



Phase II Environmental Site Assessment

8015 Russell Road
Ottawa (Vars), Ontario

Prepared for:

2572768 Ontario Inc.
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Attention: Bob Cousins

LRL File No.: 170254

August 24, 2018



EXECUTIVE SUMMARY

Mr. Bob Cousins retained LRL Associates Ltd. (LRL) to complete a Phase II Environmental Site Assessment (ESA) on the commercial/industrial property located at 8015 Russell Road in Ottawa (Vars), Ontario (herein referred to as the "Site"). The Site is zoned as 'rural heavy industrial'. This assessment was conducted in the context of the proposed land use development.

The Site under investigation is a commercial property located at 8015 Russell Road in Ottawa (Vars), Ontario. The Site's location is presented in **Figure 1**. The property has an irregular shape being between approximately 640 m wide (east-west) by between 110 and 153 m deep (north-south), for a total area of approximately 89 954 m². The property is currently undeveloped with fields/cleared and built up land across the west portion and mature treed areas across the east portion. The approximate locations of these features are shown in **Figure 2**. The topography of the Site is relatively flat with an approximate elevation of 72 m above mean sea level (amsl).

A Phase I ESA reported prepared by LRL, dated September 24, 2015, identified the following areas of potential environmental concern:

- Former earth-moving activities across the western portion of the Site;
- Unknown materials piled across the eastern portion of the Site (now adjacent property to the east) from at least the 1970's to the 1990's;
- Concrete manufacturing plants/suppliers located north and east of the Site.
- Evidence of dumping east of the center treeline, along the north perimeter of the Site (now adjacent property to the north).

The purpose of this Phase II ESA is to determine if the recognized potential environmental concerns identified in the Phase I ESA, associated with current and past activities on the Site and neighbouring properties have negatively impacted soil and groundwater quality of the subject Site. Such an assessment provides information regarding the nature and extent of potential contamination to assist in making informed business decisions about the property.

Site condition standards (SCSs) are set out in MOECC's '*Soil, Ground Water and Sediment Standards for Use Under Part IV.1 of the Environmental Protection Act, April 15, 2011*'. The applicable site condition standard used was Table 2 Full Depth Site Condition Standards (SCS) in a Potable Ground Water Condition, commercial property use and coarse-textured soils.

The investigation included the advancement six (6) boreholes (BH18-1 through BH18-6) across the Site. Four (4) of the boreholes were completed as monitoring wells (MW18-1, MW18-3 through MW18-5).

The general subsurface stratigraphy encountered in the boreholes consisted of silt with sand, clay and some gravel to depths between 0.4 and 2.5 m bgs underlain by till to 4.5 m bgs where the boreholes were terminated. An upper layer of fill material was encountered in BH18-2 and MW18-4 from 0 to 1.22 m bgs in BH18-2 and 0 to 0.56 m bgs in MW18-4.

The soil samples were screened for combustible soil vapours (CSVs). The CSV concentrations ranged from below the detection limit of the PID (<0.1 ppm) to 18.1 ppm, the higher levels of which were observed in BH18-1 and BH18-4. No olfactory or visual (i.e. staining or free phase) evidence of petroleum hydrocarbon impacts were observed in any of the soil samples retrieved from the boreholes.



The pH in borehole BH18-2 (0.6 - 1.2 m bgs) was reported as 12.06, outside the range for surface soils of 5 to 9 to determine if a Site is considered sensitive as specified in O. Reg. 153. The elevated pH reported is likely related to the presence of concrete in the fill at this location and not representative of the soil conditions across the Site.

The reported concentrations of PHCs, VOCs and metals in the submitted soil samples were below the applicable Table 2 SCS with the following exceptions:

- Barium was detected in BH18-5 (1.8 - 2.4 m bgs) at a concentration of 956 µg/g, above the Table 2 SCS of 670 µg/g; and
- Vanadium was detected in BH18-5 (0.6 - 1.2 m bgs) at a concentration of 86.6 µg/g, marginally above the Table 2 SCS of 86 µg/g.

There is potential that the elevated levels of barium and vanadium reported in the soil in BH18-5 are related to the adjacent property use or the historical use of the Site. Research studies indicate that Champlain Sea deposits are known to have levels barium and vanadium above the MOECC SCSs (Sterling et al., 2017). There is a strong potential that the levels of these parameters are naturally occurring from these deposits. Furthermore, the groundwater tested in the monitoring wells across the Site, including the monitoring well installed in BH18-5 (MW18-5), were below the applicable SCS for barium and vanadium, suggesting that these parameters are not significantly leaching into the groundwater. Therefore, the levels of barium and vanadium at this location are not expected to impact the proposed development on the Site.

Groundwater levels measured in the monitoring wells on July 24, 2018 ranged from 1.11 to 1.55 m bgs. Based on the corresponding groundwater elevations, the groundwater flow direction is interpreted towards the southwest.

Headspace VOC levels measured in the monitoring wells, MW18-1 through MW18-4, were below the detection limit of the PID (<0.1 ppm). No olfactory or visual (i.e. sheen or free phase) evidence of petroleum hydrocarbon impacts were observed in the groundwater purged from the monitoring wells.

The reported concentrations of PHC, VOC and metals in the submitted water samples were below the applicable Table 2 SCS.

Based on the results of this Phase II Environmental Site Assessment no additional investigation is warranted.

It is recommended that if groundwater monitoring wells are not required for future monitoring purposes, they should be decommissioned in accordance with O. Reg. 903.



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(In order following text)

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Figure 3 Borehole and Monitoring Well Location Plan

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(In order following Figures)

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Table 3 Summary of Soil Results - Metals

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Table 5 Summary of Groundwater Results - Metals

APPENDICES

(In order following Tables)

Appendix A Borehole Logs

Appendix B Laboratory Certificates of Analysis



1 INTRODUCTION

Mr. Bob Cousins retained LRL Associates Ltd. (LRL) to complete a Phase II Environmental Site Assessment (ESA) on the commercial/industrial property located at 8015 Russell Road in Ottawa (Vars), Ontario (herein referred to as the “Site”). The Site is zoned as ‘rural heavy industrial’. This assessment was conducted in the context of the proposed land use development.

1.1 Site and Surrounding Description

1.1.1 Subject Property

The Site under investigation is a commercial property located at 8015 Russell Road in Ottawa (Vars), Ontario. The Site's location is presented in **Figure 1**. The property has an irregular shape being between approximately 640 m wide (east-west) by between 110 and 153 m deep (north-south), for a total area of approximately 89 954 m². The property is currently undeveloped with fields/cleared and built up land across the west portion and mature treed areas across the east portion. The approximate locations of these features are shown in **Figure 2**. The topography of the Site is relatively flat with an approximate elevation of 72 m above mean sea level (amsl).

1.1.2 Surrounding Land Use

Surrounding land use is as follows:

Directions	Current Land Use	Current Occupant
North	Residential and vacant, followed by industrial	Vacant/residential; Concrete supplier
South	Russell Road followed by residential and agricultural	Residential/agricultural
East	Undeveloped land, followed by industrial	Undeveloped; Concrete manufacturer and supplier
West	Frank Kenny Road, followed by residential and agricultural	Residential/undeveloped

1.1.3 Site Services

The Site is currently not serviced. Potable water and sanitary services will be provided by a private well and sewage disposal system.

1.2 Current and Proposed Future Uses

At the time of the investigation the Site was undeveloped. The proposed future use is commercial (office building) and industrial (garage).

1.3 Applicable Site Condition Standards

Site Condition Standards (SCS) are set out in Ministry of Environment and Climate Change (MOECC) ‘*Soil, Ground Water and Sediment Standards for Use Under Part IV.1 of the Environmental Protection Act, April 15, 2011*’. The applicable SCS used was Table 2 Full Depth Generic Site Condition Standards in a Potable Groundwater Condition for commercial/industrial/community use.

- The Site and surrounding properties within 250 m are serviced by potable water wells.

- The native subsurface material was determined to be coarse-grained, consisting of a mix of silty clay of medium to fine-texture, and/or fine to medium grained sand with silt clay and trace gravel. Accordingly, the SCSs for coarse-grained soil was applied
- The proposed site use is commercial and industrial; and
- The pH in borehole BH18-2 (0.6 - 1.2 m bgs) was reported as 12.06, outside the range for surface soils of 5 to 9 to determine if a Site is considered environmentally sensitive. The elevated pH reported is likely related to the presence of concrete in the fill at this location and not representative of the soil conditions across the Site.
- The Site is not considered environmentally sensitive (i.e. presence of less than 2 m of overburden overlying the bedrock, a water body on or within 30 m of the Site, or within an area of natural significance).

2 BACKGROUND INFORMATION

2.1 Physical Settings

Surficial soil deposit mapping (St-Onge, 2009) indicates that overburden material across the Site consists of till, hummocky, with local relief less than 5 m to 25 m. Bedrock mapping (Ontario Geological Survey, 1991) describes the bedrock on the Site as limestone, dolostone, shale, arkose and sandstone.

2.2 Previous Investigation

A Phase I Environmental Site Assessment was completed at the Site in September 2015 by LRL Associates Ltd. to identify any potential areas of environmental concern associated with the Site.

Report:	Phase I Environmental Site Assessment, 8015 Russell Road, Ottawa, Ontario
Date:	September 24, 2015
Author:	LRL Associates Ltd.
Prepared for:	2245040 Ontario Inc.
Description of data, analysis and findings relevant to the Phase I ESA: <p>The report was conducted by LRL for 2245040 Ontario Inc. The subject site, 8015 Russell Road, Ottawa, Ontario, was a larger un-severed property which was vacant undeveloped land at the time of the Phase I ESA. The historical use of the property indicated undeveloped land. Earth moving activities were noted, beginning in 2005 in the southwestern portions of the property and the northwestern portions of the Site in 2014.</p> <p>Potential environmental concerns identified by LRL Associates included:</p> <ul style="list-style-type: none"> • Former earth-moving activities across the western portion of the Site; • Unknown materials piled across the eastern portion of the Site (now adjacent property to the east) from at least the 1970's to the 1990's; • Concrete manufacturing plants/suppliers located north and east of the Site. • Evidence of dumping east of the center treeline, along the north perimeter of the Site (now adjacent property to the north). <p>It was recommended that a Phase II ESA be conducted.</p>	

3 SCOPE OF THE INVESTIGATION

3.1 Overview of Site Investigation

The purpose of this Phase II ESA is to determine if the recognized potential environmental concerns identified in the Phase I ESA, associated with current and past activities on the Site and neighbouring properties have negatively impacted soil and groundwater quality of the subject Site. Such an assessment provides information regarding the nature and extent of potential contamination to assist in making informed business decisions about the property.

The areas of potential environmental concerns (APECs) identified in the Phase I ESA along with additional concerns identified during the Phase II ESA that require investigation are:

Areas of Potential Environmental Concern	Location	Comments	Contaminants of Concern	Media Potentially Impacted
Former earth-moving activities and mounded fill material.	Western portion of Site.	Site activities appeared to take place on the western half of the Site until approximately 2014. The fill material was graded across the western portion of the Site prior to the Phase II ESA Site investigation.	PHC, VOC and metals	Soil Groundwater
Mounded fill material.	Adjacent property to the east of the Site.	Material was present from at least 1976 to the 1990's.	PHC, VOC and metals	Soil Groundwater
Evidence of dumping.	Adjacent property to the north.	An abandoned car and stained soil was observed.	PHC, VOC and metals	Soil Groundwater
Concrete Manufacturing	Approximately 150 m north and 20 m east of the Site.	Concrete manufacturing.	PHC, VOC, metals (arsenic, boron, barium), pH	Soil Groundwater

PHC – Petroleum Hydrocarbon Compounds

VOC – Volatile Organic Compounds

The findings and conclusions presented in this Phase II ESA report apply only to these recognized environmental conditions assessed.

3.2 Media Investigated

The Phase II ESA will establish the Site's subsurface geology and hydrogeological conditions. Soil and groundwater conditions will be evaluated with respect to the contaminants of concern in context of the current regulations and guidelines applicable to contaminated sites.

3.3 Scope and Methodology

Primary objective of this Phase II ESA was to evaluate current conditions of the Site in context of the applicable legislative and regulatory requirements. LRL's scope of work was as follows:

- Review all available information provided concerning the Site. Conduct a Site visit to determine existing conditions;

- Advance six (6) boreholes at strategic locations based on potential areas of environmental concern, to allow for soil sampling;
- Complete four (4) of the boreholes as monitoring wells to assess hydrogeological conditions and facilitate groundwater sampling;
- Submit representative soil and groundwater samples to an accredited laboratory for analysis of potential parameters of concern; and
- Interpret results in relation to current provincial guidelines to establish subsurface soil and groundwater quality.

This report will present results of Site activities carried out between July 20th and 30th, 2018.

4 INVESTIGATION METHOD

4.1 Field Preparation

Locations of all buried and overhead services were obtained by LRL prior to initiation of any subsurface investigation.

4.2 Borehole/Auger Hole Drilling

Six (6) boreholes (BH18-1 through BH18-6) were advanced across the Site on July 20th, 2018, four (4) of which were completed as monitoring wells (MW18-1, MW18-3, MW18-4 and MW18-5):

Borehole/ Monitoring Well	Location	Rational
BH/MW18-1	West portion of the Site along the north property limit.	To establish the potential soil or groundwater impacts from the fill material and earth moving activities on-Site and the concrete supplier to the north of the Site.
BH18-2	Central portion of the Site along the north property limit.	To establish the potential soil impacts from the fill material and earth moving activities on-Site and the concrete supplier to the north of the Site.
BH/MW18-3	East-central portion of the Site along the north property limit.	To establish the potential soil and groundwater impacts associated with the dumping activities on the adjacent property to the north.
BH/MW18-4	Central portion of the Site along the south property limit.	To establish the potential soil impacts from the fill material and earth moving activities on-Site.
BH/MW18-5	North-east corner of the Site.	To establish the potential soil and groundwater impacts associated with the adjacent concrete manufacturing activities and former mounded material on adjacent property to east.
BH18-6	South-east corner of the Site.	To establish the potential soil and groundwater impacts associated with the adjacent concrete manufacturing activities and former mounded material on adjacent property to east.

Borehole and monitoring well locations are presented in **Figure 3**.

The drilling contractor was George Downing Estate Drilling Ltd. (Hawkesbury, Ontario) and worked under LRL field staff supervision. The boreholes were advanced by auger from ground surface to 0.6 m bgs, and then continuously using a split-spoon sampler of 0.6 m in length. Between each spoon, the sampling equipment was thoroughly cleaned.

Details of the borehole and monitoring wells are provided in the borehole logs in **Appendix A**.

4.3 Soil Sampling and Field Screening

Representative soil samples from each split-spoon sampler or soil stratum encountered were collected and transferred immediately into sealed laboratory supplied glass jars and “Ziploc” freezer bags. Samples were examined for soil type, colour, staining/discoloration and odours. Samples were logged, labelled and stored on-Site in a cooler chilled with ice to prevent volatilization of potential combustible soil vapours (CSV). The soil samples stored in bags were screened for CSV presence using a Mini Rae 2000 Photoionization Detector (PID).

4.4 Monitoring Well Installation

Four (4) boreholes were completed as monitoring wells as follows: BH18-1; BH18-3; BH18-4 and BH18-5. Monitoring wells were installed into each 203 mm diameter borehole with a 31 mm PVC 10-slot screen placed to bisect the groundwater table. The tops of the screens were extended to the ground surface using a solid riser pipe. The annular space around the slotted portion of the piezometer was backfilled with pre-washed and graded silica sand up to 300 mm above the top of the screen. A bentonite seal of at least 0.3 m was placed above the sand pack. The remaining backfill in boreholes consisted of soil cuttings and/or additional sand. Monitoring wells were finished at the surface with a stick-up steel protective cover. Details of monitoring wells are provided in borehole logs in **Appendix A**.

4.5 Elevation Surveying

Ground surface elevations and the tops of all monitoring well risers were surveyed and referenced to a temporary benchmark. The benchmark was established as the top of casing of the installed drinking well located in the north-central portion of the Site. It was assigned an elevation of 100.00 m. Subsequent measurements of water elevations were made in reference to top of well risers.

4.6 Groundwater Monitoring and Sampling

Headspace vapour measurements for volatile organic compounds (VOC) were measured in each monitoring well immediately after removing the cap, prior to purging and sampling. VOC concentrations were measured by placing the combustible soil vapour nozzle at least 15 cm below the top of the casing and recording the peak VOC reading.

Newly installed wells were instrumented with dedicated LDPE tubing to facilitate well development, purging and sampling requirements. Prior to sampling, water levels were measured using an electronic water level meter and reduced to static elevations based on monitoring well survey data. Each well was purged (three well volumes) using dedicated LDPE tubing and foot valve. The purged water was observed for colour, sheens and odour. Using dedicated LDPE tubing, groundwater was transferred into laboratory supplied water bottles. Samples were logged, labelled and stored on-Site in a cooler chilled with ice.



4.7 Analytical Testing

Representative soil and groundwater samples collected during the investigation were submitted for laboratory analysis. Samples were submitted to Paracel Laboratories Ltd., Ottawa, Ontario for the following contaminants of concern: PHC fractions F1-F4, VOC & Benzene, Toluene, Ethylbenzene and Xylenes (BTEX) and pH (select locations).

Potential Environmental Concern	Soil		Groundwater	
	Sample No.	Analysis	Sample No.	Analysis
On-Site earth moving and mounded material.	BH18-1-1/4	PHC, VOC metals, pH	MW18-1	PHC, VOC, metals
	BH18-2-10/13		MW18-3	
	BH18-4-21/23		MW18-4	
Mounded material on adjacent properties to the north and east of the Site.	BH18-5-30/32	PHC, VOC (BTEX), metals, pH	MW18-5	PHC, VOC, metals
	BH18-6-38			
Evidence of dumping on adjacent property to the north.	BH18-3-15/17	PHC, VOC metals, pH	MW18-4	PHC, VOC, metals
Concrete manufacturing activities	BH18-1-1/4	PHC, VOC (BTEX), metals, pH	MW18-1	PHC, VOC, metals
	BH18-2-10/13		MW18-5	
	BH18-5-30/32			
	BH18-6-38			

Laboratory Certificates of Analysis are included in **Appendix B**. All remaining samples not analyzed will be kept in storage for a period of one (1) month following submission of this report at which time they shall be disposed of unless a written or verbal notice is received, stating otherwise.

4.8 QA/QC Protocols

Quality assurance/quality control (QA/QC) protocols were followed during the borehole drilling and sampling to ensure that representative samples were obtained. The protocols were generally performed in accordance with the following;

- Ontario Ministry of the Environment (MOE) *"Guidance on Sampling and Analytical Methods for Use at Contaminated Sites in Ontario"*, revised February 1997.
- Canadian Standards Association (CSA) Phase II Environmental Site Assessment, Z769-00 (R2013);

Field protocols that were employed include:

- All field-screening devices, such as a combustible gas detector, were calibrated prior to use, to ensure accuracy and reliability of readings;
- Thorough decontamination of all drilling and sampling equipment. Dedicated sampling equipment was used when possible;
- Soil and groundwater samples collected were placed in laboratory supplied glass sample containers;
- Thorough documentation of all field activities and sample handling practices including field notes, chain of custody forms, memos to files, etc.; and
- Samples were submitted to a laboratory which is certified by the Canadian Association for Laboratory Accreditation (CALA).
- Blind field duplicate samples were collected for soil and groundwater analysis.

5 RESULTS

5.1 Geology

The general subsurface stratigraphy encountered in the boreholes consisted of silt with sand, clay and some gravel to depths between 0.4 and 2.5 m bgs underlain by till to 4.5 m bgs where the boreholes were terminated. An upper layer of fill material (including brick pieces at BH18-2) was encountered in BH18-2 and MW18-4 from 0 to 1.22 m bgs in BH18-2 and 0 to 0.56 m bgs in MW18-4.

Detailed borehole logs of all borings are presented in **Appendix A**.

5.2 Groundwater Elevations & Flow Direction

Static groundwater elevations measured on July 24, 2018 at each monitoring well are summarized in **Table 1**. Static water levels measured in the monitoring well ranged from 0.6 to 1.9 m bgs, which correspond to elevations ranging from 97.17 to 99.03 m. Interpreted groundwater contours are presented in **Figure 4**. Based on these elevations the groundwater flow direction on the Site is interpreted towards the southwest.

5.3 Soil: Field Screening

No olfactory or visual (i.e. staining or free phase) evidence of petroleum hydrocarbon impacts were observed in any of the soil samples collected.

The soils samples were screened for combustible soil vapours (CSVs). The concentrations CSVs ranged from below the detection limit of the PID (<0.1 ppm) to 18.1 ppm, the higher levels of which were observed in BH18-1 and BH18-4.

CSV measurements are summarized in the borehole logs in **Appendix A**.

5.4 Soil Texture

Based on previous laboratory grain size analysis from LRL's report "Hydrogeological Assessment & Terrain Analysis – Proposed Land Development, March 2018", the native subsurface material was determined to be coarse-grained, consisting of a mix of silty clay of medium to fine-texture, and/or fine to medium grained sand with silt clay and trace gravel. Accordingly, the SCSs for coarse-grained soil was applied.

5.5 Soil Quality

The soil analytical results and respective MOECC standards are summarized in **Tables 2** and **3**. One (1) or two (2) soil sample(s) were submitted from each borehole for chemical analysis of the potential contaminants of concern.

The concentrations of PHC F1-F4 and VOCs in the tested soil samples were below the applicable laboratory detection limit, and the detection limits were below the applicable Table 2 SCS. The concentrations of metals were below the applicable standard, except for:

- Barium was detected in BH18-5 (1.8 - 1.2 m bgs) at a concentration of 956 µg/g, above the Table 2 SCS of 670 µg/g; and
- Vanadium was detected in BH18-5 (0.6 - 1.2 m bgs) at a concentration of 86.6 µg/g dry, above the Table 2 SCS of 86 µg/g.



There is potential that the concentrations of barium and vanadium detected are related to the adjacent property use or the historical use of the Site. Research studies indicate that Champlain Sea deposits are known to have levels barium and vanadium above the MOECC standards (Sterling et al., 2017). There is a strong potential that the levels of these parameters are naturally occurring from these deposits. Furthermore, the groundwater tested in the monitoring wells across the Site, including MW18-5 (installed in BH18-5), were below the applicable SCS for barium and vanadium, suggesting that these parameters are not significantly leaching into the groundwater. Therefore, the levels of barium and vanadium at this location are not expected to impact the proposed development on the Site.

5.6 Groundwater Quality

The VOC levels measured in the headspace in all monitoring wells (MW18-1 through MW18-5) were below the PID detection limit (<0.1 ppm). No olfactory or visual (i.e. sheen or free phase) evidence of petroleum hydrocarbon impacts were observed.

The groundwater analytical results and corresponding MOECC standards are summarized in **Tables 4** and **5**. The reported concentrations of the tested parameters in the groundwater samples collected from the monitoring wells were below the applicable Table 2 SCS.

6 CONCLUSIONS AND RECOMMENDATIONS

Based on our Site visit, results of soil and groundwater sampling and laboratory analytical programs, LRL offers the following conclusions regarding environmental conditions of the subject Site.

- The Site under investigation is an 89 954 m² commercial/industrial property located at 8015 Russell Road, Ottawa (Vars), Ontario. The Site is zoned as 'rural heavy industrial'. At the time of the investigation the Site was undeveloped with fields/cleared land and mature treed areas. The Site is not serviced, however, a potable drilled well is present in the central north portion of the Site.
- At the time of the investigation the Site was undeveloped with fields/cleared land and mature treed areas. The Site is not serviced, however, a potable drilled well is present in the central north portion of the Site.
- The potential environmental concerns identified in the Phase I ESA along with additional concerns identified during the Phase II ESA that require investigation are:
 - Former earth-moving activities and mounded fill material on the western portion of the Site;
 - Mounded fill material on adjacent property to the east;
 - Concrete manufacturing on properties located north and east of the Site; and
 - Evidence of dumping on adjacent property to the north.
- The investigation included the advancement six (6) boreholes (BH18-1 through BH18-6) across the Site. Four (4) of the boreholes were completed as monitoring wells (MW18-1, MW18-3 through MW18-5).
- The general subsurface stratigraphy encountered in the boreholes consisted of silt with sand, clay and some gravel to depths between 0.4 and 2.5 m bgs underlain by till to 4.5 m bgs where the boreholes were terminated. An upper layer of fill material with



(some brick pieces as found in BH18-2) was encountered in BH18-2 and MW18-4 from 0 to 1.22 m bgs in BH18-2 and 0 to 0.56 m bgs in MW18-4.

- The soil samples were screened for combustible soil vapours (CSVs). The CSV concentrations ranged from below the detection limit of the PID (<0.1 ppm) to 18.1 ppm, the higher levels of which were observed in BH18-1 and BH18-4. No olfactory or visual (i.e. staining or free phase) evidence of petroleum hydrocarbon impacts were observed in any of the soil samples retrieved from the boreholes.
- The pH in borehole BH18-2 (0.6 - 1.2 m bgs) was reported as 12.06, outside the range for surface soils of 5 to 9 to determine if a Site is considered sensitive as specified in O. Reg. 153. The elevated pH reported is likely related to the presence of concrete in the fill at this location and not representative of the soil conditions across the Site.
- The reported concentrations of PHCs, VOCs and metals in the submitted soil samples were below the applicable Table 2 SCS with the following exceptions:
 - Barium was detected in BH18-5 (1.8 - 2.4 m bgs) at a concentration of 956 µg/g, above the Table 2 SCS of 670 µg/g; and
 - Vanadium was detected in BH18-5 (0.6 - 1.2 m bgs) at a concentration of 86.6 µg/g dry, marginally above the Table 2 SCS of 86 µg/g.

There is potential that the elevated levels of barium and vanadium reported in the soil in BH18-5 are related to the adjacent property use or the historical use of the Site. Research studies indicate that Champlain Sea deposits are known to have levels barium and vanadium above the MOECC standards (Sterling et al., 2017). There is a strong potential that the levels of these parameters are naturally occurring from these deposits. Furthermore, the groundwater tested in the monitoring wells across the Site, including the monitoring well installed in BH18-5 (MW18-5), were below the applicable SCS for barium and vanadium, suggesting that these parameters are not significantly leaching into the groundwater. Therefore, the levels of barium and vanadium at this location are not expected to impact the proposed development on the Site.

- Groundwater levels measured in the monitoring wells on July 24, 2018 ranged from 1.11 to 1.55 m bgs. Based on the corresponding groundwater elevations, the groundwater flow direction is interpreted towards the southwest.
- Headspace VOC levels measured in the monitoring wells, MW18-1 through MW18-4, were below the detection limit of the PID (<0.1 ppm). No olfactory or visual (i.e. sheen or free phase) evidence of petroleum hydrocarbon impacts were observed in the groundwater purged from the monitoring wells.
- The reported concentrations of PHC, VOC and metals in the submitted water samples were below the applicable Table 2 SCS.

Based on the results of this Phase II Environmental Site Assessment no additional investigation is warranted.

It is recommended that if groundwater monitoring wells are not required for future monitoring purposes, they should be decommissioned in accordance with O. Reg. 903.

7 LIMITATIONS AND USE OF REPORT

Results of this Phase II ESA should not be considered a warranty that the subject property is free from any and all contaminants from former and current practices, other than those noted in this report, nor that all compliance issues have been addressed.

Findings contained in this report are based on data and information collected during the Phase II ESA of the subject property conducted by LRL Associates Ltd. Conclusions and recommendations are based solely on-site conditions encountered during fieldwork completed between July 20th and July 30th, 2018. No assurance is made regarding changes in conditions subsequent to the time of this investigation. If additional information is discovered or obtained, LRL Associates Ltd. should be requested to re-evaluate conclusions presented in this report and to provide amendments as required.

In evaluating the subject property, LRL Associates Ltd. has relied in good faith on information provided by individuals as noted in this report. We assume that information provided is factual and accurate. We accept no responsibility for any deficiencies, misstatements or inaccuracies contained in this report as a result of omissions, misinterpretation or fraudulent acts of the persons contacted.

This report is intended for sole use of 2572768 Ontario Inc. and his authorized agents. LRL Associates Ltd. will not be responsible for any use of the information contained within this report by any third party.

In addition, LRL Associates Ltd. will not be responsible for the real or perceived decrease in property value, its saleability or ability to gain financing, through reporting of factual information.

Yours truly,
LRL Associates Ltd.

Matthew Whitney, P. Eng.



8 REFERENCES

Canadian Standards Association, *Phase II Environmental Site Assessment CAN/CSA-Z769-00*, R2013.

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FIGURES



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PROJECT

PHASE II ENVIRONMENTAL SITE ASSESSMENT
8015 RUSSELL ROAD
OTTAWA (VARS), ONTARIO

DRAWING TITLE

SITE LOCATION
(NOT TO SCALE)
SOURCE: geoOttawa

CLIENT

2572768 ONTARIO INC.

DATE

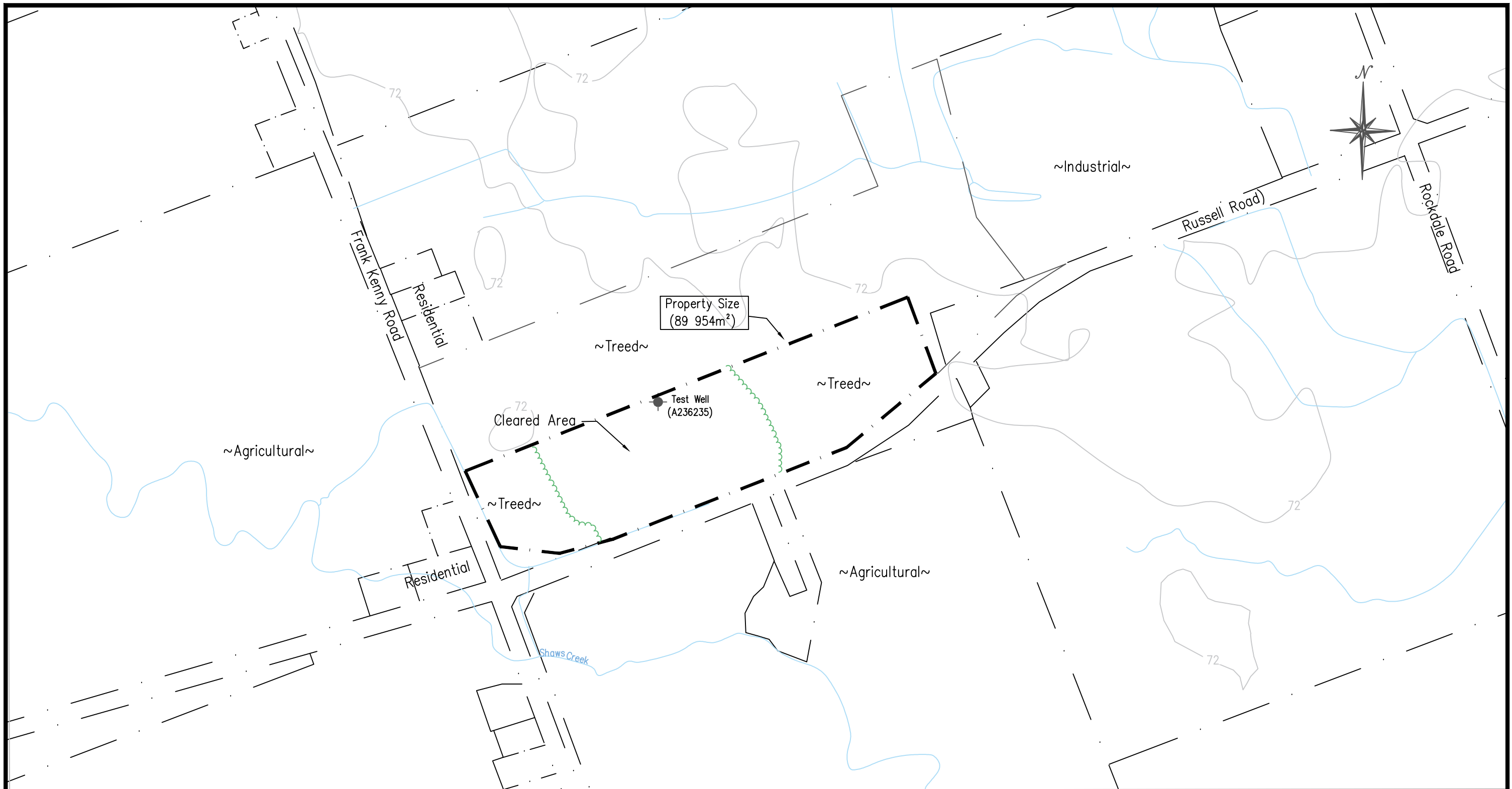
AUGUST 2018

PROJECT

170254

FIGURE1





Legend

- Property Line
- Surface Water (according to City of Ottawa, Interactive geoOttawa Mapping)
- Groundsurface Contour Line
- Existing Treeline
- Test Well (as parrrt of 2017 & 2018 Hydrogeological Study)



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DESIGNED BY:

A.S.

DRAWN BY:

A.S.

APPROVED BY:

M.W.

PROJECT

PHASE II ENVIRONMENTAL SITE
ASSESSMENT
8015 RUSSELL ROAD
OTTAWA (VARS), ONTARIO

DRAWING TITLE

SITE PLAN

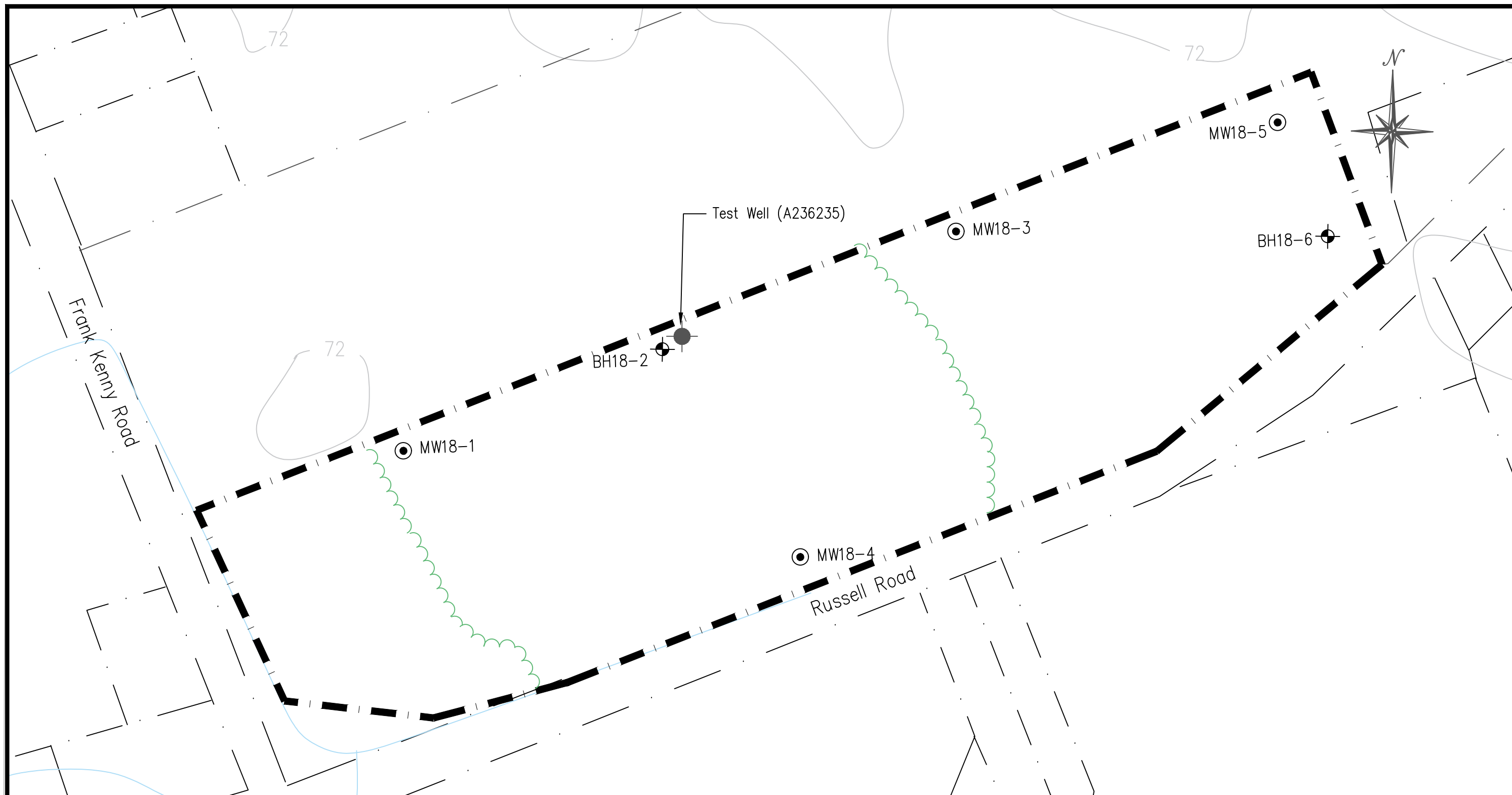
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FIGURE2



Legend

- Property Line
- Surface Water (according to City of Ottawa, Interactive geoOttawa Mapping)
- Groundsurface Contour Line
- Existing Treeline
- Test Well (as part of 2017 & 2018 Hydrogeological Study)
- BH/MW99 Monitoring Well
- BH99 Borehole



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PHASE II ENVIRONMENTAL SITE
ASSESSMENT
8015 RUSSELL ROAD
OTTAWA (VARS), ONTARIO

DRAWING TITLE

BOREHOLE AND MONITORING WELL
LOCATION PLAN

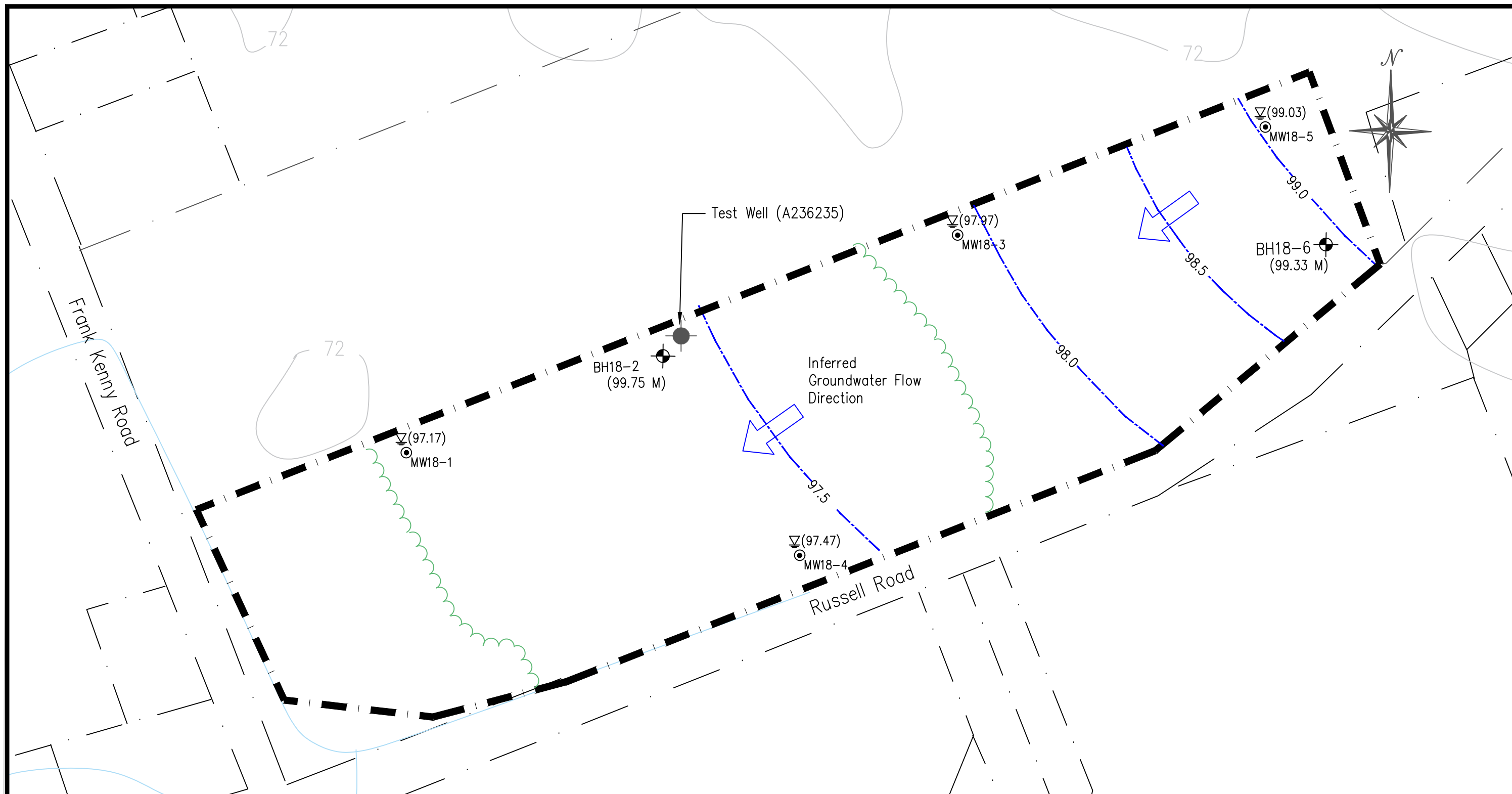
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DATE

AUGUST 2018

FIGURE 3



Legend

	Property Line		BH99	Borehole
	Surface Water (according to City of Ottawa, Interactive geoOttawa Mapping)		▽(99.99)	Groundwater Elevation (m)
	Groundsurface Contour Line		(99.99)	Groundsurface Elevation (m)
	Existing Treeline			
	Test Well (as part of 2017 & 2018 Hydrogeological Study)			
	Monitoring Well			



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PROJECT

PHASE II ENVIRONMENTAL SITE
ASSESSMENT
8015 RUSSELL ROAD
OTTAWA (VARS), ONTARIO

DRAWING TITLE

STATIC GROUNDWATER ELEVATIONS
AND INTERPRETED FLOW DIRECTION

PROJECT NO.

170254

DATE

AUGUST 2018

FIGURE 4

TABLES

Table 1
Summary of Ground Surface and Groundwater Elevations - July 24, 2018
Phase II Environmental Site Assessment
8015 Russell Road, Ottawa (Vars), Ontario
LRL File: 170254

Monitoring Well	Ground Surface Elevation ¹ (m)	Reference Elevation ² (m)	Depth To Water Table (m)		Groundwater Elevation (m)
			Reference Point	Ground Surface	
MW18-1	98.74	99.74	2.57	1.57	97.17
BH18-2	99.75	--	--	--	--
MW18-3	99.71	100.71	2.74	1.74	97.97
MW18-4	99.37	100.39	2.92	1.90	97.47
MW18-5	99.63	100.60	1.57	0.60	99.03
BH18-6	99.33	--	--	--	--

NOTES

¹ Elevations measured from temporary benchmark established at the top of casing of the installed drinking well at 8015 Russell Road (100.00 m).

² Reference elevation is top of PVC riser.

Table 2
Summary of Soil Results - PHC and VOC
Phase II Environmental Site Assessment
8015 Russell Road, Ottawa (Vars), Ontario
LRL File: 170254

			O. Reg. 153/04 ¹ Table 2 ² Commercial/Industrial Property Use Coarse textured soil	Sample											Duplicate for BH-5-32
Parameter	Units	MDL		BH18-1-1	BH18-1-4	BH18-2-10	BH18-2-13	BH18-3-15	BH18-3-17	BH18-4-21	BH18-4-23	BH18-5-30	BH18-5-32	BH18-6-38	BH18-Y
Sample Date (d/m/y)			--	20/07/2018	20/07/2018	20/07/2018	20/07/2018	20/07/2018	20/07/2018	20/07/2018	20/07/2018	20/07/2018	20/07/2018	20/07/2018	20/07/2018
Depth	m		--	0 - 0.6	1.8 - 2.4	0.6 - 1.2	2.4 - 3.0	0.6 - 1.2	1.8 - 2.4	0 - 0.6	1.2 - 1.8	0.6 - 1.2	1.8 - 2.4	1.2 - 1.8	1.8 - 2.4
CSV Readings ³	ppm	5	--	13.0	18.1	<0.1	1.2	0.2	0.4	2.4	10.9	0.4	<0.1	0.2	<0.1
Physical Characteristics															
% Solids	% by wt.	0.1	--	93.6	93.2	92.0	95.3	93.6	92.1	93.7	76.4	68.9	64.5	65.0	46.4
General Inorganics															
pH	pH Units	0.05	--	7.71	7.73	12.06	9.42	7.84	7.86	--	7.07	7.10	8.04	7.89	8.33
Volatiles															
Acetone	ug/g dry	0.50	16	--	<0.50	--	--	--	<0.50	--	<0.50	--	--	--	--
Benzene	ug/g dry	0.02	0.32	--	<0.02	--	--	--	<0.02	--	<0.02	<0.02	--	--	--
Bromodichloromethane	ug/g dry	0.05	1.5	--	<0.05	--	--	--	<0.05	--	<0.05	--	--	--	--
Bromoform	ug/g dry	0.05	0.61	--	<0.05	--	--	--	<0.05	--	<0.05	--	--	--	--
Bromomethane	ug/g dry	0.05	0.05	--	<0.05	--	--	--	<0.05	--	<0.05	--	--	--	--
Carbon Tetrachloride	ug/g dry	0.05	0.21	--	<0.05	--	--	--	<0.05	--	<0.05	--	--	--	--
Chlorobenzene	ug/g dry	0.05	2.4	--	<0.05	--	--	--	<0.05	--	<0.05	--	--	--	--
Chloroform	ug/g dry	0.05	0.47	--	<0.05	--	--	--	<0.05	--	<0.05	--	--	--	--
Dibromochloromethane	ug/g dry	0.05	2.3	--	<0.05	--	--	--	<0.05	--	<0.05	--	--	--	--
Dichlorodifluoromethane	ug/g dry	0.05	16	--	<0.05	--	--	--	<0.05	--	<0.05	--	--	--	--
1,2-Dichlorobenzene	ug/g dry	0.05	1.2	--	<0.05	--	--	--	<0.05	--	<0.05	--	--	--	--
1,3-Dichlorobenzene	ug/g dry	0.05	9.6	--	<0.05	--	--	--	<0.05	--	<0.05	--	--	--	--
1,4-Dichlorobenzene	ug/g dry	0.05	0.2	--	<0.05	--	--	--	<0.05	--	<0.05	--	--	--	--
1,1-Dichloroethane	ug/g dry	0.05	0.47	--	<0.05	--	--	--	<0.05	--	<0.05	--	--	--	--
1,2-Dichloroethane	ug/g dry	0.05	0.05	--	<0.05	--	--	--	<0.05	--	<0.05	--	--	--	--
1,1-Dichloroethylene	ug/g dry	0.05	0.064	--	<0.05	--	--	--	<0.05	--	<0.05	--	--	--	--
cis-1,2-Dichloroethylene	ug/g dry	0.05	1.9	--	<0.05	--	--	--	<0.05	--	<0.05	--	--	--	--
trans-1,2-Dichloroethylene	ug/g dry	0.05	1.3	--	<0.05	--	--	--	<0.05	--	<0.05	--	--	--	--
1,2-Dichloropropane	ug/g dry	0.05	0.16	--	<0.05	--	--	--	<0.05	--	<0.05	--	--	--	--
cis-1,3-Dichloropropylene	ug/g dry	0.05	--	--	<0.05	--	--	--	<0.05	--	<0.05	--	--	--	--
trans-1,3-Dichloropropylene	ug/g dry	0.05	--	--	<0.05	--	--	--	<0.05	--	<0.05	--	--	--	--
1,3-Dichloropropene, total	ug/g dry	0.05	0.059	--	<0.05	--	--	--	<0.05	--	<0.05	--	--	--	--
Ethylbenzene	ug/g dry	0.05	1.1	--	<0.05	--	--	--	<0.05	--	<0.05	<0.05	--	--	--
Ethylene dibromide (1,2 - dibromoethane)	ug/g dry	0.05	0.05	--	<0.05	--	--	--	<0.05	--	<0.05	--	--	--	--
Hexane	ug/g dry	0.05	46	--	<0.05	--	--	--	<0.05	--	<0.05	--	--	--	--
Methyl Ethyl Ketone (2-Butanone)	ug/g dry	0.50	70	--	<0.50	--	--	--	<0.50	--	<0.50	--	--	--	--
Methyl Isobutyl Ketone	ug/g dry	0.50	31	--	<0.50	--	--	--	<0.50	--	<0.50	--	--	--	--
Methyl tert-butyl ether	ug/g dry	0.05	1.6	--	<0.05	--	--	--	<0.05	--	<0.05	--	--	--	--
Methylene Chloride	ug/g dry	0.05	1.6	--	<0.05	--	--	--	<0.05	--	<0.05	--	--	--	--
Styrene	ug/g dry	0.05	34	--	<0.05	--	--	--	<0.05	--	<0.05	--	--	--	--
1,1,1,2-Tetrachloroethane	ug/g dry	0.05	0.087	--	<0.05	--	--	--	<0.05	--	<0.05	--	--	--	--
1,1,2,2-Tetrachloroethane	ug/g dry	0.05	0.05	--	<0.05	--	--	--	<0.05	--	<0.05	--	--	--	--
Tetrachloroethylene	ug/g dry	0.05	1.9	--	<0.05	--	--	--	<0.05	--	<0.05	--	--	--	--
Toluene	ug/g dry	0.05	6.4	--	<0.05	--	--	--	<0.05	--	<0.05	<0.05	--	--	--
1,1,1-Trichloroethane	ug/g dry	0.05	6.1	--	<0.05	--	--	--	<0.05	--	<0.05	--	--	--	--
1,1,2-Trichloroethane	ug/g dry	0.05	0.05	--	<0.05	--	--	--	<0.05	--	<0.05	--	--	--	--
Trichloroethylene	ug/g dry	0.05	0.55	--	<0.05	--	--	--	<0.05	--	<0.05	--	--	--	--
Trichlorofluoromethane	ug/g dry	0.05	4	--	<0.05	--	--	--	<0.05	--	<0.05	--	--	--	--
Vinyl Chloride	ug/g dry	0.02	0.032	--	<0.02	--	--	--	<0.02	--	<0.02	--	--	--	--
m/p-Xylene	ug/g dry	0.05	--	--	<0.05	--	--	--	<0.05	--	<0.05	<0.05	--	--	--
o-Xylene	ug/g dry	0.05	--	--	<0.05	--	--	--	<0.05	--	<0.05	<0.05	--	--	--
Xylenes, total	ug/g dry	0.05	26	--	<0.05	--	--	--	<0.05	--	<0.05	<0.05	--	--	--
Hydrocarbons															
F1 PHCs (C6-C10)	ug/g dry	7	55	<7	<7	--	<7	--	<7	--	<7	<7	<7	<7	<7
F2 PHCs (C10-C16)	ug/g dry	4	230	<4	<4	--	<4	--	<4	--	<4	<4	<4	<4	<4
F3 PHCs (C16-C34)	ug/g dry	8	1700	<8	<8	--	<8	--	<8	--	<8	<8	<8	<8	<8
F4 PHCs (C34-C50)	ug/g dry	6	3300	<6	<6	--	<6	--	<6	--	<6	<6	<6	<6	<6

NOTES:
¹ MOE's Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act, April 15, 2011
² Table 2: Full depth generic site condition standards in a potable groundwater condition.
³

MDL Method Detection Limit
-- No Value/Not Analysed
PHC Petroleum Hydrocarbon

Table 3
Summary of Soil Results - Metals
Phase II Environmental Site Assessment
8015 Russell Road, Ottawa (Vars), Ontario
LRL File: 170254

Parameter	Units	MDL	O. Reg. 153/04 ¹ Table 2 ² Commercial/Industrial Property Use Coarse textured soil	Sample											Duplicate for BH-5-32 BH18-Y
				BH18-1-1	BH18-1-4	BH18-2-10	BH18-2-13	BH18-3-15	BH18-3-17	BH18-4-21	BH18-4-23	BH18-5-30	BH18-5-32	BH18-6-38	
Sample Date (d/m/y)			--	20/07/2018	20/07/2018	20/07/2018	20/07/2018	20/07/2018	20/07/2018	20/07/2018	20/07/2018	20/07/2018	20/07/2018	20/07/2018	20/07/2018
Depth	m		--	0 - 0.6	1.8 - 2.4	0.6 - 1.2	2.4 - 3.0	0.6 - 1.2	1.8 - 2.4	0 - 0.6	1.2 - 1.8	0.6 - 1.2	1.8 - 2.4	1.2 - 1.8	1.8 - 2.4
CSV Readings ³	ppm	5	--	13.0	18.1	<0.1	1.2	0.2	0.4	2.4	10.9	0.4	<0.1	0.2	<0.1
Metals															
Antimony	ug/g dry	1.0	40	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Arsenic	ug/g dry	1.0	18	2.7	5.8	<1.0	5.0	6.2	6.2	2.3	1.6	1.3	<1.0	4.7	<1.0
Barium	ug/g dry	1.0	670	220	88.4	32.9	107	88.1	132	102	202	485	956	89.9	642
Beryllium	ug/g dry	0.5	8	0.9	0.8	<0.5	0.8	1.1	0.8	0.6	0.7	1.0	0.9	0.6	0.8
Boron	ug/g dry	5.0	120	7.1	8.8	5.5	9.2	10.5	7.4	10.1	5.2	8.0	9.1	8.0	8.6
Cadmium	ug/g dry	0.5	1.9	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Chromium	ug/g dry	5.0	160	41.4	22.1	16.4	24.3	27.6	23.5	26.4	73.1	70.6	67.2	18.7	49.4
Cobalt	ug/g dry	1.0	80	15.1	17.1	2.2	12.6	20.4	25.3	7.9	14.6	19.6	17.7	11.5	14.2
Copper	ug/g dry	5.0	230	36.0	47.4	6.4	43.6	51.8	46.9	20.5	23.4	42.8	42.0	32.0	28.4
Lead	ug/g dry	1.0	120	7.6	6.4	2.5	8.5	7.8	7.4	6.5	8.3	9.0	9.1	5.8	8.0
Molybdenum	ug/g dry	1.0	40	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Nickel	ug/g dry	5.0	270	32.5	32.6	7.9	28.5	38.2	35.6	20.6	39.7	45.2	42.7	24.9	32.4
Selenium	ug/g dry	1.0	5.5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Silver	ug/g dry	0.3	40	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Thallium	ug/g dry	1.0	3.3	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Uranium	ug/g dry	1.0	33	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Vanadium	ug/g dry	10.0	86	52.4	28.4	16.3	30.1	33.2	29.3	31.2	60.2	86.8	84.7	24.8	64.3
Zinc	ug/g dry	20.0	340	62.9	53.6	27.0	60.9	67.8	60.3	46.5	74.5	113	91.8	48.2	70.3

NOTES:

¹ MOE's Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act, April 15, 2011

² Table 3: Full depth generic site condition standards in a potable groundwater condition.

³ Combustible soil vapour concentrations measured with a MiniRAE 2000 PID

MDL Method Detection Limit

-- No Value/Not Analysed

BOLD Above Table 2 Standard

Table 4
Summary of Groundwater Results - PHC and VOC
Phase II Environmental Site Assessment
8015 Russell Road, Ottawa (Vars), Ontario
LRL File: 170254

Parameter	Units	MDL	O. Reg. 153/04 ¹ Table 2 ² Commercial/Industrial Property Use Coarse textured soil	Sample				
				MW1	MW3	MW4	MW5	Duplicate for MW5 MWX
Sample Date (d/m/y)				24/07/2018	24/07/2018	24/07/2018	24/07/2018	24/07/2018
Headspace VOC Readings ³	ppm	0.1		<0.1	<0.1	<0.1	<0.1	<0.1
Evidence of free product?	--	--	⁴	No	No	No	No	No
General Inorganics (Field Measurements)								
pH	pH Units	0.05	--	7.53	7.16	6.83	6.97	--
Volatiles								
Acetone	ug/L	5.0	2700	<5.0	<5.0	<5.0	<5.0	<5.0
Benzene	ug/L	0.5	5	<0.5	<0.5	<0.5	<0.5	<0.5
Bromodichloromethane	ug/L	0.5	16	<0.5	<0.5	<0.5	<0.5	<0.5
Bromoform	ug/L	0.5	25	<0.5	<0.5	<0.5	<0.5	<0.5
Bromomethane	ug/L	0.5	0.89	<0.5	<0.5	<0.5	<0.5	<0.5
Carbon Tetrachloride	ug/L	0.2	0.79	<0.2	<0.2	<0.2	<0.2	<0.2
Chlorobenzene	ug/L	0.5	30	<0.5	<0.5	<0.5	<0.5	<0.5
Chloroform	ug/L	0.5	2.4	<0.5	<0.5	<0.5	<0.5	<0.5
Dibromochloromethane	ug/L	0.5	25	<0.5	<0.5	<0.5	<0.5	<0.5
Dichlorodifluoromethane	ug/L	1.0	590	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichlorobenzene	ug/L	0.5	3	<0.5	<0.5	<0.5	<0.5	<0.5
1,3-Dichlorobenzene	ug/L	0.5	59	<0.5	<0.5	<0.5	<0.5	<0.5
1,4-Dichlorobenzene	ug/L	0.5	1	<0.5	<0.5	<0.5	<0.5	<0.5
1,1-Dichloroethane	ug/L	0.5	5	<0.5	<0.5	<0.5	<0.5	<0.5
1,2-Dichloroethane	ug/L	0.5	1.6	<0.5	<0.5	<0.5	<0.5	<0.5
1,1-Dichloroethylene	ug/L	0.5	1.6	<0.5	<0.5	<0.5	<0.5	<0.5
cis-1,2-Dichloroethylene	ug/L	0.5	1.6	<0.5	<0.5	<0.5	<0.5	<0.5
trans-1,2-Dichloroethylene	ug/L	0.5	1.6	<0.5	<0.5	<0.5	<0.5	<0.5
1,2-Dichloropropane	ug/L	0.5	5	<0.5	<0.5	<0.5	<0.5	<0.5
cis-1,3-Dichloropropylene	ug/L	0.5	--	<0.5	<0.5	<0.5	<0.5	<0.5
trans-1,3-Dichloropropylene	ug/L	0.5	--	<0.5	<0.5	<0.5	<0.5	<0.5
1,3-Dichloropropene, total	ug/L	0.5	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	ug/L	0.5	2.4	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylene dibromide (1,2 - dibromoethane)	ug/L	0.2	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Hexane	ug/L	1.0	51	<1.0	<1.0	<1.0	<1.0	<1.0
Methyl Ethyl Ketone (2-Butanone)	ug/L	5.0	1800	<5.0	<5.0	<5.0	<5.0	<5.0
Methyl Isobutyl Ketone	ug/L	5.0	640	<5.0	<5.0	<5.0	<5.0	<5.0
Methyl tert-butyl ether	ug/L	2.0	15	<2.0	<2.0	<2.0	<2.0	<2.0
Methylene Chloride	ug/L	5.0	50	<5.0	<5.0	<5.0	<5.0	<5.0
Styrene	ug/L	0.5	5.4	<0.5	<0.5	<0.5	<0.5	<0.5
1,1,1,2-Tetrachloroethane	ug/L	0.5	1.1	<0.5	<0.5	<0.5	<0.5	<0.5
1,1,2,2-Tetrachloroethane	ug/L	0.5	1	<0.5	<0.5	<0.5	<0.5	<0.5
Tetrachloroethylene	ug/L	0.5	1.6	<0.5	<0.5	<0.5	<0.5	<0.5
Toluene	ug/L	0.5	24	<0.5	<0.5	<0.5	<0.5	<0.5
1,1,1-Trichloroethane	ug/L	0.5	200	<0.5	<0.5	<0.5	<0.5	<0.5
1,1,2-Trichloroethane	ug/L	0.5	4.7	<0.5	<0.5	<0.5	<0.5	<0.5
Trichloroethylene	ug/L	0.5	1.6	<0.5	<0.5	<0.5	<0.5	<0.5
Trichlorofluoromethane	ug/L	1.0	150	<1.0	<1.0	<1.0	<1.0	<1.0
Vinyl Chloride	ug/L	0.5	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
m/p-Xylene	ug/L	0.5	--	<0.5	<0.5	<0.5	<0.5	<0.5
o-Xylene	ug/L	0.5	--	<0.5	<0.5	<0.5	<0.5	<0.5
Xylenes, total	ug/L	0.5	300	<0.5	<0.5	<0.5	<0.5	<0.5
Hydrocarbons								
F1 PHCs (C6-C10)	ug/L	25	750	<25	<25	<25	<25	<25
F2 PHCs (C10-C16)	ug/L	100	150	<100	<100	<100	<100	<100
F3 PHCs (C16-C34)	ug/L	100	500	<100	<100	<100	<100	<100
F4 PHCs (C34-C50)	ug/L	100	500	<100	<100	<100	<100	<100
F1 + F2 PHCs	ug/L	125	--	<125	<125	<125	<125	<125
F3 + F4 PHCs	ug/L	200	--	<200	<200	<200	<200	<200

NOTES:¹ MOE's Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act, April 15, 2011² Table 2: Full depth generic site condition standards in a potable groundwater condition.³ Headspace values were measured with a MiniRAE 2000 PID and an Eagle RKI II (methane elimination mode on)⁴ To meet the standard there must be no evidence of free product including film or sheen.

MDL Method Detection Limit

-- No Value/Not Analysed

PHC Petroleum Hydrocarbon

Table 5
Summary of Groundwater Results - Metals
Phase II Environmental Site Assessment
8015 Russell Road, Ottawa (Vars), Ontario
LRL File: 170254

Parameter	Units	MDL	O. Reg. 153/04 ¹ Table 2 ² Commercial/Industrial Property Use Coarse textured soil	Sample			
				MW1	MW3	MW4	MW5
Sample Date (d/m/y)				24/07/2018	24/07/2018	24/07/2018	24/07/2018
Headspace VOC Readings ³	ppm	0.1		<0.1	<0.1	<0.1	<0.1
Metals							
Antimony	ug/L	0.5	6	1.5	<0.5	<0.5	<0.5
Arsenic	ug/L	1	25	2 ^[5]	<1	2	<1
Barium	ug/L	1	1000	50	106	811	469
Beryllium	ug/L	0.5	4	<0.5	<0.5	<0.5	<0.5
Boron	ug/L	10	5000	67	34	35	27
Cadmium	ug/L	0.1	2.7	<0.1	<0.1	<0.1	<0.1
Chromium	ug/L	1	50	<1	<1	<1	<1
Cobalt	ug/L	0.5	3.8	<0.5 ^[5]	<0.5	1.1	<0.5
Copper	ug/L	0.5	87	<0.5	3.5	3.5	5.8
Lead	ug/L	0.1	10	<0.1	<0.1	0.1	0.4
Molybdenum	ug/L	0.5	70	6.9	<0.5	0.5	0.6
Nickel	ug/L	1	100	<1	<1	3	1
Selenium	ug/L	1	10	<1	<1	<1	<1
Silver	ug/L	0.1	1.5	<0.1	<0.1	<0.1	<0.1
Sodium	ug/L	200	490000	13100	7050	45000	10900
Thallium	ug/L	0.1	2	<0.1	<0.1	<0.1	<0.1
Uranium	ug/L	0.1	20	0.9	0.3	0.6	0.3
Vanadium	ug/L	0.5	6.2	2.5	2.2	6.0	2.3
Zinc	ug/L	5	1100	<5	<5	<5	9

NOTES:

- ¹ MOE's *Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act, A*
 - ² Table 2: Full depth generic site condition standards in a potable groundwater condition.
 - ³ Headspace values were measured with a MiniRAE 2000 PID
 - ⁴ To meet the standard there must be no evidence of free product including film or sheen.
 - ^[5] Sediment and/or particulates in this liquid sample required digestion for total metals analysis, which resulted in elevated detection limits
- MDL Method Detection Limit
-- No Value/Not Analysed

APPENDIX A

Borehole Logs



Project No.: 170254

Client: 2572768 Ontario Inc.

Date: July 20, 2018

Borehole Log: BH/MW18-1

Project: Phase II Environmental Site Assessment

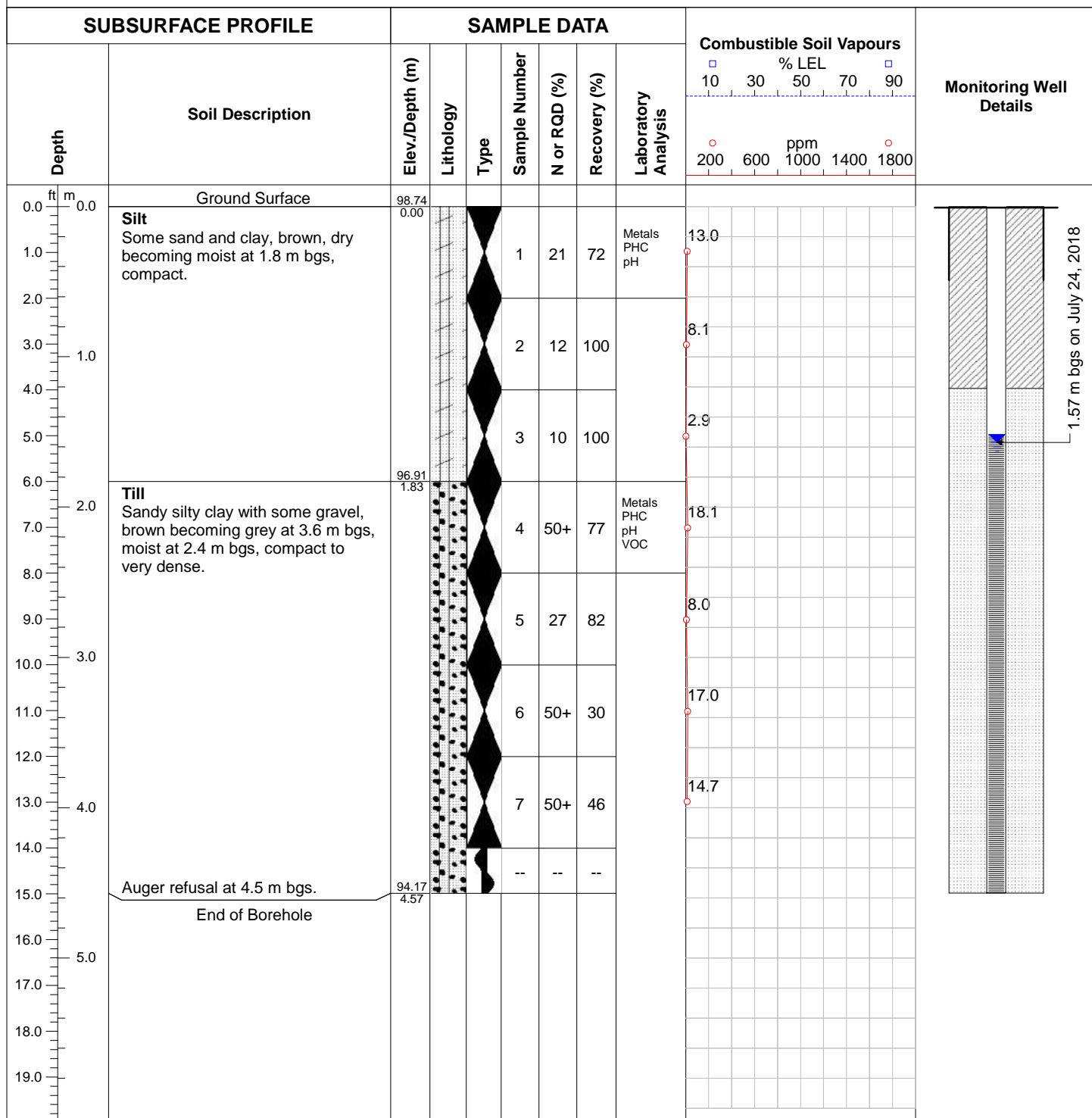
Location: 8015 Russell Road, Vars, Ontario

Field Personnel: AS

Driller: Downing Drilling

Drilling Equipment: Trackmount CME

Drilling Method: HSA



Easting: 0470332

Northing: 18 T 5024501

Site Datum: Top of casing of drilled test well on site (100.00 m).

Groundsurface Elevation: 98.74 m

Top of Riser Elev.: 99.74 m

Hole Diameter: 203 mm

Monitoring Well Diameter: 31 mm

NOTES

HSA: Hollow stem augers
BGS: Below ground surface
PHC: Petroleum hydrocarbon compounds
VOC: Volatile organic compounds

Groundwater sample collected and submitted on July 24, 2018 for VOC, PHC and metal parameters.



Project No.: 170254

Client: 2572768 Ontario Inc.

Date: July 20, 2018

Borehole Log: BH/MW18-3

Project: Phase II Environmental Site Assessment

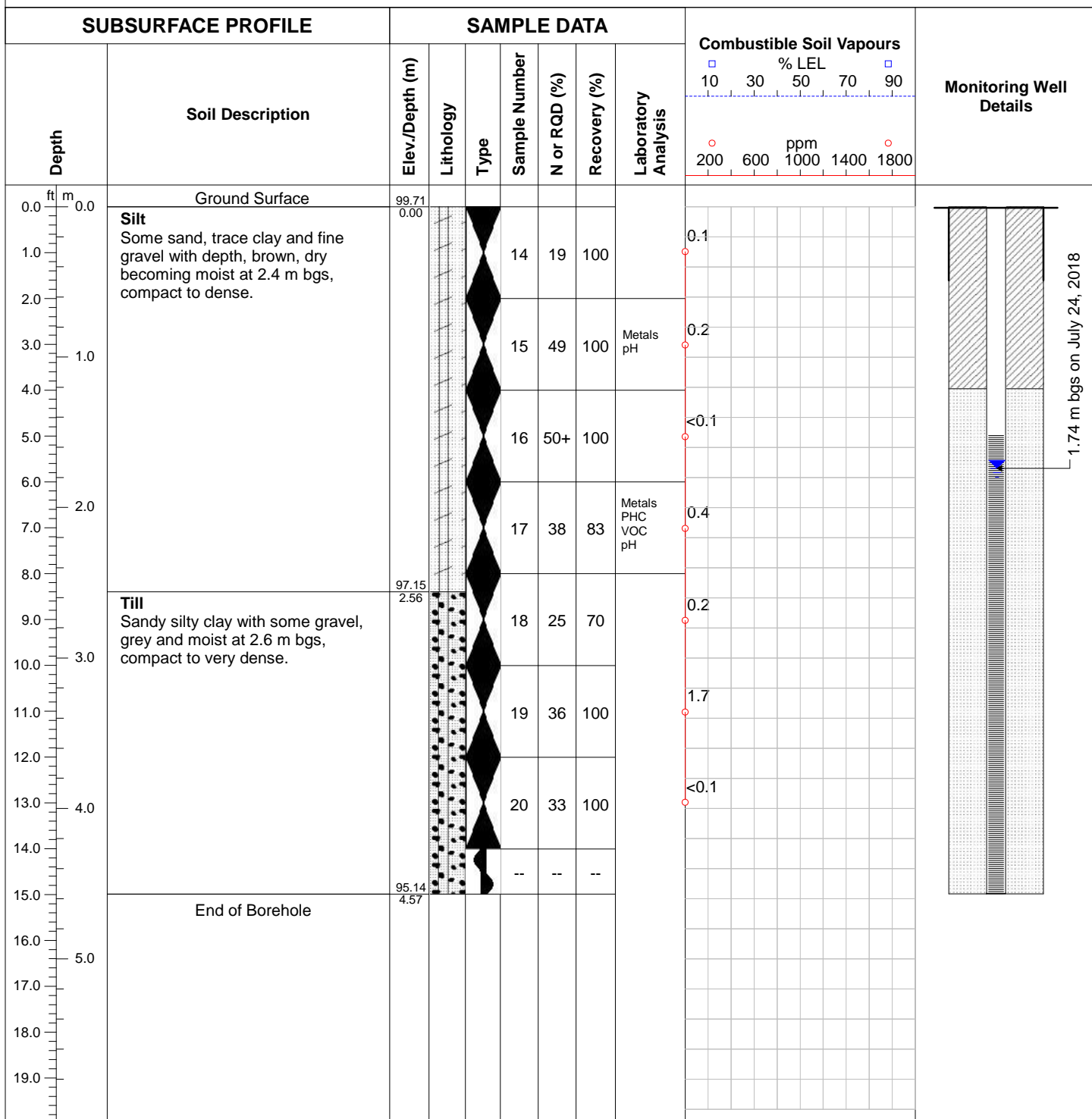
Location: 8015 Russell Road, Vars, Ontario

Field Personnel: AS

Driller: Downing Drilling

Drilling Equipment: Trackmount CME

Drilling Method: HSA



Easting: 0470601

Northing: 18 T 5024620

Site Datum: Top of casing of drilled test well on site (100.00 m).

Groundsurface Elevation: 99.71 m

Top of Riser Elev.: 100.71 m

Hole Diameter: 203 mm

Monitoring Well Diameter: 31 mm

NOTES

HSA: Hollow stem augers
BGS: Below ground surface
PHC: Petroleum hydrocarbon compounds
VOC: Volatile organic compounds

Groundwater sample collected and submitted on July 24, 2018 for VOC, PHC and metal parameters.



Project No.: 170254

Client: 2572768 Ontario Inc.

Date: July 20, 2018

Borehole Log: BH/MW18-4

Project: Phase II Environmental Site Assessment

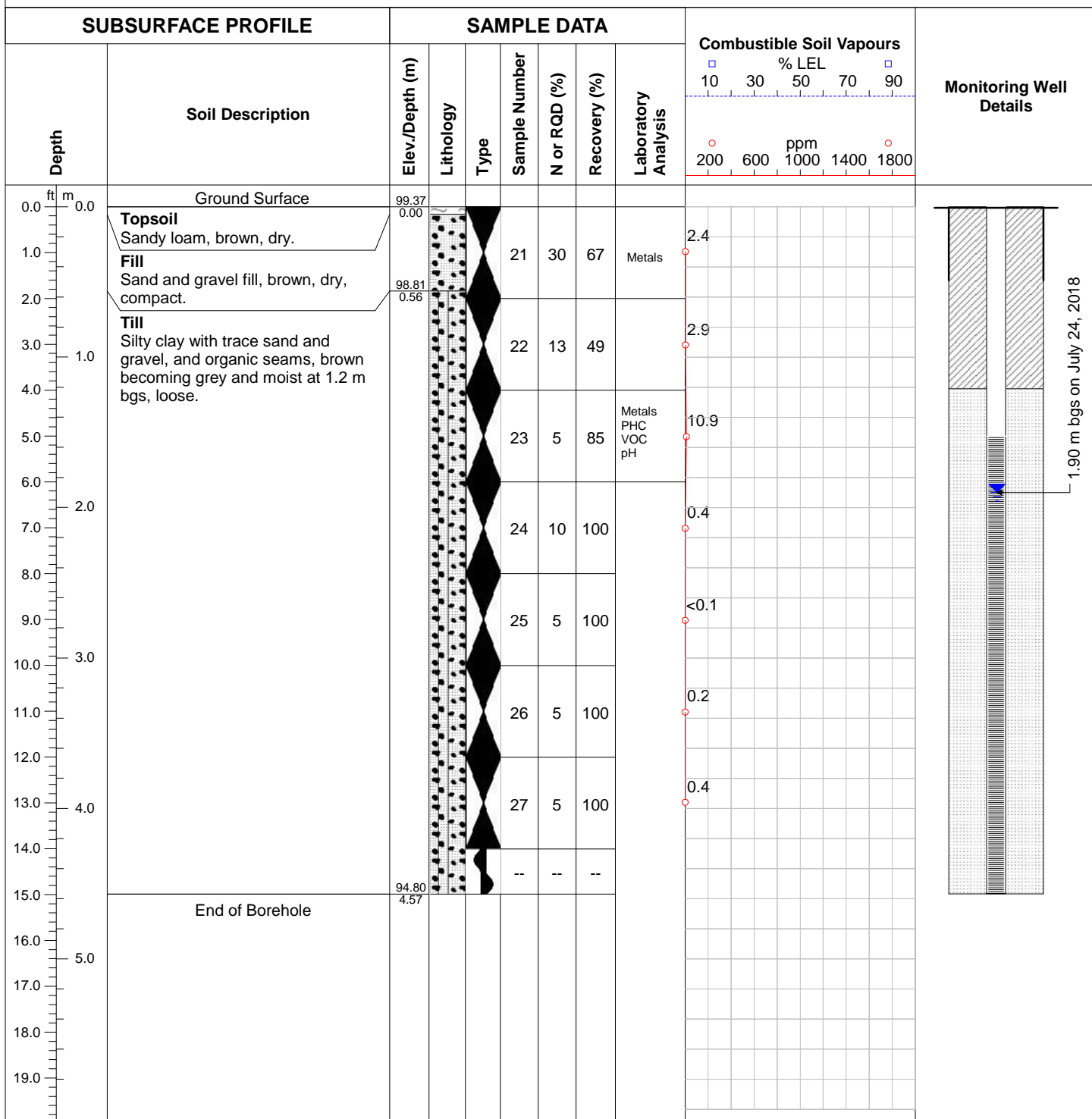
Location: 8015 Russell Road, Vars, Ontario

Field Personnel: AS

Driller: Downing Drilling

Drilling Equipment: Trackmount CME

Drilling Method: HSA



Easting: 0470522

Northing: 18 T 5024441

Site Datum: Top of casing of test drinking well on site (100.00 m).

Groundsurface Elevation: 99.37 m

Top of Riser Elev.: 100.39 m

Hole Diameter: 203 mm

Monitoring Well Diameter: 31 mm

NOTES

HSA: Hollow stem augers
BGS: Below ground surface
PHC: Petroleum hydrocarbon compounds
VOC: Volatile organic compounds

Groundwater sample collected and submitted on July 24, 2018 for VOC, PHC and metal parameters.



Project No.: 170254

Client: 2572768 Ontario Inc.

Date: July 20, 2018

Borehole Log: BH/MW18-5

Project: Phase II Environmental Site Assessment

Location: 8015 Russell Road, Vars, Ontario

Field Personnel: AS

Driller: Downing Drilling

Drilling Equipment: Trackmount CME

Drilling Method: HSA

SUBSURFACE PROFILE		SAMPLE DATA							Monitoring Well Details
Depth	Soil Description	Elev./Depth (m)	Lithology	Type	Sample Number	N or RQD (%)	Recovery (%)	Laboratory Analysis	
									Combustible Soil Vapours 10 30 50 70 90 % LEL 200 600 1000 1400 1800 ppm
0.0	Ground Surface	99.71							
0.0	Silt Some sand, brown, dry, loose.	0.00							
1.0		99.29			28	6	68		
2.0	Till Silty clay with trace to some sand and gravel, brown becoming grey and moist at 1.2 m bgs, loose to very dense.	0.42			29				
3.0					30	5	100	Metals PHC BTEX pH	
4.0									
5.0					31	6	100		
6.0									
7.0					32	3	100	Metals PHC pH	
8.0									
9.0					33	1	100		
10.0									
11.0					34	20	59		
12.0									
13.0					35	50+	68		
14.0									
15.0	End of Borehole	95.14			--	--	--		
16.0		4.57							
17.0									
18.0									
19.0									

Easting: 0470781

Northing: 18 T 5024661

Site Datum: Top of casing of test drinking well on site (100.00 m).

Groundsurface Elevation: 99.63 m

Top of Riser Elev.: 100.60 m

Hole Diameter: 203 mm

Monitoring Well Diameter: 31 mm

NOTES

HSA: Hollow stem augers
 BGS: Below ground surface
 PHC: Petroleum hydrocarbon compounds
 BTEX: Benzene, toluene, ethylbenzene, xylene
 VOC: Volatile organic compounds

Groundwater sample collected and submitted on July 24, 2018 for VOC, PHC and metal parameters.



Project No.: 170254

Client: 2572768 Ontario Inc.

Date: July 20, 2018

Borehole Log: BH18-2

Project: Phase II Environmental Site Assessment

Location: 8015 Russell Road, Vars, Ontario

Field Personnel: AS

Driller: Downing Drilling

Drilling Equipment: Trackmount CME

Drilling Method: HSA

SUBSURFACE PROFILE		SAMPLE DATA							Monitoring Well Details
Depth	Soil Description	Elev./Depth (m)	Lithology	Type	Sample Number	N or RQD (%)	Recovery (%)	Laboratory Analysis	
									Combustible Soil Vapours □ % LEL 10 30 50 70 90 ○ ppm 200 600 1000 1400 1800
0.0	Ground Surface	99.75							
0.0	Fill Sand and gravel, trace brick, brown, compact.	0.00			8	26	75		0.3
1.0					9				<0.1
2.0					10	50+	55	Metals pH	0.3
3.0									
4.0		98.53							
4.0	Till Sandy silty clay with some gravel. Brown becoming moist at 1.8 m bgs, compact to very dense.	1.22			11	10	54		<0.1
5.0									
6.0					12	50+	100		0.6
7.0									
8.0					13	50+	100	Metals PHC pH	1.2
9.0									
10.0		96.71							
10.0	End of Borehole	3.04							
11.0									
12.0									
13.0									
14.0									
15.0									
16.0									
17.0									
18.0									
19.0									

Easting: 0470472

Northing: 18 T 5024559

Site Datum: Top of casing of drilled test well on site (100.00 m).

Groundsurface Elevation: 99.75 m

Top of Riser Elev.: --

Hole Diameter: 203 mm

Monitoring Well Diameter: --

NOTES

HSA: Hollow stem augers
BGS: Below ground surface
PHC: Petroleum hydrocarbon compounds



Project No.: 170254

Client: 2572768 Ontario Inc.

Date: July 20, 2018

Borehole Log: BH18-6

Project: Phase II Environmental Site Assessment

Location: 8015 Russell Road, Vars, Ontario

Field Personnel: AS

Driller: Downing Drilling

Drilling Equipment: Trackmount CME

Drilling Method: HSA

SUBSURFACE PROFILE		SAMPLE DATA							Monitoring Well Details
Depth	Soil Description	Elev./Depth (m)	Lithology	Type	Sample Number	N or RQD (%)	Recovery (%)	Laboratory Analysis	
									Combustible Soil Vapours <div> <div> <div>10</div> <div>30</div> <div>50</div> <div>70</div> <div>90</div> </div> <div>% LEL</div> </div> <div> <div>200</div> <div>600</div> <div>1000</div> <div>1400</div> <div>1800</div> </div> <div>ppm</div>

Easting: 0470801

Northing: 18 T 5024596

Site Datum: Top of casing of test drinking well on site (100.00 m).

Groundsurface Elevation: 99.33 m

Top of Riser Elev.: --

Hole Diameter: 203 mm

Monitoring Well Diameter: --

NOTES

HSA: Hollow stem augers
BGS: Below ground surface
PHC: Petroleum hydrocarbon compounds

APPENDIX B
Laboratory Certificates of Analysis

Certificate of Analysis

LRL Associates Ltd.

5430 Canotek Road
Ottawa, ON K1J 9G2
Attn: Andrea Sare

Client PO:
Project: 170254
Custody: 117490

Report Date: 26-Jul-2018
Order Date: 23-Jul-2018

Order #: 1830136

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

Paracel ID	Client ID
1830136-01	BH18-Y
1830136-02	BH18-6-38

Approved By:



Dale Robertson, BSc
Laboratory Director

Certificate of Analysis
Client: LRL Associates Ltd.
Client PO:

Report Date: 26-Jul-2018

Order Date: 23-Jul-2018

Project Description: 170254

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
pH, soil	EPA 150.1 - pH probe @ 25 °C, CaCl buffered ext.	24-Jul-18	25-Jul-18
PHC F1	CWS Tier 1 - P&T GC-FID	25-Jul-18	26-Jul-18
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	24-Jul-18	25-Jul-18
REG 153: Metals by ICP/MS, soil	EPA 6020 - Digestion - ICP-MS	25-Jul-18	26-Jul-18
Solids, %	Gravimetric, calculation	25-Jul-18	25-Jul-18

Certificate of Analysis
Client: LRL Associates Ltd.
Client PO:

Report Date: 26-Jul-2018

Order Date: 23-Jul-2018

Project Description: 170254

Client ID:	BH18-Y	BH18-6-38	-	-
Sample Date:	07/20/2018 09:00	07/20/2018 09:00	-	-
Sample ID:	1830136-01	1830136-02	-	-
MDL/Units	Soil	Soil	-	-

Physical Characteristics

% Solids	0.1 % by Wt.	46.4	65.0	-	-
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General Inorganics

pH	0.05 pH Units	8.33	7.89	-	-
----	---------------	------	------	---	---

Metals

Antimony	1.0 ug/g dry	<1.0	<1.0	-	-
Arsenic	1.0 ug/g dry	<1.0	4.7	-	-
Barium	1.0 ug/g dry	642	89.9	-	-
Beryllium	0.5 ug/g dry	0.8	0.6	-	-
Boron	5.0 ug/g dry	8.6	8.0	-	-
Cadmium	0.5 ug/g dry	<0.5	<0.5	-	-
Chromium	5.0 ug/g dry	49.4	18.7	-	-
Cobalt	1.0 ug/g dry	14.2	11.5	-	-
Copper	5.0 ug/g dry	28.4	32.0	-	-
Lead	1.0 ug/g dry	8.0	5.8	-	-
Molybdenum	1.0 ug/g dry	<1.0	<1.0	-	-
Nickel	5.0 ug/g dry	32.4	24.9	-	-
Selenium	1.0 ug/g dry	<1.0	<1.0	-	-
Silver	0.3 ug/g dry	<0.3	<0.3	-	-
Thallium	1.0 ug/g dry	<1.0	<1.0	-	-
Uranium	1.0 ug/g dry	<1.0	<1.0	-	-
Vanadium	10.0 ug/g dry	64.3	24.8	-	-
Zinc	20.0 ug/g dry	70.3	48.2	-	-

Hydrocarbons

F1 PHCs (C6-C10)	7 ug/g dry	<7	<7	-	-
F2 PHCs (C10-C16)	4 ug/g dry	<4	<4	-	-
F3 PHCs (C16-C34)	8 ug/g dry	<8	<8	-	-
F4 PHCs (C34-C50)	6 ug/g dry	<6	<6	-	-

Certificate of Analysis
Client: LRL Associates Ltd.
Client PO:

Report Date: 26-Jul-2018

Order Date: 23-Jul-2018

Project Description: 170254

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
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Hydrocarbons

F1 PHCs (C6-C10)	ND	7	ug/g						
F2 PHCs (C10-C16)	ND	4	ug/g						
F3 PHCs (C16-C34)	ND	8	ug/g						
F4 PHCs (C34-C50)	ND	6	ug/g						

Metals

Antimony	ND	1.0	ug/g						
Arsenic	ND	1.0	ug/g						
Barium	ND	1.0	ug/g						
Beryllium	ND	0.5	ug/g						
Boron	ND	5.0	ug/g						
Cadmium	ND	0.5	ug/g						
Chromium	ND	5.0	ug/g						
Cobalt	ND	1.0	ug/g						
Copper	ND	5.0	ug/g						
Lead	ND	1.0	ug/g						
Molybdenum	ND	1.0	ug/g						
Nickel	ND	5.0	ug/g						
Selenium	ND	1.0	ug/g						
Silver	ND	0.3	ug/g						
Thallium	ND	1.0	ug/g						
Uranium	ND	1.0	ug/g						
Vanadium	ND	10.0	ug/g						
Zinc	ND	20.0	ug/g						

Certificate of Analysis
Client: LRL Associates Ltd.
Client PO:

Report Date: 26-Jul-2018

Order Date: 23-Jul-2018

Project Description: 170254

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
General Inorganics									
pH	6.92	0.05	pH Units	6.85			1.0	10	
Hydrocarbons									
F1 PHCs (C6-C10)	ND	7	ug/g dry	ND				40	
F2 PHCs (C10-C16)	ND	4	ug/g dry	ND				30	
F3 PHCs (C16-C34)	17	8	ug/g dry	24			31.6	30	QR-01
F4 PHCs (C34-C50)	12	6	ug/g dry	9			31.6	30	QR-01
Metals									
Antimony	1.7	1.0	ug/g dry	ND			0.0	30	
Arsenic	2.2	1.0	ug/g dry	2.4			7.8	30	
Barium	110	1.0	ug/g dry	119			7.9	30	
Beryllium	ND	0.5	ug/g dry	ND			0.0	30	
Boron	6.2	5.0	ug/g dry	5.4			13.3	30	
Cadmium	ND	0.5	ug/g dry	ND			0.0	30	
Chromium	25.4	5.0	ug/g dry	27.5			8.1	30	
Cobalt	8.5	1.0	ug/g dry	9.0			6.1	30	
Copper	28.4	5.0	ug/g dry	31.2			9.2	30	
Lead	31.4	1.0	ug/g dry	34.1			8.2	30	
Molybdenum	ND	1.0	ug/g dry	ND			0.0	30	
Nickel	20.3	5.0	ug/g dry	21.6			6.2	30	
Selenium	ND	1.0	ug/g dry	ND			0.0	30	
Silver	ND	0.3	ug/g dry	ND			0.0	30	
Thallium	ND	1.0	ug/g dry	ND			0.0	30	
Uranium	ND	1.0	ug/g dry	ND			0.0	30	
Vanadium	29.1	10.0	ug/g dry	32.3			10.4	30	
Zinc	64.2	20.0	ug/g dry	99.4			43.1	30	
Physical Characteristics									
% Solids	79.4	0.1	% by Wt.	81.1			2.1	25	

Certificate of Analysis
Client: LRL Associates Ltd.
Client PO:

Report Date: 26-Jul-2018

Order Date: 23-Jul-2018

Project Description: 170254

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	195	7	ug/g		97.6	80-120			
F2 PHCs (C10-C16)	88	4	ug/g	ND	102	60-140			
F3 PHCs (C16-C34)	242	8	ug/g	24	103	60-140			
F4 PHCs (C34-C50)	128	6	ug/g	9	89.2	60-140			
Metals									
Antimony	47.1		ug/L	ND	93.7	70-130			
Arsenic	48.7		ug/L	1.0	95.5	70-130			
Barium	97.3		ug/L	47.8	99.1	70-130			
Beryllium	51.6		ug/L	ND	103	70-130			
Boron	51.9		ug/L	ND	99.4	70-130			
Cadmium	47.3		ug/L	ND	94.2	70-130			
Chromium	63.3		ug/L	11.0	105	70-130			
Cobalt	56.5		ug/L	3.6	106	70-130			
Copper	65.6		ug/L	12.5	106	70-130			
Lead	66.2		ug/L	13.6	105	70-130			
Molybdenum	46.9		ug/L	ND	93.2	70-130			
Nickel	62.6		ug/L	8.7	108	70-130			
Selenium	47.0		ug/L	ND	93.8	70-130			
Silver	56.0		ug/L	ND	112	70-130			
Thallium	54.2		ug/L	ND	108	70-130			
Uranium	56.5		ug/L	ND	112	70-130			
Vanadium	64.6		ug/L	12.9	103	70-130			
Zinc	70.6		ug/L	39.8	61.6	70-130			

Certificate of Analysis
Client: LRL Associates Ltd.
Client PO:

Report Date: 26-Jul-2018

Order Date: 23-Jul-2018

Project Description: 170254

Qualifier Notes:

QC Qualifiers :

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

Sample Data Revisions

None

Work Order Revisions / Comments:

None

Other Report Notes:

n/a: not applicable

ND: Not Detected

MDL: Method Detection Limit

Source Result: Data used as source for matrix and duplicate samples

%REC: Percent recovery.

RPD: Relative percent difference.

Soil results are reported on a dry weight basis when the units are denoted with 'dry'.

Where %Solids is reported, moisture loss includes the loss of volatile hydrocarbons.

CCME PHC additional information:

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

Certificate of Analysis

LRL Associates Ltd.

5430 Canotek Road
Ottawa, ON K1J 9G2
Attn: Andrea Sare

Client PO:
Project: 170254
Custody: 43244

Report Date: 27-Jul-2018
Order Date: 23-Jul-2018

Order #: 1830138

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

Paracel ID	Client ID
1830138-01	BH18-1-1
1830138-02	BH18-1-4
1830138-03	BH18-2-10
1830138-04	BH18-2-13
1830138-05	BH18-3-15
1830138-06	BH18-3-17
1830138-07	BH18-4-21
1830138-08	BH18-4-23
1830138-09	BH18-5-30
1830138-10	BH18-5-32

Approved By:



Dale Robertson, BSc
Laboratory Director

Certificate of Analysis
Client: LRL Associates Ltd.
Client PO:

Report Date: 27-Jul-2018

Order Date: 23-Jul-2018

Project Description: 170254

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
BTEX by P&T GC-MS	EPA 8260 - P&T GC-MS	25-Jul-18	26-Jul-18
pH, soil	EPA 150.1 - pH probe @ 25 °C, CaCl buffered ext.	24-Jul-18	25-Jul-18
PHC F1	CWS Tier 1 - P&T GC-FID	25-Jul-18	26-Jul-18
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	24-Jul-18	25-Jul-18
REG 153: Metals by ICP/MS, soil	EPA 6020 - Digestion - ICP-MS	25-Jul-18	26-Jul-18
REG 153: VOCs by P&T GC/MS	EPA 8260 - P&T GC-MS	25-Jul-18	26-Jul-18
Solids, %	Gravimetric, calculation	25-Jul-18	25-Jul-18

Certificate of Analysis
Client: LRL Associates Ltd.
Client PO:

Report Date: 27-Jul-2018

Order Date: 23-Jul-2018

Project Description: 170254

Client ID:	BH18-1-1	BH18-1-4	BH18-2-10	BH18-2-13
Sample Date:	07/20/2018 09:00	07/20/2018 09:00	07/20/2018 09:00	07/20/2018 09:00
Sample ID:	1830138-01	1830138-02	1830138-03	1830138-04
MDL/Units	Soil	Soil	Soil	Soil

Physical Characteristics

% Solids	0.1 % by Wt.	93.6	93.2	92.0	95.3
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General Inorganics

pH	0.05 pH Units	7.71	7.73	12.06	9.42
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Metals

Antimony	1.0 ug/g dry	<1.0	<1.0	<1.0	<1.0
Arsenic	1.0 ug/g dry	2.7	5.8	<1.0	5.0
Barium	1.0 ug/g dry	220	88.4	32.9	107
Beryllium	0.5 ug/g dry	0.9	0.8	<0.5	0.8
Boron	5.0 ug/g dry	7.1	8.8	5.5	9.2
Cadmium	0.5 ug/g dry	<0.5	<0.5	<0.5	<0.5
Chromium	5.0 ug/g dry	41.4	22.1	16.4	24.3
Cobalt	1.0 ug/g dry	15.1	17.1	2.2	12.6
Copper	5.0 ug/g dry	36.0	47.4	6.4	43.6
Lead	1.0 ug/g dry	7.6	6.4	2.5	8.5
Molybdenum	1.0 ug/g dry	<1.0	<1.0	<1.0	<1.0
Nickel	5.0 ug/g dry	32.5	32.6	7.9	28.5
Selenium	1.0 ug/g dry	<1.0	<1.0	<1.0	<1.0
Silver	0.3 ug/g dry	<0.3	<0.3	<0.3	<0.3
Thallium	1.0 ug/g dry	<1.0	<1.0	<1.0	<1.0
Uranium	1.0 ug/g dry	<1.0	<1.0	<1.0	<1.0
Vanadium	10.0 ug/g dry	52.4	28.4	16.3	30.1
Zinc	20.0 ug/g dry	62.9	53.6	27.0	60.9

Volatiles

Acetone	0.50 ug/g dry	-	<0.50	-	-
Benzene	0.02 ug/g dry	-	<0.02	-	-
Bromodichloromethane	0.05 ug/g dry	-	<0.05	-	-
Bromoform	0.05 ug/g dry	-	<0.05	-	-
Bromomethane	0.05 ug/g dry	-	<0.05	-	-
Carbon Tetrachloride	0.05 ug/g dry	-	<0.05	-	-
Chlorobenzene	0.05 ug/g dry	-	<0.05	-	-
Chloroform	0.05 ug/g dry	-	<0.05	-	-
Dibromochloromethane	0.05 ug/g dry	-	<0.05	-	-
Dichlorodifluoromethane	0.05 ug/g dry	-	<0.05	-	-
1,2-Dichlorobenzene	0.05 ug/g dry	-	<0.05	-	-
1,3-Dichlorobenzene	0.05 ug/g dry	-	<0.05	-	-

Certificate of Analysis
 Client: LRL Associates Ltd.
 Client PO:

Report Date: 27-Jul-2018

Order Date: 23-Jul-2018

Project Description: 170254

	Client ID: Sample Date: Sample ID:	BH18-1-1 07/20/2018 09:00 1830138-01 Soil	BH18-1-4 07/20/2018 09:00 1830138-02 Soil	BH18-2-10 07/20/2018 09:00 1830138-03 Soil	BH18-2-13 07/20/2018 09:00 1830138-04 Soil
	MDL/Units				
1,4-Dichlorobenzene	0.05 ug/g dry	-	<0.05	-	-
1,1-Dichloroethane	0.05 ug/g dry	-	<0.05	-	-
1,2-Dichloroethane	0.05 ug/g dry	-	<0.05	-	-
1,1-Dichloroethylene	0.05 ug/g dry	-	<0.05	-	-
cis-1,2-Dichloroethylene	0.05 ug/g dry	-	<0.05	-	-
trans-1,2-Dichloroethylene	0.05 ug/g dry	-	<0.05	-	-
1,2-Dichloropropane	0.05 ug/g dry	-	<0.05	-	-
cis-1,3-Dichloropropylene	0.05 ug/g dry	-	<0.05	-	-
trans-1,3-Dichloropropylene	0.05 ug/g dry	-	<0.05	-	-
1,3-Dichloropropene, total	0.05 ug/g dry	-	<0.05	-	-
Ethylbenzene	0.05 ug/g dry	-	<0.05	-	-
Ethylene dibromide (dibromoethane)	0.05 ug/g dry	-	<0.05	-	-
Hexane	0.05 ug/g dry	-	<0.05	-	-
Methyl Ethyl Ketone (2-Butanone)	0.50 ug/g dry	-	<0.50	-	-
Methyl Isobutyl Ketone	0.50 ug/g dry	-	<0.50	-	-
Methyl tert-butyl ether	0.05 ug/g dry	-	<0.05	-	-
Methylene Chloride	0.05 ug/g dry	-	<0.05	-	-
Styrene	0.05 ug/g dry	-	<0.05	-	-
1,1,1,2-Tetrachloroethane	0.05 ug/g dry	-	<0.05	-	-
1,1,2,2-Tetrachloroethane	0.05 ug/g dry	-	<0.05	-	-
Tetrachloroethylene	0.05 ug/g dry	-	<0.05	-	-
Toluene	0.05 ug/g dry	-	<0.05	-	-
1,1,1-Trichloroethane	0.05 ug/g dry	-	<0.05	-	-
1,1,2-Trichloroethane	0.05 ug/g dry	-	<0.05	-	-
Trichloroethylene	0.05 ug/g dry	-	<0.05	-	-
Trichlorofluoromethane	0.05 ug/g dry	-	<0.05	-	-
Vinyl chloride	0.02 ug/g dry	-	<0.02	-	-
m,p-Xylenes	0.05 ug/g dry	-	<0.05	-	-
o-Xylene	0.05 ug/g dry	-	<0.05	-	-
Xylenes, total	0.05 ug/g dry	-	<0.05	-	-
4-Bromofluorobenzene	Surrogate	-	83.5%	-	-
Dibromofluoromethane	Surrogate	-	113%	-	-
Toluene-d8	Surrogate	-	82.6%	-	-

Hydrocarbons

F1 PHCs (C6-C10)	7 ug/g dry	<7	<7	-	<7
F2 PHCs (C10-C16)	4 ug/g dry	<4	<4	-	<4

Certificate of Analysis
Client: LRL Associates Ltd.
Client PO:

Report Date: 27-Jul-2018

Order Date: 23-Jul-2018

Project Description: 170254

	Client ID:	BH18-1-1	BH18-1-4	BH18-2-10	BH18-2-13
	Sample Date:	07/20/2018 09:00	07/20/2018 09:00	07/20/2018 09:00	07/20/2018 09:00
	Sample ID:	1830138-01	1830138-02	1830138-03	1830138-04
	MDL/Units	Soil	Soil	Soil	Soil
F3 PHCs (C16-C34)	8 ug/g dry	<8	<8	-	<8
F4 PHCs (C34-C50)	6 ug/g dry	<6	<6	-	<6

Certificate of Analysis
Client: LRL Associates Ltd.
Client PO:

Report Date: 27-Jul-2018

Order Date: 23-Jul-2018

Project Description: 170254

Client ID:	BH18-3-15	BH18-3-17	BH18-4-21	BH18-4-23
Sample Date:	07/20/2018 09:00	07/20/2018 09:00	07/20/2018 09:00	07/20/2018 09:00
Sample ID:	1830138-05	1830138-06	1830138-07	1830138-08
MDL/Units	Soil	Soil	Soil	Soil

Physical Characteristics

% Solids	0.1 % by Wt.	93.6	92.1	93.7	76.4
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General Inorganics

pH	0.05 pH Units	7.84	7.86	-	7.07
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Metals

Antimony	1.0 ug/g dry	<1.0	<1.0	<1.0	<1.0
Arsenic	1.0 ug/g dry	6.2	6.2	2.3	1.6
Barium	1.0 ug/g dry	88.1	132	102	202
Beryllium	0.5 ug/g dry	1.1	0.8	0.6	0.7
Boron	5.0 ug/g dry	10.5	7.4	10.1	5.2
Cadmium	0.5 ug/g dry	<0.5	<0.5	<0.5	<0.5
Chromium	5.0 ug/g dry	27.6	23.5	26.4	73.1
Cobalt	1.0 ug/g dry	20.4	25.3	7.9	14.6
Copper	5.0 ug/g dry	51.8	46.9	20.5	23.4
Lead	1.0 ug/g dry	7.8	7.4	6.5	8.3
Molybdenum	1.0 ug/g dry	<1.0	<1.0	<1.0	<1.0
Nickel	5.0 ug/g dry	38.2	35.6	20.6	39.7
Selenium	1.0 ug/g dry	<1.0	<1.0	<1.0	<1.0
Silver	0.3 ug/g dry	<0.3	<0.3	<0.3	<0.3
Thallium	1.0 ug/g dry	<1.0	<1.0	<1.0	<1.0
Uranium	1.0 ug/g dry	<1.0	<1.0	<1.0	<1.0
Vanadium	10.0 ug/g dry	33.2	29.3	31.2	60.2
Zinc	20.0 ug/g dry	67.8	60.8	46.5	74.5

Volatiles

Acetone	0.50 ug/g dry	-	<0.50	-	<0.50
Benzene	0.02 ug/g dry	-	<0.02	-	<0.02
Bromodichloromethane	0.05 ug/g dry	-	<0.05	-	<0.05
Bromoform	0.05 ug/g dry	-	<0.05	-	<0.05
Bromomethane	0.05 ug/g dry	-	<0.05	-	<0.05
Carbon Tetrachloride	0.05 ug/g dry	-	<0.05	-	<0.05
Chlorobenzene	0.05 ug/g dry	-	<0.05	-	<0.05
Chloroform	0.05 ug/g dry	-	<0.05	-	<0.05
Dibromochloromethane	0.05 ug/g dry	-	<0.05	-	<0.05
Dichlorodifluoromethane	0.05 ug/g dry	-	<0.05	-	<0.05
1,2-Dichlorobenzene	0.05 ug/g dry	-	<0.05	-	<0.05
1,3-Dichlorobenzene	0.05 ug/g dry	-	<0.05	-	<0.05

Certificate of Analysis
 Client: LRL Associates Ltd.
 Client PO:

Report Date: 27-Jul-2018

Order Date: 23-Jul-2018

Project Description: 170254

	Client ID: Sample Date: Sample ID:	BH18-3-15 07/20/2018 09:00 1830138-05 Soil	BH18-3-17 07/20/2018 09:00 1830138-06 Soil	BH18-4-21 07/20/2018 09:00 1830138-07 Soil	BH18-4-23 07/20/2018 09:00 1830138-08 Soil
	MDL/Units				
1,4-Dichlorobenzene	0.05 ug/g dry	-	<0.05	-	<0.05
1,1-Dichloroethane	0.05 ug/g dry	-	<0.05	-	<0.05
1,2-Dichloroethane	0.05 ug/g dry	-	<0.05	-	<0.05
1,1-Dichloroethylene	0.05 ug/g dry	-	<0.05	-	<0.05
cis-1,2-Dichloroethylene	0.05 ug/g dry	-	<0.05	-	<0.05
trans-1,2-Dichloroethylene	0.05 ug/g dry	-	<0.05	-	<0.05
1,2-Dichloropropane	0.05 ug/g dry	-	<0.05	-	<0.05
cis-1,3-Dichloropropylene	0.05 ug/g dry	-	<0.05	-	<0.05
trans-1,3-Dichloropropylene	0.05 ug/g dry	-	<0.05	-	<0.05
1,3-Dichloropropene, total	0.05 ug/g dry	-	<0.05	-	<0.05
Ethylbenzene	0.05 ug/g dry	-	<0.05	-	<0.05
Ethylene dibromide (dibromoethane)	0.05 ug/g dry	-	<0.05	-	<0.05
Hexane	0.05 ug/g dry	-	<0.05	-	<0.05
Methyl Ethyl Ketone (2-Butanone)	0.50 ug/g dry	-	<0.50	-	<0.50
Methyl Isobutyl Ketone	0.50 ug/g dry	-	<0.50	-	<0.50
Methyl tert-butyl ether	0.05 ug/g dry	-	<0.05	-	<0.05
Methylene Chloride	0.05 ug/g dry	-	<0.05	-	<0.05
Styrene	0.05 ug/g dry	-	<0.05	-	<0.05
1,1,1,2-Tetrachloroethane	0.05 ug/g dry	-	<0.05	-	<0.05
1,1,2,2-Tetrachloroethane	0.05 ug/g dry	-	<0.05	-	<0.05
Tetrachloroethylene	0.05 ug/g dry	-	<0.05	-	<0.05
Toluene	0.05 ug/g dry	-	<0.05	-	<0.05
1,1,1-Trichloroethane	0.05 ug/g dry	-	<0.05	-	<0.05
1,1,2-Trichloroethane	0.05 ug/g dry	-	<0.05	-	<0.05
Trichloroethylene	0.05 ug/g dry	-	<0.05	-	<0.05
Trichlorofluoromethane	0.05 ug/g dry	-	<0.05	-	<0.05
Vinyl chloride	0.02 ug/g dry	-	<0.02	-	<0.02
m,p-Xylenes	0.05 ug/g dry	-	<0.05	-	<0.05
o-Xylene	0.05 ug/g dry	-	<0.05	-	<0.05
Xylenes, total	0.05 ug/g dry	-	<0.05	-	<0.05
4-Bromofluorobenzene	Surrogate	-	87.5%	-	92.2%
Dibromofluoromethane	Surrogate	-	77.2%	-	121%
Toluene-d8	Surrogate	-	81.9%	-	81.0%
Hydrocarbons					
F1 PHCs (C6-C10)	7 ug/g dry	-	<7	-	<7

Certificate of Analysis
Client: LRL Associates Ltd.
Client PO:

Report Date: 27-Jul-2018

Order Date: 23-Jul-2018

Project Description: 170254

	MDL/Units	Client ID:	BH18-3-15	BH18-3-17	BH18-4-21	BH18-4-23
		Sample Date:	07/20/2018 09:00	07/20/2018 09:00	07/20/2018 09:00	07/20/2018 09:00
		Sample ID:	1830138-05	1830138-06	1830138-07	1830138-08
			Soil	Soil	Soil	Soil
F2 PHCs (C10-C16)	4 ug/g dry		-	<4	-	<4
F3 PHCs (C16-C34)	8 ug/g dry		-	<8	-	<8
F4 PHCs (C34-C50)	6 ug/g dry		-	<6	-	<6

Certificate of Analysis
Client: LRL Associates Ltd.
Client PO:

Report Date: 27-Jul-2018

Order Date: 23-Jul-2018

Project Description: 170254

Client ID:	BH18-5-30	BH18-5-32	-	-
Sample Date:	07/20/2018 09:00	07/20/2018 09:00	-	-
Sample ID:	1830138-09	1830138-10	-	-
MDL/Units	Soil	Soil	-	-

Physical Characteristics

% Solids	0.1 % by Wt.	68.9	64.5	-	-
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General Inorganics

pH	0.05 pH Units	7.10	8.04	-	-
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Metals

Antimony	1.0 ug/g dry	<1.0	<1.0	-	-
Arsenic	1.0 ug/g dry	1.3	<1.0	-	-
Barium	1.0 ug/g dry	485	956	-	-
Beryllium	0.5 ug/g dry	1.0	0.9	-	-
Boron	5.0 ug/g dry	8.0	9.1	-	-
Cadmium	0.5 ug/g dry	<0.5	<0.5	-	-
Chromium	5.0 ug/g dry	70.6	67.2	-	-
Cobalt	1.0 ug/g dry	19.6	17.7	-	-
Copper	5.0 ug/g dry	42.8	42.0	-	-
Lead	1.0 ug/g dry	9.0	9.1	-	-
Molybdenum	1.0 ug/g dry	<1.0	<1.0	-	-
Nickel	5.0 ug/g dry	45.2	42.7	-	-
Selenium	1.0 ug/g dry	<1.0	<1.0	-	-
Silver	0.3 ug/g dry	<0.3	<0.3	-	-
Thallium	1.0 ug/g dry	<1.0	<1.0	-	-
Uranium	1.0 ug/g dry	<1.0	<1.0	-	-
Vanadium	10.0 ug/g dry	86.8	84.7	-	-
Zinc	20.0 ug/g dry	113	91.8	-	-

Volatiles

Benzene	0.02 ug/g dry	<0.02	-	-	-
Ethylbenzene	0.05 ug/g dry	<0.05	-	-	-
Toluene	0.05 ug/g dry	<0.05	-	-	-
m,p-Xylenes	0.05 ug/g dry	<0.05	-	-	-
o-Xylene	0.05 ug/g dry	<0.05	-	-	-
Xylenes, total	0.05 ug/g dry	<0.05	-	-	-
Toluene-d8	Surrogate	82.1%	-	-	-

Hydrocarbons

F1 PHCs (C6-C10)	7 ug/g dry	<7	<7	-	-
F2 PHCs (C10-C16)	4 ug/g dry	<4	<4	-	-
F3 PHCs (C16-C34)	8 ug/g dry	<8	<8	-	-
F4 PHCs (C34-C50)	6 ug/g dry	<6	<6	-	-

Certificate of Analysis
Client: **LRL Associates Ltd.**
Client PO:

Report Date: 27-Jul-2018

Order Date: 23-Jul-2018

Project Description: **170254**

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	7	ug/g						
F2 PHCs (C10-C16)	ND	4	ug/g						
F3 PHCs (C16-C34)	ND	8	ug/g						
F4 PHCs (C34-C50)	ND	6	ug/g						
Metals									
Antimony	ND	1.0	ug/g						
Arsenic	ND	1.0	ug/g						
Barium	ND	1.0	ug/g						
Beryllium	ND	0.5	ug/g						
Boron	ND	5.0	ug/g						
Cadmium	ND	0.5	ug/g						
Chromium	ND	5.0	ug/g						
Cobalt	ND	1.0	ug/g						
Copper	ND	5.0	ug/g						
Lead	ND	1.0	ug/g						
Molybdenum	ND	1.0	ug/g						
Nickel	ND	5.0	ug/g						
Selenium	ND	1.0	ug/g						
Silver	ND	0.3	ug/g						
Thallium	ND	1.0	ug/g						
Uranium	ND	1.0	ug/g						
Vanadium	ND	10.0	ug/g						
Zinc	ND	20.0	ug/g						
Volatiles									
Acetone	ND	0.50	ug/g						
Benzene	ND	0.02	ug/g						
Bromodichloromethane	ND	0.05	ug/g						
Bromoform	ND	0.05	ug/g						
Bromomethane	ND	0.05	ug/g						
Carbon Tetrachloride	ND	0.05	ug/g						
Chlorobenzene	ND	0.05	ug/g						
Chloroform	ND	0.05	ug/g						
Dibromochloromethane	ND	0.05	ug/g						
Dichlorodifluoromethane	ND	0.05	ug/g						
1,2-Dichlorobenzene	ND	0.05	ug/g						
1,3-Dichlorobenzene	ND	0.05	ug/g						
1,4-Dichlorobenzene	ND	0.05	ug/g						
1,1-Dichloroethane	ND	0.05	ug/g						
1,2-Dichloroethane	ND	0.05	ug/g						
1,1-Dichloroethylene	ND	0.05	ug/g						
cis-1,2-Dichloroethylene	ND	0.05	ug/g						
trans-1,2-Dichloroethylene	ND	0.05	ug/g						
1,2-Dichloropropane	ND	0.05	ug/g						
cis-1,3-Dichloropropylene	ND	0.05	ug/g						
trans-1,3-Dichloropropylene	ND	0.05	ug/g						
1,3-Dichloropropene, total	ND	0.05	ug/g						
Ethylbenzene	ND	0.05	ug/g						
Ethylene dibromide (dibromoethane)	ND	0.05	ug/g						
Hexane	ND	0.05	ug/g						
Methyl Ethyl Ketone (2-Butanone)	ND	0.50	ug/g						
Methyl Isobutyl Ketone	ND	0.50	ug/g						
Methyl tert-butyl ether	ND	0.05	ug/g						
Methylene Chloride	ND	0.05	ug/g						
Styrene	ND	0.05	ug/g						
1,1,1,2-Tetrachloroethane	ND	0.05	ug/g						
1,1,2,2-Tetrachloroethane	ND	0.05	ug/g						
Tetrachloroethylene	ND	0.05	ug/g						
Toluene	ND	0.05	ug/g						
1,1,1-Trichloroethane	ND	0.05	ug/g						

Certificate of Analysis
Client: LRL Associates Ltd.
Client PO:

Report Date: 27-Jul-2018

Order Date: 23-Jul-2018

Project Description: 170254

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
1,1,2-Trichloroethane	ND	0.05	ug/g						
Trichloroethylene	ND	0.05	ug/g						
Trichlorofluoromethane	ND	0.05	ug/g						
Vinyl chloride	ND	0.02	ug/g						
m,p-Xylenes	ND	0.05	ug/g						
o-Xylene	ND	0.05	ug/g						
Xylenes, total	ND	0.05	ug/g						
Surrogate: 4-Bromofluorobenzene	3.27		ug/g		102	50-140			
Surrogate: Dibromofluoromethane	3.60		ug/g		112	50-140			
Surrogate: Toluene-d8	2.95		ug/g		92.2	50-140			
Benzene	ND	0.02	ug/g						
Ethylbenzene	ND	0.05	ug/g						
Toluene	ND	0.05	ug/g						
m,p-Xylenes	ND	0.05	ug/g						
o-Xylene	ND	0.05	ug/g						
Xylenes, total	ND	0.05	ug/g						
Surrogate: Toluene-d8	2.95		ug/g		92.2	50-140			

Certificate of Analysis
Client: LRL Associates Ltd.
Client PO:

Report Date: 27-Jul-2018

Order Date: 23-Jul-2018

Project Description: 170254

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
General Inorganics									
pH	7.58	0.05	pH Units	7.57			0.1	10	
Hydrocarbons									
F1 PHCs (C6-C10)	ND	7	ug/g dry	ND				40	
F2 PHCs (C10-C16)	ND	4	ug/g dry	ND				30	
F3 PHCs (C16-C34)	17	8	ug/g dry	24			31.6	30	QR-01
F4 PHCs (C34-C50)	12	6	ug/g dry	9			31.6	30	QR-01
Metals									
Antimony	1.7	1.0	ug/g dry	ND			0.0	30	
Arsenic	2.2	1.0	ug/g dry	2.4			7.8	30	
Barium	110	1.0	ug/g dry	119			7.9	30	
Beryllium	ND	0.5	ug/g dry	ND			0.0	30	
Boron	6.2	5.0	ug/g dry	5.4			13.3	30	
Cadmium	ND	0.5	ug/g dry	ND			0.0	30	
Chromium	25.4	5.0	ug/g dry	27.5			8.1	30	
Cobalt	8.5	1.0	ug/g dry	9.0			6.1	30	
Copper	28.4	5.0	ug/g dry	31.2			9.2	30	
Lead	31.4	1.0	ug/g dry	34.1			8.2	30	
Molybdenum	ND	1.0	ug/g dry	ND			0.0	30	
Nickel	20.3	5.0	ug/g dry	21.6			6.2	30	
Selenium	ND	1.0	ug/g dry	ND			0.0	30	
Silver	ND	0.3	ug/g dry	ND			0.0	30	
Thallium	ND	1.0	ug/g dry	ND			0.0	30	
Uranium	ND	1.0	ug/g dry	ND			0.0	30	
Vanadium	29.1	10.0	ug/g dry	32.3			10.4	30	
Zinc	64.2	20.0	ug/g dry	99.4			43.1	30	
Physical Characteristics									
% Solids	79.4	0.1	% by Wt.	81.1			2.1	25	
Volatiles									
Acetone	ND	0.50	ug/g dry	ND				50	
Benzene	ND	0.02	ug/g dry	ND				50	
Bromodichloromethane	ND	0.05	ug/g dry	ND				50	
Bromoform	ND	0.05	ug/g dry	ND				50	
Bromomethane	ND	0.05	ug/g dry	ND				50	
Carbon Tetrachloride	ND	0.05	ug/g dry	ND				50	
Chlorobenzene	ND	0.05	ug/g dry	ND				50	
Chloroform	ND	0.05	ug/g dry	ND				50	
Dibromochloromethane	ND	0.05	ug/g dry	ND				50	
Dichlorodifluoromethane	ND	0.05	ug/g dry	ND				50	
1,2-Dichlorobenzene	ND	0.05	ug/g dry	ND				50	
1,3-Dichlorobenzene	ND	0.05	ug/g dry	ND				50	
1,4-Dichlorobenzene	ND	0.05	ug/g dry	ND				50	
1,1-Dichloroethane	ND	0.05	ug/g dry	ND				50	
1,2-Dichloroethane	ND	0.05	ug/g dry	ND				50	
1,1-Dichloroethylene	ND	0.05	ug/g dry	ND				50	
cis-1,2-Dichloroethylene	ND	0.05	ug/g dry	ND				50	
trans-1,2-Dichloroethylene	ND	0.05	ug/g dry	ND				50	
1,2-Dichloropropane	ND	0.05	ug/g dry	ND				50	
cis-1,3-Dichloropropylene	ND	0.05	ug/g dry	ND				50	
trans-1,3-Dichloropropylene	ND	0.05	ug/g dry	ND				50	
Ethylbenzene	ND	0.05	ug/g dry	ND				50	
Ethylene dibromide (dibromoethane)	ND	0.05	ug/g dry	ND				50	
Hexane	ND	0.05	ug/g dry	ND				50	
Methyl Ethyl Ketone (2-Butanone)	ND	0.50	ug/g dry	ND				50	
Methyl Isobutyl Ketone	ND	0.50	ug/g dry	ND				50	
Methyl tert-butyl ether	ND	0.05	ug/g dry	ND				50	
Methylene Chloride	ND	0.05	ug/g dry	ND				50	

Certificate of Analysis
Client: LRL Associates Ltd.
Client PO:

Report Date: 27-Jul-2018

Order Date: 23-Jul-2018

Project Description: 170254

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Styrene	ND	0.05	ug/g dry	ND				50	
1,1,1,2-Tetrachloroethane	ND	0.05	ug/g dry	ND				50	
1,1,2,2-Tetrachloroethane	ND	0.05	ug/g dry	ND				50	
Tetrachloroethylene	ND	0.05	ug/g dry	ND				50	
Toluene	ND	0.05	ug/g dry	ND				50	
1,1,1-Trichloroethane	ND	0.05	ug/g dry	ND				50	
1,1,2-Trichloroethane	ND	0.05	ug/g dry	ND				50	
Trichloroethylene	ND	0.05	ug/g dry	ND				50	
Trichlorofluoromethane	ND	0.05	ug/g dry	ND				50	
Vinyl chloride	ND	0.02	ug/g dry	ND				50	
m,p-Xylenes	ND	0.05	ug/g dry	ND				50	
o-Xylene	ND	0.05	ug/g dry	ND				50	
Surrogate: 4-Bromofluorobenzene	3.17		ug/g dry		87.1	50-140			
Surrogate: Dibromofluoromethane	4.36		ug/g dry		120	50-140			
Surrogate: Toluene-d8	3.04		ug/g dry		83.5	50-140			
Benzene	ND	0.02	ug/g dry	ND				50	
Ethylbenzene	ND	0.05	ug/g dry	ND				50	
Toluene	ND	0.05	ug/g dry	ND				50	
m,p-Xylenes	ND	0.05	ug/g dry	ND				50	
o-Xylene	ND	0.05	ug/g dry	ND				50	
Surrogate: Toluene-d8	3.04		ug/g dry		83.5	50-140			

Certificate of Analysis
Client: LRL Associates Ltd.
Client PO:

Report Date: 27-Jul-2018

Order Date: 23-Jul-2018

Project Description: 170254

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	195	7	ug/g		97.6	80-120			
F2 PHCs (C10-C16)	88	4	ug/g	ND	102	60-140			
F3 PHCs (C16-C34)	242	8	ug/g	24	103	60-140			
F4 PHCs (C34-C50)	128	6	ug/g	9	89.2	60-140			
Metals									
Antimony	47.1		ug/L	ND	93.7	70-130			
Arsenic	48.7		ug/L	1.0	95.5	70-130			
Barium	97.3		ug/L	47.8	99.1	70-130			
Beryllium	51.6		ug/L	ND	103	70-130			
Boron	51.9		ug/L	ND	99.4	70-130			
Cadmium	47.3		ug/L	ND	94.2	70-130			
Chromium	63.3		ug/L	11.0	105	70-130			
Cobalt	56.5		ug/L	3.6	106	70-130			
Copper	65.6		ug/L	12.5	106	70-130			
Lead	66.2		ug/L	13.6	105	70-130			
Molybdenum	46.9		ug/L	ND	93.2	70-130			
Nickel	62.6		ug/L	8.7	108	70-130			
Selenium	47.0		ug/L	ND	93.8	70-130			
Silver	56.0		ug/L	ND	112	70-130			
Thallium	54.2		ug/L	ND	108	70-130			
Uranium	56.5		ug/L	ND	112	70-130			
Vanadium	64.6		ug/L	12.9	103	70-130			
Zinc	70.6		ug/L	39.8	61.6	70-130			
Volatiles									
Acetone	10.9	0.50	ug/g		109	50-140			
Benzene	3.68	0.02	ug/g		92.0	60-130			
Bromodichloromethane	3.90	0.05	ug/g		97.6	60-130			
Bromoform	4.91	0.05	ug/g		123	60-130			
Bromomethane	3.39	0.05	ug/g		84.7	50-140			
Carbon Tetrachloride	3.61	0.05	ug/g		90.1	60-130			
Chlorobenzene	5.12	0.05	ug/g		128	60-130			
Chloroform	3.49	0.05	ug/g		87.2	60-130			
Dibromochloromethane	4.73	0.05	ug/g		118	60-130			
Dichlorodifluoromethane	3.67	0.05	ug/g		91.8	50-140			
1,2-Dichlorobenzene	4.50	0.05	ug/g		113	60-130			
1,3-Dichlorobenzene	4.44	0.05	ug/g		111	60-130			
1,4-Dichlorobenzene	4.33	0.05	ug/g		108	60-130			
1,1-Dichloroethane	3.79	0.05	ug/g		94.9	60-130			
1,2-Dichloroethane	3.80	0.05	ug/g		94.9	60-130			
1,1-Dichloroethylene	3.31	0.05	ug/g		82.8	60-130			
cis-1,2-Dichloroethylene	3.43	0.05	ug/g		85.6	60-130			
trans-1,2-Dichloroethylene	3.33	0.05	ug/g		83.3	60-130			
1,2-Dichloropropane	3.89	0.05	ug/g		97.2	60-130			
cis-1,3-Dichloropropylene	4.33	0.05	ug/g		108	60-130			
trans-1,3-Dichloropropylene	3.92	0.05	ug/g		97.9	60-130			
Ethylbenzene	4.72	0.05	ug/g		118	60-130			
Ethylene dibromide (dibromoethane)	4.92	0.05	ug/g		123	60-130			
Hexane	4.80	0.05	ug/g		120	60-130			
Methyl Ethyl Ketone (2-Butanone)	6.23	0.50	ug/g		62.3	50-140			
Methyl Isobutyl Ketone	12.2	0.50	ug/g		122	50-140			
Methyl tert-butyl ether	9.26	0.05	ug/g		92.6	50-140			

Certificate of Analysis
Client: LRL Associates Ltd.
Client PO:

Report Date: 27-Jul-2018

Order Date: 23-Jul-2018

Project Description: 170254

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Methylene Chloride	3.40	0.05	ug/g		85.0	60-130			
Styrene	4.86	0.05	ug/g		122	60-130			
1,1,1,2-Tetrachloroethane	4.78	0.05	ug/g		119	60-130			
1,1,2,2-Tetrachloroethane	4.99	0.05	ug/g		125	60-130			
Tetrachloroethylene	4.47	0.05	ug/g		112	60-130			
Toluene	4.67	0.05	ug/g		117	60-130			
1,1,1-Trichloroethane	3.71	0.05	ug/g		92.6	60-130			
1,1,2-Trichloroethane	3.83	0.05	ug/g		95.8	60-130			
Trichloroethylene	3.74	0.05	ug/g		93.6	60-130			
Trichlorofluoromethane	3.53	0.05	ug/g		88.3	50-140			
Vinyl chloride	3.76	0.02	ug/g		94.1	50-140			
m,p-Xylenes	10.2	0.05	ug/g		128	60-130			
o-Xylene	4.82	0.05	ug/g		121	60-130			
Surrogate: 4-Bromofluorobenzene	2.01		ug/g		62.9	50-140			
Benzene	3.68	0.02	ug/g		92.0	60-130			
Ethylbenzene	4.86	0.05	ug/g		122	60-130			
Toluene	4.67	0.05	ug/g		117	60-130			
m,p-Xylenes	10.2	0.05	ug/g		128	60-130			
o-Xylene	4.90	0.05	ug/g		123	60-130			

Certificate of Analysis
Client: LRL Associates Ltd.
Client PO:

Report Date: 27-Jul-2018
Order Date: 23-Jul-2018
Project Description: 170254

Qualifier Notes:***QC Qualifiers :***

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

Sample Data Revisions

None

Work Order Revisions / Comments:

None

Other Report Notes:

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

Soil results are reported on a dry weight basis when the units are denoted with 'dry'.

Where %Solids is reported, moisture loss includes the loss of volatile hydrocarbons.

CCME PHC additional information:

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

Certificate of Analysis

LRL Associates Ltd.

5430 Canotek Road
Ottawa, ON K1J 9G2
Attn: Andrea Sare

Client PO:
Project: 170254
Custody: 117474

Report Date: 30-Jul-2018
Order Date: 24-Jul-2018

Order #: 1830267

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

Paracel ID	Client ID
1830267-01	MW1
1830267-02	MW3
1830267-03	MW4
1830267-04	MW5
1830267-05	MW-X

Approved By:



Dale Robertson, BSc
Laboratory Director

Certificate of Analysis
Client: LRL Associates Ltd.
Client PO:

Report Date: 30-Jul-2018

Order Date: 24-Jul-2018

Project Description: 170254

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
Metals, ICP-MS	EPA 200.8 - ICP-MS	27-Jul-18	27-Jul-18
PHC F1	CWS Tier 1 - P&T GC-FID	25-Jul-18	25-Jul-18
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	25-Jul-18	25-Jul-18
REG 153: VOCs by P&T GC/MS	EPA 624 - P&T GC-MS	25-Jul-18	25-Jul-18

Certificate of Analysis
 Client: LRL Associates Ltd.
 Client PO:

Report Date: 30-Jul-2018

Order Date: 24-Jul-2018

Project Description: 170254

Client ID:	MW1	MW3	MW4	MW5
Sample Date:	07/24/2018 09:00	07/24/2018 09:00	07/24/2018 09:00	07/24/2018 09:00
Sample ID:	1830267-01	1830267-02	1830267-03	1830267-04
MDL/Units	Water	Water	Water	Water

Metals

Antimony	0.5 ug/L	1.5	<0.5	<0.5	<0.5
Arsenic	1 ug/L	2 [1]	<1	2	<1
Barium	1 ug/L	50	106	811	469
Beryllium	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Boron	10 ug/L	67	34	35	27
Cadmium	0.1 ug/L	<0.1	<0.1	<0.1	<0.1
Chromium	1 ug/L	<1	<1	<1	<1
Cobalt	0.5 ug/L	<0.5 [1]	<0.5	1.1	<0.5
Copper	0.5 ug/L	<0.5	3.5	3.5	5.8
Lead	0.1 ug/L	<0.1	<0.1	0.1	0.4
Molybdenum	0.5 ug/L	6.9	<0.5	0.5	0.6
Nickel	1 ug/L	<1	<1	3	1
Selenium	1 ug/L	<1	<1	<1	<1
Silver	0.1 ug/L	<0.1	<0.1	<0.1	<0.1
Sodium	200 ug/L	13100	7050	45000	10900
Thallium	0.1 ug/L	<0.1	<0.1	<0.1	<0.1
Uranium	0.1 ug/L	0.9	0.3	0.6	0.3
Vanadium	0.5 ug/L	2.5	2.2	6.0	2.3
Zinc	5 ug/L	<5	<5	<5	9

Volatiles

Acetone	5.0 ug/L	<5.0	<5.0	<5.0	<5.0
Benzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Bromodichloromethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Bromoform	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Bromomethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Carbon Tetrachloride	0.2 ug/L	<0.2	<0.2	<0.2	<0.2
Chlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Chloroform	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Dibromochloromethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Dichlorodifluoromethane	1.0 ug/L	<1.0	<1.0	<1.0	<1.0
1,2-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,3-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,4-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,1-Dichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,2-Dichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5

Certificate of Analysis
 Client: LRL Associates Ltd.
 Client PO:

Report Date: 30-Jul-2018

Order Date: 24-Jul-2018

Project Description: 170254

	Client ID: Sample Date: Sample ID:	MW1 07/24/2018 09:00 1830267-01 Water	MW3 07/24/2018 09:00 1830267-02 Water	MW4 07/24/2018 09:00 1830267-03 Water	MW5 07/24/2018 09:00 1830267-04 Water
	MDL/Units				
1,1-Dichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
cis-1,2-Dichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
trans-1,2-Dichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,2-Dichloropropane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
cis-1,3-Dichloropropylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
trans-1,3-Dichloropropylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,3-Dichloropropene, total	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Ethylene dibromide (dibromoethane)	0.2 ug/L	<0.2	<0.2	<0.2	<0.2
Hexane	1.0 ug/L	<1.0	<1.0	<1.0	<1.0
Methyl Ethyl Ketone (2-Butanone)	5.0 ug/L	<5.0	<5.0	<5.0	<5.0
Methyl Isobutyl Ketone	5.0 ug/L	<5.0	<5.0	<5.0	<5.0
Methyl tert-butyl ether	2.0 ug/L	<2.0	<2.0	<2.0	<2.0
Methylene Chloride	5.0 ug/L	<5.0	<5.0	<5.0	<5.0
Styrene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,1,1,2-Tetrachloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,1,1,2,2-Tetrachloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Tetrachloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Toluene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,1,1-Trichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,1,2-Trichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Trichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Trichlorofluoromethane	1.0 ug/L	<1.0	<1.0	<1.0	<1.0
Vinyl chloride	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
m,p-Xylenes	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
o-Xylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Xylenes, total	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
4-Bromofluorobenzene	Surrogate	94.0%	94.8%	92.7%	92.7%
Dibromofluoromethane	Surrogate	82.7%	105%	89.1%	92.7%
Toluene-d8	Surrogate	91.4%	92.2%	91.9%	91.0%

Hydrocarbons

F1 PHCs (C6-C10)	25 ug/L	<25	<25	<25	<25
F2 PHCs (C10-C16)	100 ug/L	<100	<100	<100	<100
F3 PHCs (C16-C34)	100 ug/L	<100	<100	<100	<100
F4 PHCs (C34-C50)	100 ug/L	<100	<100	<100	<100

Certificate of Analysis
Client: LRL Associates Ltd.
Client PO:

Report Date: 30-Jul-2018

Order Date: 24-Jul-2018

Project Description: 170254

Client ID:	MW-X	-	-	-
Sample Date:	07/24/2018 09:00	-	-	-
Sample ID:	1830267-05	-	-	-
MDL/Units	Water	-	-	-

Volatiles

Acetone	5.0 ug/L	<5.0	-	-	-
Benzene	0.5 ug/L	<0.5	-	-	-
Bromodichloromethane	0.5 ug/L	<0.5	-	-	-
Bromoform	0.5 ug/L	<0.5	-	-	-
Bromomethane	0.5 ug/L	<0.5	-	-	-
Carbon Tetrachloride	0.2 ug/L	<0.2	-	-	-
Chlorobenzene	0.5 ug/L	<0.5	-	-	-
Chloroform	0.5 ug/L	<0.5	-	-	-
Dibromochloromethane	0.5 ug/L	<0.5	-	-	-
Dichlorodifluoromethane	1.0 ug/L	<1.0	-	-	-
1,2-Dichlorobenzene	0.5 ug/L	<0.5	-	-	-
1,3-Dichlorobenzene	0.5 ug/L	<0.5	-	-	-
1,4-Dichlorobenzene	0.5 ug/L	<0.5	-	-	-
1,1-Dichloroethane	0.5 ug/L	<0.5	-	-	-
1,2-Dichloroethane	0.5 ug/L	<0.5	-	-	-
1,1-Dichloroethylene	0.5 ug/L	<0.5	-	-	-
cis-1,2-Dichloroethylene	0.5 ug/L	<0.5	-	-	-
trans-1,2-Dichloroethylene	0.5 ug/L	<0.5	-	-	-
1,2-Dichloropropane	0.5 ug/L	<0.5	-	-	-
cis-1,3-Dichloropropylene	0.5 ug/L	<0.5	-	-	-
trans-1,3-Dichloropropylene	0.5 ug/L	<0.5	-	-	-
1,3-Dichloropropene, total	0.5 ug/L	<0.5	-	-	-
Ethylbenzene	0.5 ug/L	<0.5	-	-	-
Ethylene dibromide (dibromoethar	0.2 ug/L	<0.2	-	-	-
Hexane	1.0 ug/L	<1.0	-	-	-
Methyl Ethyl Ketone (2-Butanone)	5.0 ug/L	<5.0	-	-	-
Methyl Isobutyl Ketone	5.0 ug/L	<5.0	-	-	-
Methyl tert-butyl ether	2.0 ug/L	<2.0	-	-	-
Methylene Chloride	5.0 ug/L	<5.0	-	-	-
Styrene	0.5 ug/L	<0.5	-	-	-
1,1,1,2-Tetrachloroethane	0.5 ug/L	<0.5	-	-	-
1,1,2,2-Tetrachloroethane	0.5 ug/L	<0.5	-	-	-
Tetrachloroethylene	0.5 ug/L	<0.5	-	-	-
Toluene	0.5 ug/L	<0.5	-	-	-

Certificate of Analysis
Client: LRL Associates Ltd.
Client PO:

Report Date: 30-Jul-2018

Order Date: 24-Jul-2018

Project Description: 170254

	Client ID:	MW-X	-	-	-
	Sample Date:	07/24/2018 09:00	-	-	-
	Sample ID:	1830267-05	-	-	-
	MDL/Units	Water	-	-	-
1,1,1-Trichloroethane	0.5 ug/L	<0.5	-	-	-
1,1,2-Trichloroethane	0.5 ug/L	<0.5	-	-	-
Trichloroethylene	0.5 ug/L	<0.5	-	-	-
Trichlorofluoromethane	1.0 ug/L	<1.0	-	-	-
Vinyl chloride	0.5 ug/L	<0.5	-	-	-
m,p-Xylenes	0.5 ug/L	<0.5	-	-	-
o-Xylene	0.5 ug/L	<0.5	-	-	-
Xylenes, total	0.5 ug/L	<0.5	-	-	-
4-Bromofluorobenzene	Surrogate	92.4%	-	-	-
Dibromofluoromethane	Surrogate	85.5%	-	-	-
Toluene-d8	Surrogate	91.1%	-	-	-
Hydrocarbons					
F1 PHCs (C6-C10)	25 ug/L	<25	-	-	-
F2 PHCs (C10-C16)	100 ug/L	<100	-	-	-
F3 PHCs (C16-C34)	100 ug/L	<100	-	-	-
F4 PHCs (C34-C50)	100 ug/L	<100	-	-	-

Certificate of Analysis
Client: LRL Associates Ltd.
Client PO:

Report Date: 30-Jul-2018

Order Date: 24-Jul-2018

Project Description: 170254

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	25	ug/L						
F2 PHCs (C10-C16)	ND	100	ug/L						
F3 PHCs (C16-C34)	ND	100	ug/L						
F4 PHCs (C34-C50)	ND	100	ug/L						
Metals									
Antimony	ND	0.5	ug/L						
Arsenic	ND	1	ug/L						
Barium	ND	1	ug/L						
Beryllium	ND	0.5	ug/L						
Boron	ND	10	ug/L						
Cadmium	ND	0.1	ug/L						
Chromium	ND	1	ug/L						
Cobalt	ND	0.5	ug/L						
Copper	ND	0.5	ug/L						
Lead	ND	0.1	ug/L						
Molybdenum	ND	0.5	ug/L						
Nickel	ND	1	ug/L						
Selenium	ND	1	ug/L						
Silver	ND	0.1	ug/L						
Sodium	ND	200	ug/L						
Thallium	ND	0.1	ug/L						
Uranium	ND	0.1	ug/L						
Vanadium	ND	0.5	ug/L						
Zinc	ND	5	ug/L						
Volatiles									
Acetone	ND	5.0	ug/L						
Benzene	ND	0.5	ug/L						
Bromodichloromethane	ND	0.5	ug/L						
Bromoform	ND	0.5	ug/L						
Bromomethane	ND	0.5	ug/L						
Carbon Tetrachloride	ND	0.2	ug/L						
Chlorobenzene	ND	0.5	ug/L						
Chloroform	ND	0.5	ug/L						
Dibromochloromethane	ND	0.5	ug/L						
Dichlorodifluoromethane	ND	1.0	ug/L						
1,2-Dichlorobenzene	ND	0.5	ug/L						
1,3-Dichlorobenzene	ND	0.5	ug/L						
1,4-Dichlorobenzene	ND	0.5	ug/L						
1,1-Dichloroethane	ND	0.5	ug/L						
1,2-Dichloroethane	ND	0.5	ug/L						
1,1-Dichloroethylene	ND	0.5	ug/L						
cis-1,2-Dichloroethylene	ND	0.5	ug/L						
trans-1,2-Dichloroethylene	ND	0.5	ug/L						
1,2-Dichloropropane	ND	0.5	ug/L						
cis-1,3-Dichloropropylene	ND	0.5	ug/L						
trans-1,3-Dichloropropylene	ND	0.5	ug/L						
1,3-Dichloropropene, total	ND	0.5	ug/L						
Ethylbenzene	ND	0.5	ug/L						
Ethylene dibromide (dibromoethane)	ND	0.2	ug/L						
Hexane	ND	1.0	ug/L						
Methyl Ethyl Ketone (2-Butanone)	ND	5.0	ug/L						
Methyl Isobutyl Ketone	ND	5.0	ug/L						
Methyl tert-butyl ether	ND	2.0	ug/L						
Methylene Chloride	ND	5.0	ug/L						
Styrene	ND	0.5	ug/L						
1,1,1,2-Tetrachloroethane	ND	0.5	ug/L						
1,1,2,2-Tetrachloroethane	ND	0.5	ug/L						
Tetrachloroethylene	ND	0.5	ug/L						
Toluene	ND	0.5	ug/L						

Certificate of Analysis
Client: LRL Associates Ltd.
Client PO:

Report Date: 30-Jul-2018

Order Date: 24-Jul-2018

Project Description: 170254

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
1,1,1-Trichloroethane	ND	0.5	ug/L						
1,1,2-Trichloroethane	ND	0.5	ug/L						
Trichloroethylene	ND	0.5	ug/L						
Trichlorofluoromethane	ND	1.0	ug/L						
Vinyl chloride	ND	0.5	ug/L						
m,p-Xylenes	ND	0.5	ug/L						
o-Xylene	ND	0.5	ug/L						
Xylenes, total	ND	0.5	ug/L						
Surrogate: 4-Bromofluorobenzene	77.5		ug/L		96.8	50-140			
Surrogate: Dibromofluoromethane	60.2		ug/L		75.2	50-140			
Surrogate: Toluene-d8	72.5		ug/L		90.6	50-140			

Certificate of Analysis
Client: LRL Associates Ltd.
Client PO:

Report Date: 30-Jul-2018

Order Date: 24-Jul-2018

Project Description: 170254

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	25	ug/L	ND				30	
Metals									
Antimony	ND	2.5	ug/L	ND			0.0	20	
Arsenic	ND	5	ug/L	ND			0.0	20	
Barium	73.7	5	ug/L	72.2			2.1	20	
Beryllium	ND	2.5	ug/L	ND			0.0	20	
Boron	ND	50	ug/L	ND			0.0	20	
Cadmium	ND	0.5	ug/L	ND			0.0	20	
Chromium	ND	5	ug/L	ND			0.0	20	
Cobalt	ND	2.5	ug/L	ND			0.0	20	
Copper	2.51	2.5	ug/L	ND			0.0	20	
Lead	ND	0.5	ug/L	ND			0.0	20	
Molybdenum	ND	2.5	ug/L	ND			0.0	20	
Nickel	ND	5	ug/L	ND			0.0	20	
Selenium	ND	5	ug/L	ND			0.0	20	
Silver	ND	0.5	ug/L	ND			0.0	20	
Sodium	51400	1000	ug/L	50800			1.2	20	
Thallium	ND	0.5	ug/L	ND			0.0	20	
Uranium	0.6	0.5	ug/L	0.6			0.9	20	
Vanadium	ND	2.5	ug/L	ND			0.0	20	
Zinc	ND	25	ug/L	ND			0.0	20	
Volatiles									
Acetone	ND	5.0	ug/L	ND				30	
Benzene	ND	0.5	ug/L	ND				30	
Bromodichloromethane	4.74	0.5	ug/L	3.18			39.4	30	QR-07
Bromoform	ND	0.5	ug/L	ND				30	
Bromomethane	ND	0.5	ug/L	ND				30	
Carbon Tetrachloride	ND	0.2	ug/L	ND				30	
Chlorobenzene	ND	0.5	ug/L	ND				30	
Chloroform	8.54	0.5	ug/L	8.24			3.6	30	
Dibromochloromethane	ND	0.5	ug/L	ND				30	
Dichlorodifluoromethane	ND	1.0	ug/L	ND				30	
1,2-Dichlorobenzene	ND	0.5	ug/L	ND				30	
1,3-Dichlorobenzene	ND	0.5	ug/L	ND				30	
1,4-Dichlorobenzene	ND	0.5	ug/L	ND				30	
1,1-Dichloroethane	ND	0.5	ug/L	ND				30	
1,2-Dichloroethane	ND	0.5	ug/L	ND				30	
1,1-Dichloroethylene	ND	0.5	ug/L	ND				30	
cis-1,2-Dichloroethylene	ND	0.5	ug/L	ND				30	
trans-1,2-Dichloroethylene	ND	0.5	ug/L	ND				30	
1,2-Dichloropropane	ND	0.5	ug/L	ND				30	
cis-1,3-Dichloropropylene	ND	0.5	ug/L	ND				30	
trans-1,3-Dichloropropylene	ND	0.5	ug/L	ND				30	
Ethylbenzene	ND	0.5	ug/L	ND				30	
Ethylene dibromide (dibromoethane)	ND	0.2	ug/L	ND				30	
Hexane	ND	1.0	ug/L	ND				30	
Methyl Ethyl Ketone (2-Butanone)	ND	5.0	ug/L	ND				30	
Methyl Isobutyl Ketone	ND	5.0	ug/L	ND				30	
Methyl tert-butyl ether	ND	2.0	ug/L	ND				30	
Methylene Chloride	ND	5.0	ug/L	ND				30	
Styrene	ND	0.5	ug/L	ND				30	
1,1,1,2-Tetrachloroethane	ND	0.5	ug/L	ND				30	
1,1,2,2-Tetrachloroethane	ND	0.5	ug/L	ND				30	
Tetrachloroethylene	ND	0.5	ug/L	ND				30	
Toluene	ND	0.5	ug/L	ND				30	
1,1,1-Trichloroethane	ND	0.5	ug/L	ND				30	
1,1,2-Trichloroethane	ND	0.5	ug/L	ND				30	

Certificate of Analysis
Client: LRL Associates Ltd.
Client PO:

Report Date: 30-Jul-2018

Order Date: 24-Jul-2018

Project Description: 170254

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Trichloroethylene	ND	0.5	ug/L	ND				30	
Trichlorofluoromethane	ND	1.0	ug/L	ND				30	
Vinyl chloride	ND	0.5	ug/L	ND				30	
m,p-Xylenes	ND	0.5	ug/L	ND				30	
o-Xylene	ND	0.5	ug/L	ND				30	
Surrogate: 4-Bromofluorobenzene	75.4		ug/L		94.3	50-140			
Surrogate: Dibromofluoromethane	74.4		ug/L		92.9	50-140			
Surrogate: Toluene-d8	75.7		ug/L		94.6	50-140			

Certificate of Analysis
Client: LRL Associates Ltd.
Client PO:

Report Date: 30-Jul-2018

Order Date: 24-Jul-2018

Project Description: 170254

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	1680	25	ug/L		83.8	68-117			
F2 PHCs (C10-C16)	1670	100	ug/L		104	60-140			
F3 PHCs (C16-C34)	3980	100	ug/L		102	60-140			
F4 PHCs (C34-C50)	2710	100	ug/L		109	60-140			
Metals									
Antimony	54.8		ug/L	1.46	107	80-120			
Arsenic	60.8		ug/L	1.5	119	80-120			
Barium	99.3		ug/L	49.9	98.7	80-120			
Beryllium	60.6		ug/L	ND	121	80-120			QM-07
Boron	127		ug/L	67	120	80-120			
Cadmium	51.6		ug/L	ND	103	80-120			
Chromium	51.7		ug/L	ND	103	80-120			
Cobalt	49.6		ug/L	ND	98.9	80-120			
Copper	68.5		ug/L	ND	137	80-120			QM-07
Lead	54.1		ug/L	ND	108	80-120			
Molybdenum	56.9		ug/L	6.89	100	80-120			
Nickel	50.5		ug/L	ND	99.6	80-120			
Selenium	61.3		ug/L	ND	122	80-120			QM-07
Silver	45.5		ug/L	ND	91.0	80-120			
Sodium	14400		ug/L	13100	131	80-120			QM-07
Thallium	52.8		ug/L	ND	106	80-120			
Uranium	56.0		ug/L	0.9	110	80-120			
Vanadium	52.9		ug/L	2.53	101	80-120			
Zinc	64		ug/L	ND	124	80-120			QM-07
Volatiles									
Acetone	106	5.0	ug/L		106	50-140			
Benzene	49.0	0.5	ug/L		122	60-130			
Bromodichloromethane	46.0	0.5	ug/L		115	60-130			
Bromoform	39.0	0.5	ug/L		97.6	60-130			
Bromomethane	37.8	0.5	ug/L		94.5	50-140			
Carbon Tetrachloride	42.1	0.2	ug/L		105	60-130			
Chlorobenzene	37.5	0.5	ug/L		93.7	60-130			
Chloroform	32.0	0.5	ug/L		80.0	60-130			
Dibromochloromethane	38.7	0.5	ug/L		96.7	60-130			
Dichlorodifluoromethane	40.8	1.0	ug/L		102	50-140			
1,2-Dichlorobenzene	48.4	0.5	ug/L		121	60-130			
1,3-Dichlorobenzene	48.8	0.5	ug/L		122	60-130			
1,4-Dichlorobenzene	48.4	0.5	ug/L		121	60-130			
1,1-Dichloroethane	40.9	0.5	ug/L		102	60-130			
1,2-Dichloroethane	31.0	0.5	ug/L		77.5	60-130			
1,1-Dichloroethylene	35.4	0.5	ug/L		88.4	60-130			
cis-1,2-Dichloroethylene	45.4	0.5	ug/L		114	60-130			
trans-1,2-Dichloroethylene	34.9	0.5	ug/L		87.3	60-130			
1,2-Dichloropropane	50.8	0.5	ug/L		127	60-130			
cis-1,3-Dichloropropylene	49.4	0.5	ug/L		124	60-130			
trans-1,3-Dichloropropylene	48.7	0.5	ug/L		122	60-130			
Ethylbenzene	44.3	0.5	ug/L		111	60-130			
Ethylene dibromide (dibromoethane)	40.3	0.2	ug/L		101	60-130			
Hexane	49.0	1.0	ug/L		123	60-130			
Methyl Ethyl Ketone (2-Butanone)	125	5.0	ug/L		125	50-140			
Methyl Isobutyl Ketone	128	5.0	ug/L		128	50-140			

Certificate of Analysis
Client: LRL Associates Ltd.
Client PO:

Report Date: 30-Jul-2018

Order Date: 24-Jul-2018

Project Description: 170254

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Methyl tert-butyl ether	118	2.0	ug/L		118	50-140			
Methylene Chloride	38.9	5.0	ug/L		97.2	60-130			
Styrene	44.5	0.5	ug/L		111	60-130			
1,1,1,2-Tetrachloroethane	38.2	0.5	ug/L		95.6	60-130			
1,1,2,2-Tetrachloroethane	36.6	0.5	ug/L		91.4	60-130			
Tetrachloroethylene	40.3	0.5	ug/L		101	60-130			
Toluene	37.4	0.5	ug/L		93.6	60-130			
1,1,1-Trichloroethane	31.7	0.5	ug/L		79.3	60-130			
1,1,2-Trichloroethane	48.8	0.5	ug/L		122	60-130			
Trichloroethylene	45.8	0.5	ug/L		115	60-130			
Trichlorofluoromethane	31.8	1.0	ug/L		79.4	60-130			
Vinyl chloride	44.3	0.5	ug/L		111	50-140			
m,p-Xylenes	88.6	0.5	ug/L		111	60-130			
o-Xylene	42.7	0.5	ug/L		107	60-130			
Surrogate: 4-Bromofluorobenzene	80.0		ug/L		99.9	50-140			

Certificate of Analysis
Client: LRL Associates Ltd.
Client PO:

Report Date: 30-Jul-2018

Order Date: 24-Jul-2018

Project Description: 170254

Qualifier Notes:

Login Qualifiers :

Sample - Not preserved - Metals

Applies to samples: MW1

Sample - Not submitted in the correct container - VOCs vial was subsampled from PHCs bottle as Dup vial

Applies to samples: MW-X

Sample preserved upon receipt at the lab.

Applies to samples: MW1

Sample Qualifiers :

1 : Sediment and/or particulates in this liquid sample required digestion for Total metals analysis, which resulted in elevated detection limits.

QC Qualifiers :

QM-07 : The spike recovery was outside acceptance limits for the MS and/or MSD. The batch was accepted based on other acceptable QC.

QR-07 : Duplicate result exceeds RPD limits due to non-homogeneity between multiple sample vials. Remainder of QA/QC is acceptable.

QS-02 : Spike level outside of control limits. Analysis batch accepted based on other QC included in the batch.

Sample Data Revisions

None

Work Order Revisions / Comments:

Metals analyzed using ICP-OES.

Other Report Notes:

n/a: not applicable

ND: Not Detected

MDL: Method Detection Limit

Source Result: Data used as source for matrix and duplicate samples

%REC: Percent recovery.

RPD: Relative percent difference.

CCME PHC additional information:

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