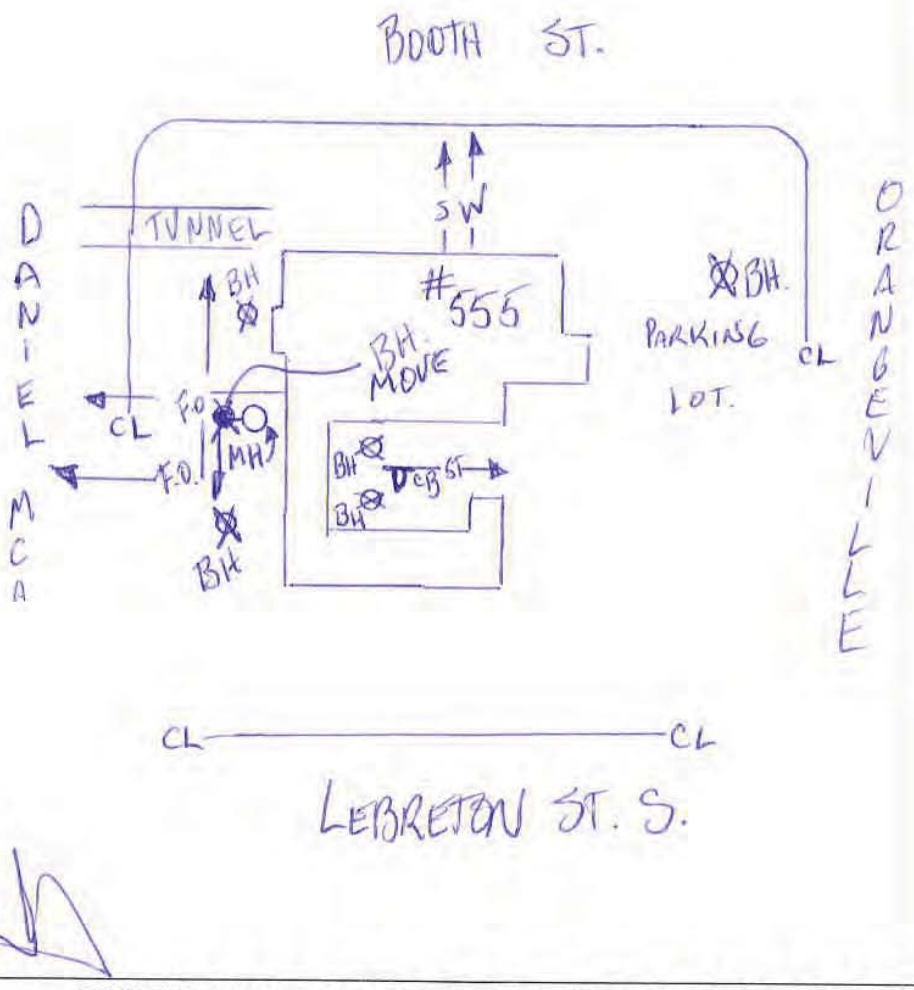
(not to scale)

Customer GENIVAR **Date** Dec 13, 2013

Property Description, Address, City, Work Area: 555 BOOTH. ST.

On-Site Contact: KELLY/STEVE/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

979 Mossdale St 1, Ottawa, ON, K2B 5S6 or www.ottawavalleylocate.com
info@ottawavalleylocate.com or 613-829-8118 (phone) or 613-383-0129 (fax)

2013491544_BCOE01

PROMARK TELECON Inc.

Primary Locate Sheet

UNION GAS EMERGENCY # 1-877-969-0999

Phone: 613-723-9888 Fax: 613-723-9277 Toll free: 1-800-371-8866 Email:

Request #2013491544

NORMAL

Utilities Located: ● Bell ● Gas ● HydroOttawa ☐ Street Lighting ☐ Videotron ☐ Peel Fibre ☐ Veridian Connections		Revised Excavation Date: N/A mm/dd/yyyy	Excavation Date: 12/13/2013 08:00:00 mm/dd/yyyy	Status: STANDARD Homeowner ☐ Contractor ● Project ☐
Requested by: KEVIN DONNELLY	Company: OTTAWA VALLEY LOCATE	Phone: (613)-829-8118 ext.	Fax/email: (613)-383-0129 ext.	
Appt Date: N/A mm/dd/yyyy	Received Date: 12/03/2013 mm/dd/yyyy	Locate Address: 555, BOOTH ST 1st Inters.: DANIEL MCCANN ST 2nd Inters.:		
Type of work: BORE HOLES			City: OTTAWA	

Caller's Remarks:

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

SEND HYDRO OTTAWA & GMOBILE*CA***-75.706400, 45.402590, NB_SEGMENTS::1, NO_PLAN::613 567, HOT1, BCOE01, TELUSON3, ENOE01, ROGOTT01

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

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

Records Reference: __ Proviewer
● LAC Multiviewer ● Gmobile
● Datapak #P10-10
Atlas Plate: NE185
Field Notes/As-Laids: 6N1178-4

DPT Remarks: #

__ Third Party Notification

N/A

Apply Sticker Here if Required

Excavator shall notify & 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	● Mark & Fax __ Left on Site __ Emailed
ID #: 1425	End Time: 10:30	Print:
Date 12/10/13	Total Hours: .75	Signature:

A copy of this Primary Locate Sheet and Auxiliary 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

PROMARK TELECON Inc.

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 ☐ HydroOttawa ☐ ☐ 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
FROM: E.FC BOOTH

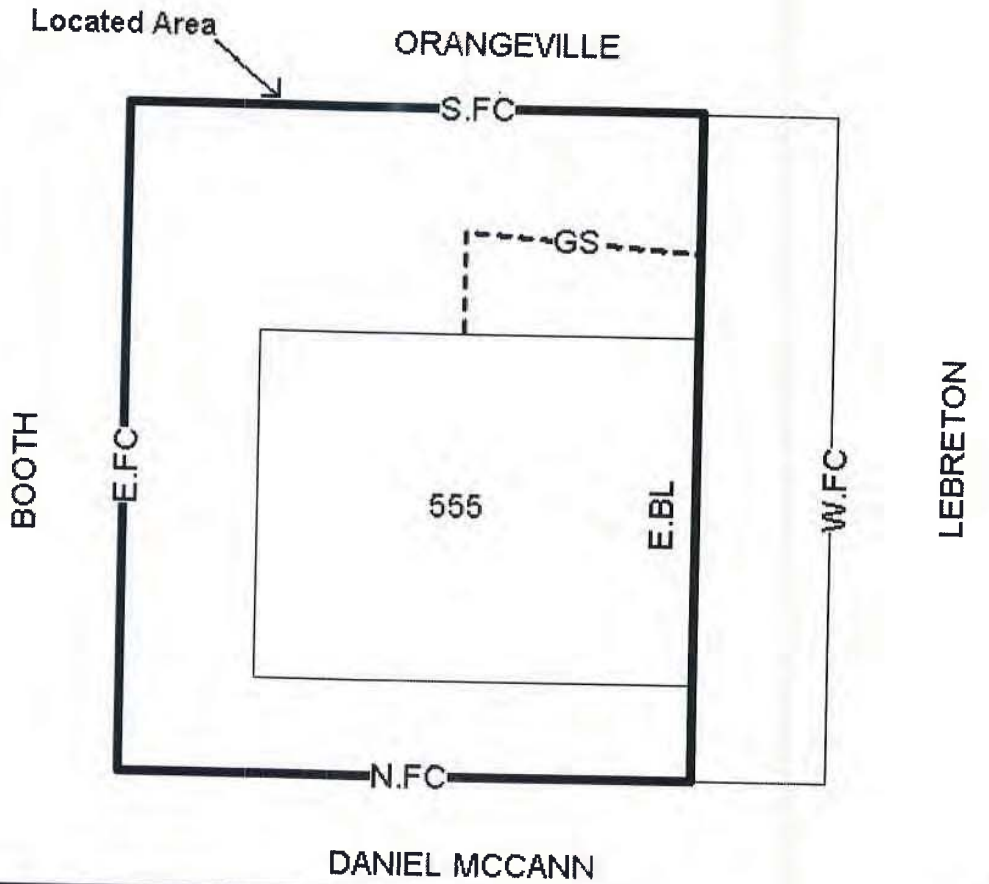
TO: N.FC DANIEL MCCANN
TO: E.BL #555 BOOTH

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
- Pole
- Flush to Grade Pedestal
- Pedestal
- Buried Cable — B —
- Conduit — C —
- Buried Service Wire —BSW—
- Manhole M/H
- Fibre Optic Cable –FOC–
- Gas Main — GM —
- Gas Service — GS —
- Gas Valve
- Hydrant
- Transformer
- HydroOttawa — H —
- Hydro Pole
- StreetLightCable — SL —
- Street Light LP
- 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-11/4"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.

PROMARK TELECON Inc.

2013491544_BCOE01

Auxiliary Locate Sheet

Ontario 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 ● HydroOttawa ☐ ☐ 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
FROM: E.FC BOOTH

TO: N.FC DANIEL MCCANN
TO: E.BL #555 BOOTH

LEGEND

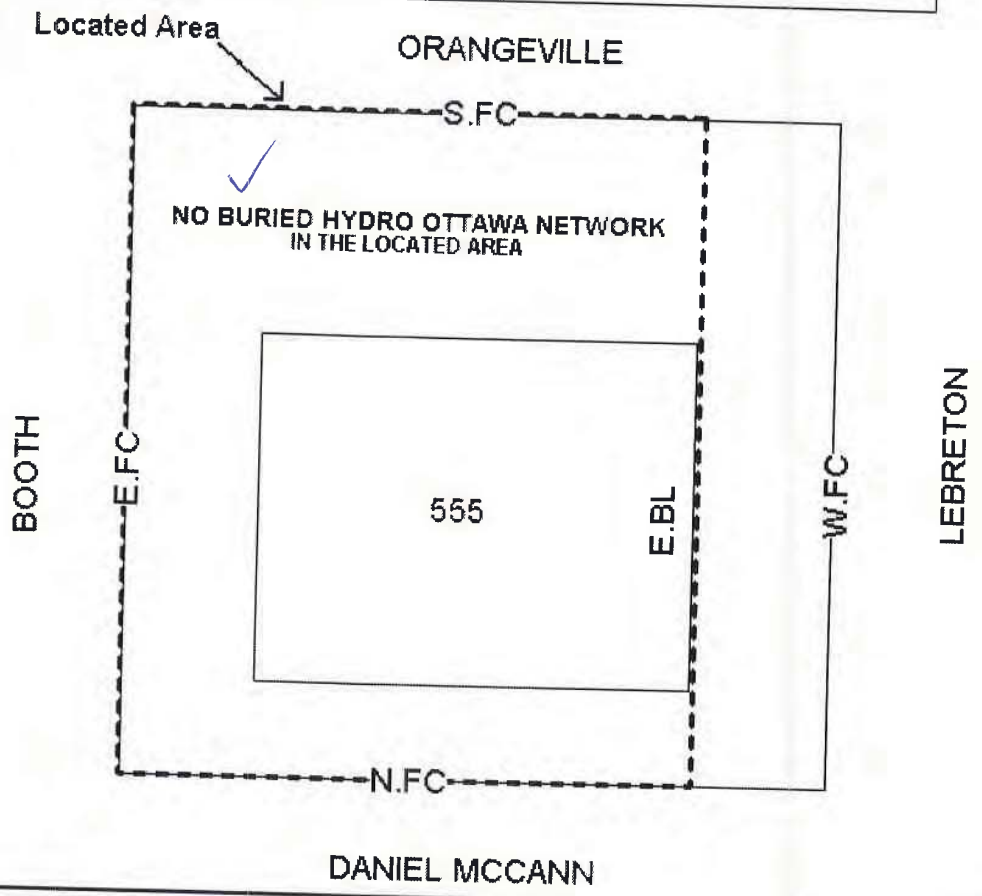
- Building Line — BL —
- Fence Line — FL —
- Face of Curb — FC —
- Road Edge — RE —
- Property Line — PL —
- Driveway — DRWY —
- Catch Basin CB
- Sidewalk — SDWK —
- Demarcation DM
- Railway
- Pole O
- Flush to Grade Pedestal
- Pedestal
- Buried Cable — B —
- Conduit — C —
- Buried Service Wire — BSW —
- Manhole M/H
- Fibre Optic Cable — FOC —
- Gas Main — GM —
- Gas Service — GS —
- Gas Valve
- Hydrant
- Transformer
- HydroOttawa — H —
- Hydro Pole ●
- StreetLightCable — SL —
- Street Light LP
- 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 ***



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 guility 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

ON1CALL
CALL BEFORE YOU DIG

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: 556 Booth St ☐ ARCVIEW ATTACHED

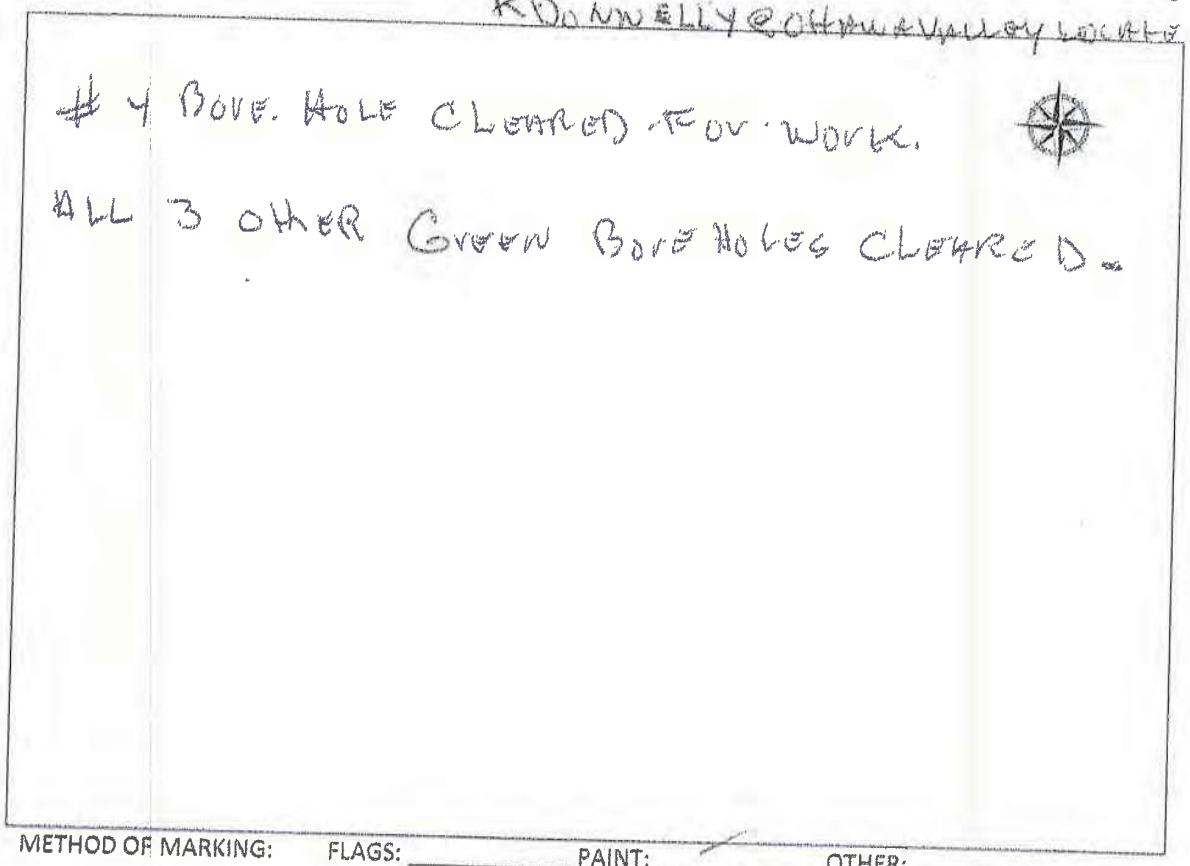
TYPE OF WORK: Bore Holes. ☐ DEMOLITION

CONTRACTOR: Ottawa Valley Locates FAX: ( ) -

613 - 983 - 5628

kDonnelly@ottawavalleylocates.com

SKETCH NOT TO SCALE



METHOD OF MARKING: FLAGS: _____ PAINT: ✓ OTHER: _____

CONTRACTOR: _____ (Signature) LOCATOR: Greg Maillette

REMARKS: No indication that Com Sewer in work area.

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 FACILTIES 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.

Date: 12/2/2013 Time: 3:32 PM Ticket #: , 2013491544 @ 916133830129
Page: 001

ROGERS

ROGERS LOCATE SERVICE

CLEAR TO DIG

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

8200 Dixie Rd
East Bldg, 2nd Flr
Brampton, Ontario, L6T 0C1
Tel.: (866) 232-0342
Fax.: (905) 780-7379

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
Address : 555, BOOTH ST
Call Date: 02/12/2013 2:04:00 PM
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
OTTAWA VALLEY LOCATE
WORK BEING DONE FOR:GENIVAR
kdonnelly@ottawavalleylocate.com
ALT CONTACT:

Tel.:(613)829-8118

Cell:(613)983-5628
Fax:(613)383-0129

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
Public Property:
Mark & Fax: X Site Meet Req.:
Area is Marked: X
Directional Drilling:

Hand Dig: X
Private Property: X
Area is Not Marked:

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)		