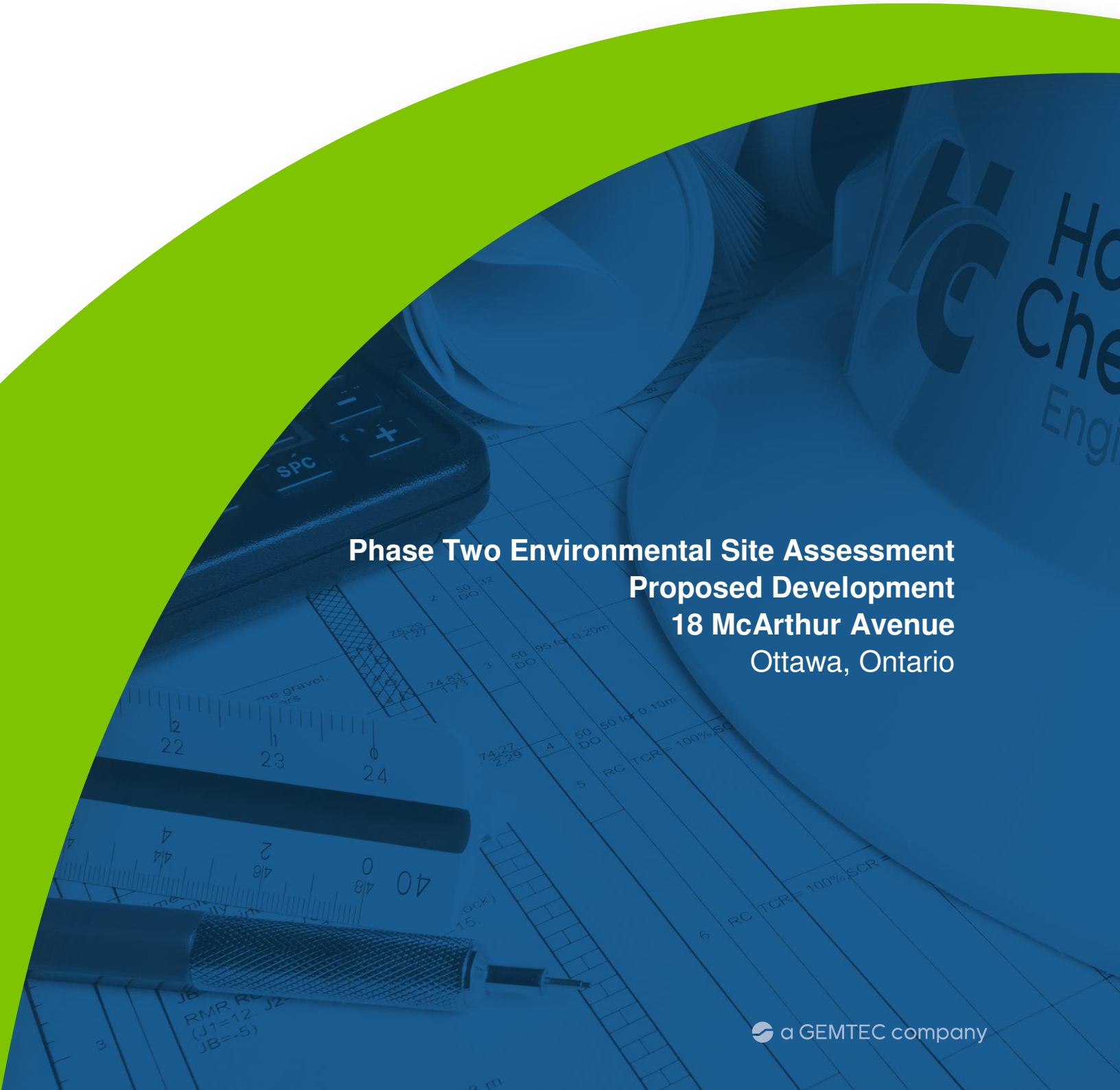
Houle Chevrier Engineering



Phase Two Environmental Site Assessment
Proposed Development
18 McArthur Avenue
Ottawa, Ontario

a GEMTEC company

Houle Chevrier Engineering

Submitted to:

SOMA STUDIO
2277 Prospect Avenue
Ottawa, ON
K1H 7G2

Phase Two Environmental Site Assessment
Proposed Development
18 McArthur Avenue
Ottawa, Ontario

May 27, 2016
Project: 64176.01

EXECUTIVE SUMMARY

A Phase One ESA report previously carried out for the subject property recommended that a Phase Two ESA investigation be carried out for the proposed residential development located at 18 McArthur Avenue in Ottawa, Ontario. The Phase Two ESA investigated the following Area of Potential Environmental Concern (APEC) that was identified in the Phase One ESA:

APEC 1: Fill Material Across Subject Property

A geotechnical investigation of the subject property indicated that fill material has been placed on the subject property. During the investigation, fill and possible fill material was encountered below the asphaltic concrete parking area at the two (2) borehole locations advanced on the subject property. The fill material/possible fill material underlying the asphaltic concrete generally consists of dark brown, brown and grey brown silty clay and sand with varying amounts of gravel. The total thickness of the fill/possible fill materials in the boreholes ranged from about 1.3 to 1.9 metres. Due to the unknown origin and quality of this fill material, the contaminants of concern are metals, polycyclic aromatic hydrocarbons (PAHs), and petroleum hydrocarbons (PHCs)

The Phase Two ESA investigation was carried out on May 17, 2016. The components of the Phase Two ESA investigation consisted of advancing three (3) test pits to assess the soil in the area of APEC 1. Soil samples were collected and submitted to Paracel Laboratories Ltd. of Ottawa, Ontario for laboratory analyses of selected parameters.

The data collected during test pit investigation indicated that the site is underlain by a surficial layer of asphaltic concrete overlying fill material.

The analytical results of the soil sampling do not meet the applicable MOE Table 3 site condition standards for the contaminants of concern identified during the Phase One ESA.

Based on the results of the current investigation, the contaminants within the fill material in the vicinity of test pits 16-2 and 16-3 should be removed as part of the site development and disposed of at a licensed landfill. Delineation of soil exceeding the site condition standards could be performed in order to identify the amount of material required to be disposed at a licensed landfill facility. The landfill may also require leachate test results for the soil. This may be completed in advance of construction or at the time of site development.

Confirmation sampling should be carried out by Houle Chevrier Engineering Ltd. following the removal of the contaminated soil to confirm that all contaminants have been removed.

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1.0 INTRODUCTION

Houle Chevrier Engineering Ltd. (HCEL) was retained by SOMA STUDIOS. to carry out a Phase Two Environmental Site Assessment (ESA) for the property located at 18 McArthur Avenue in Ottawa, Ontario (hereafter referred to as "the subject property"). The general location of the subject property is illustrated on the Key Plan, Figure 1.

The purpose of the Phase Two ESA was to investigate the area of potential environmental concern identified in the Phase One ESA carried out by Kollard Associates Inc., dated September 8, 2014, and to assess the potential for environmental impact at the subject property. This Phase Two ESA was completed in general accordance with Ontario Regulation 153/04.

1.1 Phase Two Property Description

The subject property is approximately 407 square metres (0.1 acres) in size. The legal description for 18 McArthur Avenue Lot 64, Plan 239, save and except Part 14 on Plan Ct 193, 429, formerly City of Vanier, City of Ottawa, Ontario, PIN 04249-0041.

1.2 Phase Two Property Ownership

The contact person for the subject property is Mr. Fernando Matos at (613) 884-4425.

1.3 Current and Future Land Uses

The site is currently vacant and is in use as a rental parking lot. Based on a review of aerial photographs, it is our understanding that the site was formerly occupied by a single family detached residential dwelling which was demolished prior to the current ownership. The subject property is currently zoned as residential. Plans are being prepared to develop the land as a residential building.

1.4 Applicable Site Condition Standard

Site restoration standards were selected for this site in accordance with the requirements of Ontario Regulation 153/04, Record of Site Condition – Part XV.1 of the Environmental Protection Act (O. Reg. 153/04, Ministry of Environment and Climate Change, October 31, 2011).

The following information was considered in selecting the site condition standards:

- The subject property is within an urban area;
- No drinking water wells are located on the subject property or within 250 metres of the subject property;

- The current property use is vacant (paved for parking); however, plans are being prepared to develop the property as residential and its last former use was likely residential;
- The overburden thickness is greater than 2 metres.

Based on the above information, the current Ministry of Environment and Climate Change (MOECC) Table 3 full depth generic site condition standards for coarse grained soil, commercial property use, in a non-potable groundwater condition as outlined in the MOECC, Soil, Groundwater and Sediment Standards for use under Part XV.1 of the Environmental Protection Act (MOECC, April 15, 2011) was selected for the subject property.

2.0 BACKGROUND INFORMATION

2.1 Physical Setting

The subject property is currently vacant and has historically been used as residential. There are no underground utilities on the subject site.

The subject property has a relatively flat topography and is at an elevation of approximately 56 metres above sea level. Surrounding topography generally slopes gradually downwards to the west. Based on the topography of the area, it is expected that the local shallow groundwater flow is towards the Rideau River to the west.

2.2 Past Investigations

A Phase One ESA was conducted by Kollard Associates Inc. for the subject property and is provided in the report titled "Phase I Environmental Site Assessment, 18 McArthur Avenue, City of Ottawa, Ontario" dated September 8, 2014. The Phase One ESA was carried out under the supervision of a qualified person in accordance with the Ontario Regulation 153/04 made under the Environmental Protection Act.

A geotechnical investigation was carried out by Houle Chevrier Engineering Ltd. for the proposed development on the subject property. The results of the geotechnical investigation are provided in the report titled, "Geotechnical Investigation, Proposed Development, 18 McArthur Avenue, Ottawa, Ontario", dated March 23, 2016.

The following Area of Potential Environmental Concern (APEC) was determined through the Phase One ESA and the geotechnical investigation to exist for the subject property:

APEC 1: Fill Material Across Subject Property

A review of aerial photographs indicated the presence of a former building at the site. The geotechnical investigation at the subject property indicated that fill material has been placed on the subject property. During the investigation, fill and possible fill material was encountered below the asphaltic concrete parking area at all two (2) boreholes advanced on the subject property. The fill material/possible fill material underlying the asphaltic concrete generally consists of dark brown, brown and grey brown silty clay and sand with varying amounts of gravel. The total thickness of the fill/possible fill materials in the boreholes ranged from about 1.3 to 1.9 metres. Due to the unknown origin and quality of this fill material, the contaminants of concern are metals, polycyclic aromatic hydrocarbons (PAHs), and petroleum hydrocarbons (PHCs)

3.0 SCOPE OF INVESTIGATION

3.1 Overview of Site Investigation

The objectives of the Phase Two ESA were based on the results of the Phase One ESA and the geotechnical investigation and are to document the presence or absence of contaminants in the land or water on, in or under the subject property, and if contaminants are present, to identify the locations of and concentrations of contaminants in the land or water on, in or under the subject site, and to assess if the subject property meets the applicable MOECC site condition standards. The presence or absence of contaminants was investigated at discrete sampling locations using a limited number of samples.

The following tasks were completed during the Phase Two ESA:

- Preparation of a sampling and analysis plan;
- Three (3) test pits were advanced at the site to collect soil samples;
- Soil samples were submitted to an accredited laboratory for laboratory analysis of contaminants of concern;
- Compare the analytical results with the applicable site condition standard; and,
- Preparation of a Phase Two Environmental Site Assessment report.

3.2 Media Investigated

This Phase Two ESA included sampling and analysis of soil. No groundwater or sediment sampling was conducted as contaminants in the groundwater were not of concern and no surface water bodies are present on the subject property. The rationale for sampling the soil was to investigate the potential for contamination at the APECs identified in the Phase One ESA.

The soil quality at discrete locations on the subject property was assessed by collecting soil samples from three (3) test pits, numbered 16-1 to 16-3, inclusive, at regular depth intervals. All soil samples were field preserved in methanol and screened in the field and at the office, with a subset being submitted for laboratory analysis of the identified contaminants of concern. The locations of the test pits are provided on Figure 2.

3.3 Phase One Conceptual Site Model

The Phase One Conceptual Site Model (CSM) prepared as part of the Phase One ESA identified the following details:

- The site is currently vacant and is used as a paid parking area.
- Adjacent land use has historically been residential and currently is a mix of commercial and residential;

- No areas of natural significance are present on the subject property or within the Phase One study area;
- Locations where potentially contaminating activities have occurred;
- Areas of potential environmental concern on the subject property.

3.3.1 Potentially Contaminating Activities

The following potentially contaminating activities were identified during the Phase One ESA to create an Area of Potential Environmental Concern:

- Unknown fill material had previously been brought to the subject property in the area of the former building footprint and to possibly raise the grade of the parking lot.

3.3.2 Areas of Potential Environmental Concern

The areas of potential environmental concern (APEC) on the subject property are summarized in the following table:

APEC	Location of APEC on Phase One Property	PCA	Location of PCA	Contaminants of Potential Concern	Media Potentially Impacted
APEC 1	Across subject property	Fill material	On site	• PAHs[1] • PHCs[2] • Metals	Soil

Notes:

1. PAHs – Polycyclic Aromatic Hydrocarbons
2. PHCs - Petroleum Hydrocarbons

3.4 Deviations from Sampling and Analysis Plan

No deviations occurred from the sampling and analysis plan.

3.5 Impediments

No impediments occurred during the investigation.

4.0 INVESTIGATION METHODS

4.1 General

Three (3) test pits (numbered 16-1 to 16-3) were advanced on May 17, 2016. Soil samples were recovered at regular depth intervals and screened for visual and olfactory indications of contamination. Soil samples were collected from the test pits, and submitted to Paracel Laboratories Ltd. for chemical analyses of selected parameters.

4.2 Test Pitting

The test pits were advanced at the subject property using a rubber tired backhoe supplied and operated by Lacroix Heavy Equipment Rentals Ltd.. New, disposable nitrile gloves were worn and changed between each sample.

4.3 Soil Sampling

Soil samples were collected following the Guidance on Sampling and Analytical Methods for Use at Contaminated Sites in Ontario (MOECC, 1996). Soil samples were collected from the walls of the test pit or bucket of the backhoe and placed directly into sample jars and resealable zipper bags using nitrile gloves.

Geological descriptions of the collected soil samples based on the Record of Test Pit sheets in Appendix A are summarized in the following table:

Test Pit	Sample	Ground Surface Elevation (m)	Sample Depth (metres below ground surface)	Geological Description
TP16-1	GS-1	56.39	0.3 – 0.4	Grey brown silty clay, trace sand and gravel (Fill)
	GS-2	56.39	0.8 – 0.9	Brown fine to medium grained sand, trace gravel, contains construction debris fragments (Fill)
	GS-3	56.39	1.4 – 1.5	Brown fine to medium sand, trace gravel, contains construction debris fragments (Fill)
TP16-2	GS-1	56.42	0.2 – 0.3	Brown fine to medium silty sand (Fill)

Test Pit	Sample	Ground Surface Elevation (m)	Sample Depth (metres below ground surface)	Geological Description
	GS-2	56.42	0.5 – 0.6	Grey/brown silty clay, trace sand and gravel (Fill)
	GS-3	56.42	1.4 – 1.5	Brown fine to medium sand, trace gravel, contains construction debris fragments (Fill)
TP16-3	GS-1	56.50	0.4 – 0.5	Grey/brown silty clay, trace sand, trace gravel, contains construction debris fragments (Fill)
	GS-2	56.50	1.2 – 1.5	Grey/brown silty clay, trace sand, trace gravel, contains construction debris fragments (Fill)
	GS-3	56.50	2.0 – 2.1	Brown fine to medium silty sand, trace gravel (Fill)

4.4 Groundwater Sampling

Groundwater was not sampled as part of the Phase Two ESA work program as impacts to the groundwater were not identified during the Phase One ESA.

No significant moisture was observed during the test pit investigation of the subsurface.

4.5 Sediment Sampling

No sediments were sampled as part of the Phase Two ESA work program as there are no surface water bodies present on the site.

4.6 Analytical Testing

Laboratory analysis of soil samples was carried out by Paracel Laboratories Ltd. located at 300-2319 St. Laurent Boulevard in Ottawa, ON.

4.7 Residue Management Procedures

Recovered soil from the test pitting was placed back into the test excavations in the order it was recovered, as close as reasonably possible.

4.8 Quality Assurance and Quality Control Measures

Soil Samples

Soil samples were collected in clear glass jars supplied by the laboratory. The jars were partially pre-labeled prior to going out in the field to record the client (Houle Chevrier Engineering Ltd.), project number, test pit number and date of sampling on each laboratory supplied jar. In the field, a black pen or permanent marker was used to fill in the sample number and date. This allowed for the time spent in the field labeling jars to be minimized and reduced possible errors. A chain of custody was clearly completed to include the information for each sample collected and was attached to the sampling cooler storing the samples while the samples were transferred to the analytical laboratory for chemical testing.

A new pair of nitrile gloves was worn for collecting each of the soil samples to minimize cross contamination between samples and to protect staff from exposure to contaminants. Samples were collected directly into laboratory supplied jars. Following collection of soil samples in laboratory supplied jars, the remaining soil in the sampling tubes was placed in a plastic resealable zipper bag.

The soil samples collected in the laboratory supplied containers were immediately preserved in the field by placing the samples in a laboratory supplied cooler filled with ice packs to maintain the temperature between 4 and 10 degrees Celsius. Soil samples were returned to our office and placed into a dedicated refrigerator for storage of soil and groundwater samples. Soil samples were selected for submission based on visual and olfactory signs of contamination and the presence of fill material. All samples were submitted within the maximum allowable holding time of 14 days.

5.0 REVIEW AND EVALUATION OF INFORMATION

5.1 Geology

Surficial geology at the subject property was interpreted from the stratigraphic information obtained during test pitting at the specific test locations as well as two (2) pre-existing boreholes numbered 15-1 and 15-2.

Detailed descriptions of soil conditions can be found on the Record of Test Pit sheets and Record of Borehole Logs in Appendix A.

The following presents an overview of the subsurface conditions encountered in the test pits and boreholes advanced at this site.

5.1.1 Existing Pavement Structure

A layer of asphaltic concrete was encountered at the surface of all boreholes and test pits. The thickness of the asphaltic concrete ranges from about 40 to 100 millimetres. The asphaltic concrete is underlain by granular base material composed of grey crushed sand and gravel, with trace amounts of silt. The thickness of the base material ranges from 50 to 130 millimetres.

5.1.2 Fill Material

Fill was encountered below the existing pavement structure at all of the test pit and borehole locations. The fill material generally consists of dark brown, brown and grey brown silty clay and sand with varying amounts of gravel. Foreign debris consisting of organic material, brick, metal, plastic and asphaltic concrete were encountered within the fill material.

Possible fill material was encountered below the fill material in borehole 15-1 at a depth of about 1.1 metres below ground surface (elevation 55.1 metres, geodetic datum). The fill material is difficult to distinguish from native soils being of similar composition, and is often only identifiable by the presence of erroneous material (e.g. brick fragments, asphaltic concrete pieces, etc.). Since no erroneous material was observed in the recovered soil sample, and there is doubt regarding the depth to the undisturbed (native) material, the material was labelled as 'possible fill' material. The possible fill material can be described as grey brown sandy silt and has a thickness of about 0.4 metres.

The fill/possible fill material extend to depths ranging between about 1.5 and 2.3 metres below ground surface (elevation 54.2 and 54.8 metres, geodetic datum).

5.1.3 Glacial Till

Native deposits of glacial till were encountered at depths of about 1.5 and 2.0 metres below ground surface in boreholes 15-1 and 15-2, respectively (elevation 54.8 and 54.5 metres, geodetic datum). The glacial till is heterogeneous mixture of all grain sizes but can generally be

described as silty sand with varying amounts of clay and gravel. Cobbles and boulders should be expected within the glacial till.

5.1.4 Inferred Bedrock

Inferred weathered bedrock was encountered in borehole 15-2 at a depth of about 5.2 metres below ground surface (elevation 51.3 metres, geodetic datum).

Auger refusal within the inferred weathered bedrock was encountered at depths of about 5.4 and 5.8 metres below ground surface in boreholes 15-1 and 15-2, respectively (elevation 50.7 and 50.9 metres, geodetic datum). It should be noted that the top of bedrock or bedrock conditions were not confirmed through bedrock coring.

5.2 Site Condition Standards

Site condition standards were selected for this site in accordance with the requirements of Ontario Regulation 153/04, Records of Site Condition – Part XV.1 of the Environmental Protection Act (O. Reg. 153/04, MOE, October 31, 2011).

The following information was considered in selecting the site condition standards:

- The subject property is within an urban area;
- No drinking water wells are located on the subject property or within 250 metres of the subject property;
- The current property use is vacant (paved for parking); however, plans are being prepared to develop the property as residential and its last former use was likely residential;
- The overburden thickness at the property is greater than 2 metres.

Based on the above information, the current Ministry of Environment and Climate Change (MOECC) Table 3 full depth generic site condition standards for coarse grained soil, residential property use, in a non-potable groundwater condition as outlined in the MOE, Soil, Groundwater and Sediment Standards for use under Part XV.1 of the Environmental Protection Act (MOECC, April 15, 2011) was selected for the subject property.

5.3 Soil Quality

The laboratory certificates of analysis for the selected soil samples are presented in Appendix B. The locations and depths of the selected soil samples submitted for laboratory analysis are summarized in the following table:

Test Pit	Sample	Depth Interval (m bgs[1])	PAHs[2]	PHCs[3]	Metals
16-1	GS 1	0.3 – 0.4	✓	✓	✓
16-2	GS 3	1.4 – 1.5	✓	✓	✓
16-102[4]	GS 3	1.4 – 1.5	✓	✓	✓
16-3	GS 1	0.4 – 0.5	✓	✓	✓

Notes:

1. m bgs – metres below ground surface
2. PAHs – Polycyclic Aromatic Hydrocarbons
3. PHCs – Petroleum Hydrocarbons
4. 16-102 is a duplicate of test pit 16-2

The analytical results from the laboratory certificates of analysis were compared with the applicable Table 3 site condition standards (MOECC, 2011). The results are summarized in Tables 1 to 3 following the text of the report. As shown in Tables 1 to 3, the soil sample results satisfy the applicable MOECC Table 3 site condition standards, with the exception of the following:

- Multiple PAH parameter exceedances in TP16-102 (duplicate of TP 16-2);
- Lead exceedance in TP16-3.

It should be noted that exceedances were observed in sample TP16-102 and not in the duplicate sample TP 16-2. This is attributed to the heterogeneous nature of the fill material encountered.

5.4 Groundwater and Sediment Quality

Groundwater and sediments were not investigated as part of the Phase Two ESA.

5.5 Quality Assurance and Quality Control Results

One (1) duplicate soil sample was submitted to Paracel Laboratories Ltd. for analysis of metals, PHCs and PAHs. The soil sample TP16-101 GS3 is a duplicate of sample 16-2 GS3. As indicated in Tables 1 to 3, the results of the duplicate soil sample varied significantly original sample. As discussed with the laboratory, the samples were re-analyzed, however the results were consistent with the initial results. The laboratory also noted significant differences in color between the two samples and attributed it to the non-homogeneous nature of the material.

The Laboratory QA/QC results for the soil analysis are included with the laboratory analytical data provided in Appendix B. Soil sample holding times were met, and all laboratory quality control blanks, duplicates and spikes and surrogate compound recoveries met applicable industry criteria.

Based on the measures discussed above, sample collection and handling protocols are considered acceptable and associated analytical results reproducible. The quality of the field data and laboratory data from the investigation was sufficient in that decision making was not affected and the overall objectives of the investigation and assessment were met.

5.6 Phase Two Conceptual Site Model

5.6.1 Potentially Contaminating Activities

The following potentially contaminating activities were identified during the Phase One ESA:

- Unknown fill material had previously been brought to the subject property.

5.6.2 Areas of Potential Environmental Concern (APECs)

A description and assessment of areas where potentially contaminating activities have occurred and areas of potential environmental concern are summarized in the following table:

APEC	Location of APEC on Phase One Property	PCA	Location of PCA	Contaminants of Potential Concern	Media Potentially Impacted
APEC 1	Across subject property	Fill material	On site	• PAHs • PHCs • Metals	Soil

As indicated on Tables 1 to 3, soil exceedances were identified in the fill material in test pits 16-2 and TP 16-3 compared with the MOECC Table 3 site condition standards.

5.6.3 Subsurface Structures

No underground services for hydro and gas were identified on the subject property.

5.6.4 Physical Settings and Hydrogeological Characteristics of the Subject Property

The stratigraphy of the subject property is generally taken as a surficial layer of asphaltic concrete overlying fill material, followed by native deposits of glacial till.

5.6.5 Selection of Site Condition Standards

Based on the results of the Phase One and Two ESAs conducted for the subject property, the site restoration standards selected for this site are the MOECC Table 3 Full Depth Generic Site Condition Standards for Commercial Property Use in a Non-Potable Ground Water Condition (coarse textured soils).

5.6.6 Identified Contamination and Impacted Medium on the Subject Property

The Phase Two ESA investigated the APEC identified in the Phase One ESA and the result of the investigation is summarized below:

APEC 1: Fill Material

As indicated in Tables 1 to 3, the soil samples submitted from the test pits do not meet the applicable MOECC Table 3 site condition standards for lead and multiple PAHs.

5.6.7 Summary of Identified Impacts

The samples of the fill within the foundation of the old structure at test pit locations 16-2 and 16-3 exceed the MOECC Table 3 for multiple PAHs and lead, respectively.

6.0 CONCLUSIONS

The Phase One ESA report previously carried out for the subject property recommended that a Phase Two ESA investigation be carried out for the proposed residential building 18 McArthur Avenue in Ottawa, Ontario. The Phase Two ESA investigated the following Area of Potential Environmental Concern (APEC) that was identified in the Phase One ESA:

APEC 1: Fill Material Across Subject Property

A geotechnical investigation of the subject property indicated that fill material has been placed on the subject property. During the investigation, fill and possible fill material was encountered below the asphaltic concrete layer at the two (2) boreholes advanced on the subject property. The fill/possible fill material underlying the asphaltic concrete generally consists of The fill material/possible fill material underlying the asphaltic concrete generally consists of dark brown, brown and grey brown silty clay and sand with varying amounts of gravel. The total thickness of the fill/possible fill materials in the boreholes ranged from about 1.3 to 1.9 metres. Due to the unknown origin and quality of this fill material, the contaminants of concern are metals, polycyclic aromatic hydrocarbons (PAHs), and petroleum hydrocarbons (PHCs).

The Phase Two ESA investigation was carried out on May 17, 2016. The components of the Phase Two ESA investigation consisted of advancing three (3) test pits to assess the soil in the area of APEC 1. Soil samples were collected and submitted to Paracel Laboratories Ltd. of Mississauga, Ontario for laboratory analyses of selected parameters.

The data collected during test pitting indicated that the site is underlain by a surficial layer of asphaltic concrete overlying fill material.

The analytical results of the soil sampling do not meet the applicable MOE Table 3 site condition standards for the contaminants of concern identified during the Phase One ESA.

Based on the results of the current investigation, the contaminants within the fill material in the vicinity of test pits 16-2 and 16-3 should be removed as part of the site development and disposed of at a licensed landfill. Delineation of soil exceeding the site condition standards could be performed in order to identify the amount of material required to be disposed at a licensed landfill facility. The landfill may also require leachate test results for the soil. This may be completed in advance of construction or at the time of site development.

Confirmation sampling should be carried out by Houle Chevrier Engineering Ltd. following the removal of the contaminated soil to confirm that all contaminants have been removed.

7.0 LIMITATION OF LIABILITY

This report was prepared for and the work referred to within it has been undertaken by Houle Chevrier Engineering Ltd. (HCEL) for SOMA STUDIO and is intended for the exclusive use of the SOMA STUDIO. This report may not be relied upon by any other person or entity without the express written consent of HCEL and SOMA STUDIO. Nothing in this report is intended to provide a legal opinion.

The investigation undertaken by HCEL with respect to this report and any conclusions or recommendations made in this report reflect the best judgements of HCEL based on the site conditions observed during the investigations undertaken at the date(s) identified in the report and on the information available at the time the report was prepared. This report has been prepared for the application noted and it is based, in part, on visual observations made at the site, subsurface investigations at discrete locations and depths and laboratory analyses of specific chemical parameters and material during a specific time interval, all as described in the report. Unless otherwise stated, the findings contained in this report cannot be extrapolated or extended to previous or future site conditions, portions of the site that were unavailable for direct investigation, subsurface locations on the site that were not investigated directly, or chemical parameters, materials or analysis which were not addressed. Chemical parameters other than those addressed by the investigation described in this report may exist in soil and groundwater elsewhere on the site, the chemical parameters addressed in the report may exist in soil and groundwater at other locations at the site that were not investigated and concentrations of the chemical parameters addressed which are different than those reported may exist at other locations on the site than those from where the samples were taken.

Should new information become available during future work, including excavations, borings or other studies, HCEL should be requested to review the information and, if necessary, re-assess the conclusions presented herein.

We trust this report provides sufficient information for your present purposes. If you have any questions concerning this report, please do not hesitate to contact our office.

Katherine Rispoli, B.Eng., M.A.Sc.
Environmental Scientist

Shaun Pelkey, M.Sc.E., P.Eng.
Principal, Environmental Engineer

8.0 REFERENCES

Kollaard Associates. Phase I Environmental Site Assessment 18 McArthur Avenue, Ottawa, Ontario. September 8, 2014.

Ontario Ministry of the Environment. Ontario Regulation 153/04, Made under the Environmental Protection Act, Part XV.1 – Records of Site Condition. October 31, 2011.

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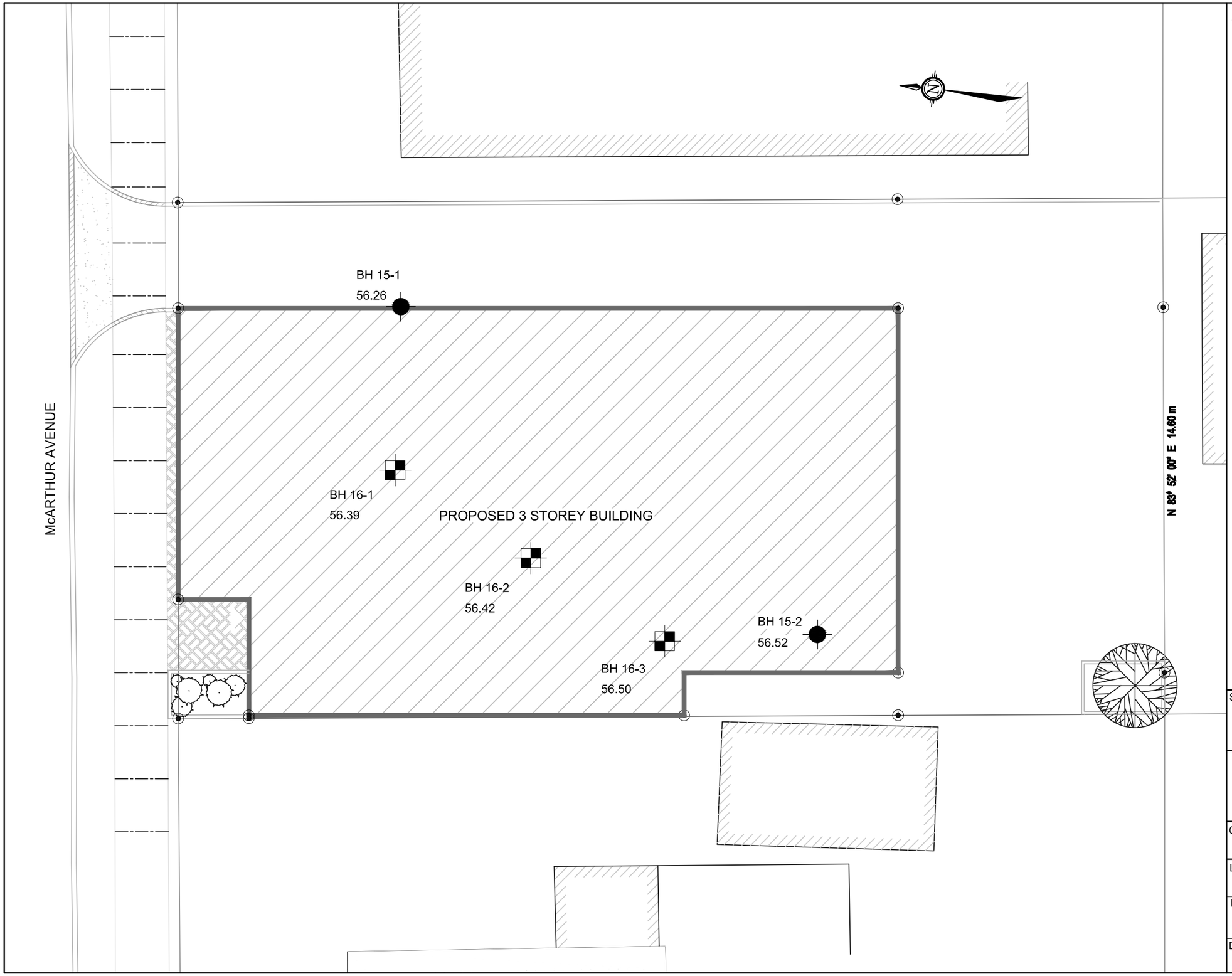
Project	Drawing
PHASE II ENVIRONMENTAL SITE ASSESSMENT 18 McARTHUR AVENUE, OTTAWA, ONTARIO	KEY PLAN

Drwn By	Chkd By	Date	Project No.	Revision No.	
D.J.R.	L.A.	MAY 2016	64176.01	0	**FIGURE 1**



LEGEND

TP 16-1
56.39
TEST PIT LOCATION IN PLAN
(current investigation by Houle Chevrier Engineering Ltd.)
ELEVATION IN METRES GEODETIC DATUM

BH 15-1
56.26
BOREHOLE LOCATION IN PLAN
(previous investigation by Houle Chevrier Engineering Ltd.)
ELEVATION IN METRES GEODETIC DATUM

Scale 1:100

0 2 4 6m

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Client	SOMA STUDIO
Project	64176.01
Location	18 McARTHUR AVENUE, OTTAWA, ON
Drwn by	M.L.
Chkd by	L.A.
	TEST HOLE LOCATION PLAN
Date	MAY 2016
Rev.	0
	FIGURE 2

TABLE 1
SOIL ANALYTICAL RESULTS
PETROLEUM PARAMETERS

Parameter	Units	RDL	MOE Table 3*	Sample Location: TP16-1 Sample ID: TP16-1 GS1 Laboratory Sample ID: 1621205-01 Date Sampled: 05/17/2016	TP16-2 TP16-2 GS3 1621205-02 05/17/2016	TP16-102 TP16-102 GS3 1621205-03 05/17/2016	TP16-3 TP16-3 GS1 1621205-04 05/17/2016
F1 PHCs (C6-C10)	ug/g dry	7	55 ug/g dry	ND (7)	ND (7)	ND (7)	ND (7)
F2 PHCs (C10-C16)	ug/g dry	4	98 ug/g dry	ND (4)	ND (4)	ND (4)	ND (4)
F3 PHCs (C16-C34)	ug/g dry	8	300 ug/g dry	ND (8)	ND (8)	ND (8)	ND (8)
F4 PHCs (C34-C50)	ug/g dry	6	2800 ug/g dry	ND (6)	ND (6)	ND (6)	ND (6)

Notes:

1 RDL - Reported Detection Limit
2 ND - Not detected
3 * - Table 3: Full Depth Generic Site Condition Standards for Commercial Properties in a Non-Potable Ground Water Condition (coarse textu (MOE, April 15, 2011)
4 ** - Xylene Mixture is calculated using the sum of m/p-xylene and o-xylene
5 **Bold** - Exceeds MOE Table 7 Site Condition Standard

TABLE 2
SOIL ANALYTICAL RESULTS
METAL PARAMETERS

Parameter	Units	RDL	MOE Table 3*	Sample Location: TP16-1 Sample ID: TP16-1 GS1 Laboratory Sample ID: 1621205-01 Date Sampled: 05/17/2016	TP16-2 TP16-2 GS3 1621205-02 05/17/2016	TP16-102 TP16-102 GS3 1621205-03 05/17/2016	TP16-3 TP16-3 GS1 1621205-04 05/17/2016
Antimony	ug/g dry	1.0	7.5 ug/g dry	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Arsenic	ug/g dry	1.0	18 ug/g dry	4.8	1.4	1.7	3.6
Barium	ug/g dry	1.0	390 ug/g dry	239	53.0	41.1	158
Beryllium	ug/g dry	1.0	4 ug/g dry	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Boron	ug/g dry	1.0	120 ug/g dry	6.7	4.2	4.3	8.6
Cadmium	ug/g dry	0.5	1.2 ug/g dry	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
Chromium	ug/g dry	1.0	160 ug/g dry	78.4	11.3	9.5	25.2
Cobalt	ug/g dry	1.0	22 ug/g dry	18.3	3.9	3.5	10.0
Copper	ug/g dry	1.0	140 ug/g dry	42.7	12.1	9.3	28.4
Lead	ug/g dry	1.0	120 ug/g dry	28.8	29.7	24.3	**181**
Molybdenum	ug/g dry	1.0	6.9 ug/g dry	1.6	ND (1.0)	ND (1.0)	1.7
Nickel	ug/g dry	1.0	100 ug/g dry	45.9	7.7	6.6	27.9
Selenium	ug/g dry	1.0	2.4 ug/g dry	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Silver	ug/g dry	0.5	20 ug/g dry	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
Thallium	ug/g dry	1.0	1 ug/g dry	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Uranium	ug/g dry	1.0	23 ug/g dry	2.8	1.5	1.5	2.5
Vanadium	ug/g dry	1.0	86 ug/g dry	76.0	18.1	16.3	36.4
Zinc	ug/g dry	1.0	340 ug/g dry	87.3	37.0	27.2	120

Notes:

1 RDL - Reported Detection Limit

2 ND - Not detected

3 * - Table 3: Full Depth Generic Site Condition Standards for Commercial Properties in a Non-Potable Ground Water Condition (coarse textured soils) (MOE, April 15, 2011)

4 **Bold** - Exceeds MOE Table 3 Site Condition Standard

TABLE 3
SOIL ANALYTICAL RESULTS
POLYCYCLIC AROMATIC HYDROCARBONS

Parameter	Units	RDL	MOE Table 3*	Sample Location: TP16-1 Sample ID: TP16-1 GS1 Laboratory Sample ID: 1621205-01 Date Sampled: 05/17/2016	TP16-2 TP16-2 GS3 1621205-02 05/17/2016	TP16-102 TP16-102 GS3 1621205-03 05/17/2016	TP16-3 TP16-3 GS1 1621205-04 05/17/2016
Acenaphthene	ug/g dry	0.02	7.9 ug/g dry	ND (0.02)	0.02	0.27	ND (0.02)
Acenaphthylene	ug/g dry	0.02	0.15 ug/g dry	ND (0.02)	0.04	**0.26**	0.03
Anthracene	ug/g dry	0.02	0.67 ug/g dry	ND (0.02)	0.06	**0.74**	0.05
Benzo[a]anthracene	ug/g dry	0.02	0.5 ug/g dry	ND (0.02)	0.19	**2.23**	0.14
Benzo[a]pyrene	ug/g dry	0.02	0.3 ug/g dry	ND (0.02)	0.23	**2.54**	0.18
Benzo[b]fluoranthene	ug/g dry	0.02	0.78 ug/g dry	ND (0.02)	0.26	**2.82**	0.20
Benzo[g,h,i]perylene	ug/g dry	0.02	6.6 ug/g dry	ND (0.02)	0.17	1.67	0.13
Benzo[k]fluoranthene	ug/g dry	0.02	0.78 ug/g dry	ND (0.02)	0.14	**1.93**	0.14
Chrysene	ug/g dry	0.02	7 ug/g dry	ND (0.02)	0.20	2.27	0.15
Dibenzo[a,h]anthracene	ug/g dry	0.02	0.1 ug/g dry	ND (0.02)	0.04	**0.56**	0.03
Fluoranthene	ug/g dry	0.02	0.69 ug/g dry	ND (0.02)	0.47	**5.70**	0.38
Fluorene	ug/g dry	0.02	62 ug/g dry	ND (0.02)	0.02	0.35	ND (0.02)
Indeno[1,2,3-cd]pyrene	ug/g dry	0.02	0.38 ug/g dry	ND (0.02)	0.16	**1.72**	0.13
1-Methylnaphthalene	ug/g dry	0.02	0.99 ug/g dry	ND (0.02)	ND (0.02)	0.13	ND (0.02)
2-Methylnaphthalene	ug/g dry	0.02	0.99 ug/g dry	ND (0.02)	ND (0.02)	0.10	ND (0.02)
Methylnaphthalene (1&2)	ug/g dry	0.04	0.99 ug/g dry	ND (0.04)	ND (0.04)	0.22	ND (0.04)
Naphthalene	ug/g dry	0.01	0.6 ug/g dry	ND (0.01)	0.02	0.13	0.01
Phenanthrene	ug/g dry	0.02	6.2 ug/g dry	ND (0.02)	0.26	4.11	0.15
Pyrene	ug/g dry	0.02	78 ug/g dry	ND (0.02)	0.39	4.45	0.31

Notes:

1 RDL - Reported Detection Limit

2 ND - Not detected

3 * - Table 3: Full Depth Generic Site Condition Standards for Commercial Properties in a Non-Potable Ground Water Condition (coarse textured soils) (MOE, April 15, 2011)

4 **Bold** - Exceeds MOE Table 3 Site Condition Standard

APPENDIX A

Record of Test Pit and Borehole Sheets

PROJECT: 64176.01

RECORD OF TEST PIT TP16-1

SHEET 1 OF 1

LOCATION: See Test Pit Location Plan, Figure 2

DATUM: Geodetic

DATE OF EXCAVATION: May 17, 2016

TYPE OF EXCAVATOR:

DEPTH SCALE METRES	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLE NUMBER	ADDITIONAL LABORATORY TESTING	COMBUSTIBLE VAPOUR READINGS ON SAMPLE HEADSPACE (PARTS PER MILLION) 100 200 300 400	WATER LEVEL IN OPEN TEST PIT OR STANDPIPE INSTALLATION
0	Ground Surface		56.39				
	Asphaltic concrete		56.34 / 0.05				
	Grey crushed sand and gravel (BASE MATERIAL)		56.24 / 0.15				
	Grey brown silty clay, trace sand and gravel (FILL MATERIAL)			1	METALS, PAHs, PHCs	5	Backfilled with excavated material.
			55.69 / 0.70				
	Brown fine to medium grained sand, trace gravel, containing fragments of construction debris such as metal, concrete, brick, plastic, and asphalt (FILL MATERIAL)			2		0	
1				3		0	
			54.74 / 1.65				
	Test pit terminated on former concrete slab.						No groundwater seepage observed upon completion of excavating.
2							
3							

DEPTH SCALE

1 to 15

Houle Chevrier Engineering

LOGGED: M.L.

CHECKED:

PROJECT: 64176.01

RECORD OF TEST PIT TP16-2

SHEET 1 OF 1

LOCATION: See Test Pit Location Plan, Figure 2

DATUM: Geodetic

DATE OF EXCAVATION: May 17, 2016

TYPE OF EXCAVATOR:

DEPTH SCALE METRES	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLE NUMBER	ADDITIONAL LABORATORY TESTING	COMBUSTIBLE VAPOUR READINGS ON SAMPLE HEADSPACE (PARTS PER MILLION) 100 200 300 400	WATER LEVEL IN OPEN TEST PIT OR STANDPIPE INSTALLATION
0	Ground Surface		56.42				
	Asphaltic concrete		0.04				
	Grey crushed sand and gravel (BASE MATERIAL)		0.10				
	Brown fine to medium silty sand (FILL MATERIAL)		55.97	1		0	
	Grey bown silty clay, trace sand and gravel (FILL MATERIAL)		0.45 / 55.78	2		0	Backfilled with excavated material.
	Brown fine to medium grained silty sand, trace gravel (FILL MATERIAL)		0.64 / 55.51				
1	Brown fine to medium grained sand, trace gravel, containing fragments of construction debris such as metal, concrete, brick, plastic, and asphalt (FILL MATERIAL)		0.91 / 54.77	3	METALS, PAHs, PHCs	0	
	Test pit terminated on former concrete slab.		1.65				No groundwater seepage observed upon completion of excavating.
2							
3							

DEPTH SCALE

1 to 15

Houle Chevrier Engineering

LOGGED: M.L.

CHECKED:

PROJECT: 64176.01

RECORD OF TEST PIT TP16-3

SHEET 1 OF 1

LOCATION: See Test Pit Location Plan, Figure 2

DATUM: Geodetic

DATE OF EXCAVATION: May 17, 2016

TYPE OF EXCAVATOR:

DEPTH SCALE METRES	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLE NUMBER	ADDITIONAL LABORATORY TESTING	COMBUSTIBLE VAPOUR READINGS ON SAMPLE HEADSPACE (PARTS PER MILLION) 100 200 300 400	WATER LEVEL IN OPEN TEST PIT OR STANDPIPE INSTALLATION
0	Ground Surface		56.50				
	Asphaltic concrete		0.04				
	Grey crushed sand and gravel (BASE MATERIAL)		0.10				
	Brown fine to medium silty sand (FILL MATERIAL)		0.15				
	Grey brown silty clay, trace sand, trace gravel, containing fragments of construction debris such as metal, concrete, brick, plastic, and asphalt (FILL MATERIAL)			1	METALS, PAHs, PHCs	0	Backfilled with excavated material.
1				2		0	
2	Brown fine to medium grained silty sand, trace gravel (FILL MATERIAL)		54.54 1.96	3		0	
	End of test pit		54.19 2.31				No groundwater seepage observed upon completion of excavating.
3							

DEPTH SCALE

1 to 15

Houle Chevrier Engineering

LOGGED: M.L.

CHECKED:

RECORD OF BOREHOLE 15-1

PROJECT: 15-128

LOCATION: See Site Plan, Figure 2

BORING DATE: May 19, 2015

SHEET 1 OF 1

DATUM: Geodetic

SPT HAMMER: 63.5 kg; drop 0.76 m

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m; SHEAR STRENGTH Cu, kPa; nat. V - +; rem. V - ⊕; Q - ●; U - ○	HYDRAULIC CONDUCTIVITY, k, cm/s; WATER CONTENT, PERCENT; Wp; W; WI	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
0	Power Auger 200 mm Diameter Hollow Stem	Ground Surface	56.26							Cold Patch
		Asphaltic Concrete	56.16 / 0.10							
		Grey sand, gravel and boulders, trace silt (BASE MATERIAL)	56.03 / 0.23							
		Brown silty clay, some gravel with pockets of brown, fine to coarse grained sand, some silt, gravel, cobbles, boulders, brick debris(FILL MATERIAL)		1	C.S.					
1		Grey brown, silty clay, some sand, some gravel and organic material (FILL MATERIAL)	55.42 / 0.84							
		Grey brown sandy silt, trace clay (POSSIBLE FILL MATERIAL)	55.12 / 1.14	2	50 D.O.	8				
		Grey brown to dark grey silty sand, some clay, some gravel, cobbles, possible boulders (GLACIAL TILL)	54.76 / 1.50	3	50 D.O.	5				
2				4	50 D.O.	12				
3				5	50 D.O.	16			Hydrometer (See Fig. B1)	Borehole backfilled with auger cuttings
		Dark grey to grey black silty sand, some gravel, cobbles, possible boulders (GLACIAL TILL)	52.81 / 3.45							
4				6	50 D.O.	30				
5				7	50 D.O.	34				
		Auger Refusal on Inferred Bedrock	50.87 / 5.39	8	50 D.O.	50 for 0.05m				No groundwater seepage observed in open borehole upon completion of drilling.
6		End of Borehole								
7										

DEPTH SCALE

1 to 35

Houle Chevrier Engineering

LOGGED: A.N.

CHECKED:

BOREHOLE LOG 15128_BOREHOLE LOGS_GNT_V01_2015-05-20.GPJ HOULE CHEVRIER 2015.GDT 6-5-15

PROJECT: 15-128

RECORD OF BOREHOLE 15-2

SHEET 1 OF 1

LOCATION: See Site Plan, Figure 2

DATUM: Geodetic

BORING DATE: May 19, 2015

SPT HAMMER: 63.5 kg; drop 0.76 m

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m
0	Power Auger 200 mm Diameter Hollow Stem	Ground Surface	56.52			
		Asphaltic Concrete	0.04			
		Grey, crushed sand and gravel, trace silt (BASE MATERIAL)	0.09 / 0.14			
		Brown, fine to medium grained sand, some silt (FILL MATERIAL)		1	C.S.	
		Dark brown silty clay, some sand, some gravel, cobbles, brick debris (FILL MATERIAL)	55.76 / 0.76			
1		Dark brown, silty clay, some sand, some gravel, possible cobbles, organic material (FILL MATERIAL)		2	50 D.O.	7
				3	50 D.O.	9
2			54.52 / 2.00			
		Grey brown to dark grey silty clay, some sand, gravel, cobbles, possible boulders (GLACIAL TILL)		4	50 D.O.	41
3				5	50 D.O.	35
			52.71 / 3.81			
4		Dark grey to grey black silty sand, some gravel, possible cobbles and boulders (GLACIAL TILL)		6	50 D.O.	67 for 0.23m
				7	50 D.O.	50
5			51.34 / 5.18			
		Possible weathered shale bedrock		8	50 D.O.	50 for 0.08m
			50.73 / 5.79			
6		Auger Refusal in Inferred Bedrock End of Borehole				
7						

DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m: 20, 40, 60, 80

SHEAR STRENGTH Cu, kPa: 20, 40, 60, 80 — nat. V - + Q - ● — rem. V - ⊕ U - ○

HYDRAULIC CONDUCTIVITY, k, cm/s: 10^{-5}, 10^{-4}, 10^{-3}, 10^{-2}

WATER CONTENT, PERCENT: Wp — W — Wl; 20, 40, 60, 80

ADDITIONAL LAB. TESTING: Corrosion

PIEZOMETER OR STANDPIPE INSTALLATION: Cold Patch; Bentonite; Borehole backfilled with auger cuttings; No groundwater seepage observed in open borehole upon completion of drilling.

DEPTH SCALE

1 to 35

Houle Chevrier Engineering

LOGGED: A.N.

CHECKED:

BOREHOLE LOG 15128_BOREHOLE LOGS_GNT_V01_2015-05-20.GPJ_HOULE CHEVRIER 2015.GDT 5-29-15

APPENDIX B

Soil Laboratory Certificates of Analysis

PARACEL LABORATORIES LTD.
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300 - 2319 St. Laurent Blvd
Ottawa, ON, K1G 4J8
1-800-749-1947
www.paracellabs.com

Certificate of Analysis

Houle Chevrier

32 Steacie Drive
Kanata, ON K2K 2A9
Attn: Katherine Rispoli

Client PO:
Project: 64 176.01
Custody: 107869

Report Date: 18-May-2016
Order Date: 17-May-2016

Order #: 1621205

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

Paracel ID	Client ID
1621205-01	TP 16-1 GS-1
1621205-02	TP 16-2 GS-3
1621205-03	TP 16-102 GS-3
1621205-04	TP 16-3 GS-1

Approved By:

Mark Foto, M.Sc.
Lab Supervisor

Certificate of Analysis
Client: Houle Chevrier
Client PO:

Report Date: 18-May-2016
Order Date: 17-May-2016
Project Description: 64 176.01

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
PHC F1	CWS Tier 1 - P&T GC-FID	17-May-16	18-May-16
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	18-May-16	18-May-16
REG 153: Metals by ICP/OES, soil	based on MOE E3470, ICP-OES	18-May-16	18-May-16
REG 153: PAHs by GC-MS	EPA 8270 - GC-MS, extraction	18-May-16	18-May-16
Solids, %	Gravimetric, calculation	18-May-16	18-May-16

Certificate of Analysis
Client: Houle Chevrier
Client PO:

Report Date: 18-May-2016
Order Date: 17-May-2016
Project Description: 64 176.01

	Client ID:	TP 16-1 GS-1	TP 16-2 GS-3	TP 16-102 GS-3	TP 16-3 GS-1
	Sample Date:	17-May-16	17-May-16	17-May-16	17-May-16
	Sample ID:	1621205-01	1621205-02	1621205-03	1621205-04
	MDL/Units	Soil	Soil	Soil	Soil
Physical Characteristics					
% Solids	0.1 % by Wt.	80.0	89.9	90.2	88.3
Metals					
Antimony	1.0 ug/g dry	<1.0	<1.0	<1.0	<1.0
Arsenic	1.0 ug/g dry	4.8	1.4	1.7	3.6
Barium	1.0 ug/g dry	239	53.0	41.1	158
Beryllium	1.0 ug/g dry	<1.0	<1.0	<1.0	<1.0
Boron	1.0 ug/g dry	6.7	4.2	4.3	8.6
Cadmium	0.5 ug/g dry	<0.5	<0.5	<0.5	<0.5
Chromium	1.0 ug/g dry	78.4	11.3	9.5	25.2
Cobalt	1.0 ug/g dry	18.3	3.9	3.5	10.0
Copper	1.0 ug/g dry	42.7	12.1	9.3	28.4
Lead	1.0 ug/g dry	28.8	29.7	24.3	181
Molybdenum	1.0 ug/g dry	1.6	<1.0	<1.0	1.7
Nickel	1.0 ug/g dry	45.9	7.7	6.6	27.9
Selenium	1.0 ug/g dry	<1.0	<1.0	<1.0	<1.0
Silver	0.5 ug/g dry	<0.5	<0.5	<0.5	<0.5
Thallium	1.0 ug/g dry	<1.0	<1.0	<1.0	<1.0
Uranium	1.0 ug/g dry	2.8	1.5	1.5	2.5
Vanadium	1.0 ug/g dry	76.0	18.1	16.3	36.4
Zinc	1.0 ug/g dry	87.3	37.0	27.2	120
Hydrocarbons					
F1 PHCs (C6-C10)	7 ug/g dry	<7	<7	<7	<7
F2 PHCs (C10-C16)	4 ug/g dry	<4	<4	<4	<4
F3 PHCs (C16-C34)	8 ug/g dry	<8	<8	<8	<8
F4 PHCs (C34-C50)	6 ug/g dry	<6	<6	<6	<6
Semi-Volatiles					
Acenaphthene	0.02 ug/g dry	<0.02	0.02	0.27	<0.02
Acenaphthylene	0.02 ug/g dry	<0.02	0.04	0.26	0.03
Anthracene	0.02 ug/g dry	<0.02	0.06	0.74	0.05
Benzo [a] anthracene	0.02 ug/g dry	<0.02	0.19	2.23	0.14
Benzo [a] pyrene	0.02 ug/g dry	<0.02	0.23	2.54	0.18
Benzo [b] fluoranthene	0.02 ug/g dry	<0.02	0.26	2.82	0.20
Benzo [g,h,i] perylene	0.02 ug/g dry	<0.02	0.17	1.67	0.13
Benzo [k] fluoranthene	0.02 ug/g dry	<0.02	0.14	1.93	0.14
Chrysene	0.02 ug/g dry	<0.02	0.20	2.27	0.15

Certificate of Analysis
Client: Houle Chevrier
Client PO:

Report Date: 18-May-2016
Order Date: 17-May-2016
Project Description: 64 176.01

	Client ID:	TP 16-1 GS-1	TP 16-2 GS-3	TP 16-102 GS-3	TP 16-3 GS-1
	Sample Date:	17-May-16	17-May-16	17-May-16	17-May-16
	Sample ID:	1621205-01	1621205-02	1621205-03	1621205-04
	MDL/Units	Soil	Soil	Soil	Soil
Dibenzo [a,h] anthracene	0.02 ug/g dry	<0.02	0.04	0.56	0.03
Fluoranthene	0.02 ug/g dry	<0.02	0.47	5.70	0.38
Fluorene	0.02 ug/g dry	<0.02	0.02	0.35	<0.02
Indeno [1,2,3-cd] pyrene	0.02 ug/g dry	<0.02	0.16	1.72	0.13
1-Methylnaphthalene	0.02 ug/g dry	<0.02	<0.02	0.13	<0.02
2-Methylnaphthalene	0.02 ug/g dry	<0.02	<0.02	0.10	<0.02
Methylnaphthalene (1&2)	0.04 ug/g dry	<0.04	<0.04	0.22	<0.04
Naphthalene	0.01 ug/g dry	<0.01	0.02	0.13	0.01
Phenanthrene	0.02 ug/g dry	<0.02	0.26	4.11	0.15
Pyrene	0.02 ug/g dry	<0.02	0.39	4.45	0.31
2-Fluorobiphenyl	Surrogate	71.5%	61.4%	61.9%	64.6%
Terphenyl-d14	Surrogate	77.8%	76.9%	78.6%	76.3%

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	1.0	ug/g						
Boron	ND	1.0	ug/g						
Cadmium	ND	0.5	ug/g						
Chromium	ND	1.0	ug/g						
Cobalt	ND	1.0	ug/g						
Copper	ND	1.0	ug/g						
Lead	ND	1.0	ug/g						
Molybdenum	ND	1.0	ug/g						
Nickel	ND	1.0	ug/g						
Selenium	ND	1.0	ug/g						
Silver	ND	0.5	ug/g						
Thallium	ND	1.0	ug/g						
Uranium	ND	1.0	ug/g						
Vanadium	ND	1.0	ug/g						
Zinc	ND	1.0	ug/g						
Semi-Volatiles									
Acenaphthene	ND	0.02	ug/g						
Acenaphthylene	ND	0.02	ug/g						
Anthracene	ND	0.02	ug/g						
Benzo [a] anthracene	ND	0.02	ug/g						
Benzo [a] pyrene	ND	0.02	ug/g						
Benzo [b] fluoranthene	ND	0.02	ug/g						
Benzo [g,h,i] perylene	ND	0.02	ug/g						
Benzo [k] fluoranthene	ND	0.02	ug/g						
Chrysene	ND	0.02	ug/g						
Dibenzo [a,h] anthracene	ND	0.02	ug/g						
Fluoranthene	ND	0.02	ug/g						
Fluorene	ND	0.02	ug/g						
Indeno [1,2,3-cd] pyrene	ND	0.02	ug/g						
1-Methylnaphthalene	ND	0.02	ug/g						
2-Methylnaphthalene	ND	0.02	ug/g						
Methylnaphthalene (1&2)	ND	0.04	ug/g						
Naphthalene	ND	0.01	ug/g						
Phenanthrene	ND	0.02	ug/g						
Pyrene	ND	0.02	ug/g						
Surrogate: 2-Fluorobiphenyl	*1.09*		*ug/g*		*82.0*	*50-140*			
Surrogate: Terphenyl-d14	*1.22*		*ug/g*		*91.4*	*50-140*			

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	7	ug/g dry	ND				40	
F2 PHCs (C10-C16)	309	4	ug/g dry	197			44.6	30	QR-04
F3 PHCs (C16-C34)	451	8	ug/g dry	408			10.1	30	
F4 PHCs (C34-C50)	176	6	ug/g dry	156			12.2	30	
Metals									
Antimony	ND	1.0	ug/g dry	ND			0.0	30	
Arsenic	4.35	1.0	ug/g dry	3.72			15.4	30	
Barium	111	1.0	ug/g dry	117			4.7	30	
Beryllium	ND	1.0	ug/g dry	ND			0.0	30	
Boron	7.78	1.0	ug/g dry	8.65			10.6	30	
Cadmium	ND	0.5	ug/g dry	ND			0.0	30	
Chromium	56.5	1.0	ug/g dry	58.1			2.9	30	
Cobalt	17.6	1.0	ug/g dry	18.0			2.4	30	
Copper	78.8	1.0	ug/g dry	83.3			5.6	30	
Lead	8.90	1.0	ug/g dry	8.86			0.4	30	
Molybdenum	2.89	1.0	ug/g dry	2.76			4.4	30	
Nickel	51.5	1.0	ug/g dry	54.3			5.4	30	
Selenium	ND	1.0	ug/g dry	ND			0.0	30	
Silver	0.60	0.5	ug/g dry	ND			0.0	30	
Thallium	ND	1.0	ug/g dry	ND			0.0	30	
Uranium	3.45	1.0	ug/g dry	3.39			1.7	30	
Vanadium	45.7	1.0	ug/g dry	46.7			2.4	30	
Zinc	114	1.0	ug/g dry	116			1.6	30	
Physical Characteristics									
% Solids	86.6	0.1	% by Wt.	87.0			0.5	25	
Semi-Volatiles									
Acenaphthene	ND	0.02	ug/g dry	ND				40	
Acenaphthylene	ND	0.02	ug/g dry	ND				40	
Anthracene	ND	0.02	ug/g dry	ND				40	
Benzo [a] anthracene	ND	0.02	ug/g dry	ND				40	
Benzo [a] pyrene	ND	0.02	ug/g dry	ND				40	
Benzo [b] fluoranthene	ND	0.02	ug/g dry	ND				40	
Benzo [g,h,i] perylene	ND	0.02	ug/g dry	ND				40	
Benzo [k] fluoranthene	ND	0.02	ug/g dry	ND				40	
Chrysene	ND	0.02	ug/g dry	ND				40	
Dibenzo [a,h] anthracene	ND	0.02	ug/g dry	ND				40	
Fluoranthene	ND	0.02	ug/g dry	ND				40	
Fluorene	ND	0.02	ug/g dry	ND				40	
Indeno [1,2,3-cd] pyrene	ND	0.02	ug/g dry	ND				40	
1-Methylnaphthalene	ND	0.02	ug/g dry	ND				40	
2-Methylnaphthalene	ND	0.02	ug/g dry	ND				40	
Naphthalene	ND	0.01	ug/g dry	ND				40	
Phenanthrene	ND	0.02	ug/g dry	ND				40	
Pyrene	ND	0.02	ug/g dry	ND				40	
Surrogate: 2-Fluorobiphenyl	*0.842*		*ug/g dry*	*ND*	*51.3*	*50-140*			
Surrogate: Terphenyl-d14	*1.08*		*ug/g dry*	*ND*	*65.5*	*50-140*			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	181	7	ug/g	ND	90.5	80-120			
F2 PHCs (C10-C16)	102	4	ug/g	ND	113	80-120			
F3 PHCs (C16-C34)	166	8	ug/g	ND	89.2	80-120			
F4 PHCs (C34-C50)	118	6	ug/g	ND	95.2	80-120			
Metals									
Antimony	167		ug/L	6.04	129	70-130			
Arsenic	221		ug/L	74.5	117	70-130			
Barium	2440		ug/L	2330	83.2	70-130			
Beryllium	152		ug/L	2.39	120	70-130			
Boron	321		ug/L	173	118	70-130			
Cadmium	160		ug/L	5.95	123	70-130			
Chromium	1290		ug/L	1160	97.8	70-130			
Cobalt	496		ug/L	360	108	70-130			
Copper	1770		ug/L	1670	86.2	70-130			
Lead	315		ug/L	177	110	70-130			
Molybdenum	195		ug/L	55.2	112	70-130			
Nickel	1210		ug/L	1090	95.4	70-130			
Selenium	147		ug/L	ND	118	70-130			
Silver	150		ug/L	7.86	114	70-130			
Thallium	145		ug/L	15.0	104	70-130			
Uranium	222		ug/L	67.8	124	70-130			
Vanadium	1070		ug/L	935	107	70-130			
Zinc	2420		ug/L	2320	75.0	70-130			
Semi-Volatiles									
Acenaphthene	0.161	0.02	ug/g	ND	78.4	50-140			
Acenaphthylene	0.162	0.02	ug/g	ND	78.7	50-140			
Anthracene	0.186	0.02	ug/g	ND	90.5	50-140			
Benzo [a] anthracene	0.143	0.02	ug/g	ND	69.4	50-140			
Benzo [a] pyrene	0.159	0.02	ug/g	ND	77.6	50-140			
Benzo [b] fluoranthene	0.197	0.02	ug/g	ND	95.7	50-140			
Benzo [g,h,i] perylene	0.176	0.02	ug/g	ND	85.7	50-140			
Benzo [k] fluoranthene	0.237	0.02	ug/g	ND	115	50-140			
Chrysene	0.177	0.02	ug/g	ND	86.1	50-140			
Dibenzo [a,h] anthracene	0.175	0.02	ug/g	ND	85.3	50-140			
Fluoranthene	0.181	0.02	ug/g	ND	88.4	50-140			
Fluorene	0.161	0.02	ug/g	ND	78.4	50-140			
Indeno [1,2,3-cd] pyrene	0.183	0.02	ug/g	ND	89.3	50-140			
1-Methylnaphthalene	0.194	0.02	ug/g	ND	94.4	50-140			
2-Methylnaphthalene	0.191	0.02	ug/g	ND	93.2	50-140			
Naphthalene	0.161	0.01	ug/g	ND	78.2	50-140			
Phenanthrene	0.174	0.02	ug/g	ND	84.8	50-140			
Pyrene	0.189	0.02	ug/g	ND	92.0	50-140			
Surrogate: 2-Fluorobiphenyl	*0.921*		*ug/g*		*56.0*	*50-140*			

Qualifier Notes:

QC Qualifiers :

QR-04 : Duplicate results exceeds RPD limits due to non-homogeneous matrix.

Sample Data Revisions

None

Work Order Revisions / Comments:

None

Other Report Notes:

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

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

CCME PHC additional information:

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

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Chain of Custody
(Lab Use Only)
№ 107869

Page 1 of 1

Client Name: Houle Chevrier Eng. Ltd.	Project Reference: 64176.01	**Turnaround Time:**	
Contact Name: Katherine Krispoli	Quote #	☑ 1 Day	☐ 3 Day
Address: 32 Steacie Drive.	PO #	☐ 2 Day	☐ Regular
Telephone: 613 836 1422	Email Address: Krispoli@hcengi.ca	Date Required:	

Criteria: ☑ O. Reg. 153/04 (As Amended) Table 3 ☐ RSC Filing ☐ O. Reg. 558/00 ☐ PWQO ☐ CCME ☐ SUB (Storm) ☐ SUB (Sanitary) Municipality: ☐ Other:

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

Required Analyses

Paracel Order Number: 1621205

	Sample ID/Location Name		Matrix	Air Volume	# of Containers	Sample Taken Date	Sample Taken Time	PHCs F1-F4	VOCs	PAHs	Metals by ICP	Hg	CrVI	B (HWS)	TCLP	
1	TP16-1	GS-1	S		2	May 17, 2016		✓		✓	✓					250 ml x MEOH vial
2	TP16-2	GS-3	S		2			✓		✓	✓					
3	TP16-102	GS-3	S		2			✓		✓	✓					
4	TP16-3	GS-1	S		2			✓		✓	✓					
5	TP16-1	TCLP	S		2											250 ml x 2
6	TP16-2	TCLP	S		2											Please hold 3
7	TP16-3	TCLP	S		2											Samples for TCLP.
8																
9																
10																

Comments:

Method of Delivery: Walk-in

Relinquished By (Sign): Mich Lalonde	Received by Driver/Depot: Karen Cull	Received at Lab: SUNEEPORN DOKMAI	Verified By:
Relinquished By (Print):	Date/Time: May 17/16 2:21	Date/Time: MAY 17 2016 03:27	Date/Time: May 17/16 3:52
Date/Time: May 17, 2016 2:15 pm	Temperature: 11.1 °C	Temperature: 15.6 °C	pH Verified [X] By: N/A

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