

# LOPERS & ASSOCIATES

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**LOP20-003B-BRIGIL**

**September 18, 2020**

**Mr. Philip Thibert**

Project Manager – Land Development & Infrastructure  
Brigil Construction  
98 Rue Lois, Gatineau, J8Y 3R7

**Environmental Fill Quality Assessment  
Proposed Residential Development  
100 Steacie Drive, Ottawa, ON**

Dear Mr. Thibert,

This letter outlines our background information, field program, analytical results and findings for an Environmental Fill Quality Assessment (EFQA) at the property Civically addressed as 100 Steacie Drive, Ottawa, ON (“Property” or “Site”).

## **BACKGROUND**

Lopers & Associates (Lopers) was retained by 3223701 Canada Inc. (BRIGIL) to complete an Environmental Fill Quality Assessment (EFQA) of the undeveloped property with Civic address No. 100 Steacie Drive, Ottawa, Ontario (“Property” or “Site”). The location of the EFQA Property is depicted on Figure 1: Key Plan.

Lopers understands that the Site is currently owned by 3223701 Canada Inc., a subsidiary company of Brigil Construction (BRIGIL), is undeveloped, zoned for industrial use and has been proposed for residential development. Based on preliminary environmental research completed as part of a concurrent Phase One Environmental Site Assessment (Phase One ESA), previous investigations and reports by others, the Site was formerly partially graded with fill material of unknown environmental quality on the south and east portions of the Property. The importation of fill material of unknown environmental quality at the Property is a Potentially Contaminating Activity (PCA) which could be interpreted as an Area of Potential Environmental Concern (APEC) for the Property. Since a potential APEC has been identified for the Property as part of the Phase One ESA research, an investigation into the environmental quality of the fill material was completed to determine its suitability for on-Site use or potential re-use off-Site.

This EFQA was designed to meet the general sampling and analytical requirements of O.Reg. 153/04 as amended, with details of scope presented in Lopers’ Letter entitled “Proposal for Limited Phase Two Environmental Site Assessment, Proposed Residential Development, 100 Steacie Drive, Ottawa, ON”, dated August 20, 2020, reference, No. LOP-003B-20-BRIGIL.

## FIELD INVESTIGATION

The scope of work for investigation was discussed with Brigil and sampling and analysis plan (SAP) was prepared to achieve the objectives of the EFQA. In the event that an RSC is required for the Property, additional effort, including groundwater sampling, laboratory analysis and reporting may be required.

Underground utility locates were completed through Ontario 1-Call to identify any active public services on the Property. On September 2, 2020, a total of eight test pits (TP1-20 through TP8-20) were dug at the Property. The test pits were dug using an 8-ton rubber track mounted excavator operated by C.A.C.E. Construction 1991 Ltd. (CACE). Soil samples were collected directly from the excavator bucket. The eight test pits were dug to approximate depths of 0.1 to 1.5 meters below ground surface (m BGS); the depth of investigation of fill is based on observations from historical investigations/reports completed at the Site as well as the presence of shallow bedrock in various locations at the Property. Continuous soil sampling was completed in the test pits with field screening for environmental quality. Representative and 'worst case' samples were selected and containerized for laboratory analysis. The locations of the test pits completed as part of this EFQA at the Property are presented on Figure 2: Site Plan.

Soil samples were initially collected in Ziploc bags for initial screening as part of sample selection. Soil samples selected for laboratory analysis were collected in dedicated clear glass jars prepared and provided by the analytical laboratory. Soil samples collected for BTEXs/VOCs and the F1 range of PHCs analysis were collected using a dedicated graduated syringe provided by the laboratory and placed directly into a glass vial with a known quantity of methanol preservative. Analytes and associated preservatives were specified on each jar/vial by the laboratory. Each jar/vial sample set was provided with a unique sample identifier, project number and date of sampling in the field.

Initial field screening of the soil samples consisted of visual and olfactory observations made at the time of sample collection during the drilling program. Additional field screening of the soil samples was completed using an RKI Instruments Model Eagle-2 combustible gas detector ("RKI Eagle"). The RKI Eagle used for soil sample screening as part of this EFQA was obtained from Maxim Environmental and Safety Inc. and was calibrated by Maxim on August 31, 2020. The RKI Eagle is capable of measuring combustible vapours at concentrations ranging from 0 parts per million (PPM) to 50% of the lower explosive limit (LEL). The RKI Eagle is also capable of measuring VOC vapours at concentrations ranging from 0 ppm to 1000 ppm.

## APPLICABLE SITE CONDITION STANDARD

Through Ontario Regulation 153/04 (O.Reg. 153/04) the Ministry of Environment, Conservation and Parks (MECP) prescribes the conditions to determine the applicable site condition standard for a property.

The Site is currently zoned industrial, but has been proposed future use of the Property is for residential use; as such, the residential land use standards have been applied for the purposes of this report as they represent the more environmentally sensitive land use conditions.

The Property and all other properties within 250 m of the property boundaries are supplied by the municipal drinking water system. The Site will not be used for agricultural use and there are no wells within 250 m of the property boundaries that are intended for use as a source of water for human consumption or agriculture. As such, the designation of non-potable groundwater setting is determined to be applicable [O.Reg. 153/04, section 35].

The soil quality over the full depth of overburden was considered for this EFQA. The full depth generic site condition standards were selected for comparison for the Property [O.Reg. 153/04, sections 36, 37, 38, 39 and 40].

The Property is not situated within or adjacent to an area of natural significance and does not include any land within 30 m of an area of natural significance. The pH of the soil was analyzed as part of this EFQA and was found to range from

6.22 to 7.52. As such, the Property is not considered to be an environmentally sensitive area [O.Reg. 153/04, section 41].

A layer of native glacial till, consisting of silty sand and gravel, cobbles and boulders, which would be classified as coarse grained soil, is present near ground surface and/or underlying a silty clay unit to full depth to bedrock. It is interpreted that greater than 1/3 of the Property has coarse grained soil. For the purposes of this EFQA, the soil conditions are considered to be coarse grained, which provides a more conservative comparison to the MECP site condition standards than the fine-grained values [O.Reg. 153/04, section 42].

Review of the historical drilling programs and test pits completed as part of this EFQA were completed. It was determined that less than 2/3 of the Property has greater than 2 m of overburden soil. The Property is considered a shallow soil property [O.Reg. 153/04, section 43.1].

The Property includes a water body, a creek, which is a tributary of Shirley's Brook is present on the west side of the Site. The MECP site condition standards for use within 30 m of a water body have been applied [O.Reg. 153/04, section 43.1].

The full depth generic site condition standards, with non-potable groundwater, coarse textured soil, for residential/parkland/institutional property use, as specified in Table 9 of the MECP Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act, April 15, 2011 were determined to be the applicable site condition standards for the Property as part of this EFQA.

## INVESTIGATION FINDINGS

### Stratigraphy

Based on the observations of soil samples collected during the EFQA field program, there were five stratigraphic units identified at the Property, which include:

#### **Topsoil**

A layer of topsoil, approximately 0.10 to 0.45 m in thickness, was encountered at the ground surface in all of the test pit locations (TP1 through TP8).

#### **Silty Sand, Gravel and Cobbles (Fill)**

A layer of silty sand, gravel and cobble fill material, ranging from approximately 0.1 to 0.2 m in thickness, was encountered immediately below the topsoil layer, or stratified with the topsoil in TP2 and TP3. This material was generally dry and loose. No odours, staining or evidence of deleterious fill were observed in this layer. No asphalt was observed in the fill samples.

#### **Silty Clay**

A layer of silty clay, ranging from at least 0.5 to 1.1 m in thickness, was encountered immediately below the topsoil layer in TP1, TP3 and TP6. This material was identified to consist of silty clay, which generally moist, firm and was grey. No odours, staining or evidence of deleterious fill were observed in this layer.

#### **Silty Sand and Gravel (Till)**

A layer of silty sand, gravel and cobbles, at least 0.5 to 1.1 m in thickness, was encountered below the topsoil layer in TP4, TP7 and TP8. This material consisted of brown to grey silty sand, gravel and cobbles with some occasional clay and was compact and moist to damp; groundwater, possibly perched, was encountered at a depth of approximately 1.1 m in PT 8. No odours, staining or evidence of deleterious fill were observed in this layer.

Mineral deposits, suspected to consist of muscovite and biotite were observed within the till deposit; it should be noted that this mineral visually resembles the physical properties of weathered asphalt.

### **Granite Bedrock**

Granite bedrock was encountered below the fill and natural soils at the Property in test pits TP2 and TP5 at depths of 0.3 m BGS and 0.1 m BGS, respectively.

### **Field Screening Observations**

Initial field screening of the soil samples consisted of visual and olfactory observations made at the time of sample collection during the test pitting program. There were no olfactory observations of PHC contamination encountered in any of the samples recovered as part of this EFQA. No indications of staining, odours, deleterious fill, refuse or any other observable environmental contamination were observed in any of the soil samples collected from the test pits.

Additional field screening of the soil samples was completed using an RKI Eagle gas detector. Combustible soil vapour screening concentrations were all measured at 0 ppm, which generally are not considered indicative of significant PHC contamination.

### **Laboratory Analysis**

As previously noted, APECs and CPCs for Laboratory Analysis were estimated and based on preliminary background and assessment of the Site, as part of the Phase One ESA. For the purposes of this EFQA, Laboratory Analysis consisted of the following analysis:

- Petroleum Hydrocarbons (PHCs) and Benzene, Toluene, Ethylbenzene and Xylenes (BTEXs) – 4 soil samples;
- Polycyclic Aromatic Hydrocarbons (PAHs) – 6 soil samples;
- Metals – 6 soil samples.

It should be noted that the aforementioned sample quantities included 1 duplicate sample for each parameter set.

Soil analytical testing was conducted by Paracel Laboratories Ltd. (Paracel). Paracel is accredited by the Canadian Association for Laboratory Accreditation Inc. (CALA) and the National Institute of Standards and Technology (NIST), Standard Services Division, National Voluntary Laboratory Accreditation Program (NVLAP) for specific environmental and IAQ tests listed in the Scopes of Accreditation registered with each association. For the scope of accreditation under CALA Membership Number 1262, Paracel is accredited for analysis including, but not limited to, metals, organics, conventionals, bacteria, mold, and asbestos in various matrices.

### **Comparison of Soil Analytical Results to Applicable Site Conditions Standards**

The analytical soil results were compared to the full depth generic site condition standards, with non-potable groundwater, coarse textured soil, for residential property use, as specified in Table 9 of the MECP Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act, April 15, 2011.

The aforementioned soil samples selected for laboratory analysis were submitted to Paracel under chain of custody No. 128622 on September 2, 2020. The laboratory certificate of analysis (Paracel Report # 2036345) is attached following the Figures and Tables of this letter.

All of the analyzed soil samples were in compliance with the site condition standards. A full summary of the soil analytical results and comparison to the applicable site condition standards are presented in Table 1: Soil Analytical Results following the text of this report. It should be noted that all organics parameters analyzed as part of the EFQA were reported below the laboratory method detection limits.

## Quality Assurance & Quality Control

The soil sample (TP11) was submitted to the laboratory as a blind field duplicate sample of TP1. The ratio of soil duplicate results to original sample results was generally 0 to 7%, which meets the required ratio. These samples were analyzed for PHCs, BTEXs, PAHs and metals, which provide a blind quality assurance and quality control QA/QC validation for all soil parameters analyzed as part of this EFQA. It should be noted that the organics parameters were all reported below the laboratory method detection limits.

## CONCLUSION

All of the soil results for Property are in compliance with the applicable site condition standards as of the certification date of September 2, 2020.

Based on the results of the EFQA, the environmental fill quality at the Site is not considered an Area of Potential Environmental Concern (APEC) for the Property, as it relates to the Phase One ESA. No further investigation is warranted at this time.

## ADDITIONAL DEVELOPMENT CONSIDERATIONS

It should be noted that, based on field observations and a review of previous subsurface investigations, a high degree of heterogeneity is expected in any imported backfill which has been historically placed at the Property as part of previous grading work. It is recommended that an environmental consultant periodically review the excavation work during redevelopment to ensure that excess soil generated as part of the redevelopment is managed appropriately. Best management practices would also include preparation of a soil management plan in accordance with O.Reg. 406/19.

## CLOSURE

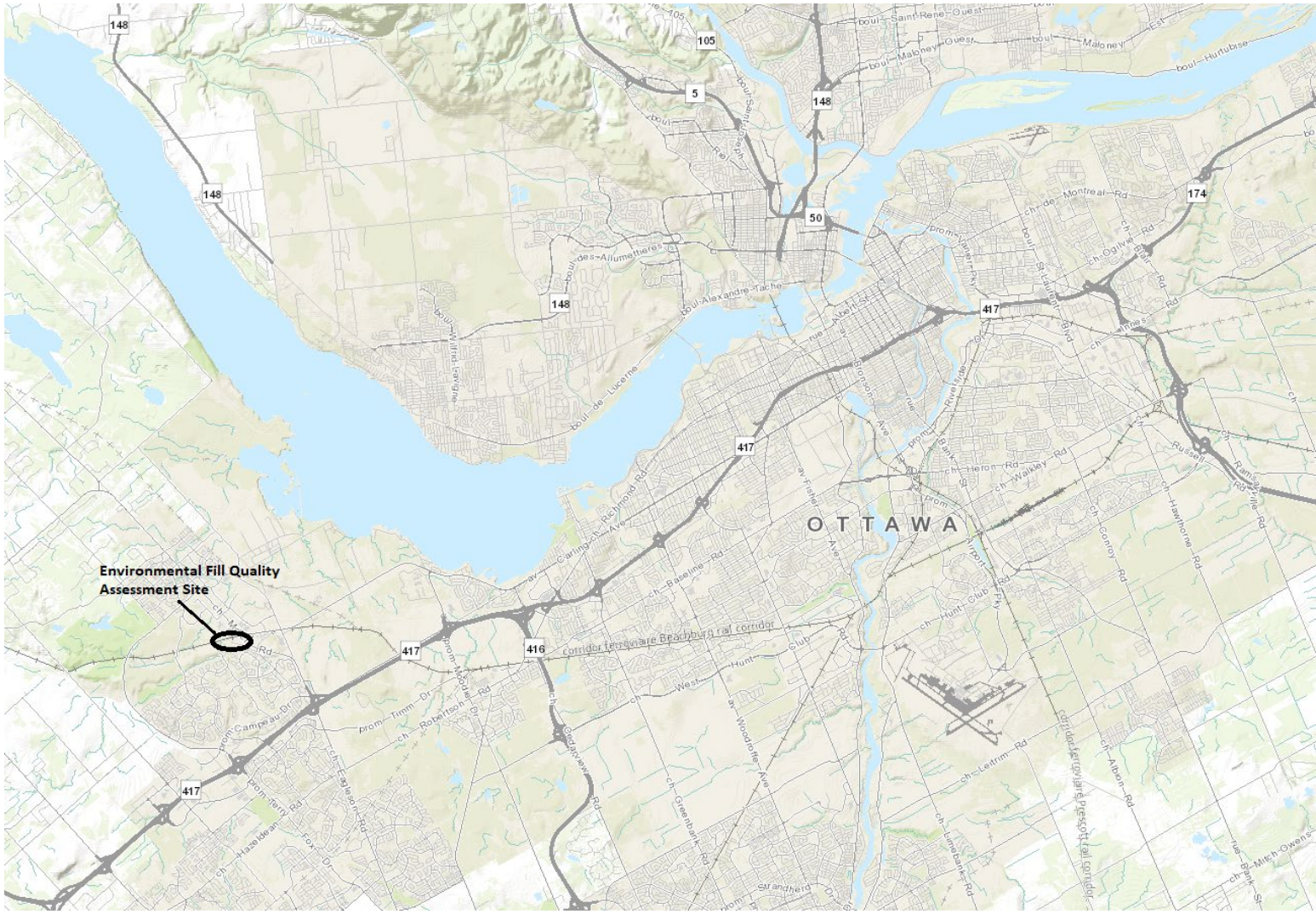
This Environmental Fill Quality Assessment (EFQA) was completed concurrently with a Phase One ESA and addresses any potentially contaminating activities including the historic importation of fill material of unknown quality, identified at the during the Phase One ESA. Any future activities, development or occupancy of the Site has the potential to result in new PCAs, which may require further assessment at a later date.

Regards,



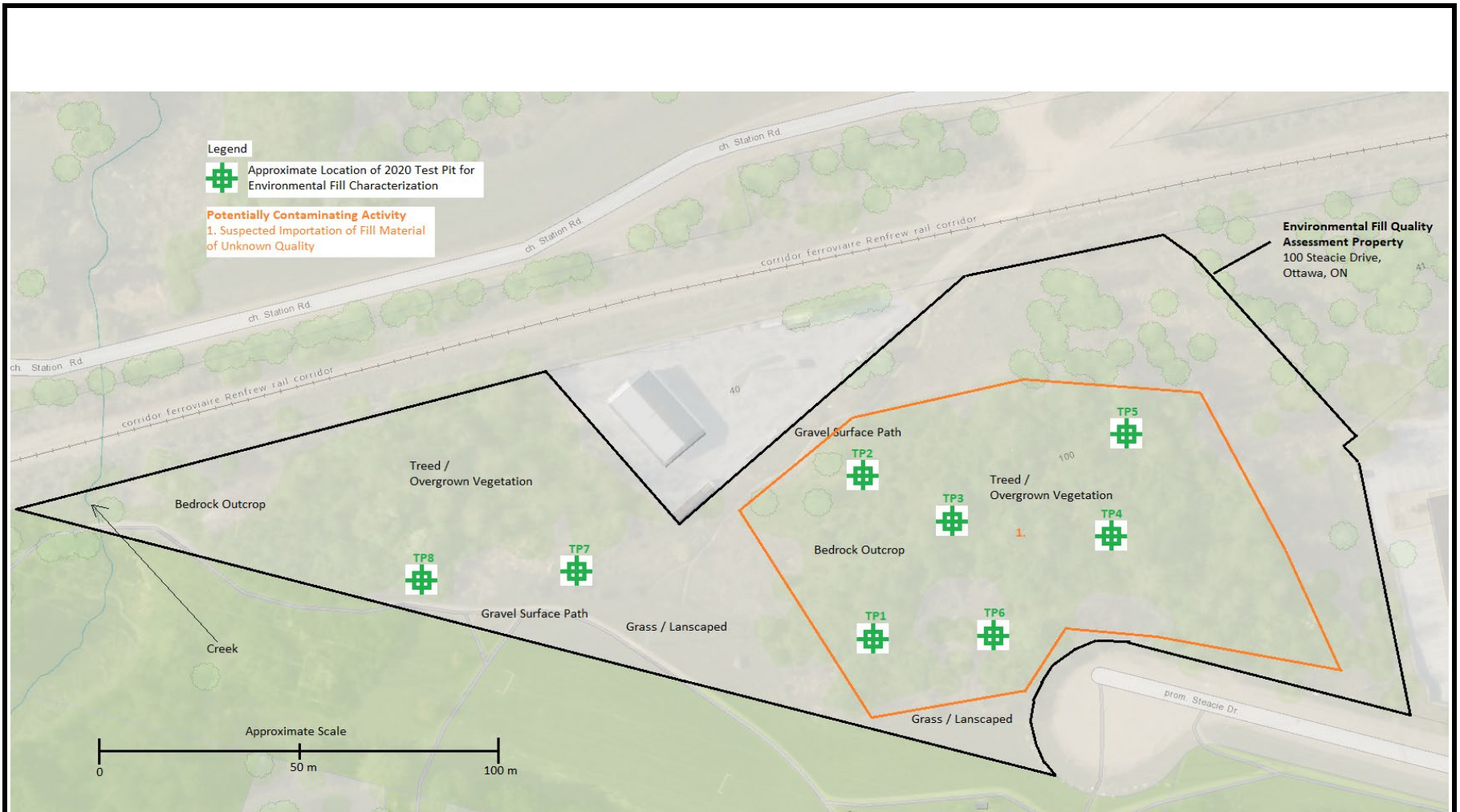
**Luke Lopers, P.Eng.**  
Principal





**Figure 1: Key Plan**  
 Environmental Fill Quality Assessment  
 100 Steacie Drive, Ottawa, Ontario  
 3223701 Canada Inc.

Project Reference No: LOP20-003B  
 Drawing No.: LOP20-003B-1  
 Date: September 18, 2020  
 Author: L. Lopers  
 Source: geoOttawa, Base Mapping



**Figure 2: Site Plan**  
 Environmental Fill Quality Assessment  
 100 Steacie Drive, Ottawa, Ontario  
 3223701 Canada Inc.

Project Reference No: LOP20-003B  
 Drawing No.: LOP20-003B-2  
 Date: September 18, 2020  
 Author: L. Lopers  
 Source: geoOttawa, 2017 Aerial Imagery

**Table 1: Soil Analytical Results**

100 Steacie Drive, Ottawa, Ontario

|                                          |          | Sample Location:             |                                                                   | TP1               | TP11                              | TP2               | TP3               | TP4               | TP8               |
|------------------------------------------|----------|------------------------------|-------------------------------------------------------------------|-------------------|-----------------------------------|-------------------|-------------------|-------------------|-------------------|
|                                          |          | Sample Depth:                |                                                                   | 0.5-1.0 m BGS     | Duplicate of TP1<br>0.5-1.0 m BGS | 0.1 - 0.3 m BGS   | 0.0 - 0.2 m BGS   | 0.2 - 1.0 m BGS   | 0.5 - 1.1 m BGS   |
|                                          |          | Sample Date:                 |                                                                   | September 2, 2020 | September 2, 2020                 | September 2, 2020 | September 2, 2020 | September 2, 2020 | September 2, 2020 |
|                                          |          | Laboratory Sample ID:        |                                                                   | 2036345-01        | 2036345-06                        | 2036345-02        | 2036345-03        | 2036345-04        | 2036345-05        |
| Parameter                                | Units    | Method Detection Limit (MDL) | MECP Table 9: Residential Property Use Standard Coarse Grain Soil |                   |                                   |                   |                   |                   |                   |
| <b>Petroleum Hydrocarbons (PHCs)</b>     |          |                              |                                                                   |                   |                                   |                   |                   |                   |                   |
| F1 PHCs (C6-C10)                         | ug/g     | 7                            | 25                                                                | ND                | ND                                | ND                | -                 | ND                | -                 |
| F2 PHCs (C10-C16)                        | ug/g     | 4                            | 10                                                                | ND                | ND                                | ND                | -                 | ND                | -                 |
| F3 PHCs (C16-C34)                        | ug/g     | 8                            | 240                                                               | ND                | ND                                | ND                | -                 | ND                | -                 |
| F4 PHCs (C34-C50)                        | ug/g     | 6                            | 120                                                               | ND                | ND                                | ND                | -                 | ND                | -                 |
| F4G PHCs (gravimetric)                   | ug/g     | 50                           | 120                                                               | -                 | -                                 | -                 | -                 | -                 | -                 |
| <b>Volatile Organic Compounds (VOCs)</b> |          |                              |                                                                   |                   |                                   |                   |                   |                   |                   |
| Benzene                                  | ug/g     | 0.02                         | 0.02                                                              | ND                | ND                                | ND                | -                 | ND                | -                 |
| Ethylbenzene                             | ug/g     | 0.05                         | 0.05                                                              | ND                | ND                                | ND                | -                 | ND                | -                 |
| Toluene                                  | ug/g     | 0.05                         | 0.2                                                               | ND                | ND                                | ND                | -                 | ND                | -                 |
| m/p-Xylene                               | ug/g     | 0.05                         | NV                                                                | ND                | ND                                | ND                | -                 | ND                | -                 |
| o-Xylene                                 | ug/g     | 0.05                         | NV                                                                | ND                | ND                                | ND                | -                 | ND                | -                 |
| Xylenes, total                           | ug/g     | 0.05                         | 0.05                                                              | ND                | ND                                | ND                | -                 | ND                | -                 |
| <b>Polycyclic Aromatic Hydrocarbons</b>  |          |                              |                                                                   |                   |                                   |                   |                   |                   |                   |
| Acenaphthene                             | ug/g     | 0.02                         | 0.072                                                             | ND                | ND                                | ND                | ND                | ND                | ND                |
| Acenaphthylene                           | ug/g     | 0.02                         | 0.093                                                             | ND                | ND                                | ND                | ND                | ND                | ND                |
| Anthracene                               | ug/g     | 0.02                         | 0.22                                                              | ND                | ND                                | ND                | ND                | ND                | ND                |
| Benzo[a]anthracene                       | ug/g     | 0.02                         | 0.36                                                              | ND                | ND                                | ND                | ND                | ND                | ND                |
| Benzo[a]pyrene                           | ug/g     | 0.02                         | 0.3                                                               | ND                | ND                                | ND                | ND                | ND                | ND                |
| Benzo[b]fluoranthene                     | ug/g     | 0.02                         | 0.47                                                              | ND                | ND                                | ND                | ND                | ND                | ND                |
| Benzo[g,h,i]perylene                     | ug/g     | 0.02                         | 0.68                                                              | ND                | ND                                | ND                | ND                | ND                | ND                |
| Benzo[k]fluoranthene                     | ug/g     | 0.02                         | 0.48                                                              | ND                | ND                                | ND                | ND                | ND                | ND                |
| Chrysene                                 | ug/g     | 0.02                         | 2.8                                                               | ND                | ND                                | ND                | ND                | ND                | ND                |
| Dibenzo[a,h]anthracene                   | ug/g     | 0.02                         | 0.1                                                               | ND                | ND                                | ND                | ND                | ND                | ND                |
| Fluoranthene                             | ug/g     | 0.02                         | 0.69                                                              | ND                | ND                                | ND                | ND                | ND                | ND                |
| Fluorene                                 | ug/g     | 0.02                         | 0.19                                                              | ND                | ND                                | ND                | ND                | ND                | ND                |
| Indeno[1,2,3-cd]pyrene                   | ug/g     | 0.02                         | 0.23                                                              | ND                | ND                                | ND                | ND                | ND                | ND                |
| 1-Methylnaphthalene                      | ug/g     | 0.02                         | 0.59                                                              | ND                | ND                                | ND                | ND                | ND                | ND                |
| 2-Methylnaphthalene                      | ug/g     | 0.02                         | 0.59                                                              | ND                | ND                                | ND                | ND                | ND                | ND                |
| Methylnaphthalene (1&2)                  | ug/g     | 0.04                         | 0.59                                                              | ND                | ND                                | ND                | ND                | ND                | ND                |
| Naphthalene                              | ug/g     | 0.01                         | 0.09                                                              | ND                | ND                                | ND                | ND                | ND                | ND                |
| Phenanthrene                             | ug/g     | 0.02                         | 0.69                                                              | ND                | ND                                | ND                | ND                | ND                | ND                |
| Pyrene                                   | ug/g     | 0.02                         | 1                                                                 | ND                | ND                                | ND                | ND                | ND                | ND                |
| <b>Metals</b>                            |          |                              |                                                                   |                   |                                   |                   |                   |                   |                   |
| Antimony                                 | ug/g     | 1.0                          | 1.3                                                               | ND                | ND                                | ND                | ND                | ND                | ND                |
| Arsenic                                  | ug/g     | 1.0                          | 18                                                                | 3.1               | 3.1                               | 2.3               | 2.7               | 3                 | 2.5               |
| Barium                                   | ug/g     | 1.0                          | 220                                                               | 194               | 203                               | 150               | 100               | 158               | 183               |
| Beryllium                                | ug/g     | 0.5                          | 2.5                                                               | 0.7               | 0.7                               | ND                | 0.7               | 0.7               | 0.6               |
| Boron                                    | ug/g     | 5.0                          | 36                                                                | ND                | ND                                | ND                | ND                | ND                | 5.7               |
| Cadmium                                  | ug/g     | 0.5                          | 1.2                                                               | ND                | ND                                | ND                | ND                | ND                | ND                |
| Chromium                                 | ug/g     | 5.0                          | 70                                                                | 55.4              | 56.1                              | 34.1              | 29.2              | 39.2              | 37.5              |
| Cobalt                                   | ug/g     | 1.0                          | 22                                                                | 13.2              | 13.5                              | 10.8              | 8.5               | 10.7              | 12.3              |
| Copper                                   | ug/g     | 5.0                          | 92                                                                | 22.6              | 23.5                              | 23.5              | 15.3              | 18.2              | 18.5              |
| Lead                                     | ug/g     | 1.0                          | 120                                                               | 5.8               | 6.3                               | 6.8               | 6.1               | 8.4               | 7.4               |
| Molybdenum                               | ug/g     | 1.0                          | 2                                                                 | ND                | ND                                | ND                | ND                | ND                | ND                |
| Nickel                                   | ug/g     | 5.0                          | 82                                                                | 28.3              | 29.5                              | 19.6              | 17.5              | 20.5              | 19.4              |
| Selenium                                 | ug/g     | 1.0                          | 1.5                                                               | ND                | ND                                | ND                | ND                | ND                | ND                |
| Silver                                   | ug/g     | 0.3                          | 0.5                                                               | ND                | ND                                | ND                | ND                | ND                | ND                |
| Thallium                                 | ug/g     | 1.0                          | 1                                                                 | ND                | ND                                | ND                | ND                | ND                | ND                |
| Uranium                                  | ug/g     | 1.0                          | 2.5                                                               | ND                | ND                                | ND                | ND                | ND                | ND                |
| Vanadium                                 | ug/g     | 10.0                         | 86                                                                | 68.1              | 67.7                              | 45.2              | 37.2              | 51.3              | 52.4              |
| Zinc                                     | ug/g     | 20.0                         | 290                                                               | 68.1              | 73.1                              | 41.3              | 67.4              | 60.4              | 60.7              |
| <b>General Inorganics</b>                |          |                              |                                                                   |                   |                                   |                   |                   |                   |                   |
| pH                                       | pH Units | 0.05                         | NV                                                                | 6.22              | -                                 | -                 | -                 | -                 | 7.52              |

NV - No value listed in MECP site condition standards

- - Not Analyzed

ND - Not detected above laboratory method detection limits

Exceeds MECP site condition standards



## Certificate of Analysis

**Lopers & Associates**

30 Lansfield Way  
Ottawa, ON K2G 3V8  
Attn: Luke Lopers

Client PO:  
Project: LOP20-003B  
Custody: 128622

Report Date: 18-Sep-2020  
Order Date: 2-Sep-2020

Revised Report

**Order #: 2036345**

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

| Parcel ID  | Client ID | Parcel ID | Client ID |
|------------|-----------|-----------|-----------|
| 2036345-01 | TP1       |           |           |
| 2036345-02 | TP2       |           |           |
| 2036345-03 | TP3       |           |           |
| 2036345-04 | TP4       |           |           |
| 2036345-05 | TP8       |           |           |
| 2036345-06 | TP11      |           |           |

Approved By:



Dale Robertson, BSc  
Laboratory Director

Certificate of Analysis  
 Client: **Lopers & Associates**  
 Client PO:

Report Date: 18-Sep-2020  
 Order Date: 2-Sep-2020  
 Project Description: **LOP20-003B**

**Analysis Summary Table**

| Analysis                        | Method Reference/Description                     | Extraction Date | Analysis Date |
|---------------------------------|--------------------------------------------------|-----------------|---------------|
| BTEX by P&T GC-MS               | EPA 8260 - P&T GC-MS                             | 2-Sep-20        | 3-Sep-20      |
| pH, soil                        | EPA 150.1 - pH probe @ 25 °C, CaCl buffered ext. | 17-Sep-20       | 17-Sep-20     |
| PHC F1                          | CWS Tier 1 - P&T GC-FID                          | 2-Sep-20        | 3-Sep-20      |
| PHCs F2 to F4                   | CWS Tier 1 - GC-FID, extraction                  | 3-Sep-20        | 8-Sep-20      |
| REG 153: Metals by ICP/MS, soil | EPA 6020 - Digestion - ICP-MS                    | 4-Sep-20        | 4-Sep-20      |
| REG 153: PAHs by GC-MS          | EPA 8270 - GC-MS, extraction                     | 3-Sep-20        | 5-Sep-20      |
| Solids, %                       | Gravimetric, calculation                         | 3-Sep-20        | 3-Sep-20      |

Certificate of Analysis  
**Client: Lopers & Associates**  
**Client PO:**

Report Date: 18-Sep-2020  
 Order Date: 2-Sep-2020  
**Project Description: LOP20-003B**

## Summary of Exceedances

(If this page is blank then there are no exceedances)

Only those criteria that a sample exceeds will be highlighted in red

### Regulatory Comparison:

Paracel Laboratories has provided regulatory guidelines on this report for informational purposes only and makes no representations or warranties that the data is accurate or reflects the current regulatory values. The user is advised to consult with the appropriate official regulations to evaluate compliance. Sample results that are highlighted have exceeded the selected regulatory limit. Calculated uncertainty estimations have not been applied for determining regulatory exceedances. Regulatory limits displayed in brackets, ( ), applies to medium and fine textured soils.

### Criteria:

| Client ID | Analyte | MDL / Units | Result | Reg 153/04 (2011)-Table 1 Residential/Industrial |
|-----------|---------|-------------|--------|--------------------------------------------------|
|-----------|---------|-------------|--------|--------------------------------------------------|

Certificate of Analysis  
 Client: Lopers & Associates  
 Client PO:

Report Date: 18-Sep-2020

Order Date: 2-Sep-2020

Project Description: LOP20-003B

| Client ID:   | TP1         | TP2         | TP3         | TP4         | Criteria:<br>Reg 153/04 (2011)-Table 1 Residential/Industrial |
|--------------|-------------|-------------|-------------|-------------|---------------------------------------------------------------|
| Sample Date: | 02-Sep-2020 | 02-Sep-2020 | 02-Sep-2020 | 02-Sep-2020 |                                                               |
| Sample ID:   | 2036345-01  | 2036345-02  | 2036345-03  | 2036345-04  |                                                               |
| Matrix:      | Soil        | Soil        | Soil        | Soil        |                                                               |
| MDL/Units    |             |             |             |             |                                                               |

**Physical Characteristics**

|          |              |      |      |      |      |  |
|----------|--------------|------|------|------|------|--|
| % Solids | 0.1 % by Wt. | 76.1 | 90.6 | 82.3 | 84.6 |  |
|----------|--------------|------|------|------|------|--|

**General Inorganics**

|    |               |      |   |   |   |                |
|----|---------------|------|---|---|---|----------------|
| pH | 0.05 pH Units | 6.22 | - | - | - | 5 - 9 pH units |
|----|---------------|------|---|---|---|----------------|

**Metals**

|            |           |      |      |      |      |          |
|------------|-----------|------|------|------|------|----------|
| Antimony   | 1.0 ug/g  | <1.0 | <1.0 | <1.0 | <1.0 | 1.3 ug/g |
| Arsenic    | 1.0 ug/g  | 3.1  | 2.3  | 2.7  | 3.0  | 18 ug/g  |
| Barium     | 1.0 ug/g  | 194  | 150  | 100  | 158  | 220 ug/g |
| Beryllium  | 0.5 ug/g  | 0.7  | <0.5 | 0.7  | 0.7  | 2.5 ug/g |
| Boron      | 5.0 ug/g  | <5.0 | <5.0 | <5.0 | <5.0 | 36 ug/g  |
| Cadmium    | 0.5 ug/g  | <0.5 | <0.5 | <0.5 | <0.5 | 1.2 ug/g |
| Chromium   | 5.0 ug/g  | 55.4 | 34.1 | 29.2 | 39.2 | 70 ug/g  |
| Cobalt     | 1.0 ug/g  | 13.2 | 10.8 | 8.5  | 10.7 | 21 ug/g  |
| Copper     | 5.0 ug/g  | 22.6 | 23.5 | 15.3 | 18.2 | 92 ug/g  |
| Lead       | 1.0 ug/g  | 5.8  | 6.8  | 6.1  | 8.4  | 120 ug/g |
| Molybdenum | 1.0 ug/g  | <1.0 | <1.0 | <1.0 | <1.0 | 2 ug/g   |
| Nickel     | 5.0 ug/g  | 28.3 | 19.6 | 17.5 | 20.5 | 82 ug/g  |
| Selenium   | 1.0 ug/g  | <1.0 | <1.0 | <1.0 | <1.0 | 1.5 ug/g |
| Silver     | 0.3 ug/g  | <0.3 | <0.3 | <0.3 | <0.3 | 0.5 ug/g |
| Thallium   | 1.0 ug/g  | <1.0 | <1.0 | <1.0 | <1.0 | 1 ug/g   |
| Uranium    | 1.0 ug/g  | <1.0 | <1.0 | <1.0 | <1.0 | 2.5 ug/g |
| Vanadium   | 10.0 ug/g | 68.1 | 45.2 | 37.2 | 51.3 | 86 ug/g  |
| Zinc       | 20.0 ug/g | 68.1 | 41.3 | 67.4 | 60.4 | 290 ug/g |

**Volatiles**

Certificate of Analysis  
 Client: Lopers & Associates  
 Client PO:

Report Date: 18-Sep-2020

Order Date: 2-Sep-2020

Project Description: LOP20-003B

|                | Client ID:   | TP1         | TP2         | TP3         | TP4         | Criteria:<br>Reg 153/04 (2011)-Table 1 Residential/Industrial |      |
|----------------|--------------|-------------|-------------|-------------|-------------|---------------------------------------------------------------|------|
|                | Sample Date: | 02-Sep-2020 | 02-Sep-2020 | 02-Sep-2020 | 02-Sep-2020 |                                                               |      |
|                | Sample ID:   | 2036345-01  | 2036345-02  | 2036345-03  | 2036345-04  |                                                               |      |
|                | Matrix:      | Soil        | Soil        | Soil        | Soil        |                                                               |      |
|                | MDL/Units    |             |             |             |             |                                                               |      |
| Benzene        | 0.02 ug/g    | <0.02       | <0.02       | -           | <0.02       | 0.02                                                          | ug/g |
| Ethylbenzene   | 0.05 ug/g    | <0.05       | <0.05       | -           | <0.05       | 0.05                                                          | ug/g |
| Toluene        | 0.05 ug/g    | <0.05       | <0.05       | -           | <0.05       | 0.2                                                           | ug/g |
| m,p-Xylenes    | 0.05 ug/g    | <0.05       | <0.05       | -           | <0.05       |                                                               |      |
| o-Xylene       | 0.05 ug/g    | <0.05       | <0.05       | -           | <0.05       |                                                               |      |
| Xylenes, total | 0.05 ug/g    | <0.05       | <0.05       | -           | <0.05       | 0.05                                                          | ug/g |
| Toluene-d8     | Surrogate    | 114%        | 119%        | -           | 116%        |                                                               |      |

**Hydrocarbons**

|                   |        |    |    |   |    |     |      |
|-------------------|--------|----|----|---|----|-----|------|
| F1 PHCs (C6-C10)  | 7 ug/g | <7 | <7 | - | <7 | 25  | ug/g |
| F2 PHCs (C10-C16) | 4 ug/g | <4 | <4 | - | <4 | 10  | ug/g |
| F3 PHCs (C16-C34) | 8 ug/g | <8 | <8 | - | <8 | 240 | ug/g |
| F4 PHCs (C34-C50) | 6 ug/g | <6 | <6 | - | <6 | 120 | ug/g |

**Semi-Volatiles**

|                          |           |       |       |       |       |       |      |
|--------------------------|-----------|-------|-------|-------|-------|-------|------|
| Acenaphthene             | 0.02 ug/g | <0.02 | <0.02 | <0.02 | <0.02 | 0.072 | ug/g |
| Acenaphthylene           | 0.02 ug/g | <0.02 | <0.02 | <0.02 | <0.02 | 0.093 | ug/g |
| Anthracene               | 0.02 ug/g | <0.02 | <0.02 | <0.02 | <0.02 | 0.16  | ug/g |
| Benzo [a] anthracene     | 0.02 ug/g | <0.02 | <0.02 | <0.02 | <0.02 | 0.36  | ug/g |
| Benzo [a] pyrene         | 0.02 ug/g | <0.02 | <0.02 | <0.02 | <0.02 | 0.3   | ug/g |
| Benzo [b] fluoranthene   | 0.02 ug/g | <0.02 | <0.02 | <0.02 | <0.02 | 0.47  | ug/g |
| Benzo [g,h,i] perylene   | 0.02 ug/g | <0.02 | <0.02 | <0.02 | <0.02 | 0.68  | ug/g |
| Benzo [k] fluoranthene   | 0.02 ug/g | <0.02 | <0.02 | <0.02 | <0.02 | 0.48  | ug/g |
| Chrysene                 | 0.02 ug/g | <0.02 | <0.02 | <0.02 | <0.02 | 2.8   | ug/g |
| Dibenzo [a,h] anthracene | 0.02 ug/g | <0.02 | <0.02 | <0.02 | <0.02 | 0.1   | ug/g |
| Fluoranthene             | 0.02 ug/g | <0.02 | <0.02 | <0.02 | <0.02 | 0.56  | ug/g |

Certificate of Analysis  
Client: **Lopers & Associates**  
Client PO:

Report Date: 18-Sep-2020

Order Date: 2-Sep-2020

Project Description: **LOP20-003B**

|                          | Client ID:   | TP1         | TP2         | TP3         | TP4         | Criteria:<br>Reg 153/04 (2011)-Table 1 Residential/Industrial |      |
|--------------------------|--------------|-------------|-------------|-------------|-------------|---------------------------------------------------------------|------|
|                          | Sample Date: | 02-Sep-2020 | 02-Sep-2020 | 02-Sep-2020 | 02-Sep-2020 |                                                               |      |
|                          | Sample ID:   | 2036345-01  | 2036345-02  | 2036345-03  | 2036345-04  |                                                               |      |
|                          | Matrix:      | Soil        | Soil        | Soil        | Soil        |                                                               |      |
|                          | MDL/Units    |             |             |             |             |                                                               |      |
| Fluorene                 | 0.02 ug/g    | <0.02       | <0.02       | <0.02       | <0.02       | 0.12                                                          | ug/g |
| Indeno [1,2,3-cd] pyrene | 0.02 ug/g    | <0.02       | <0.02       | <0.02       | <0.02       | 0.23                                                          | ug/g |
| 1-Methylnaphthalene      | 0.02 ug/g    | <0.02       | <0.02       | <0.02       | <0.02       | 0.59                                                          | ug/g |
| 2-Methylnaphthalene      | 0.02 ug/g    | <0.02       | <0.02       | <0.02       | <0.02       | 0.59                                                          | ug/g |
| Methylnaphthalene (1&2)  | 0.04 ug/g    | <0.04       | <0.04       | <0.04       | <0.04       | 0.59                                                          | ug/g |
| Naphthalene              | 0.01 ug/g    | <0.01       | <0.01       | <0.01       | <0.01       | 0.09                                                          | ug/g |
| Phenanthrene             | 0.02 ug/g    | <0.02       | <0.02       | <0.02       | <0.02       | 0.69                                                          | ug/g |
| Pyrene                   | 0.02 ug/g    | <0.02       | <0.02       | <0.02       | <0.02       | 1                                                             | ug/g |
| 2-Fluorobiphenyl         | Surrogate    | 93.3%       | 85.6%       | 57.5%       | 69.7%       |                                                               |      |
| Terphenyl-d14            | Surrogate    | 108%        | 93.5%       | 70.5%       | 81.8%       |                                                               |      |

Certificate of Analysis  
 Client: Lopers & Associates  
 Client PO:

Report Date: 18-Sep-2020

Order Date: 2-Sep-2020

Project Description: LOP20-003B

|                     |             |             |   |   |                                                                      |
|---------------------|-------------|-------------|---|---|----------------------------------------------------------------------|
| <b>Client ID:</b>   | TP8         | TP11        | - | - | <b>Criteria:</b><br>Reg 153/04 (2011)-Table 1 Residential/Industrial |
| <b>Sample Date:</b> | 02-Sep-2020 | 02-Sep-2020 | - | - |                                                                      |
| <b>Sample ID:</b>   | 2036345-05  | 2036345-06  | - | - |                                                                      |
| <b>Matrix:</b>      | Soil        | Soil        | - | - |                                                                      |
| <b>MDL/Units</b>    |             |             |   |   |                                                                      |

**Physical Characteristics**

|          |              |      |      |   |   |
|----------|--------------|------|------|---|---|
| % Solids | 0.1 % by Wt. | 91.3 | 78.4 | - | - |
|----------|--------------|------|------|---|---|

**General Inorganics**

|    |               |      |   |   |   |       |          |
|----|---------------|------|---|---|---|-------|----------|
| pH | 0.05 pH Units | 7.52 | - | - | - | 5 - 9 | pH units |
|----|---------------|------|---|---|---|-------|----------|

**Metals**

|            |           |      |      |   |   |     |      |
|------------|-----------|------|------|---|---|-----|------|
| Antimony   | 1.0 ug/g  | <1.0 | <1.0 | - | - | 1.3 | ug/g |
| Arsenic    | 1.0 ug/g  | 2.5  | 3.1  | - | - | 18  | ug/g |
| Barium     | 1.0 ug/g  | 183  | 203  | - | - | 220 | ug/g |
| Beryllium  | 0.5 ug/g  | 0.6  | 0.7  | - | - | 2.5 | ug/g |
| Boron      | 5.0 ug/g  | 5.7  | <5.0 | - | - | 36  | ug/g |
| Cadmium    | 0.5 ug/g  | <0.5 | <0.5 | - | - | 1.2 | ug/g |
| Chromium   | 5.0 ug/g  | 37.5 | 56.1 | - | - | 70  | ug/g |
| Cobalt     | 1.0 ug/g  | 12.3 | 13.5 | - | - | 21  | ug/g |
| Copper     | 5.0 ug/g  | 18.5 | 23.5 | - | - | 92  | ug/g |
| Lead       | 1.0 ug/g  | 7.4  | 6.3  | - | - | 120 | ug/g |
| Molybdenum | 1.0 ug/g  | <1.0 | <1.0 | - | - | 2   | ug/g |
| Nickel     | 5.0 ug/g  | 19.4 | 29.5 | - | - | 82  | ug/g |
| Selenium   | 1.0 ug/g  | <1.0 | <1.0 | - | - | 1.5 | ug/g |
| Silver     | 0.3 ug/g  | <0.3 | <0.3 | - | - | 0.5 | ug/g |
| Thallium   | 1.0 ug/g  | <1.0 | <1.0 | - | - | 1   | ug/g |
| Uranium    | 1.0 ug/g  | <1.0 | <1.0 | - | - | 2.5 | ug/g |
| Vanadium   | 10.0 ug/g | 52.4 | 67.7 | - | - | 86  | ug/g |
| Zinc       | 20.0 ug/g | 60.7 | 73.1 | - | - | 290 | ug/g |

**Volatiles**

Certificate of Analysis  
Client: **Lopers & Associates**  
Client PO:

Report Date: 18-Sep-2020

Order Date: 2-Sep-2020

Project Description: **LOP20-003B**

|                | MDL/Units | Client ID:   | TP8         | TP11        | - | - | Criteria:<br>Reg 153/04 (2011)-Table 1 Residential/Industrial |      |
|----------------|-----------|--------------|-------------|-------------|---|---|---------------------------------------------------------------|------|
|                |           | Sample Date: | 02-Sep-2020 | 02-Sep-2020 | - | - |                                                               |      |
|                |           | Sample ID:   | 2036345-05  | 2036345-06  | - | - |                                                               |      |
|                |           | Matrix:      | Soil        | Soil        | - | - |                                                               |      |
| Benzene        | 0.02 ug/g |              | -           | <0.02       | - | - | 0.02                                                          | ug/g |
| Ethylbenzene   | 0.05 ug/g |              | -           | <0.05       | - | - | 0.05                                                          | ug/g |
| Toluene        | 0.05 ug/g |              | -           | <0.05       | - | - | 0.2                                                           | ug/g |
| m,p-Xylenes    | 0.05 ug/g |              | -           | <0.05       | - | - |                                                               |      |
| o-Xylene       | 0.05 ug/g |              | -           | <0.05       | - | - |                                                               |      |
| Xylenes, total | 0.05 ug/g |              | -           | <0.05       | - | - | 0.05                                                          | ug/g |
| Toluene-d8     | Surrogate |              | -           | 119%        | - | - |                                                               |      |

**Hydrocarbons**

|                   |        |   |    |   |   |     |      |
|-------------------|--------|---|----|---|---|-----|------|
| F1 PHCs (C6-C10)  | 7 ug/g | - | <7 | - | - | 25  | ug/g |
| F2 PHCs (C10-C16) | 4 ug/g | - | <4 | - | - | 10  | ug/g |
| F3 PHCs (C16-C34) | 8 ug/g | - | <8 | - | - | 240 | ug/g |
| F4 PHCs (C34-C50) | 6 ug/g | - | <6 | - | - | 120 | ug/g |

**Semi-Volatiles**

|                          |           |       |       |   |   |       |      |
|--------------------------|-----------|-------|-------|---|---|-------|------|
| Acenaphthene             | 0.02 ug/g | <0.02 | <0.02 | - | - | 0.072 | ug/g |
| Acenaphthylene           | 0.02 ug/g | <0.02 | <0.02 | - | - | 0.093 | ug/g |
| Anthracene               | 0.02 ug/g | <0.02 | <0.02 | - | - | 0.16  | ug/g |
| Benzo [a] anthracene     | 0.02 ug/g | <0.02 | <0.02 | - | - | 0.36  | ug/g |
| Benzo [a] pyrene         | 0.02 ug/g | <0.02 | <0.02 | - | - | 0.3   | ug/g |
| Benzo [b] fluoranthene   | 0.02 ug/g | <0.02 | <0.02 | - | - | 0.47  | ug/g |
| Benzo [g,h,i] perylene   | 0.02 ug/g | <0.02 | <0.02 | - | - | 0.68  | ug/g |
| Benzo [k] fluoranthene   | 0.02 ug/g | <0.02 | <0.02 | - | - | 0.48  | ug/g |
| Chrysene                 | 0.02 ug/g | <0.02 | <0.02 | - | - | 2.8   | ug/g |
| Dibenzo [a,h] anthracene | 0.02 ug/g | <0.02 | <0.02 | - | - | 0.1   | ug/g |
| Fluoranthene             | 0.02 ug/g | <0.02 | <0.02 | - | - | 0.56  | ug/g |



Certificate of Analysis  
Client: **Lopers & Associates**  
Client PO:

Report Date: 18-Sep-2020

Order Date: 2-Sep-2020

Project Description: **LOP20-003B**

|                          | Client ID:   | TP8         | TP11        | - | - | Criteria:                                        |      |
|--------------------------|--------------|-------------|-------------|---|---|--------------------------------------------------|------|
|                          | Sample Date: | 02-Sep-2020 | 02-Sep-2020 | - | - | Reg 153/04 (2011)-Table 1 Residential/Industrial |      |
|                          | Sample ID:   | 2036345-05  | 2036345-06  | - | - |                                                  |      |
|                          | Matrix:      | Soil        | Soil        | - | - |                                                  |      |
|                          | MDL/Units    |             |             |   |   |                                                  |      |
| Fluorene                 | 0.02 ug/g    | <0.02       | <0.02       | - | - | 0.12                                             | ug/g |
| Indeno [1,2,3-cd] pyrene | 0.02 ug/g    | <0.02       | <0.02       | - | - | 0.23                                             | ug/g |
| 1-Methylnaphthalene      | 0.02 ug/g    | <0.02       | <0.02       | - | - | 0.59                                             | ug/g |
| 2-Methylnaphthalene      | 0.02 ug/g    | <0.02       | <0.02       | - | - | 0.59                                             | ug/g |
| Methylnaphthalene (1&2)  | 0.04 ug/g    | <0.04       | <0.04       | - | - | 0.59                                             | ug/g |
| Naphthalene              | 0.01 ug/g    | <0.01       | <0.01       | - | - | 0.09                                             | ug/g |
| Phenanthrene             | 0.02 ug/g    | <0.02       | <0.02       | - | - | 0.69                                             | ug/g |
| Pyrene                   | 0.02 ug/g    | <0.02       | <0.02       | - | - | 1                                                | ug/g |
| 2-Fluorobiphenyl         | Surrogate    | 95.4%       | 88.2%       | - | - |                                                  |      |
| Terphenyl-d14            | Surrogate    | 101%        | 86.0%       | - | - |                                                  |      |

Certificate of Analysis  
Client: **Lopers & Associates**  
Client PO:

Report Date: 18-Sep-2020

Order Date: 2-Sep-2020

Project Description: **LOP20-003B**

**Method Quality Control: Blank**

| Analyte                  | Result | Reporting Limit | Units | Source Result | %REC | %REC Limit | RPD | RPD Limit | Notes |
|--------------------------|--------|-----------------|-------|---------------|------|------------|-----|-----------|-------|
| <b>Hydrocarbons</b>      |        |                 |       |               |      |            |     |           |       |
| 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  |               |      |            |     |           |       |
| <b>Metals</b>            |        |                 |       |               |      |            |     |           |       |
| 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  |               |      |            |     |           |       |
| <b>Semi-Volatiles</b>    |        |                 |       |               |      |            |     |           |       |
| 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  |               |      |            |     |           |       |

Certificate of Analysis  
Client: **Lopers & Associates**  
Client PO:

Report Date: 18-Sep-2020  
Order Date: 2-Sep-2020  
Project Description: **LOP20-003B**

**Method Quality Control: Blank**

| Analyte                     | Result | Reporting Limit | Units | Source Result | %REC | %REC Limit | RPD | RPD Limit | Notes |
|-----------------------------|--------|-----------------|-------|---------------|------|------------|-----|-----------|-------|
| Naphthalene                 | ND     | 0.01            | ug/g  |               |      |            |     |           |       |
| Phenanthrene                | ND     | 0.02            | ug/g  |               |      |            |     |           |       |
| Pyrene                      | ND     | 0.02            | ug/g  |               |      |            |     |           |       |
| Surrogate: 2-Fluorobiphenyl | 0.953  |                 | ug/g  |               | 71.5 | 50-140     |     |           |       |
| Surrogate: Terphenyl-d14    | 1.25   |                 | ug/g  |               | 93.7 | 50-140     |     |           |       |
| <b>Volatiles</b>            |        |                 |       |               |      |            |     |           |       |
| 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       | 3.63   |                 | ug/g  |               | 113  | 50-140     |     |           |       |

Certificate of Analysis  
Client: **Lopers & Associates**  
Client PO:

Report Date: 18-Sep-2020  
Order Date: 2-Sep-2020  
Project Description: **LOP20-003B**

**Method Quality Control: Duplicate**

| Analyte                         | Result | Reporting Limit | Units    | Source Result | %REC | %REC Limit | RPD  | RPD Limit | Notes |
|---------------------------------|--------|-----------------|----------|---------------|------|------------|------|-----------|-------|
| <b>General Inorganics</b>       |        |                 |          |               |      |            |      |           |       |
| pH                              | 7.49   | 0.05            | pH Units | 7.36          |      |            | 1.8  | 2.3       |       |
| <b>Hydrocarbons</b>             |        |                 |          |               |      |            |      |           |       |
| F1 PHCs (C6-C10)                | ND     | 7               | ug/g     | ND            |      |            | NC   | 40        |       |
| F2 PHCs (C10-C16)               | ND     | 4               | ug/g     | ND            |      |            | NC   | 30        |       |
| F3 PHCs (C16-C34)               | 32     | 8               | ug/g     | ND            |      |            | NC   | 30        |       |
| F4 PHCs (C34-C50)               | 15     | 6               | ug/g     | ND            |      |            | NC   | 30        |       |
| <b>Metals</b>                   |        |                 |          |               |      |            |      |           |       |
| Antimony                        | ND     | 1.0             | ug/g     | ND            |      |            | NC   | 30        |       |
| Arsenic                         | 2.8    | 1.0             | ug/g     | 2.4           |      |            | 18.8 | 30        |       |
| Barium                          | 96.6   | 1.0             | ug/g     | 96.1          |      |            | 0.5  | 30        |       |
| Beryllium                       | ND     | 0.5             | ug/g     | ND            |      |            | NC   | 30        |       |
| Boron                           | ND     | 5.0             | ug/g     | ND            |      |            | NC   | 30        |       |
| Cadmium                         | ND     | 0.5             | ug/g     | ND            |      |            | NC   | 30        |       |
| Chromium                        | 28.3   | 5.0             | ug/g     | 26.8          |      |            | 5.4  | 30        |       |
| Cobalt                          | 7.3    | 1.0             | ug/g     | 6.9           |      |            | 5.6  | 30        |       |
| Copper                          | 17.1   | 5.0             | ug/g     | 15.9          |      |            | 7.2  | 30        |       |
| Lead                            | 12.5   | 1.0             | ug/g     | 12.0          |      |            | 4.4  | 30        |       |
| Molybdenum                      | ND     | 1.0             | ug/g     | ND            |      |            | NC   | 30        |       |
| Nickel                          | 16.3   | 5.0             | ug/g     | 15.3          |      |            | 6.2  | 30        |       |
| Selenium                        | ND     | 1.0             | ug/g     | ND            |      |            | NC   | 30        |       |
| Silver                          | ND     | 0.3             | ug/g     | ND            |      |            | NC   | 30        |       |
| Thallium                        | ND     | 1.0             | ug/g     | ND            |      |            | NC   | 30        |       |
| Uranium                         | ND     | 1.0             | ug/g     | ND            |      |            | NC   | 30        |       |
| Vanadium                        | 33.4   | 10.0            | ug/g     | 31.2          |      |            | 6.9  | 30        |       |
| Zinc                            | 47.9   | 20.0            | ug/g     | 47.7          |      |            | 0.5  | 30        |       |
| <b>Physical Characteristics</b> |        |                 |          |               |      |            |      |           |       |
| % Solids                        | 97.2   | 0.1             | % by Wt. | 95.3          |      |            | 1.9  | 25        |       |
| <b>Semi-Volatiles</b>           |        |                 |          |               |      |            |      |           |       |
| Acenaphthene                    | ND     | 0.02            | ug/g     | ND            |      |            | NC   | 40        |       |
| Acenaphthylene                  | ND     | 0.02            | ug/g     | ND            |      |            | NC   | 40        |       |
| Anthracene                      | ND     | 0.02            | ug/g     | ND            |      |            | NC   | 40        |       |
| Benzo [a] anthracene            | ND     | 0.02            | ug/g     | ND            |      |            | NC   | 40        |       |
| Benzo [a] pyrene                | ND     | 0.02            | ug/g     | ND            |      |            | NC   | 40        |       |
| Benzo [b] fluoranthene          | ND     | 0.02            | ug/g     | ND            |      |            | NC   | 40        |       |
| Benzo [g,h,i] perylene          | ND     | 0.02            | ug/g     | ND            |      |            | NC   | 40        |       |
| Benzo [k] fluoranthene          | ND     | 0.02            | ug/g     | ND            |      |            | NC   | 40        |       |
| Chrysene                        | ND     | 0.02            | ug/g     | ND            |      |            | NC   | 40        |       |
| Dibenzo [a,h] anthracene        | ND     | 0.02            | ug/g     | ND            |      |            | NC   | 40        |       |

Certificate of Analysis  
Client: **Lopers & Associates**  
Client PO:

Report Date: 18-Sep-2020  
Order Date: 2-Sep-2020  
Project Description: **LOP20-003B**

**Method Quality Control: Duplicate**

| Analyte                     | Result | Reporting Limit | Units | Source Result | %REC | %REC Limit | RPD | RPD Limit | Notes |
|-----------------------------|--------|-----------------|-------|---------------|------|------------|-----|-----------|-------|
| Fluoranthene                | ND     | 0.02            | ug/g  | ND            |      |            | NC  | 40        |       |
| Fluorene                    | ND     | 0.02            | ug/g  | ND            |      |            | NC  | 40        |       |
| Indeno [1,2,3-cd] pyrene    | ND     | 0.02            | ug/g  | ND            |      |            | NC  | 40        |       |
| 1-Methylnaphthalene         | ND     | 0.02            | ug/g  | ND            |      |            | NC  | 40        |       |
| 2-Methylnaphthalene         | ND     | 0.02            | ug/g  | ND            |      |            | NC  | 40        |       |
| Naphthalene                 | ND     | 0.01            | ug/g  | ND            |      |            | NC  | 40        |       |
| Phenanthrene                | ND     | 0.02            | ug/g  | ND            |      |            | NC  | 40        |       |
| Pyrene                      | ND     | 0.02            | ug/g  | ND            |      |            | NC  | 40        |       |
| Surrogate: 2-Fluorobiphenyl | 1.78   |                 | ug/g  |               | 89.1 | 50-140     |     |           |       |
| Surrogate: Terphenyl-d14    | 1.84   |                 | ug/g  |               | 92.4 | 50-140     |     |           |       |
| <b>Volatiles</b>            |        |                 |       |               |      |            |     |           |       |
| Benzene                     | ND     | 0.02            | ug/g  | ND            |      |            | NC  | 50        |       |
| Ethylbenzene                | ND     | 0.05            | ug/g  | ND            |      |            | NC  | 50        |       |
| Toluene                     | ND     | 0.05            | ug/g  | ND            |      |            | NC  | 50        |       |
| m,p-Xylenes                 | ND     | 0.05            | ug/g  | ND            |      |            | NC  | 50        |       |
| o-Xylene                    | ND     | 0.05            | ug/g  | ND            |      |            | NC  | 50        |       |
| Surrogate: Toluene-d8       | 3.95   |                 | ug/g  |               | 116  | 50-140     |     |           |       |

Certificate of Analysis  
 Client: Lopers & Associates  
 Client PO:

Report Date: 18-Sep-2020  
 Order Date: 2-Sep-2020  
 Project Description: LOP20-003B

**Method Quality Control: Spike**

| Analyte                | Result | Reporting Limit | Units | Source Result | %REC | %REC Limit | RPD | RPD Limit | Notes |
|------------------------|--------|-----------------|-------|---------------|------|------------|-----|-----------|-------|
| <b>Hydrocarbons</b>    |        |                 |       |               |      |            |     |           |       |
| F1 PHCs (C6-C10)       | 196    | 7               | ug/g  | ND            | 98.2 | 80-120     |     |           |       |
| F2 PHCs (C10-C16)      | 114    | 4               | ug/g  | ND            | 95.3 | 60-140     |     |           |       |
| F3 PHCs (C16-C34)      | 286    | 8               | ug/g  | ND            | 97.6 | 60-140     |     |           |       |
| F4 PHCs (C34-C50)      | 228    | 6               | ug/g  | ND            | 123  | 60-140     |     |           |       |
| <b>Metals</b>          |        |                 |       |               |      |            |     |           |       |
| Antimony               | 45.5   | 1.0             | ug/g  | ND            | 91.0 | 70-130     |     |           |       |
| Arsenic                | 52.7   | 1.0             | ug/g  | ND            | 103  | 70-130     |     |           |       |
| Barium                 | 86.5   | 1.0             | ug/g  | 38.4          | 96.2 | 70-130     |     |           |       |
| Beryllium              | 51.1   | 0.5             | ug/g  | ND            | 102  | 70-130     |     |           |       |
| Boron                  | 45.4   | 5.0             | ug/g  | ND            | 87.7 | 70-130     |     |           |       |
| Cadmium                | 48.9   | 0.5             | ug/g  | ND            | 97.8 | 70-130     |     |           |       |
| Chromium               | 63.0   | 5.0             | ug/g  | 10.7          | 105  | 70-130     |     |           |       |
| Cobalt                 | 53.7   | 1.0             | ug/g  | 2.8           | 102  | 70-130     |     |           |       |
| Copper                 | 55.1   | 5.0             | ug/g  | 6.4           | 97.4 | 70-130     |     |           |       |
| Lead                   | 51.4   | 1.0             | ug/g  | 4.8           | 93.2 | 70-130     |     |           |       |
| Molybdenum             | 48.0   | 1.0             | ug/g  | ND            | 95.3 | 70-130     |     |           |       |
| Nickel                 | 55.9   | 5.0             | ug/g  | 6.1           | 99.4 | 70-130     |     |           |       |
| Selenium               | 49.9   | 1.0             | ug/g  | ND            | 99.5 | 70-130     |     |           |       |
| Silver                 | 51.1   | 0.3             | ug/g  | ND            | 102  | 70-130     |     |           |       |
| Thallium               | 47.7   | 1.0             | ug/g  | ND            | 95.2 | 70-130     |     |           |       |
| Uranium                | 49.7   | 1.0             | ug/g  | ND            | 98.8 | 70-130     |     |           |       |
| Vanadium               | 65.2   | 10.0            | ug/g  | 12.5          | 105  | 70-130     |     |           |       |
| Zinc                   | 66.0   | 20.0            | ug/g  | ND            | 93.8 | 70-130     |     |           |       |
| <b>Semi-Volatiles</b>  |        |                 |       |               |      |            |     |           |       |
| Acenaphthene           | 0.245  | 0.02            | ug/g  | ND            | 98.2 | 50-140     |     |           |       |
| Acenaphthylene         | 0.203  | 0.02            | ug/g  | ND            | 81.7 | 50-140     |     |           |       |
| Anthracene             | 0.213  | 0.02            | ug/g  | ND            | 85.7 | 50-140     |     |           |       |
| Benzo [a] anthracene   | 0.178  | 0.02            | ug/g  | ND            | 71.5 | 50-140     |     |           |       |
| Benzo [a] pyrene       | 0.190  | 0.02            | ug/g  | ND            | 76.4 | 50-140     |     |           |       |
| Benzo [b] fluoranthene | 0.259  | 0.02            | ug/g  | ND            | 104  | 50-140     |     |           |       |
| Benzo [g,h,i] perylene | 0.194  | 0.02            | ug/g  | ND            | 77.7 | 50-140     |     |           |       |
| Benzo [k] fluoranthene | 0.244  | 0.02            | ug/g  | ND            | 98.1 | 50-140     |     |           |       |
| Chrysene               | 0.195  | 0.02            | ug/g  | ND            | 78.4 | 50-140     |     |           |       |

Certificate of Analysis  
Client: **Lopers & Associates**  
Client PO:

Report Date: 18-Sep-2020  
Order Date: 2-Sep-2020  
Project Description: **LOP20-003B**

**Method Quality Control: Spike**

| Analyte                     | Result | Reporting Limit | Units | Source Result | %REC | %REC Limit | RPD | RPD Limit | Notes |
|-----------------------------|--------|-----------------|-------|---------------|------|------------|-----|-----------|-------|
| Dibenzo [a,h] anthracene    | 0.194  | 0.02            | ug/g  | ND            | 78.0 | 50-140     |     |           |       |
| Fluoranthene                | 0.209  | 0.02            | ug/g  | ND            | 83.7 | 50-140     |     |           |       |
| Fluorene                    | 0.221  | 0.02            | ug/g  | ND            | 88.7 | 50-140     |     |           |       |
| Indeno [1,2,3-cd] pyrene    | 0.196  | 0.02            | ug/g  | ND            | 78.6 | 50-140     |     |           |       |
| 1-Methylnaphthalene         | 0.252  | 0.02            | ug/g  | ND            | 101  | 50-140     |     |           |       |
| 2-Methylnaphthalene         | 0.280  | 0.02            | ug/g  | ND            | 112  | 50-140     |     |           |       |
| Naphthalene                 | 0.260  | 0.01            | ug/g  | ND            | 105  | 50-140     |     |           |       |
| Phenanthrene                | 0.202  | 0.02            | ug/g  | ND            | 80.9 | 50-140     |     |           |       |
| Pyrene                      | 0.207  | 0.02            | ug/g  | ND            | 83.1 | 50-140     |     |           |       |
| Surrogate: 2-Fluorobiphenyl | 1.84   |                 | ug/g  |               | 92.1 | 50-140     |     |           |       |
| Surrogate: Terphenyl-d14    | 1.93   |                 | ug/g  |               | 96.7 | 50-140     |     |           |       |
| <b>Volatiles</b>            |        |                 |       |               |      |            |     |           |       |
| Benzene                     | 2.89   | 0.02            | ug/g  | ND            | 72.3 | 60-130     |     |           |       |
| Ethylbenzene                | 3.74   | 0.05            | ug/g  | ND            | 93.6 | 60-130     |     |           |       |
| Toluene                     | 4.00   | 0.05            | ug/g  | ND            | 100  | 60-130     |     |           |       |
| m,p-Xylenes                 | 7.95   | 0.05            | ug/g  | ND            | 99.3 | 60-130     |     |           |       |
| o-Xylene                    | 4.28   | 0.05            | ug/g  | ND            | 107  | 60-130     |     |           |       |
| Surrogate: Toluene-d8       | 2.88   |                 | ug/g  |               | 90.1 | 50-140     |     |           |       |

Certificate of Analysis  
Client: Lopers & Associates  
Client PO:

Report Date: 18-Sep-2020  
Order Date: 2-Sep-2020  
Project Description: LOP20-003B

**Qualifier Notes:**

None

**Sample Data Revisions**

None

**Work Order Revisions / Comments:**

Revision 1- this report now includes data for pH

**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.

NC: Not Calculated

Soil/Solid results are reported on a dry weight basis unless otherwise indicated

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.
- When reported, data for F4G has been processed using a silica gel cleanup.

Any use of these results implies your agreement that our total liability in connection with this work, however arising, shall be limited to the amount paid by you for this work, and that our employees or agents shall not under any circumstances be liable to you in connection with this work.





2036345

Nº 128622

Client Name: LOPERS & ASSOCIATES Project Ref: LOP20-004B Page 1 of 1

Contact Name: Luke Lopers Quote #:

Address: 30 Landfield Way, Ottawa, ON PO #:

Telephone: 613-327-9073 E-mail: Luke@Lopers.ca

Turnaround Time  
 1 day  3 day  
 2 day  Regular  
 Date Required: \_\_\_\_\_

| Regulation 153/04                                                            |                                                                                | Other Regulation                   |                                     | Matrix Type: S (Soil/Sed.) GW (Ground Water)<br>SW (Surface Water) SS (Storm/Sanitary Sewer)<br>P (Paint) A (Air) O (Other) |            | Required Analysis |              |      |      |                 |      |      |               |    |      |         |  |  |  |  |  |  |  |
|------------------------------------------------------------------------------|--------------------------------------------------------------------------------|------------------------------------|-------------------------------------|-----------------------------------------------------------------------------------------------------------------------------|------------|-------------------|--------------|------|------|-----------------|------|------|---------------|----|------|---------|--|--|--|--|--|--|--|
| <input checked="" type="checkbox"/> Table 1                                  | <input checked="" type="checkbox"/> Res/Park <input type="checkbox"/> Med/Fine | <input type="checkbox"/> REG 558   | <input type="checkbox"/> PWQO       | Matrix                                                                                                                      | Air Volume | # of Containers   | Sample Taken | Date | Time | PHCs F1-F4+BTEX | VOCs | PAHs | Metals by ICP | Hg | CrVI | B (HWS) |  |  |  |  |  |  |  |
| <input type="checkbox"/> Table 2                                             | <input type="checkbox"/> Ind/Comm <input checked="" type="checkbox"/> Coarse   | <input type="checkbox"/> CCME      | <input type="checkbox"/> MISA       |                                                                                                                             |            |                   |              |      |      |                 |      |      |               |    |      |         |  |  |  |  |  |  |  |
| <input type="checkbox"/> Table 3                                             | <input type="checkbox"/> Agri/Other                                            | <input type="checkbox"/> SU - Sani | <input type="checkbox"/> SU - Storm |                                                                                                                             |            |                   |              |      |      |                 |      |      |               |    |      |         |  |  |  |  |  |  |  |
| For RSC: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No |                                                                                | Mun: _____                         |                                     |                                                                                                                             |            |                   |              |      |      |                 |      |      |               |    |      |         |  |  |  |  |  |  |  |
| Sample ID/Location Name                                                      |                                                                                |                                    |                                     |                                                                                                                             |            |                   |              |      |      |                 |      |      |               |    |      |         |  |  |  |  |  |  |  |
| 1                                                                            | TP1                                                                            | S                                  | 2                                   | Sep 2/20                                                                                                                    |            | X                 | X            | X    |      |                 |      |      |               |    |      |         |  |  |  |  |  |  |  |
| 2                                                                            | TP2                                                                            | S                                  | 2                                   | ↓                                                                                                                           |            | X                 | X            | X    |      |                 |      |      |               |    |      |         |  |  |  |  |  |  |  |
| 3                                                                            | TP3                                                                            | S                                  | 1                                   |                                                                                                                             |            |                   |              | X    | X    |                 |      |      |               |    |      |         |  |  |  |  |  |  |  |
| 4                                                                            | TP4                                                                            | S                                  | 2                                   |                                                                                                                             |            |                   | X            | X    | X    |                 |      |      |               |    |      |         |  |  |  |  |  |  |  |
| 5                                                                            | TPB                                                                            | S                                  | 1                                   |                                                                                                                             |            |                   |              | X    | X    |                 |      |      |               |    |      |         |  |  |  |  |  |  |  |
| 6                                                                            | TP11                                                                           | S                                  | 2                                   |                                                                                                                             |            |                   | X            | X    | X    |                 |      |      |               |    |      |         |  |  |  |  |  |  |  |
| 7                                                                            |                                                                                |                                    |                                     |                                                                                                                             |            |                   |              |      |      |                 |      |      |               |    |      |         |  |  |  |  |  |  |  |
| 8                                                                            |                                                                                |                                    |                                     |                                                                                                                             |            |                   |              |      |      |                 |      |      |               |    |      |         |  |  |  |  |  |  |  |
| 9                                                                            |                                                                                |                                    |                                     |                                                                                                                             |            |                   |              |      |      |                 |      |      |               |    |      |         |  |  |  |  |  |  |  |
| 10                                                                           |                                                                                |                                    |                                     |                                                                                                                             |            |                   |              |      |      |                 |      |      |               |    |      |         |  |  |  |  |  |  |  |

Comments: \_\_\_\_\_ Method of Delivery: Drop Box

Relinquished By (Print): Luke Lopers Received By (Print): [Signature] Received at Lab: Sunneborn Ottawa Verified By: [Signature]

Date/Time: September 2, 2020 Date/Time: Sept 2, 2020 14:16 Date/Time: Sept 2, 2020 04:08 Date/Time: 9-2-20 16:16

Temperature: 13.9 °C Temperature: 10.2 °C pH Verified:  By: \_\_\_\_\_