

FINAL

**National Capital Commission
Environment, Capital Lands and Parks Branch**

**Groundwater (Natural Attenuation)
Monitoring Program
16 Tavette Street, Ottawa, Ontario**

September 30, 2015

Our Ref.:
450250



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FINAL

Natural Attenuation Monitoring
Program
16 Tauvette St.
Ottawa, ON

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AT REAR OF REPORT

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Executive Summary

ARCADIS Canada Inc. (ARCADIS) was retained by the National Capital Commission (NCC) in June 2015 to collect groundwater samples and update the Natural Attenuation Groundwater Monitoring Program findings at the 16 Tauvette Street property (NCC Property Asset # 6976). A continuation of the Natural Attenuation Monitoring sampling was recommended by ARCADIS Canada Inc., formerly Decommissioning Consulting Services (DCS), in a report entitled "Phase II Environmental Site Assessment Update, 16 Tauvette Street (NCC Property Asset 6976), Ottawa, ON. dated May 2013.

The objective of this Natural Attenuation Monitoring Program was to monitor petroleum hydrocarbon concentrations in the vicinity of a former diesel and gasoline underground storage tanks (UST) Area 1 and to evaluate the monitored natural attenuation conditions. The program was recommended to evaluate the continued effectiveness of the selected remediation approach; natural attenuation.

ARCADIS staff reviewed previous reporting for the subject site, including the report prepared by Stantec entitled "Year 4 Natural Attenuation Monitoring –NCC Property Asset 6976, 16 Tauvette, Ottawa", dated July 2012.

In 2015 groundwater samples were collected from 9 of the 10 existing monitoring wells. Samples were analyzed for benzene, toluene, ethylbenzene and xylenes (BTEX) as well as the petroleum hydrocarbons four fractions (F1 to F4). Seven of the monitoring wells (MW 1, MW6, MW18, MW21, MW24, MW28 and MW34) were also analyzed for the following natural attenuation parameters: sulphate, methane and dissolved oxygen. All groundwater samples were submitted to the laboratory for analysis of BTEX, PHC, sulphate and methane parameters.

The 2015 results are as follows:

- Groundwater elevations observed on June 11, 2015 ranged from 0.72 to 1.76 mbgs. The groundwater elevations continue to support the inferred north-northeasterly direction of groundwater flow as previously stated by Stantec in 2012.
- The concentration of benzene in MW6 at 2300 ug/L exceeded both the applicable Federal Interim Groundwater Quality Guideline (FIGQG) of 88 µg/L and the MOECC Table 3 standard of 430 µg/L. All other concentrations of BTEX were less than both applicable federal or provincial standards.

- Petroleum hydrocarbon contamination (F2 and F3) were also measured in two monitoring wells (MW1 and MW20) above the MOECC Table 3 criteria, however the Federal criteria was not exceeded. In previous sampling events, there was no petroleum hydrocarbon contamination detected in MW20.
- Calculation and assessment of the assimilative capacity of the groundwater yielded a theoretical capacity of approximately 8370 µg/L. The highest concentrations of BTEX measured on-site are less than the calculated capacity, indicating the natural attenuation of the contaminant of concern should be possible within the plume area.
- The inferred down-gradient sentinel wells MW28 and MW21 did not exhibit exceedances of PHCs or BTEX which indicates that PHC contaminants have not migrated beyond the property line.

1. Introduction

ARCADIS Canada Inc. (ARCADIS) was retained by the National Capital Commission (NCC) in June 2015 to update the Natural Attenuation Groundwater Monitoring Program at 16 Tauvette Street (NCC Property Asset # 6976). Continuation of the Natural Attenuation Monitoring sampling was recommended by ARCADIS Canada Inc., formerly Decommissioning Consulting Services (DCS), in a report entitled "Phase II Environmental Site Assessment Update, 16 Tauvette Street (NCC Property Asset 6976), Ottawa, Ontario, dated May 2013.

1.1 Site Description

The subject property is located at 16 Tauvette Street, Ottawa, Ontario, as shown on Figure 1- Sample Location Plan. This NCC property asset formerly consisted of eight NCC-operated greenhouses and an office structure. The overall agricultural property is approximately 75 ha in size. The site was operated by the NCC from the early 1970s to the mid-1990s, after which the NCC leased the property to various businesses. The use of the property as a nursery was reported to have been discontinued in the late 1990s or early 2000s. The site buildings and greenhouses were demolished in March 2013.

As previously reported by ARCADIS (2013), of the 75 ha parcel, approximately 70 ha were utilized as agricultural land/nursery fields. The remaining 5 ha, located in the southeast corner, was developed as a greenhouse facility. It should be noted that vehicle refueling was formerly conducted at the greenhouse facility. Fuel storage tanks (initially UST installations followed by AST installations) were historically present northwest of the main office building.

1.1.1 Site Services

The subject site was formerly serviced by the Ottawa municipal water and sewer system. Hydro Ottawa provides hydro services. All former buildings were demolished in March 2013.

1.1.2 Topography and Drainage

It has been previously determined that, based on topographic maps and observed site topography, regional surface drainage or shallow groundwater flow direction is to the west, towards Green's Creek. Green's Creek is located on the western portion of the subject property, approximately 800 m west of the former green house complex. Water

from Green's Creek is known to discharge into the Ottawa River, which is approximately 4 km north of the subject site, therefore, a component of the shallow groundwater flow direction may also be northerly (Stantec, 2012).

1.1.3 Geology

Upon review of the Geological Survey of Canada Surficial Geology mapping (GSCS No.1506A), it was determined that the native surficial soils at the subject site comprise marine shore deposits consisting of clay and silt derived from glacial Lake Champlain. As identified in the DCS Phase II ESA report, dated May 2013, a native clay was encountered at depths generally greater than 1 m below ground surface. The overburden thickness was found to be greater than 2 m.

1.2 Previous Environmental Reporting

The NCC had provided the following reports concerning the subject property:

1. Phase II ESA, 16 Tauvette Street and 2389 Pepin Court, September 2005, by Intera Engineering Ltd.;
2. Supplemental Phase II ESA –Former UST Area -16 Tauvette Street , November 2006, by Intera Engineering Ltd.;
3. Screening Level Risk Assessment and Remedial Options Feasibility Study; 16 Tauvette, July 2008, by Intera Engineering Ltd.;
4. Year 4 Natural Attenuation Monitoring –NCC Property Asset 6976, 16 Tauvette, Ottawa, July 2012- Stantec Consulting Ltd.;
5. Phase II Environmental Site Assessment Update; 16 Tauvette Street (NCC Property Asset #6976) Ottawa, ON, May 2013, by Decommissioning Consulting Services.

ARCADIS understands that a Phase I ESA was conducted on the subject property by Environmental Ecological Enterprises (E3) in November 1998. The Phase I ESA identified an area of the site where two fuel-containing underground storage tanks (USTs) had been located. The review of property management files by E3 determined that the USTs had been removed; however there were no reports available that assessed the soil and groundwater quality following removal of the tanks. ARCADIS was not given a copy of this early Phase I ESA report.

A Phase II ESA was conducted on the subject property by Intera Engineering Ltd (Intera) in 2005, which focussed on the two former UST areas. The investigation included seven boreholes advanced within the former UST Area #1, four boreholes

advanced within former UST Area #2, and three monitoring well installations at the UST Area #1. Soils and groundwater that was significantly contaminated with hydrocarbons were identified in UST Area #1. Hydrocarbon-contaminated soils extended north, east and south of the limits of this former UST excavation. Concentrations of hydrocarbons in soils and groundwater within the former UST Area #2 were reported to be below the then applicable commercial land use guidelines and standards, and are also below the now applicable agricultural land use guidelines and standards. The Intera Phase II ESA recommended additional Phase II ESA work to delineate the extent of contaminated soil and groundwater in former UST Area #1. The reported values from the former UST Area #1 were above the now applicable agricultural land use guidelines and standards.

A supplemental Phase II ESA was conducted by Intera in 2006 which focused on delineating the hydrocarbon contamination within the former UST Area #1. The supplemental assessment included the advancement of ten boreholes, along with three additional monitoring well installations. The areal extent of soil and groundwater contamination using commercial land use criteria was estimated at approximately 750 m².

A Screening Level Risk Assessment (SLRA) and Remedial Option Feasibility Study were completed by Intera in 2008 for the UST Areas #1 and #2. The SLRA comprised a human health risk assessment (HHRA) and an ecological risk assessment (ERA) for the identified contaminants which included benzene, and petroleum hydrocarbons (PHC) F1 and PHC F2 for soil. The contaminants of concern for groundwater were identified as PHC F1 to F4. Additional field work conducted in 2008 included the advancement of 13 boreholes, with an additional four monitoring well installations. The additional data obtained from the supplementary sampling and testing further delineated the extent of soil and groundwater contamination, augmented the database of soil and groundwater quality of the site for use in the SLRA, and concluded that the inferred direction of groundwater flow was north-northeasterly. The SLRA report concluded that the PHC and BTEX contamination related to the former UST did not pose any adverse health effects to human or ecological receptors for the then-current commercial land use. Monitored natural attenuation was recommended as a possible remedial option for the site.

A Natural Attenuation Monitoring Program was conducted by Stantec Consulting Limited (Stantec) in 2012. The program evaluated the electron donor and metabolic by-product concentrations inside and outside of the plume and concluded that natural attenuation was occurring at the site. The report suggested that the areal extent of the UST Area #1 plume had decreased as compared to 2011. As part of the program

groundwater samples were collected from 10 existing wells and water samples were collected from the surrounding catch basins. Stantec recommended that the Natural Attenuation Monitoring Program be continued in 2013 to evaluate the continued effectiveness of this selected remediation approach for UST Area #1. A summary of the historical groundwater data for the UST Area #1 issued by Stantec is provided in Appendix C.

In March 2013, the former Office/warehouse building and Greenhouses were demolished. During pre-demolition inspections conducted by ARCADIS staff, a former 900 L fuel storage tank (empty) was observed inside the Generator Room. In addition, one exterior 2,200 L AST was observed on the middle north side of the main building and was determined to contain a 0.96 m depth of diesel product, based on an observation of the gauge. It was inferred that the large AST and interior day tank were used to fuel the on-site generator set. During demolition, remnants of a buried diesel copper pipe were found beneath the floor slab linking the AST location to the former Generator room location. The granular bedding beneath the pipe line was found to have a strong petroleum odour and PHC concentrations in soil which exceeded the Federal criteria.

In April 2013, ARCADIS conducted a Phase II ESA Update program that included 18 test pits to a maximum depth of 3.9 m below ground surface (bgs). Evidence of petroleum hydrocarbons (PHCs) was observed within two areas of the site. The two areas included a location beneath the former buried pipeline at the north-central end of the main building at a depth of 0.8 m bgs and within the former UST Area #1 below a depth of 1.0 m bgs.

PHC and benzene, toluene, ethylbenzene, and xylenes (BTEX) exceeded the applicable Tier I Levels for Surface Soil – Canada-Wide Standards for Petroleum Hydrocarbons in Soil (January 2008) and the Table 1 - Canadian Soil Quality Guidelines for Agricultural Land Use. No evidence of hydrocarbons was observed within the remaining test pits, which included locations beneath the former greenhouse and building footprints, beneath the former ASTs, and on either side of the former buried diesel pipe. No evidence of hydrocarbons was observed within the surface samples collected from the area of concern identified by the NCC northwest of the former greenhouse complex.

In 2014, ARCADIS excavated an estimated 25 m³ of soils along the former buried pipeline which were heavily contaminated with PHCs and disposed of them at the Navan landfill facility as a non-hazardous solid waste. TCLP results were completed that allowed disposal of PHC soils as a non-hazardous solid waste. It was also

recommended that an additional work program be directed to removing the surface debris left over from demolition activities. Following these activities, ARCADIS recommended conducting a Preliminary Quantitative Risk Assessment (PQRA) due to the proposed land use change from commercial to agricultural, and continuing the Natural Attenuation Monitoring Program through sampling the groundwater from existing wells at UST Area #1. It was also recommended to reinstate any damaged monitoring well installations.

1.3 Environmental Criteria

The subject site consists currently of vacant fallow land with associated agricultural fields nearby and residential land uses to the north.

Based on the current ownership, land use, and the fact that potable water was supplied to the former site office and greenhouse via the city water supply, the following environmental soil standards were selected:

- Federal Contaminated Sites Action Plan (FCSAP), Guidance Document on Federal Interim Groundwater Quality Guidelines (FIGQG) for Federal Contaminated Sites (November 2012 – revised March 2014). Generic Agricultural Land Use, Tier 1 – Fine Grained Soils;
- Ministry of the Environment (MOE) Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act, revised 15 April 2011- Table 3 Generic Full Depth Site Condition Standards in a Non-Potable Groundwater Condition under an Agricultural land use.

As the site is owned by the NCC, the federal guidelines were primarily referenced in the text, while laboratory results summary tables include the provincial standards/guidelines for additional reference. All chemical analyses were completed by AGAT Laboratories, a Canadian Association for Laboratory Accreditation Inc. (CALA) certified laboratory.

2. Scope of Work

The proposed 2015 scope of work included monitoring of groundwater at the UST Area #1 for BTEX/PHC parameters. The natural attenuation sampling was conducted to re-confirm that the assimilative capacity of the system remains sufficient to biodegrade any dissolved hydrocarbon contamination present under both aerobic and anaerobic conditions.

ARCADIS Canada staff located the existing wells, as described below in Table 1, and verified that the wells were functional for the purposes of groundwater sampling. Water samples from these monitoring wells were analyzed for PHCs and BTEX.

Previous reporting had indicated that a new well should be installed mid-way between monitoring wells MW34 and MW28 for the completion of groundwater delineation.

In order to re-assess the Assimilative Capacity of the on-site media, six monitoring wells [MW 1, MW6, MW18, MW21, MW31 and MW34] were sampled for dissolved oxygen, sulphate and methane. Additional groundwater parameters such as temperature, pH, and conductivity were also measured in the field.

3. Field Investigation

3.1 Methodology

3.1.1 Health and Safety

A Health and Safety Plan (HASP) was carried by ARCADIS staff at all times while on-site. The HASP listed appropriate personal protective equipment (PPE) applicable for field work at the subject site, as well as appropriate safe work protocols. A copy of photographs taken during site activities may be found in Appendix A.

3.1.2 Groundwater Monitoring Well Location and Condition

On 10 June 2015, ARCADIS staff were able to locate nine of the pre-existing ten monitoring wells and recorded the condition of these monitoring wells at the former UST Area 1. Staff verified whether the wells were functional for purposes of groundwater sampling. An overview is provided below:

Table 1 – Groundwater Monitoring Well Locations and Condition

Monitoring Well ID	Northing	Easting	Well Condition
MW1	45.42936	- 75.57532	Good Condition
MW6	45.42946	- 75.57531	Good Condition – Purged dry
MW18	45.42932	- 75.57545	Fair Condition- Minor damage to well cover
MW19	45.42940	- 75.57517	Good Condition
MW20	45.42963	- 75.57522	Fair Condition- No cap on well, open pipe
MW21	45.42966	- 75.57547	Good Condition - No cap, purged on June 10 with sampling on June 11, 2015
MW24	45.42953	- 75.57516	Good Condition
MW28	45.42969	- 75.57534	Poor Condition- No cap, purge dry after PHC/BTEX samples taken
MW31	Could not be located		
MW34	45.42947	- 75.57552	Good Condition – No cap

3.1.3 Groundwater sampling

Those monitoring wells found in good condition were purged and sampled using a low-flow Pegasus Alexis peristaltic pump. Parameters, including temperature, conductivity, pH, ORP, dissolved oxygen and turbidity, were monitored using a Horiba U52-2 water quality meter and recorded at regular intervals until stabilization was achieved and sampling could occur.

Recharge rates were observed to be very slow and minimal water quantities were found within the monitoring wells.

Water samples from the nine monitoring wells were collected for PHCs and BTEX laboratory analyses. Samples from seven of the nine wells (MW 1, MW6, MW18, MW21, MW24, MW28 and MW34) were also submitted for laboratory analyses of sulphate and methane parameters.

3.2 Quality Assurance and Quality Control

The groundwater monitoring program contained quality assurance/quality control (QA/QC) measures to ensure defined standards of quality were met within a stated level of confidence. The QA/QC program consisted of the following items:

Field Sampling Management- continuous care was given to sample collection to ensure samples were properly stored, labelled, and recorded. Field handling was consistent with standard environmental industry protocols with coolers used for sample storage. Thorough laboratory co-ordination ensured that appropriate sampling bottles were used and that protocols were consistent with QA/QC integrity. Appropriate sample labelling and packaging was used. Chain-of-custody protocols were followed for all samples transferred from the field to the laboratory. ARCADIS staff ensured that no 'holding time' conflicts occurred.

Groundwater Field QA/QC Sampling- for the groundwater sampling program, a minimum of 10% of all groundwater samples were taken as a field duplicate sampling.

Laboratory QA/QC- the laboratory provided results of lab duplicates, method blanks, spiked blanks and matrix spikes used during the analysis. Such results were reviewed by ARCADIS staff to ensure that the lab test methods were in statistical control when the analysis was performed and within acceptance criteria.

4. Results

4.1 Groundwater Elevation Survey

On June 11, 2015, ARCADIS staff measured ground water elevations for the existing monitoring wells. Results are presented in Table 2 below.

Table 2 - Summary of Groundwater Conditions/Elevation (June 11, 2015)

Monitoring Well ID	Ground Elevation (m)	Water Level (mbgs)	Water Level Elevation (m)	Water Quality
MW1	99.97	0.72	99.25	Grey, cloudy water
MW6	100.00	1.19	98.81	Strong PHC Odour
MW18	99.96	0.62	99.34	Clear, no odour
MW19	99.97	1.06	98.90	Clear, no odour
MW20	99.87	1.38	98.49	Cloudy water
MW21	99.99	1.62	98.37	Slightly cloudy
MW24	99.88	1.18	98.70	Clear, no odour
MW28	99.99	1.76	98.23	Clear, no odour
MW34	99.93	0.92	99.01	Clear, no odour

Notes:

- Survey information from Stantec (2012)

A strong petroleum odour in purged water was noted at monitoring well MW6. Purged water from the remaining wells was generally clear, odour-free, and there was no observed petroleum hydrocarbon sheen in any of the wells.

4.2 Groundwater Analytical Results - BTEX and PHCs

ARCADIS staff visited the subject site on June 11, 2015 to collect groundwater samples for laboratory analyses of PHC and BTEX parameters.

Laboratory analyses were conducted by AGAT Laboratories, a CALA-accredited laboratory located in Ottawa, Ontario. Certificates of analysis for the groundwater testing are included in Appendix B.

During the 2015 sampling program, ARCADIS Canada Inc. located the existing wells, as outlined in Table 1 above. As identified in the DCS 2014 report, all but one of the

10 wells were found to be present on-site (MW31 could not be located). The wells' condition were evaluated and recorded. Water samples from MW1, MW6, MW18, MW19, MW20, MW21, MW24, MW28 and MW34 were obtained and submitted to AGAT Laboratories for analysis of PHC's and BTEX.

4.3 QA/QC Findings

ARCADIS staff reviewed the RPD values for the duplicate samples secured. As the original samples and their duplicates were all returned as non-detect readings, the RPD values were found to meet QA/QC requirements.

The surrogate recoveries reported on the laboratory certificates were also examined to ensure that the percentage recoveries fell within the laboratory's stated acceptable range. Furthermore, the data reported on the laboratory certificates were studied to determine that the results returned were generally of the magnitude expected, based on examination of the recovered samples and the site history. It has been concluded that the laboratory test results were representative of the environmental quality of the groundwater at the site for the locations tested and on the sampling date. Decision making was not affected by the QA/QC results and the overall objectives of the investigation and the assessment were met. All of the groundwater analytical results provided in this report and reviewed by ARCADIS were within the control limits specified by the labs, and are therefore deemed to be accurate and reliable.

5. Assimilative Capacity Assessment

5.1 Methodology

As a part of the groundwater monitoring program field parameters were taken and analysis conducted to assess for contaminant assimilative capacity of the groundwater regime, in general accordance with Technical Bulletin #20 - Intrinsic Remediation - Biodegradation (Environment Canada). This was done to calculate the theoretical ability of the natural environment to biodegrade the dissolved hydrocarbon compounds under both aerobic and anaerobic conditions.

The process of evaluating intrinsic remediation involved securing groundwater data for key electron acceptors (dissolved oxygen and sulfate) as well as the metabolic by-product, methane, in order to perform calculations on the quantity of PHC constituents which could theoretically degrade through natural attenuation. It should be noted that nitrate and ferrous iron were not measured and used in the calculation due to their low utilization factor in the assimilative capacity equation. Field parameters were also evaluated to obtain evidence to support intrinsic remediation as derived from a documented loss or reduction in the mass of contaminants in the field.

Seven monitoring wells (MW 1, MW6, MW18, MW21, MW24, MW28 and MW34) were analyzed for concentrations of dissolved oxygen, sulphate and methane in order to estimate the assimilative capacity. Additional groundwater parameters such as temperature, pH, and conductivity were also measured.

MW21 was used as a reference point, due to its location outside of the inferred PHC plume, since PHC and BTEX parameters were evaluated at this location in 2006, 2007, 2009, 2010, 2012 and 2015, and no PHC or BTEX constituents have been detected at concentrations exceeding the laboratory method detection limit. MW6 was selected as a location for the assimilative capacity estimate, as it is known to contain the highest PHC and BTEX concentrations and was, therefore, considered as the plume centre. Dissolved oxygen levels were measured in the field using a Horiba U52-2 water quality meter, while sulfates, and methane were analyzed by AGAT Laboratories.

A summary of the 2015 groundwater results are presented in Table 3 and Table 4.

5.2 Results

The results of the measured parameters and assimilative capacity calculations are presented below:

Table 5 - Assimilative Capacity Calculations

	Utilization Factor	Background Value (MW21)	Plume Centre (MW6)	Difference (mg/L)	Capacity (mg/L)
Dissolved Oxygen	0.32	0.5	0.44	0.06	0.019
Sulfate	0.21	29.2	0.69	28.51	5.987
Methane	1.28	0	1.85	1.85	2.368
TOTAL					8.374

The assimilative calculations are performed as follows:

BTEX _{bio,DO} = ($O_{\text{backgr.}}$ - $O_{\text{lowest measured}}$) is reduction in BTEX concentration via aerobic respiration
BTEX _{bio,S} = (S_{backgr} - S_{measured}) is reduction in BTEX concentration via sulfate reduction
BTEX _{bio,M} = (M_{measured} - M_{backgr}) is reduction in BTEX concentration via methanogenesis

The calculations for assimilative capacity are applicable to BTEX concentrations.

Water column heights encountered during the 2015 sampling event were typically less than 1 metre. Low water column heights likely affect the dissolved oxygen measurements as the readings may be influenced by the water-atmosphere interface and may not have been a true representation of the dissolved oxygen levels in the groundwater at that location.

ARCADIS calculated assimilative capacity using electron acceptor concentrations from MW21, which is considered a background well, and concentrations of by-products measured in MW6, as it is located in the middle of the plume. ARCADIS staff were unable to locate MW31 and therefore could not use it as a reference of background conditions, as had been done by Stantec in 2012.

As previously indicated, the monitored natural attenuation and field data are presented in Table 4. A summary of the assimilative capacity calculations are presented above in Table 5.

The assimilative capacity of the groundwater system is 8.37 mg/L or 8370 µg/L. The BTEX concentrations in 2015 range from non-detect in MW21 to 4500 µg/L in MW6. PHC F1 to F4 concentrations range from 0 µg/L in MW21 to 1900 µg/L in MW6. These concentrations are both lower than the calculated assimilative capacity.

6. Conclusions and Recommendations

The purpose of this monitoring program was to assess the environmental quality of the shallow groundwater on the site in comparison to appropriate Federal and Provincial criteria and to determine whether natural attenuation is continuing to occur.

The MW31 location could not be found during the latest 2015 sampling round. There is no need to re-drill or re-install a monitoring well at this inferred up-gradient location as other monitoring wells (ie. MW18 or MW19) can act as representative of up-gradient or un-affected monitoring locations.

Groundwater collected from monitoring well MW6 contained a benzene concentration (2300 µg/L) that exceeded both the FIGQG guideline of 88 µg/L and the MOECC standard of 430 µg/L. The remaining monitoring wells were found to contain BTEX contaminants at concentrations below both federal and provincial guidelines. This supports the historical findings of Stantec, where benzene concentrations ranged from between 2000 to 8000 ug/L, with the June 2012 concentration of BTEX compounds at MW-6 being 1940 ug/L (with a duplicate of 1870 ug/L) (Appendix C).

In June 2015, monitoring well MW6 contained PHC concentrations that exceeded the MOECC standard for F1, F1-BTEX and F2. However, PHC concentrations did not exceed the FIGQG guideline for any of the fractions. Monitoring well MW1 exceeded the MOECC standard for F2 and MW20 exceeded for F3, but again these concentrations did not exceed the FIGQG guideline. Monitoring well MW20 exceeded the MOECC standard for F3 with a concentration of 560 µg/L, whereas in the previous sampling event, F3 concentrations were not detected at this MW20 location (Stantec, 2012). It did not, however, exceed the FIGQG guideline. Due to low groundwater volume in the monitoring well chosen for this sampling event's duplicate, it was necessary to obtain duplicates of BTEX and F1 as sampled from MW18 and duplicates of F2 to F4 PHCs as sampled from MW28. All duplicate results were non-detect.

A summary of the 2015 groundwater results are presented on Tables 3 and 4.

It was determined that BTEX and petroleum hydrocarbon contamination in the shallow groundwater currently remains at concentrations above both the Federal and Provincial criteria in one monitoring well (MW6). The concentrations observed at MW6 remain generally consistent with previous findings from Stantec in 2012, and have not decreased significantly since the 2012 sampling event (Appendix C).

It should also be noted that petroleum hydrocarbon contamination (F2 and F3) was also detected in two monitoring wells (MW1 and MW20) above the Provincial criteria, however the Federal criteria was not exceeded. In previous sampling events, there was never any petroleum hydrocarbon contamination detected in MW20.

Sampling to assess the assimilative capacity of the groundwater was conducted and found that the highest concentrations of BTEX and PHCs measured on-site are less than the calculated assimilative capacity, indicating that natural attenuation of the contaminant of concern is possible within the plume area, and, therefore, within the property boundaries. Natural attenuation within the property appears to be demonstrated by the low concentrations of PHCs/BTEX compounds measured at the plume front (Figure 1), as represented by water quality in MW21, MW20, and MW28.

PHC impact was not detected at the eastern sentinel monitoring wells, MW21 and MW28. Overall, BTEX and PHC concentrations in groundwater were not greater than those detected in 2012. Hence, it is inferred that the use of natural attention remains a viable remedial option for the subject property.

It is recommended that the annual groundwater monitoring program continue in the spring of 2016 to obtain additional groundwater monitoring data and to observe any changes in the concentrations of BTEX or petroleum hydrocarbons and assess the extent of the contamination plume. Groundwater samples should be collected and analyzed for PHC/BTEX from all ten monitoring wells (MW1, MW6, MW18, MW19, MW20, MW21, MW24, MW28, MW31 (if it can be located) and MW34). Future reporting could perhaps include a graphing of identified PHC concentration trends at select monitoring wells.

A cost estimate for a single return to the site for purposes of groundwater monitoring at ten monitoring well locations and associated reporting is estimated at [REDACTED]. An additional [REDACTED] should be added to the cost estimate for purposes of minor repairs to the monitoring wells and replacement of missing well J-plugs.

7. References

Decommissioning Consulting Services, *Phase II ESA, 16 Tauvette Street (NCC Property Asset #6976), Ottawa, ONT.*, dated 31 May 2013

Decommissioning Consulting Services, *Removal of PHC-Contaminated Soil, 16 Tauvette Street (NCC Property Asset #6976), Ottawa, ONT.*, dated 28 August 2014

Intera Engineering Ltd.; *Phase II ESA, 16 Tauvette Street and 2389 Pepin Court*, September 2005

Intera Engineering Ltd.; *Supplemental Phase II ESA – Former UST Area -16 Tauvette Street*, November 2006

Intera Engineering Ltd.; *Screening Level Risk Assessment and Remedial Options Feasibility Study; 16 Tauvette*, July 2008

Stantec Consulting Limited, *Year 4 Natural Attenuation Monitoring – NCC Property Asset 6976, 16 Tauvette, Ottawa*, July 2012.

8. Statement of Limitations

This monitoring report has been prepared for the exclusive use of the National Capital Commission (NCC) using a methodology for conducting environmental monitoring and reporting that is to a standard acceptable within the environmental profession. Data obtained from the groundwater monitoring wells, as well as observations made with respect to the site conditions, represent the conditions at the time that site activities were completed and, as such, can be expected to be variable with respect to location and date.

ARCADIS Canada Inc. has exercised professional judgement in collecting and analyzing the information and in formulating recommendations based on the results of the program. The evaluation and conclusions contained in the report have been prepared on the basis of conditions in evidence at the time of site monitoring activities (June 2015) and on the basis of information provided to ARCADIS. Accordingly, ARCADIS cannot accept responsibility for any deficiency, misstatement, or inaccuracy contained in this report as a result of misstatements, omissions, misrepresentations, or fraudulent acts of persons providing information.

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**Natural Attenuation
Monitoring Program**
16 Tauvette St., Ottawa, ON
450250 – September 2015

Summary Tables

TABLE 3

RESULTS OF ANALYSES FOR BTEX AND PETROLEUM HYDROCARBONS (PHCs) IN GROUNDWATER

PARAMETERS	FIGQG Table 1.2	MOECC Table 3	MDL	MW 1	MW 6	MW 18	DUP-1a ¹ Duplicate of	MW 19	MW 20	MW 21	MW 24	MW 28	DUP-1b ¹ Duplicate of	MW 34
	Fine	Fine		11-Jun-15	11-Jun-15	11-Jun-15	MW18	11-Jun-15	11-Jun-15	11-Jun-15	11-Jun-15	11-Jun-15	MW28	11-Jun-15
Benzene	88	430	0.20	5.2	2300*+	<0.20	<0.20	0.29	<0.20	<0.20	<0.20	4.2	na	2.3
Toluene	4900	18000	0.20	<0.20	67	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	na	<0.20
Ethylbenzene	3200	2300	0.10	8	450	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.47	na	<0.10
Total Xylenes	13000	4200	0.20	2.4	1700	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	2.2	na	0.51
F1 PHCs (C6-C10)	6500	750	25	55	6200+	<25	<25	<25	<25	<25	<25	<25	na	<25
F1 PHCs (C6-C10) minus BTEX	-	750	25	39	1700+	<25	<25	<25	<25	<25	<25	<25	na	<25
F2 PHCs (C10-C16)	1800	150	100	470+	200+	<100	na	<100	<100	<100	<100	<100	<100	<100
F3 PHCs (C16-C34)	-	500	100	550+	<100	<100	na	120	560+	<100	<100	<100	<100	<100
F4 PHCs (C35-C50)	-	500	100	<100	<100	<100	na	<100	<100	<100	<100	<100	<100	<100

NOTES:

All parameter values in ug/L (ppb) unless otherwise indicated.

FCSAP Guidance Document on Federal Interim Groundwater Quality Guidelines
For Federal Contaminated Sites (Nov 2012- revised March 2014)

* Exceeds Table 1.2 Generic Agricultural Land Use, Tier 1 - Fine Grained Soils

MOECC Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the EPA (April 15 2011):

+ Table 3, Non-Potable Ground Water Condition Standards.

1 Due to low groundwater volume in the monitoring well chosen for the duplicate, it was necessary to split the analysis parameters from two different wells to generate DUP-1.
BTEX and F1 were sampled from MW18 and F2 to F4 was sampled from MW28.

MDL Method Detection Limit.

-- No MDL reported by the laboratory.

- No standard provided

< Not detected.

na Not analyzed.

TABLE 4

RESULTS OF ANALYSES FOR GENERAL CHEMISTRY INCLUDING SULFATE AND METHANE IN GROUNDWATER

PARAMETERS	Units	MW 1	MW 6	MW 18	MW 19	MW 20	MW 21	MW 24	MW 28	MW 34
		11-June-15	11-June-15	11-June-15	11-June-15	11-June-15	11-June-15	11-June-15	11-June-15	11-June-15
General Chemisty										
pH	pH Units	6.87	7.09	6.64	7.24	7.45	7.37	7.49	7.14	6.63
Dissolved Oxygen	mg/L	1.28	0.44	3.83	0.66	6.11	0.50	5.74	7.45	5.03
Conductivity	mS/cm	0.41	0.80	0.35	0.46	0.40	0.54	0.38	0.32	0.38
Eh	mV	-140	-125	-31	-104	-176	70	-52	-14	-87
Sulfate	mg/L	15.3	0.69	21.6	na	na	29.2	25.1	10.1	45.3
Methane	mg/L	<0.01	1.85	<0.01	na	na	<0.01	<0.01	<0.01	<0.01
Ethane	mg/L	<0.01	<0.01	<0.01	na	na	<0.01	<0.01	<0.01	<0.01
Ethene	mg/L	<0.01	<0.01	<0.01	na	na	<0.01	<0.01	<0.01	<0.01
Propane	mg/L	<0.01	<0.01	<0.01	na	na	<0.01	<0.01	<0.01	<0.01

NOTES:

MDL Method Detection Limit.

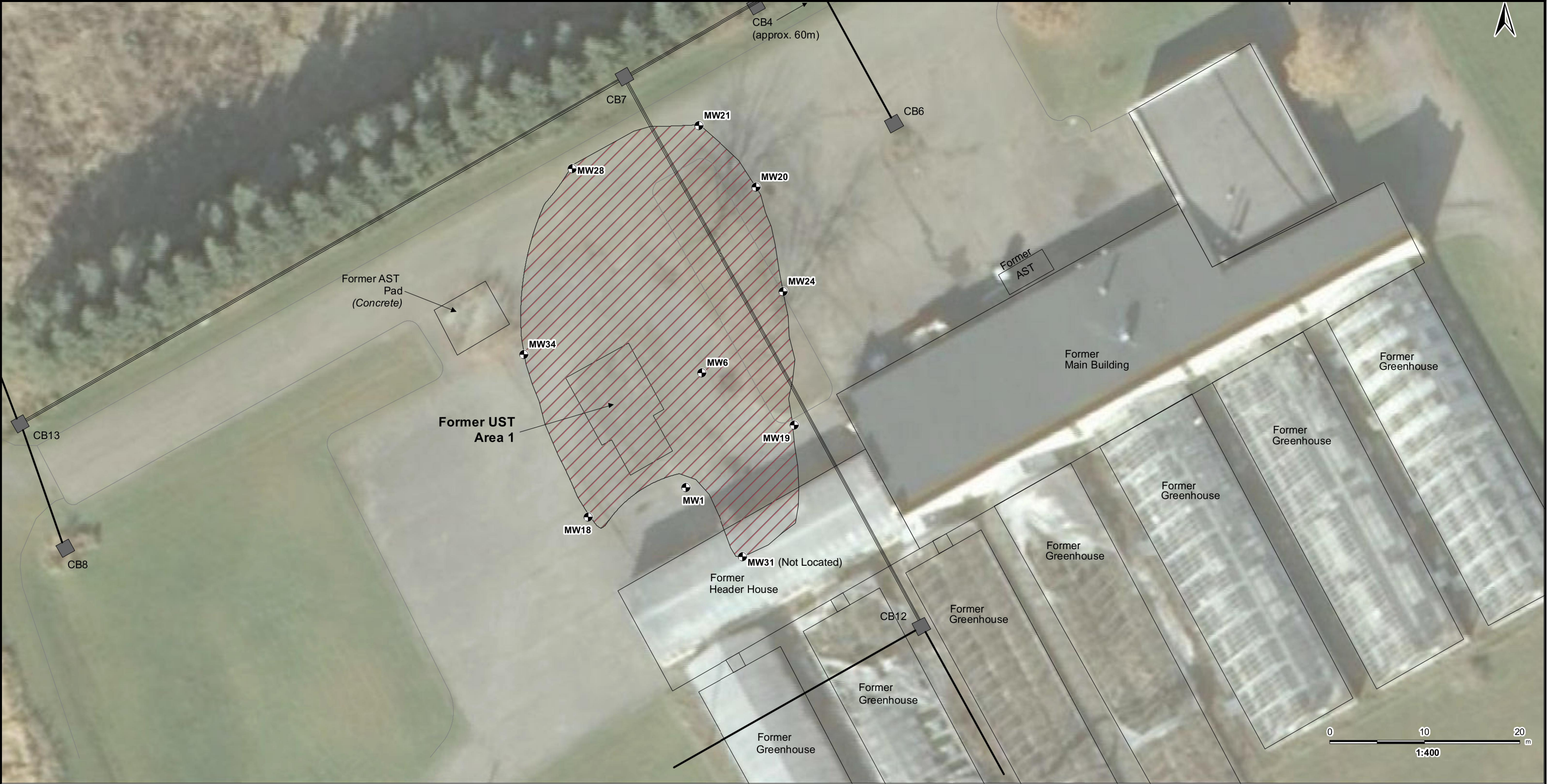
< Not detected.

na Not analyzed.





**Natural Attenuation
Monitoring Program**
16 Tauvette St., Ottawa, ON
450250 – September 2015


Figures





LEGEND:


- 

EXISTING MONITORING WELL LOCATIONS
- 

CURB
- 

FORMER ASTs AND USTs
- 

FORMER BUILDINGS, GREENHOUSES, ETC
- 

CATCH BASINS
- 

INTERPRETED EXTENT OF PHC/BTEX CONTAMINATION IN GROUNDWATER (Stantec May 31, 2012)

NOTES:

- 1. COORDINATE SYSTEM NAD 1983 UTM ZONE 18N
- 2. AIRPHOTO: FIRST BASE SOLUTIONS, 2008

REFERENCE:

Stantec, Project No. 122510686, June 2012.



NATIONAL CAPITAL COMMISSION
MONITORED NATURAL ATTENUATION
16 TAUVERTE STREET, OTTAWA, ON
SAMPLE LOCATION PLAN

Drawn By: P.A.L.	Approved By: T.A.	Project No: 450250
Date: JULY 2015	Scale: AS SHOWN	FIGURE 1



**Natural Attenuation
Monitoring Program**
16 Tauvette St., Ottawa, ON
450250 – September 2015


Appendix A

Site Photographs

**Groundwater Monitoring Program
16 Tauvette, Ottawa, Ontario**

Photograph Log


CLIENT: NCC	SITE NAME: 16 Tauvette Street
PROJECT #: 450250	SITE LOCATION: Ottawa, Ontario
PHOTOGRAPH #: 1	
PHOTOGRAPHER: LdG	
DATE: 6/10/15	
DIRECTION: west	
COMMENT: View of the 16 Tauvette Site.	

CLIENT: NCC	SITE NAME: 16 Tauvette Street
PROJECT #: 450250	SITE LOCATION: Ottawa, Ontario
PHOTOGRAPH #: 2	
PHOTOGRAPHER: LdG	
DATE: 6/10/15	
DIRECTION:	
COMMENT: View of monitoring well MW6 with peristaltic pump and Horiba U-52 Water Quality Meter.	
CLIENT: NCC	SITE NAME: 16 Tauvette Street

**Groundwater Monitoring Program
16 Tauvette, Ottawa, Ontario**

Photograph Log

PROJECT #: 450250	SITE LOCATION: Ottawa, Ontario
PHOTOGRAPH #: 3	
PHOTOGRAPHER: LdG	
DATE: 6/10/15	
DIRECTION:	
COMMENT: View of monitoring well MW21 without protective plug and well cap.	

CLIENT: NCC	SITE NAME: 16 Tauvette Street
PROJECT #: 450250	SITE LOCATION: Ottawa, Ontario
PHOTOGRAPH #: 4	
PHOTOGRAPHER: LdG	
DATE: 6/10/15	
DIRECTION: north	
COMMENT: View of monitoring well MW19 with peristaltic pump and Horiba U-52 Water Quality Meter.	



**Natural Attenuation
Monitoring Program**
16 Tauvette St., Ottawa, ON
450250 – September 2015

Appendix B

Laboratory Results

CLIENT NAME: ARCADIS CANADA INC
260 Hearst Way, Suite 512
OTTAWA, ON K2L3H1
(613) 230-2405

ATTENTION TO: TROY AUSTRINS

PROJECT: 450250

AGAT WORK ORDER: 15Z983896

TRACE ORGANICS REVIEWED BY: Neli Popnikolova, Senior Chemist

WATER ANALYSIS REVIEWED BY: Parvathi Malemath, Data Reviewer

DATE REPORTED: Jun 22, 2015

PAGES (INCLUDING COVER): 10

VERSION*: 1

Should you require any information regarding this analysis please contact your client services representative at (403) 299-2000

*NOTES

All samples will be disposed of within 30 days following analysis. Please contact the lab if you require additional sample storage time.



AGAT Laboratories

Certificate of Analysis

AGAT WORK ORDER: 15Z983896

PROJECT: 450250

2910 12TH STREET NE
CALGARY, ALBERTA
CANADA T2E 7P7
TEL (403)299-2000
FAX (403)299-2010
<http://www.agatlabs.com>

CLIENT NAME: ARCADIS CANADA INC

SAMPLING SITE:

ATTENTION TO: TROY AUSTRINS

SAMPLED BY: Lennart de Groot

Methane in Water

DATE RECEIVED: 2015-06-11

DATE REPORTED: 2015-06-22

		SAMPLE DESCRIPTION:		MW 6	MW 21	MW 18	MW 24	MW 34	MW 1	MW 28	Dup-1
		SAMPLE TYPE:		Water	Water	Water	Water	Water	Water	Water	Water
		DATE SAMPLED:		6/11/2015	6/11/2015	6/11/2015	6/11/2015	6/11/2015	6/11/2015	6/11/2015	6/11/2015
Parameter	Unit	G / S	RDL	6647348	6647378	6647391	6647399	6647407	6647415	6647423	6647431
Methane	µg/mL	0.01	1.85	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Ethane	µg/mL	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Ethene	µg/mL	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Propane	µg/mL	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

Certified By:



AGAT Laboratories

Certificate of Analysis

AGAT WORK ORDER: 15Z983896

PROJECT: 450250

2910 12TH STREET NE
CALGARY, ALBERTA
CANADA T2E 7P7
TEL (403)299-2000
FAX (403)299-2010
<http://www.agatlabs.com>

CLIENT NAME: ARCADIS CANADA INC

SAMPLING SITE:

ATTENTION TO: TROY AUSTRINS

SAMPLED BY: Lennart de Groot

O. Reg. 153(511) - PHCs F1 - F4 (Water)

DATE RECEIVED: 2015-06-11

DATE REPORTED: 2015-06-22

		SAMPLE DESCRIPTION:		MW 6	MW 1g	MW 21	MW 20	MW 18	MW 24	MW 34	MW 1
		SAMPLE TYPE:		Water	Water	Water	Water	Water	Water	Water	Water
		DATE SAMPLED:		6/11/2015	6/11/2015	6/11/2015	6/11/2015	6/11/2015	6/11/2015	6/11/2015	6/11/2015
Parameter	Unit	G / S	RDL	6647348	6647374	6647378	6647387	6647391	6647399	6647407	6647415
Benzene	µg/L	44	0.20	2300	0.29	<0.20	<0.20	<0.20	<0.20	2.3	5.2
Toluene	µg/L	18000	0.20	67	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Ethylbenzene	µg/L	2300	0.10	450	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	8.0
Xylene Mixture	µg/L	4200	0.20	1700	<0.20	<0.20	<0.20	<0.20	<0.20	0.51	2.4
F1 (C6 to C10)	µg/L		25	6200	<25	<25	<25	<25	<25	<25	55
F1 (C6 to C10) minus BTEX	µg/L	750	25	1700	<25	<25	<25	<25	<25	<25	39
F2 (C10 to C16)	µg/L	150	100	200	<100	<100	<100	<100	<100	<100	470
F3 (C16 to C34)	µg/L	500	100	<100	120	<100	560	<100	<100	<100	550
F4 (C34 to C50)	µg/L	500	100	<100	<100	<100	<100	<100	<100	<100	<100
Gravimetric Heavy Hydrocarbons	µg/L	500	500	NA	NA	NA	NA	NA	NA	NA	NA
Surrogate	Unit	Acceptable Limits									
Terphenyl	%	60-140		90	65	131	67	78	74	80	70
		SAMPLE DESCRIPTION:		MW 28	Dup-1						
		SAMPLE TYPE:		Water	Water						
		DATE SAMPLED:		6/11/2015	6/11/2015						
Parameter	Unit	G / S	RDL	6647423	6647431						
Benzene	µg/L	44	0.20	4.2	<0.20						
Toluene	µg/L	18000	0.20	<0.20	<0.20						
Ethylbenzene	µg/L	2300	0.10	0.47	<0.10						
Xylene Mixture	µg/L	4200	0.20	2.2	<0.20						
F1 (C6 to C10)	µg/L		25	<25	<25						
F1 (C6 to C10) minus BTEX	µg/L	750	25	<25	<25						
F2 (C10 to C16)	µg/L	150	100	<100	<100						
F3 (C16 to C34)	µg/L	500	100	<100	<100						
F4 (C34 to C50)	µg/L	500	100	<100	<100						
Gravimetric Heavy Hydrocarbons	µg/L	500	500	NA	NA						
Surrogate	Unit	Acceptable Limits									
Terphenyl	%	60-140		84	72						

Certified By:

N Popmukolof



AGAT Laboratories

Certificate of Analysis

AGAT WORK ORDER: 15Z983896

PROJECT: 450250

2910 12TH STREET NE
CALGARY, ALBERTA
CANADA T2E 7P7
TEL (403)299-2000
FAX (403)299-2010
<http://www.agatlabs.com>

CLIENT NAME: ARCADIS CANADA INC

SAMPLING SITE:

ATTENTION TO: TROY AUSTRINS

SAMPLED BY: Lennart de Groot

O. Reg. 153(511) - PHCs F1 - F4 (Water)

DATE RECEIVED: 2015-06-11

DATE REPORTED: 2015-06-22

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to Table 3: Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition - Non-Potable Ground Water - All Types of Property Uses - Coarse Textured Soils

6647348-6647431 The C6-C10 fraction is calculated using Toluene response factor.
The C10 - C16, C16 - C34, and C34 - C50 fractions are calculated using the average response factor for n-C10, n-C16, and nC34.
Gravimetric Heavy Hydrocarbons are not included in the Total C16 - C50 and are only determined if the chromatogram of the C34 - C50 Hydrocarbons indicated that hydrocarbons >C50 are present.
The chromatogram has returned to baseline by the retention time of nC50.
Total C6-C50 results are corrected for BTEX contributions.
This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.
nC6 and nC10 response factors are within 30% of Toluene response factor.
nC10, nC16 and nC34 response factors are within 10% of their average.
C50 response factor is within 70% of nC10 + nC16 nC34 average.
Linearity is within 15%.
Extraction and holding times were met for this sample.
Fractions 1-4 are quantified with the contribution of PAHs. Under Ontario Regulation 153/04, results are considered valid without determining the PAH contribution if not requested by the client.
NA = Not Applicable

Certified By:



AGAT Laboratories

Certificate of Analysis

AGAT WORK ORDER: 15Z983896

PROJECT: 450250

2910 12TH STREET NE
CALGARY, ALBERTA
CANADA T2E 7P7
TEL (403)299-2000
FAX (403)299-2010
<http://www.agatlabs.com>

CLIENT NAME: ARCADIS CANADA INC

SAMPLING SITE:

ATTENTION TO: TROY AUSTRINS

SAMPLED BY: Lennart de Groot

Sulphate (Water)

DATE RECEIVED: 2015-06-11

DATE REPORTED: 2015-06-22

		SAMPLE DESCRIPTION:		MW 6	MW 21	MW 18	MW 24	MW 34	MW 1	MW 28	Dup-1
		SAMPLE TYPE:		Water	Water	Water	Water	Water	Water	Water	Water
		DATE SAMPLED:		6/11/2015	6/11/2015	6/11/2015	6/11/2015	6/11/2015	6/11/2015	6/11/2015	6/11/2015
Parameter	Unit	G / S	RDL	6647348	6647378	6647391	6647399	6647407	6647415	6647423	6647431
Sulphate	mg/L	0.50	0.69	29.2	21.6	25.1	45.3	15.3	10.1	22.3	

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

Certified By:





Guideline Violation

AGAT WORK ORDER: 15Z983896

PROJECT: 450250

2910 12TH STREET NE
CALGARY, ALBERTA
CANADA T2E 7P7
TEL (403)299-2000
FAX (403)299-2010
<http://www.agatlabs.com>

CLIENT NAME: ARCADIS CANADA INC

ATTENTION TO: TROY AUSTRINS

SAMPLEID	SAMPLE TITLE	GUIDELINE	ANALYSIS PACKAGE	PARAMETER	GUIDEVALUE	RESULT
6647348	MW 6	ON T3 NPGW CT	O. Reg. 153(511) - PHCs F1 - F4 (Water)	Benzene	44	2300
6647348	MW 6	ON T3 NPGW CT	O. Reg. 153(511) - PHCs F1 - F4 (Water)	F1 (C6 to C10) minus BTEX	750	1700
6647348	MW 6	ON T3 NPGW CT	O. Reg. 153(511) - PHCs F1 - F4 (Water)	F2 (C10 to C16)	150	200
6647387	MW 20	ON T3 NPGW CT	O. Reg. 153(511) - PHCs F1 - F4 (Water)	F3 (C16 to C34)	500	560
6647415	MW 1	ON T3 NPGW CT	O. Reg. 153(511) - PHCs F1 - F4 (Water)	F2 (C10 to C16)	150	470
6647415	MW 1	ON T3 NPGW CT	O. Reg. 153(511) - PHCs F1 - F4 (Water)	F3 (C16 to C34)	500	550



Quality Assurance

CLIENT NAME: ARCADIS CANADA INC

PROJECT: 450250

SAMPLING SITE:

AGAT WORK ORDER: 15Z983896

ATTENTION TO: TROY AUSTRINS

SAMPLED BY: Lennart de Groot

Trace Organics Analysis

RPT Date: Jun 22, 2015

RPT Date: Jun 22, 2015			DUPLICATE			Method Blank	REFERENCE MATERIAL		METHOD BLANK SPIKE			MATRIX SPIKE			
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD		Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper

O. Reg. 153(511) - PHCs F1 - F4 (Water)

Benzene	6650436		< 0.20	< 0.20	0.0%	< 0.20	93%	50%	140%	93%	60%	130%	96%	50%	140%
Toluene	6650436		< 0.20	< 0.20	0.0%	< 0.20	89%	50%	140%	88%	60%	130%	95%	50%	140%
Ethylbenzene	6650436		< 0.10	< 0.10	0.0%	< 0.10	87%	50%	140%	87%	60%	130%	96%	50%	140%
Xylene Mixture	6650436		< 0.20	< 0.20	0.0%	< 0.20	89%	50%	140%	91%	60%	130%	98%	50%	140%
F1 (C6 to C10)	6650436		< 25	< 25	0.0%	< 25	90%	60%	140%	88%	60%	140%	86%	60%	140%
F2 (C10 to C16)		TW	< 100	< 100	0.0%	< 100	96%	60%	140%	65%	60%	140%	63%	60%	140%
F3 (C16 to C34)		TW	< 100	< 100	0.0%	< 100	103%	60%	140%	98%	60%	140%	95%	60%	140%
F4 (C34 to C50)		TW	< 100	< 100	0.0%	< 100	96%	60%	140%	100%	60%	140%	79%	60%	140%

Comments: TW: Tap water analysis has been performed as QC sample testing for duplicate and matrix spike due to insufficient sample volume.

Methane in Water

Methane	742	6647348	1.85	1.76	5.0%	< 0.01	91%	70%	130%	90%	70%	130%	89%	60%	140%
Ethane	742	6647348	< 0.01	< 0.01	NA	< 0.01	88%	70%	130%	85%	70%	130%	83%	60%	140%
Ethene	742	6647348	< 0.01	< 0.01	NA	< 0.01	86%	70%	130%	84%	70%	130%	87%	60%	140%
Propane	742	6647348	< 0.01	< 0.01	NA	< 0.01	88%	70%	130%	84%	70%	130%	83%	60%	140%

Comments: If the RPD value is NA, the results of the duplicates are under 5X the RDL and will not be calculated.

Non-accredited test. Inquire with lab for details.

Certified By:

N Popmukohof



Quality Assurance

CLIENT NAME: ARCADIS CANADA INC

PROJECT: 450250

SAMPLING SITE:

AGAT WORK ORDER: 15Z983896

ATTENTION TO: TROY AUSTRINS

SAMPLED BY: Lennart de Groot

Water Analysis

RPT Date: Jun 22, 2015			DUPLICATE			Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD		Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Sulphate (Water)															
Sulphate	6649849		42.0	41.9	0.2%	< 0.10	95%	90%	110%	98%	90%	110%	99%	80%	120%

Certified By: _____



Method Summary

CLIENT NAME: ARCADIS CANADA INC

PROJECT: 450250

SAMPLING SITE:

AGAT WORK ORDER: 15Z983896

ATTENTION TO: TROY AUSTRINS

SAMPLED BY: Lennart de Groot

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Trace Organics Analysis			
Methane		Kampbell & Vandegrift, J Chromatogr Sci., 36, 1999	GC/FID
Ethane		Kampbell & Vandegrift, J Chromatogr Sci., 36, 1999	GC/FID
Ethene		Kampbell & Vandegrift, J Chromatogr Sci., 36, 1999	GC/FID
Propane		Kampbell & Vandegrift, J Chromatogr Sci., 36, 1999	GC/FID
Benzene	VOL-91-5010	MOE PHC-E3421	(P&T)GC/FID
Toluene	VOL-91-5010	MOE PHC-E3421	(P&T)GC/FID
Ethylbenzene	VOL-91-5010	MOE PHC-E3421	(P&T)GC/FID
Xylene Mixture	VOL-91-5010	MOE PHC-E3421	(P&T)GC/FID
F1 (C6 to C10)	VOL-91-5010	MOE PHC-E3421	(P&T)GC/FID
F1 (C6 to C10) minus BTEX	VOL-91-5010	MOE PHC-E3421	(P&T)GC/FID
F2 (C10 to C16)	VOL-91-5010	MOE PHC-E3421	GC/FID
F3 (C16 to C34)	VOL-91-5010	MOE PHC-E3421	GC/FID
F4 (C34 to C50)	VOL -91- 5010	MOE PHC-E3421	GC/FID
Gravimetric Heavy Hydrocarbons	VOL-91-5010	MOE PHC-E3421	BALANCE
Terphenyl	VOL-91-5010		GC/FID
Water Analysis			
Sulphate	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH



**Natural Attenuation
Monitoring Program**
16 Tauvette St., Ottawa, ON
450250 – September 2015

Appendix C

Historical Groundwater Data

Table D-1
Groundwater - Analytical Results
BTEX and PHCs
NCC Property Asset 6976
16 Tauvette Street, Ottawa, ON

Parameter	Units	MOE Table 3 ¹	Federal Table 3 ²	MW1								
Sample Date				23-Jun-05	21-Jun-06	20-Sep-07	22-Jul-09	Duplicate MWD1	05-May-10	Duplicate MW-D	19-Jul-11	01-Jun-12
Benzene	µg/L	430	9,800	34	nd (0.5)	nd (0.5)	7.1	8.4	6.6	6.4	nd (0.2)	nd (0.5)
Toluene	µg/L	18,000	240,000	nd (0.5)	nd (0.5)	nd (0.5)	5.9	nd (0.2)	nd (0.2)	nd (0.2)	0.2	nd (0.5)
Ethylbenzene	µg/L	2,300	150,000	nd (0.5)	nd (0.5)	nd (0.5)	0.9	7	12	11	nd (0.2)	nd (0.5)
Total Xylenes	µg/L	4,200	74,000	0.5	nd (1.0)	nd (1.0)	1	1	2.5	2.4	nd (0.4)	nd (1.0)
F1 PHCs (C6 - C10) ³	µg/L	750	9,900	nd (0.5)	nd (200)	nd (200)	nd (200)	nd (200)	210	170	nd (200)	nd (25)
F2 PHCs (>C10 - C16)	µg/L	150	3,100	2500 ¹	6100 ^{1,2}	623 ¹	1400 ¹	700 ¹	1100 ¹	1500 ¹	nd (100)	nd (100)
F3 PHCs (>C16 - C34)	µg/L	500	NV	1300 ¹	3800 ¹	645 ¹	480	180	600 ¹	770 ¹	nd (100)	nd (100)
F4 PHCs (>C34 - C50)	µg/L	500	NV	600 ¹	nd (100)	nd (100)	nd (100)	nd (100)	nd (100)	nd (100)	nd (100)	nd (100)

NOTES:

- 1 Full Depth Generic Site Condition Standards Table 3. Non-Potable Ground Water Condition (assume medium to fine textured soil), Ontario Ministry of the Environment *Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act, 1997*.
- 2 Federal Interim Groundwater Quality Guidelines Table 3. Generic Guidelines for Commercial and Industrial Land Uses, Non-Potable Ground Water Condition, May 2010, Tier 1, assume fine textured soil.
- 3 Stantec used the PHC F1 concentration corrected for BTEX as per the methodology. Previous sample results for PHC F1 appear to contain BTEX and therefore the PHC F1 concentrations from 2005 to 2011 cannot be compared to the data from 2012.

BOLD Concentration exceeds indicated standard/guideline.

NV No Value

nd(##) Parameter not detected above laboratory method detection limit. Method detection limit in brackets.

Table D-1
Groundwater - Analytical Results
BTEX and PHCs
NCC Property Asset 6976
16 Tauvette Street, Ottawa, ON

Parameter	Units	MOE Table 3 ¹	Federal Table 3 ²	MW6							
Sample Date				23-Jun-05	21-Jun-06	20-Sep-07	22-Jul-09	05-May-10	19-Jul-11	01-Jun-12	Duplicate MW-6A 01-Jun-12
Benzene	µg/L	430	9,800	2000 ¹	8000 ¹	5300 ¹	3700 ¹	5400 ¹	5100 ¹	1940 ¹	1870 ¹
Toluene	µg/L	18,000	240,000	nd (0.5)	350	139	57	140	81	4.5	4.5
Ethylbenzene	µg/L	2,300	150,000	nd (0.5)	nd (0.5)	nd (50)	49	310	210	74.9	74.8
Total Xylenes	µg/L	4,200	74,000	80	2480	4200	670	1700	630	816	758
F1 PHCs (C6 - C10) ³	µg/L	750	9,900	nd	9000 ¹	4610 ¹	4700 ¹	13000 ^{1,2}	5400 ¹	564	573
F2 PHCs (>C10 - C16)	µg/L	150	3,100	700 ¹	1000 ¹	1140 ¹	130	150	nd (100)	nd (100)	nd (100)
F3 PHCs (>C16 - C34)	µg/L	500	NV	nd (100)	200	nd (100)	nd (100)	nd (100)	nd (100)	nd (100)	nd (100)
F4 PHCs (>C34 - C50)	µg/L	500	NV	nd (100)	nd (100)	nd (100)	nd (100)	nd (100)	nd (100)	nd (100)	nd (100)

NOTES:

- 1 Full Depth Generic Site Condition Standards Table 3. Non-Potable Ground Water Condition (assume medium to fine textured soil), Ontario Ministry of the Environment *Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act*, 1997.
- 2 Federal Interim Groundwater Quality Guidelines Table 3. Generic Guidelines for Commercial and Industrial Land Uses, Non-Potable Ground Water Condition, May 2010, Tier 1, assume fine textured soil.
- 3 Stantec used the PHC F1 concentration corrected for BTEX as per the methodology. Previous sample results for PHC F1 appear to contain BTEX and therefore the PHC F1 concentrations from 2005 to 2011 cannot be compared to the data from 2012.

BOLD Concentration exceeds indicated standard/guideline.

NV No Value

nd(##) Parameter not detected above laboratory method detection limit. Method detection limit in brackets.

Table D-1
Groundwater - Analytical Results
BTEX and PHCs
NCC Property Asset 6976
16 Tauvette Street, Ottawa, ON

Parameter	Units	MOE Table 3 ¹	Federal Table 3 ²	MW18					
				21-Jun-06	20-Sep-07	22-Jul-09	05-May-10	19-Jul-11	01-Jun-12
Sample Date									
Benzene	µg/L	430	9,800	nd (0.5)	nd (0.5)	nd (0.2)	1.8	nd (0.2)	nd (0.5)
Toluene	µg/L	18,000	240,000	nd (0.5)	nd (0.5)	nd (0.2)	nd (0.2)	nd (0.2)	nd (0.5)
Ethylbenzene	µg/L	2,300	150,000	nd (0.5)	nd (0.5)	nd (0.2)	nd (0.2)	nd (0.2)	nd (0.5)
Total Xylenes	µg/L	4,200	74,000	nd (1.0)	nd (1.0)	nd (0.2)	0.5	nd (0.4)	nd (1.0)
F1 PHCs (C6 - C10) ³	µg/L	750	9,900	nd (200)	nd (200)	nd (200)	nd (100)	nd (200)	nd (25)
F2 PHCs (>C10 - C16)	µg/L	150	3,100	nd (100)	nd (100)	nd (100)	nd (100)	nd (100)	nd (100)
F3 PHCs (>C16 - C34)	µg/L	500	NV	nd (100)	nd (100)	270	200	nd (100)	nd (100)
F4 PHCs (>C34 - C50)	µg/L	500	NV	nd (100)	nd (100)	1500 ¹	610 ¹	nd (100)	nd (100)

NOTES:

- 1 Full Depth Generic Site Condition Standards Table 3. Non-Potable Ground Water Condition (assume medium to fine textured soil), Ontario Ministry of the Environment *Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act, April 15, 2011*
- 2 Federal Interim Groundwater Quality Guidelines Table 3. Generic Guidelines for Commercial and Industrial Land Uses, Non-Potable Ground Water Condition, May 2010, Tier 1, assume fine textured soil.
- 3 Stantec used the PHC F1 concentration corrected for BTEX as per the methodology. Previous sample results for PHC F1 appear to contain BTEX and therefore the PHC F1 concentrations from 2005 to 2011 cannot be compared to the data from 2012.

BOLD Concentration exceeds indicated standard/guideline.

NV No Value

nd(##) Parameter not detected above laboratory method detection limit. Method detection limit in brackets.

Table D-1
Groundwater - Analytical Results
BTEX and PHCs
NCC Property Asset 6976
16 Tavette Street, Ottawa, ON

Parameter	Units	MOE Table 3 ¹	Federal Table 3 ²	MW19					
Sample Date				21-Jun-06	20-Sep-07	22-Jul-09	05-May-10	19-Jul-11	01-Jun-12
Benzene	µg/L	430	9,800	nd (0.5)	nd (0.5)	nd (0.2)	nd (0.2)	nd (0.2)	nd (0.5)
Toluene	µg/L	18,000	240,000	nd (0.5)	nd (0.5)	nd (0.2)	nd (0.2)	nd (0.2)	nd (0.5)
Ethylbenzene	µg/L	2,300	150,000	nd (0.5)	nd (0.5)	nd (0.2)	nd (0.2)	nd (0.2)	nd (0.5)
Total Xylenes	µg/L	4,200	74,000	nd (1.0)	nd (1.0)	nd (0.4)	nd (0.4)	nd (0.4)	nd (1.0)
F1 PHCs (C6 - C10) ³	µg/L	750	9,900	nd (200)	nd (200)	nd (200)	nd (100)	nd (200)	nd (25)
F2 PHCs (>C10 - C16)	µg/L	150	3,100	nd (100)	nd (100)	nd (100)	nd (100)	nd (100)	nd (100)
F3 PHCs (>C16 - C34)	µg/L	500	NV	nd (100)	nd (100)	nd (100)	120	nd (100)	nd (100)
F4 PHCs (>C34 - C50)	µg/L	500	NV	nd (100)	nd (100)	nd (100)	630 ¹	nd (100)	nd (100)

NOTES:

- 1 Full Depth Generic Site Condition Standards Table 3. Non-Potable Ground Water Condition (assume medium to fine textured soil), Ontario Ministry of the Environment *Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act*, April 15, 2004.
- 2 Federal Interim Groundwater Quality Guidelines Table 3. Generic Guidelines for Commercial and Industrial Land Uses, Non-Potable Ground Water Condition, May 2010, Tier 1, assume fine textured soil.
- 3 Stantec used the PHC F1 concentration corrected for BTEX as per the methodology. Previous sample results for PHC F1 appear to contain BTEX and therefore the PHC F1 concentrations from 2005 to 2011 cannot be compared to the data from 2012.

BOLD Concentration exceeds indicated standard/guideline.

NV No Value

nd(##) Parameter not detected above laboratory method detection limit. Method detection limit in brackets.

Table D-1
Groundwater - Analytical Results
BTEX and PHCs
NCC Property Asset 6976
16 Tauvette Street, Ottawa, ON

Parameter	Units	MOE Table 3 ¹	Federal Table 3 ²	MW20						
Sample Date				21-Jun-06	20-Sep-07	22-Jul-09	05-May-10	19-Jul-11	Duplicate 19-Jul-11	01-Jun-12
Benzene	µg/L	430	9,800	nd (0.5)	nd (0.5)	nd (0.2)	nd (0.2)	nd (0.2)	0.3	nd (0.5)
Toluene	µg/L	18,000	240,000	nd (0.5)	nd (0.5)	nd (0.2)	nd (0.2)	0.5	1.7	nd (0.5)
Ethylbenzene	µg/L	2,300	150,000	nd (0.5)	nd (0.5)	nd (0.2)	nd (0.2)	nd (0.2)	0.3	nd (0.5)
Total Xylenes	µg/L	4,200	74,000	nd (1.0)	nd (1.0)	nd (0.4)	nd (0.4)	0.7	1.9	nd (1.0)
F1 PHCs (C6 - C10) ³	µg/L	750	9,900	nd (200)	nd (200)	nd (200)	nd (100)	nd (200)	nd (200)	nd (25)
F2 PHCs (>C10 - C16)	µg/L	150	3,100	nd (100)	nd (100)	nd (100)	nd (100)	nd (100)	nd (100)	nd (100)
F3 PHCs (>C16 - C34)	µg/L	500	NV	nd (100)	nd (100)	nd (100)	nd (100)	nd (100)	nd (100)	nd (100)
F4 PHCs (>C34 - C50)	µg/L	500	NV	nd (100)	nd (100)	nd (100)	nd (100)	nd (100)	nd (100)	nd (100)

NOTES:

- 1 Full Depth Generic Site Condition Standards Table 3, Non-Potable Ground Water Condition (assume medium to fine textured soil), Ontario Ministry of the Environment *Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act, R.S.O. 1990*
- 2 Federal Interim Groundwater Quality Guidelines Table 3, Generic Guidelines for Commercial and Industrial Land Uses, Non-Potable Ground Water Condition, May 2010, Tier 1, assume fine textured soil.
- 3 Stantec used the PHC F1 concentration corrected for BTEX as per the methodology. Previous sample results for PHC F1 appear to contain BTEX and therefore the PHC F1 concentrations from 2005 to 2011 cannot be compared to the data from 2012.

BOLD Concentration exceeds indicated standard/guideline.

NV No Value

nd(##) Parameter not detected above laboratory method detection limit. Method detection limit in brackets.

Table D-1
Groundwater - Analytical Results
BTEX and PHCs
NCC Property Asset 6976
16 Tavette Street, Ottawa, ON

Parameter	Units	MOE Table 3 ¹	Federal Table 3 ²	MW21					
Sample Date				21-Jun-06	20-Sep-07	22-Jul-09	05-May-10	19-Jul-11	01-Jun-12
Benzene	µg/L	430	9,800	nd (0.5)	nd (0.5)	nd (0.2)	nd (0.2)	nd (0.2)	nd (0.5)
Toluene	µg/L	18,000	240,000	nd (0.5)	nd (0.5)	nd (0.2)	nd (0.2)	0.3	nd (0.5)
Ethylbenzene	µg/L	2,300	150,000	nd (0.5)	nd (0.5)	nd (0.2)	nd (0.2)	nd (0.2)	nd (0.5)
Total Xylenes	µg/L	4,200	74,000	nd (1.0)	nd (1.0)	nd (0.4)	nd (0.4)	nd (0.4)	nd (1.0)
F1 PHCs (C6 - C10) ³	µg/L	750	9,900	nd (200)	nd (200)	nd (200)	nd (100)	nd (200)	nd (25)
F2 PHCs (>C10 - C16)	µg/L	150	3,100	nd (100)	nd (100)	nd (100)	nd (100)	nd (100)	nd (100)
F3 PHCs (>C16 - C34)	µg/L	500	NV	nd (100)	nd (100)	nd (100)	nd (100)	nd (100)	nd (100)
F4 PHCs (>C34 - C50)	µg/L	500	NV	nd (100)	nd (100)	nd (100)	nd (100)	nd (100)	nd (100)

NOTES:

- 1 Full Depth Generic Site Condition Standards Table 3. Non-Potable Ground Water Condition (assume medium to fine textured soil), Ontario Ministry of the Environment *Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act*, April 15, 2004.
- 2 Federal Interim Groundwater Quality Guidelines Table 3. Generic Guidelines for Commercial and Industrial Land Uses, Non-Potable Ground Water Condition, May 2010, Tier 1, assume fine textured soil.
- 3 Stantec used the PHC F1 concentration corrected for BTEX as per the methodology. Previous sample results for PHC F1 appear to contain BTEX and therefore the PHC F1 concentrations from 2005 to 2011 cannot be compared to the data from 2012.

BOLD Concentration exceeds indicated standard/guideline.

NV No Value

nd(##) Parameter not detected above laboratory method detection limit. Method detection limit in brackets.

Table D-1
Groundwater - Analytical Results
BTEX and PHCs
NCC Property Asset 6976
16 Tauvette Street, Ottawa, ON

Parameter	Units	MOE Table 3 ¹	Federal Table 3 ²	MW24				
Sample Date				20-Sep-07	22-Jul-09	05-May-10	19-Jul-11	01-Jun-12
Benzene	µg/L	430	9,800	nd (0.5)	nd (0.5)	nd (0.2)	nd (0.2)	nd (0.5)
Toluene	µg/L	18,000	240,000	nd (0.5)	nd (0.5)	nd (0.2)	0.2	nd (0.5)
Ethylbenzene	µg/L	2,300	150,000	nd (0.5)	nd (0.5)	nd (0.2)	nd (0.2)	nd (0.5)
Total Xylenes	µg/L	4,200	74,000	nd (1.0)	nd (1.0)	nd (0.4)	nd (0.4)	nd (1.0)
F1 PHCs (C6 - C10) ³	µg/L	750	9,900	nd (200)	nd (200)	nd (200)	nd (100)	nd (25)
F2 PHCs (>C10 - C16)	µg/L	150	3,100	nd (100)	nd (100)	nd (100)	nd (100)	nd (100)
F3 PHCs (>C16 - C34)	µg/L	500	NV	nd (100)	nd (100)	nd (100)	nd (100)	nd (100)
F4 PHCs (>C34 - C50)	µg/L	500	NV	nd (100)	nd (100)	nd (100)	nd (100)	nd (100)

NOTES:

- 1 Full Depth Generic Site Condition Standards Table 3. Non-Potable Ground Water Condition (assume medium to fine textured soil), Ontario Ministry of the Environment *Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act*, April 15, 2004.
- 2 Federal Interim Groundwater Quality Guidelines Table 3. Generic Guidelines for Commercial and Industrial Land Uses, Non-Potable Ground Water Condition, May 2010, Tier 1, assume fine textured soil.
- 3 Stantec used the PHC F1 concentration corrected for BTEX as per the methodology. Previous sample results for PHC F1 appear to contain BTEX and therefore the PHC F1 concentrations from 2005 to 2011 cannot be compared to the data from 2012.

BOLD Concentration exceeds indicated standard/guideline.

NV No Value

nd(##) Parameter not detected above laboratory method detection limit. Method detection limit in brackets.

Table D-1
Groundwater - Analytical Results
BTEX and PHCs
NCC Property Asset 6976
16 Tauvette Street, Ottawa, ON

Parameter	Units	MOE Table 3 ¹	Federal Table 3 ²	MW28				
Sample Date				20-Sep-07	22-Jul-09	05-May-10	19-Jul-11	01-Jun-12
Benzene	µg/L	430	9,800	nd (0.5)	nd (0.5)	nd (0.2)	nd (0.2)	nd (0.5)
Toluene	µg/L	18,000	240,000	nd (0.5)	nd (0.5)	nd (0.2)	0.2	nd (0.5)
Ethylbenzene	µg/L	2,300	150,000	nd (0.5)	nd (0.5)	nd (0.2)	nd (0.2)	nd (0.5)
Total Xylenes	µg/L	4,200	74,000	nd (1.0)	nd (1.0)	nd (0.4)	nd (0.4)	nd (1.0)
F1 PHCs (C6 - C10) ³	µg/L	750	9,900	nd (200)	nd (200)	nd (200)	nd (100)	nd (25)
F2 PHCs (>C10 - C16)	µg/L	150	3,100	nd (100)	nd (100)	nd (100)	nd (100)	nd (100)
F3 PHCs (>C16 - C34)	µg/L	500	NV	nd (100)	nd (100)	nd (100)	nd (100)	nd (100)
F4 PHCs (>C34 - C50)	µg/L	500	NV	nd (100)	nd (100)	nd (100)	nd (100)	nd (100)

NOTES:

- Full Depth Generic Site Condition Standards Table 3. Non-Potable Ground Water Condition (assume medium to fine textured soil), Ontario Ministry of the Environment *Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act*, April 16, 2004.
- Federal Interim Groundwater Quality Guidelines Table 3. Generic Guidelines for Commercial and Industrial Land Uses, Non-Potable Ground Water Condition, May 2010, Tier 1, assume fine textured soil.
- Stantec used the PHC F1 concentration corrected for BTEX as per the methodology. Previous sample results for PHC F1 appear to contain BTEX and therefore the PHC F1 concentrations from 2005 to 2011 cannot be compared to the data from 2012.

BOLD Concentration exceeds indicated standard/guideline.

NV No Value

nd(##) Parameter not detected above laboratory method detection limit. Method detection limit in brackets.

Table D-1
Groundwater - Analytical Results
BTEX and PHCs
NCC Property Asset 6976
16 Tavette Street, Ottawa, ON

Parameter	Units	MOE Table 3 ¹	Federal Table 3 ²	MW31				
Sample Date				20-Sep-07	22-Jul-09	05-May-10	19-Jul-11	01-Jun-12
Benzene	µg/L	430	9,800	nd (0.5)	nd (0.5)	nd (0.2)	nd (0.2)	nd (0.5)
Toluene	µg/L	18,000	240,000	nd (0.5)	nd (0.5)	nd (0.2)	0.6	nd (0.5)
Ethylbenzene	µg/L	2,300	150,000	nd (0.5)	nd (0.5)	nd (0.2)	0.2	nd (0.5)
Total Xylenes	µg/L	4,200	74,000	nd (1.0)	nd (1.0)	nd (0.4)	1.5	nd (1.0)
F1 PHCs (C6 - C10) ³	µg/L	750	9,900	nd (200)	nd (200)	nd (200)	nd (100)	nd (25)
F2 PHCs (>C10 - C16)	µg/L	150	3,100	nd (100)	nd (100)	nd (100)	nd (100)	nd (100)
F3 PHCs (>C16 - C34)	µg/L	500	NV	nd (100)	nd (100)	nd (100)	nd (100)	nd (100)
F4 PHCs (>C34 - C50)	µg/L	500	NV	nd (100)	nd (100)	nd (100)	nd (100)	nd (100)

NOTES:

- 1 Full Depth Generic Site Condition Standards Table 3. Non-Potable Ground Water Condition (assume medium to fine textured soil), Ontario Ministry of the Environment *Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act, April 16, 2004*
- 2 Federal Interim Groundwater Quality Guidelines Table 3. Generic Guidelines for Commercial and Industrial Land Uses, Non-Potable Ground Water Condition, May 2010, Tier 1, assume fine textured soil.
- 3 Stantec used the PHC F1 concentration corrected for BTEX as per the methodology. Previous sample results for PHC F1 appear to contain BTEX and therefore the PHC F1 concentrations from 2005 to 2011 cannot be compared to the data from 2012.

BOLD Concentration exceeds indicated standard/guideline.

NV No Value

nd(##) Parameter not detected above laboratory method detection limit. Method detection limit in brackets.

Table D-1
Groundwater - Analytical Results
BTEX and PHCs
NCC Property Asset 6976
16 Tavette Street, Ottawa, ON

Parameter	Units	MOE Table 3 ¹	Federal Table 3 ²	MW34				
Sample Date				20-Sep-07	22-Jul-09	05-May-10	19-Jul-11	01-Jun-12
Benzene	µg/L	430	9,800	nd (0.5)	nd (0.5)	nd (0.2)	nd (0.2)	nd (0.5)
Toluene	µg/L	18,000	240,000	nd (0.5)	nd (0.5)	nd (0.2)	0.4	nd (0.5)
Ethylbenzene	µg/L	2,300	150,000	nd (0.5)	nd (0.5)	nd (0.2)	nd (0.2)	nd (0.5)
Total Xylenes	µg/L	4,200	74,000	nd (1.0)	nd (1.0)	nd (0.4)	0.5	nd (1.0)
F1 PHCs (C6 - C10) ³	µg/L	750	9,900	nd (200)	nd (200)	nd (200)	nd (100)	nd (25)
F2 PHCs (>C10 - C16)	µg/L	150	3,100	nd (100)	nd (100)	nd (100)	nd (100)	nd (100)
F3 PHCs (>C16 - C34)	µg/L	500	NV	nd (100)	nd (100)	nd (100)	nd (100)	nd (100)
F4 PHCs (>C34 - C50)	µg/L	500	NV	nd (100)	nd (100)	nd (100)	nd (100)	nd (100)

NOTES:

- 1 Full Depth Generic Site Condition Standards Table 3. Non-Potable Ground Water Condition (assume medium to fine textured soil), Ontario Ministry of the Environment *Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act, April 15, 2014*
- 2 Federal Interim Groundwater Quality Guidelines Table 3. Generic Guidelines for Commercial and Industrial Land Uses, Non-Potable Ground Water Condition, May 2010, Tier 1, assume fine textured soil.
- 3 Stantec used the PHC F1 concentration corrected for BTEX as per the methodology. Previous sample results for PHC F1 appear to contain BTEX and therefore the PHC F1 concentrations from 2005 to 2011 cannot be compared to the data from 2012.

BOLD Concentration exceeds indicated standard/guideline.

NV No Value

nd(##) Parameter not detected above laboratory method detection limit. Method detection limit in brackets.