APPENDIX E

Geotechnical Report

GeoPro Consulting Limited

Geotechnical-Hydrogeology-Environmental-Materials-Inspection

Preliminary Geotechnical Investigation

Municipal Class EA for Livingston Avenue Extension from Casablanca Boulevard to Main Street West

Grimsby, Niagara Region, Ontario

Prepared For:

Dillon Consulting Limited

GeoPro Project No.: 18-2178G03 Revised

Report Date: March 30, 2020

T: (905) 237-8336 E: office@geoproconsulting.ca

Unit 57, 40 Vogell Road, Richmond Hill, Ontario L4B 3N6

GeoPro CONSULTING LIMITED

Table of Contents

1 INTRODUCTION

GeoPro Consulting Limited (GeoPro) was retained by Dillon Consulting Limited (the Client) to conduct a geotechnical investigation for the proposed Transportation Assessment and Municipal Class EA of Livingston Avenue from Casablanca Boulevard to Main Street West, in Grimsby, Niagara Region, Ontario.

The purpose of this geotechnical investigation was to obtain information on the existing subsurface conditions by means of a limited number of boreholes, in-situ tests and laboratory tests of soil samples to provide required geotechnical design information. Based on GeoPro's interpretation of the obtained data, geotechnical comments and recommendations related to the project designs are provided.

This report is prepared with the condition that the design will be in accordance with all applicable standards and codes, regulations of authorities having jurisdiction, and good engineering practice. Furthermore, the recommendations and opinions in this report are applicable only to the proposed project as described above. On-going liaison and communication with GeoPro during the design stage and construction phase of the project is strongly recommended to confirm that the recommendations in this report are applicable and/or correctly interpreted and implemented. Also, any queries concerning the geotechnical aspects of the proposed project shall be directed to GeoPro for further elaboration and/or clarification.

This report is provided on the basis of the terms of reference presented in our approved proposal prepared based on our understanding of the project. If there are any changes in the design features relevant to the geotechnical analyses, or if any questions arise concerning the geotechnical aspects of the codes and standards, this office should be contacted to review the design. It may then be necessary to carry out additional borings and reporting before the recommendations of this report can be relied upon.

This report deals with geotechnical issues only. The geo-environmental (chemical) aspects of the subsurface conditions, including the consequences of possible surface and/or subsurface contamination resulting from previous activities or uses of the site and/or resulting from the introduction onto the site of materials from off-site sources were not investigated and were beyond the scope of this assignment. However, limited chemical testing was carried out on selected soil samples for excess soil disposal purposes.

The site investigation and recommendations follow generally accepted practice for geotechnical consultants in Ontario. Laboratory testing follows ASTM or CSA Standards or modifications of these standards that have become standard practice in Ontario.

This report has been prepared for the Client only. Third party use of this report without GeoPro's consent is prohibited. The limitations to the report presented above form an integral part of the report and they must be considered in conjunction with this report.

2 SITE AND PROJECT DESCRIPTION

This preliminary geotechnical investigation is intended for the Class EA study for Livingston Avenue improvements from Casablanca Road to Emily Street and proposed extension of Livingston Avenue from Emily Street to Oaks Road North as a two-lane roadway as dictated by growth functioning as the main east-west Regional Road, in Grimsby, Niagara Region, Ontario. The total length of the proposed municipal EA study of Livingston Avenue is approximately 1.67 km.

3 INVESTIGATION PROCEDURE

3.1 Existing Pavement Condition Survey

The section of Livingston Avenue from Casablanca Boulevard to west end of Emily Street was visited on August 6, 2018 by a GeoPro pavement engineer who carried out a detailed visual pavement condition survey of the existing pavement. The survey was conducted in general accordance with MTO SP-022 Flexible Pavement Condition Rating Guidelines for Municipalities. During the site visit, key pavement distresses were observed (noting the type, severity and general density of surface distresses); the general site and pavement drainage conditions were also noted. Photographs, including descriptions of the typical pavement distresses, are enclosed in Appendix A.

3.2 Borehole Investigation

Field work for the geotechnical investigation was carried out on August 14 and 16, October 4 and 10 to 13, 2018, during which time fifteen (15) boreholes (Boreholes BH2-01 to BH2-09, and BH2-13 to BH2-18) were advanced to depths ranging from about 1.2 m to 5.5 m below the existing ground surface. The borehole locations are shown on attached Drawings.

A proposed borehole location plan prepared by GeoPro was provided to Client for review prior to the field investigation work. The approved borehole locations were staked in the field by GeoPro; the borehole locations in the field were adjusted according to the drill rig accessibility and the underground utility conditions. The field work for this investigation was monitored by a member of our engineering staff who logged the boreholes and cared for the recovered samples.

The boreholes were advanced using truck-mounted continuous flight auger equipment supplied by a drilling specialist subcontracted to GeoPro. Soil samples were recovered at regular intervals of depth using a 50 mm O.D. split-spoon sampler driven into the soil in accordance with the Standard Penetration Test (SPT) procedure described in ASTM D1586 - 11 Standard Test Method for Standard Penetration Test (SPT) and Split-Barrel Sampling of Soils. In some boreholes, the types and approximate depths of the base, subbase and subgrade soil were obtained using an auger sampling technique.

Groundwater condition observations were made in the boreholes during drilling and upon completion of drilling. A monitoring well (51 mm in diameter) was installed in each of Boreholes BH2-03, BH2-05, BH2-08 and BH2-17 to measure the groundwater tables. The remaining boreholes were backfilled and sealed upon completion of drilling.

All soil samples obtained during this investigation were brought to our laboratory for further examination. These soil samples will be stored for a period of three (3) months after the day of issuing draft report, after which time they will be discarded unless we are advised otherwise in writing. Geotechnical classification tests (including water content, grain size distribution and Atterberg Limits, when applicable) were carried out on selected soil samples. The laboratory test results are provided in attached Figures.

It should be noted the elevations at the as-drilled borehole locations were not available at the time of preparing the report. The borehole locations plotted on the Borehole Location Plan, Drawings 1A to 1G were based on the measurement of the site features and should be considered to be approximate.

4 PAVEMENT AND SUBSURFACE CONDITIONS

4.1 Existing Pavement Conditions

In general, the existing pavement along the Livingston Avenue from Casablanca Boulevard to west end of Emily Street was observed to be mainly in good to fair condition. The major distresses were frequent slight road edge cracking, and few moderate longitudinal and transverse cracking associate with moderate depression, few moderate patching and few slight alligator cracking. The ride quality of this section was generally considered to be good to fair.

Livingston Avenue from Casablanca Boulevard to west end of Emily Street is currently a two-lane west-east local road with a rural cross section. The overall surface drainage is generally considered to be poor to fair. Observations along the roadway indicate that pavement surface water generally flows along the existing pavement grades and is being directed to ditches. However, the drainage is impaired by poor grading and surface distresses with unsealed cracks allowing surface water to infiltrate into the underlying pavement and subgrade. At some sections, ditches were observed to be shallow to non-existent and not free-flowing.

4.2 Subsurface Conditions

Notes on sample descriptions are presented in Enclosure 1A. Explanations of terms used in the borehole logs are presented in Enclosure 1B. The subsurface conditions in the boreholes are presented in the individual borehole logs. Detailed descriptions of the major soil strata encountered in the boreholes drilled at the site are provided as follows.

Existing Pavement Structure

Three (3) boreholes were advanced through the pavement structures on Livingston Avenue and Oakes Road North. The range and average thickness of pavement structure on the existing lanes summarized in the following table.

Section	Pavement Structure		
	Asphalt Concrete Range (Mean) (mm)	**Granular Base/Subbase Range (Mean) (mm)**	**Total Thickness Range (Mean) (mm)**
Livingston Avenue (BH2-15 to BH2-16)	140 – 150 (145)	190 – 250 (220)	340 – 390 (365)
Oakes Road North (BH2-1)	240	255	495

Topsoil

Topsoil with thickness ranging from 55 mm to 300 mm was encountered surficially in Boreholes BH2-02 to BH2-08, BH2-13, BH2-14, BH2-17 and BH2-18. It should be noted that the thickness of the topsoil explored at the borehole locations may not be representative of the site and should not be relied on to calculate the amount of topsoil at the site.

Fill Materials

Fill materials consisting of clayey silt, sandy silt and compacted weathered shale with sandy silt, were encountered surficially in Borehole BH2-09 and below the topsoil and granular base/subbase materials in all boreholes except Borehole BH2-09, and extended to depths ranging from about 0.5 m to 1.4 m below the existing ground surface. Borehole BH2-07 was terminated in these fill materials. For cohesionless fill materials, SPT N values ranging from 8 to 22 blows per 300 mm penetration indicated loose to compact compactness. For cohesive fill materials, SPT N values ranging from 8 to 13 blows per 300 mm penetration indicated a firm to stiff consistency. The in-situ moisture content measured in the soil samples ranged from approximately 2% to 28%.

Sandy Silt Till

Sandy silty till deposit was encountered below the fill materials in Borehole BH2-16, and extended to a depth of about 2.0 m below the existing ground surface. Borehole BH2-16 was terminated in this deposit. An SPT N value of 29 blows per 300 mm penetration indicated a compact compactness. The natural moisture content measured in the soil sample was approximately 13%.

Probable Weathered Shale

As best could be practically determined, shale presumed to coincide with the bedrock surface was encountered in all boreholes except BH2-07 and BH2-16 below the fill materials at depths ranging

from 0.5 to 1.4 m. Exploration of the bedrock was not carried out as part of this assignment, however based on samples recovered from the penetration testing, the bedrock beneath the site consisted of weathered reddish-brown shale interbedded with siltstone/limestone. A variation of greater than ±1m may be expected for the inferred bedrock surface depths/elevations.

4.3 Groundwater Conditions

Groundwater condition observations were made in the boreholes during and immediately upon completion of drilling are shown in the borehole logs and are also summarized in the following table.

BH No.	BH Depth (m)	Depth of Water Encountered during Drilling (mBGS)	Depth of Water upon Completion of Drilling (mBGS)	Cave-in Depth upon Completion of Drilling (mBGS)
BH 2-01	4.6	4.0	-	4.4
BH2-02	5.0	-	Dry	Open
BH2-03	3.9	-	Dry	Open
BH2-04	5.0	4.9	Dry	Open
BH2-05	5.5	4.0	-	Open
BH2-06	4.7	4.6	4.4	Open
BH2-07	1.2	-	Dry	Open
BH2-08	4.7	-	Dry	Open
BH2-09	4.7	4.6	-	4.1
BH2-13	4.6	-	-	3.9
BH2-14	4.7	4.6	Dry	Open
BH2-15	1.7	-	-	1.3
BH2-16	2.0	-	-	1.4
BH2-17	4.6	4.0	4.5	Open
BH2-18	4.7	4.6	-	4.3

Note: mBGS = meters below ground surface

Monitoring wells construction details and the measured groundwater level are shown in the borehole logs and also summarized in the following table.

Monitoring Well ID	Screen Interval (mBGS)	Water Level (mBGS)
		September 15, 2018
BH2-03	2.3 – 3.8	2.37
BH2-05	3.9 – 5.4	1.74
BH2-08	3.1 – 4.6	2.96
BH2-17	3.1 – 4.6	2.56

Note: mBGS = meters below ground surface

It should be noted that groundwater levels can vary and are subject to seasonal fluctuations in response to weather events.

5 LABORATORY TESTING RESULTS

5.1 Gradation Testing Results

Sieve analyses were completed on two (2) samples of the recovered granular base/subbase materials, and the results were compared to OPSS 1010 Granular A and Granular B Type I specifications. The grain size distribution curves for these samples are presented in Figures 1 and 2, and a summary of the results is provided in the following table.

Sample	OPSS 1010 Granular A	OPSS 1010 Granular B Type I
BH2-01 AS1A	Does not meet requirements due to excessive percentages passing some sieves	Meets the requirements
BH2-15 AS1A	Does not meet requirements due to excessive percentages passing all sieves	Does not meet requirements due to excessive percentages passing some sieves

Grain size analyses of two (2) subgrade samples confirmed the visual descriptions of the subgrade soils. In addition, the soils were examined and compared to frost susceptibility characteristics in accordance with the MTO Pavement Design and Rehabilitation Manual. The summarized results are provided in the following table, and the grain size distribution curves of these samples are presented in Figures 3.

Soil Sample	Soil Depth (m)	Description	Susceptibility of Frost Heaving
BH2-07 SS2	0.8 – 1.2	Clayey Silt Fill	Moderate
BH2-16 SS3	1.5 – 2.0	Sandy Silt Till	Moderate

6 DISCUSSION AND RECOMMENDATIONS

This report contains the findings of GeoPro's geotechnical investigation, together with geotechnical engineering recommendations and comments. These recommendations and comments are based on factual information and are intended only for use by the design engineers. The number of boreholes may not be sufficient to determine all factors that may affect construction methods and costs. Subsurface conditions between and beyond the boreholes may differ from those encountered at the borehole locations, and conditions may become apparent during construction that could not be detected or anticipated at the time of the site investigation. The anticipated construction conditions are also discussed, but only to the extent that they may influence design decisions. The construction methods discussed, however, express GeoPro's opinion only and are not intended to direct contractors on how to carry out construction. Contractors should also be aware that the data and interpretation presented in this report may not be sufficient to assess all factors that may have an effect on construction.

6.1 Pavement Structure Designs

6.1.1 Traffic Data Analysis

On the west side of Casablanca Boulevard, Livingston Avenue is currently a dead-end which provides access to approximately 32 homes. It is important to note that the Annual Average Daily Traffic (AADT), commercial vehicle percentage and traffic growth factor for the existing Livingston Avenue from Casablanca Boulevard to Emily Street are not representative of the potential traffic once the road section is extended to Oakes Road. As such, it is assumed that the Livingston Avenue extension would have the similar traffic volume when compared to the road section East of Casablanca Boulevard (The existing Livingston Avenue from Casablanca Boulevard to the downtown of Grimsby). Therefore, the provided traffic data for Livingston Avenue East of Casablanca Boulevard were used to perform the pavement design calculation.

Annual Average Daily Traffic (AADT) data (East of Casablanca Boulevard) was provided by the Client in an e-mail dated November 5, 2018. Approximately 2.0 percent commercial vehicle traffic and recommended compound annual traffic growth factors of 2.5 percent were also provided by the client.

The above mentioned traffic data were used to estimate the design Equivalent Single Axle Loads (ESALs). A typical combined truck factor of 1.32 was used to estimate the design ESALs on the roadway section. The traffic volumes were determined for a 20-year pavement design life, which is considered typical for pavements of this type. On this basis, the ESAL applications during design period were calculated in accordance with the MTO MI-183 Adaption and Verification of AASHTO Pavement Design Guide for Ontario Conditions. The total design ESALs anticipated over the 20-year design life period are summarized in the following table.

Parameters	Traffic Data
	Livingston Avenue
AADT	9,100
Commercial Vehicle Percentage	2.0%
Annual Growth Rate	2.5%
Truck Factor	1.32
Estimated Total Design ESALs (20-Year)	1,283,400

6.1.2 Pavement Design

The subgrade soils along the length of proposed roadway section generally consisted of clayey silt, sandy/silty soils and compacted weathered shale with sandy silt materials based on GeoPro's borehole information. The resilient modulus of subgrade has been assumed to be 30 MPa. The

pavement designs were developed based on the 1993 AASHTO Guide for Design of Pavement Structures and MTO MI-183 Adaption and Verification of AASHTO Pavement Design Guide for Ontario Conditions. The pavement design parameters are summarized in the following table.

Design Parameters	Values
Design Life	20 Years
ESALs over Analysis Period (million)	1.3
Initial Serviceability Index	4.5
Terminal Serviceability Index	2.5
Reliability Level, %	90
Overall Standard Deviation	0.49
Design Subgrade Resilient Modulus, MPa	30
Design Structure Number	110
Existing Pavement	
Layer Coefficient of Hot Mix Asphalt	0.28
Layer Coefficient of Granular Base/Subbase Course	0.09
Drainage Coefficients of Base and Subbase Courses	1.0
Reconstructed/Widening Pavements	
Layer Coefficient of Hot Mix Asphalt	0.42
Layer Coefficient of Granular Base Course	0.14
Layer Coefficient of Granular Subbase Course	0.09
Drainage Coefficients of Base and Subbase Courses	1.0

6.1.3 Existing Pavement Rehabilitation

The proposed improvements of Livingston Avenue within the project limits are divided into two sections as follows:

- Section 1 – Casablanca Boulevard to Emily Street (existing pavement improvements)
- Section 2 – Emily Street to Main Street West (extension of Livingston Avenue)

It is anticipated that the proposed road grade would remain the same as the existing grade, as such, full-depth reconstruction may be considered for Section 1. Should the road grade be allowed to raise, other rehabilitation strategies may be considered.

6.1.3.1 Recommendations for Road Section 1

Should a full-depth reconstruction be considered for the Livingston Avenue from Casablanca Boulevard to the existing dead end of the street, the recommended pavement structure is shown in the following table:

Material		Thickness of Pavement (mm)
Hot-Mix Asphalt (OPSS 1150)	HL 3 HS Surface Course	40
	HL 8 HS Binder Course	100
Granular Material (OPSS 1010)	Granular A Base (19 mm Crusher Run Limestone)	150
	Granular B Type I Subbase	350
Total Pavement Thickness (mm)		640

The construction procedure for the full-depth reconstruction road section may be considered as follows:

- Completely remove the existing asphalt concrete, granular base/subbase and subgrade soils to the depth required to accommodate the new pavement structure (about 640 mm below the proposed pavement surface);
- The exposed subgrade surface should be graded and compacted to 98 percent of Standard Proctor Maximum Dry Density (SPMDD);
- The prepared subgrade should be carefully proofrolled using a heavily loaded truck in conjunction with the inspection by the geotechnical engineer from GeoPro; any soft/loose or wet areas or other obviously deleterious materials must be excavated and properly replaced with material similar to the existing subgrade soils or other granular soils approved by the geotechnical engineer;
- All backfill materials should be placed in uniform loose lifts not exceeding 200 mm thickness and compacted to at least 98 percent of SPMDD. The finished subgrade should be provided with a grade of 3 percent towards the positive drainages;
- Place 350 mm of OPSS 1010 Granular B Type I subbase course in loose lifts not exceeding 200 mm thickness, compact to 100 percent of SPMDD;
- Place 150 mm of OPSS 1010 Granular A or 19 mm Crusher Run Limestone base course and compact to 100 percent of SPMDD; and
- Place 140 mm of hot-mix asphalt (100 mm of OPSS 1150 HL 8 HS binder course in two lifts and one lift of 40 mm OPSS 1150 HL 3 HS surface course). The surface of the completed pavement should be provided with a grade of 2 percent.

The constructed pavement Structural Number is 111, which is greater than the Design Structural Numbers (110). As such, the pavement is structurally adequate for the expected traffic loads over the 20-year design period with a regular maintenance.

6.1.3.2 Recommendations for Road Section 2

The recommended pavement structure is shown in the following table:

Material		Thickness of Pavement (mm)
Hot-Mix Asphalt (OPSS 1150)	HL 3 HS Surface Course	40
	HL 8 HS Binder Course	100
Granular Material (OPSS 1010)	Granular A Base (19 mm Crusher Run Limestone)	150
	Granular B Type I Subbase	350
Total Pavement Thickness (mm)		640

The construction procedure may be considered as follows:

- Completely remove the existing topsoil, organic matter and any other obviously deleterious materials to the depth required to accommodate the new pavement structure (about 640 mm below the proposed pavement surface);
- The exposed subgrade surface should be graded and compacted to 98 percent of Standard Proctor Maximum Dry Density (SPMDD);
- The prepared subgrade should be carefully proofrolled using a heavily loaded truck in conjunction with the inspection by the geotechnical engineer from GeoPro; any soft/loose or wet areas or other obviously deleterious materials must be excavated and properly replaced with material similar to the existing subgrade soils or other granular soils approved by the geotechnical engineer;
- All backfill materials should be placed in uniform loose lifts not exceeding 200 mm thickness and compacted to at least 98 percent of SPMDD. The finished subgrade should be provided with a grade of 3 percent towards the positive drainages;
- Place 350 mm of OPSS 1010 Granular B Type I subbase course in loose lifts not exceeding 200 mm thickness, compact to 100 percent of SPMDD;
- Place 150 mm of OPSS 1010 Granular A or 19 mm Crusher Run Limestone base course and compact to 100 percent of SPMDD; and
- Place 140 mm of hot-mix asphalt (100 mm of OPSS 1150 HL 8 HS binder course in two lifts and one lift of 40 mm OPSS 1150 HL 3 HS surface course). The surface of the completed pavement should be provided with a grade of 2 percent.

The constructed pavement Structural Number is 111, which is greater than the Design Structural Numbers (110). As such, the pavement is structurally adequate for the expected traffic loads over the 20-year design period with a regular maintenance.

6.1.4 Drainage Improvements

The provision of adequate subsurface and surface drainage is critical to the structural performance of a pavement. Drainage improvements can significantly reduce the overall

structural improvements required in future. The use of properly constructed side ditch leading to a positive outlet should be considered for the section of roadway. As the existing side ditches were relatively shallow or non-existent at some locations, these side ditches should be reconstructed, with ditches cleaned of any vegetation and deepened as necessary and restored to a free-flowing condition. In this regard, proper drainage consists of well defined (and maintained) ditching to the required depth below the top of subgrade leading to a positive outlet in accordance with municipal or OPSS specifications. Pavement should be provided with a continuous centre-to-edge cross-fall of 2%.

6.1.5 General Pavement Recommendations

6.1.5.1 Pavement Materials

The following hot-mix asphalt mix types should be selected:

- HL 3 HS Surface Course; and
- HL 8 HS Binder Course

These hot mix asphalt mixes should be designed and produced in conformance with OPSS 1150 requirements.

Granular A and Granular B Type I materials should be used as base course and subbase course, respectively. Both the Granular A and Granular B Type I materials should meet OPSS 1010 specifications.

6.1.5.2 Asphalt Cement Grade

Performance graded asphalt cement PGAC 58-28 conforming to OPSS 1101 requirements is recommended for the HMA binder and surface courses.

6.1.5.3 Tack Coat

A tack coat (SS1) should be applied to all construction joints prior to placing hot mix asphalt to create an adhesive bond. Prior to placing hot mix asphalt, SS1 tack coat must also be applied to all existing surfaces and between all new lifts in accordance with OPSS 308 requirements.

6.1.5.4 Compaction

All granular base and subbase materials should be placed in uniform lifts not exceeding 200 mm loose thickness and compacted to 100 percent of the material's SPMDD at ±2 percent of the materials Optimum Moisture Content (OMC). Hot mix asphalt should be placed and compacted in accordance with OPSS 310 specifications.

6.1.5.5 Pavement Tapers

At the limits of construction, appropriate tapering of the pavement thickness to match the existing pavement structure should be implemented in accordance with OPSS and the applicable local municipality specifications.

6.1.5.6 Subgrade Preparation

All topsoil, and any organic or other unsuitable soils should be stripped from the subgrade area. Following stripping, the site should be graded to the subgrade level and approved. The subgrade should then be proofrolled by a heavily loaded truck, in the presence of the geotechnical engineer from GeoPro. Any soft spots exposed during the proofroll should be completely removed and replaced by selected fill materials, similar to the existing subgrade soils and approved by the geotechnical engineer from GeoPro. The subgrade should then be re-compacted from the surface to at least 98% of its SPMDD. If the moisture contents of the local soil materials cannot be maintained at ±2% of the OMC, imported select materials may need to be used.

The final subgrade should be shaped properly to facilitate rapid drainage and to prevent the formation of local depressions in which water could accumulate. Proper shaping which allows the water to escape towards the sides (where it can be removed by means of subdrains or ditches) should be considered for the project. Otherwise, any water trapped in the granular base material may cause problems due to softened subgrade, and differential frost heave, etc.

Any fill materials required for re-grading the site or backfill should be free of topsoil, organic or any other unsuitable matter and must be approved by the geotechnical engineer from GeoPro. The approved fill materials should be placed in thin layers not exceeding 300 mm (uncompacted loose lift thickness) and compacted to at least 98% of its SPMDD or as per local municipal standards. The placing, spreading and rolling of the subgrade should be in accordance with OPSS or local municipal standards.

Frequent field density tests or full-time inspection should be carried out by the geotechnical engineer from GeoPro based on the project specifications or follow OPSS or local municipal standards.

6.1.5.7 Reuse and Disposal of Existing Pavement Materials

Some of the gradation analyses of the selected samples of the existing granular base and subbase materials meet the OPSS.MUNI 1010 B Type I gradation specifications. However, the existing excavated granular materials may not be reused as subbase/base materials of the new pavement structure. These materials can be reused as general earth fills in the areas approved by the geotechnical engineer.

6.1.5.8 Maintenance

Systematic routine preventative maintenance is strongly recommended for all newly constructed pavements. Crack routing and sealing will generally be required within 2 to 3 years after pavement construction. As the pavement ages, it will also be necessary to patch areas of medium to high severity distresses, such as potholes and ravelling. Routine maintenance should also be considered to extend the life of the pavement.

6.1.6 Preliminary Input on Embankment Materials and Design

6.1.6.1 Embankments

The final design drawings of the project were not available when this report was prepared. Once the design drawings and detailed site plan are available, should the embankments need to be carried out, this report will be reviewed by GeoPro and further recommendations will be provided as needed.

6.1.6.2 Slope Geometry – Fill Less Than 4.5 m

Slope stability problems are not anticipated in fills that are less than 4.5 m in height, provided that slopes no steeper than 2H:1V are maintained. Earth grading should be carried out in accordance with the OPSD 200 Series. Vegetation should be established as early as possible to control erosion.

6.1.6.3 Slope Geometry – Fill Greater Than 4.5 m

Although it is not anticipated, if embankments higher than 4.5 m are warranted, a separate Foundation Design Report should be prepared and be referenced for geotechnical details pertaining to the design of high embankments (greater than 4.5 m in height).

6.1.6.4 Borrow Materials

Fill material for this project may be obtained from offsite sources. Earth borrow material should meet the requirements of OPSS 212. The excavated fills materials and native deposits can also be used as earth borrow provided that the materials are kept free of contamination by topsoil and other organics.

To ensure adequate and uniform support throughout the pavement structure, the placement of borrow material should be carefully controlled. Mixing of materials from different sources that could result in differential settlement, frost heave, or drainage problems should be avoided.

6.1.7 Earth Cuts and Slope Stability

Slope stability problems are not anticipated in earth cuts that are less than 4.5 m in height, provided that slopes no steeper than 2H:1V are maintained. Vegetation should be established as early as possible to control erosion.

Should the base of the earth cut be below the prevailing groundwater tables, a drainage layers should be considered for the pavement structure. Should the earth cuts be considered for the proposed new roadway, this report will be reviewed by GeoPro and further recommendations will be provided as needed.

All excavations must be carried out in accordance with the most recent Occupational Health and Safety Act (OHSA). In accordance with OHSA, the existing loose to compact/firm to stiff fill materials and native compact glacial tills can be classified as Type 3 Soil above groundwater table and as Type 4 Soil below the water table.

6.1.8 Surficial Stability and Erosion Protection

Proper erosion control measures should be implemented both during construction and permanently. Vegetation cover should be established on all cut slope faces to protect against surficial erosion, as per OPSS 803 and/or OPSS 804. It is also imperative that the cut slopes be designed as much as practical to prevent surface water runoff from flowing down the face of the slope. This can be accomplished by including an interceptor ditch along the crest where space permits.

6.2 Preliminary Input on Open Cut Service Pipe Installation

6.2.1 Soil and Bedrock Behaviour in Open Excavation

The anticipated behaviour of the soils and bedrock in terms of supporting the proposed pipes and the stability of open cut excavations are summarized in the following table.

Table 1 - Soil and Bedrock Behaviour in Open Cut***

Soil Type	Pipe Support	Anticipated Stable Side Slopes during Construction in Open Excavation (**)	Possible Means of Groundwater Control
Topsoil, fill materials	Not Suitable	Stable at 2.0H:1V	Gravity drainage and pumping from filtered sumps established inside the base of trench
compact sandy silt till	Satisfactory	Stable at 1H:1V	
Shale	Satisfactory	Near-vertical (*) (10V:1H)	Gravity drainage and pumping from filtered sumps established inside the base of trench. Groundwater may seep out

			from the fracture/fissure which may require vigorous pumping and grout sealing of the fractures/fissures

(*) sidewalls of bedrock excavations may require welded wire mesh or fibre-reinforced shotcrete and rock bolting, if bedrock is exposed for a long period of time. The stability of rock excavation sidewalls must be inspected by a geotechnical engineer from GeoPro. (**) the side slope may be flattened subject to the groundwater seepage conditions and the success of contractor's groundwater control methods and weather conditions; slopes of the excavation sidewalls must be reviewed by a geotechnical engineer if the excavation depths are greater than 6.0 m. (***) the recommendations are considered to be preliminary. A detailed geotechnical investigation including rock coring in shale bedrock should be considered to confirm the preliminary input.

6.2.2 Trench Excavation

Excavation in Overburden

According to the Act, the existing loose to compact/firm to stiff fill materials and compact sandy silt till deposit would be classified as Type 3 soils above groundwater tables and Type 4 below groundwater tables. Care should be taken to direct surface runoff away from the open excavations and all excavations should be carried out in accordance with the Occupational Health and Safety Act and Regulations for Construction Projects.

Unsupported excavations may be temporarily stable for a short period of time at the anticipated side slope as described in **Table 1**. Below the groundwater tables, unsupported excavations in the cohesionless soils cannot safely proceed unless groundwater table is lowered to a minimum of 1.0 m below excavation base. Mid-height bench should be provided for the trench where the total depth is equal or greater than 6 m.

More specifically, from the records of the boreholes, the following potential problem areas can be identified: The rate of excavation in shale bedrock at depths will be slow and laboured. The hard layers in the shale will present difficulties. In addition, ground water seepage may be expected, locally flattened slopes are expected to be required. Alternatively, the walls of the trench should be shored and braced, or, where appropriate, trench boxes may be employed for Types 2 and 3 Soils. Where trench depths exceed 6 m or in Type 4 Soils of any trench depth, Engineered Support Systems are required under the OHSA as defined in the Regulation. Unstable conditions may be also expected should the trench be carried out immediately adjacent to previous excavations, particularly if these were backfilled with granular materials.

Excavation in Bedrock

The excavation into fresh, sound bedrock can be done using near - vertical sidewalls (say 10V:1H) provided that:

- All OHSA requirements regarding worker safety are met during the course of work;

- The rock face is scaled of all loose and potentially spalling material (including slaked rock as the excavation faces dry out over time).

- The deeper rock cuts may require the application of welded wire mesh (or fibre - reinforced shotcrete) and rock bolting, if the rock excavation is to be exposed for a long period of time.

Blasting should not be considered due to the potential presence of the methane gas. The bedrock would be excavated without blasting. The top weaker portion of the shale bedrock can generally be removed with a powerful excavator equipped with rock buckets and rock teeth. The removal of the underlying fresh and stronger rock, however, will be arduous and time consuming, and will require the use of hoe rams and closely spaced perimeter line drilling to minimize overbreak. The relative ease/difficulty in the excavation of bedrock will also depend on the size (width) and depth of the excavation. Combustible gas shall be expected in the bedrock which will need to be vented when encountered. Monitoring of combustible gas during excavation must be considered.

It should be noted that "hard" layers in the shale bedrock may be expected. Thick hard layers have been reported to be as much as up to 1000 mm in the same bedrock formation. Should the thicker hard layers be encountered in the shale, it will pose significant difficulties on the rock excavation, especially when blasting is not allowed. It is recommended that Non-Standard Specifications Provisions (NSSPs) be included in the Contract Documents to warn the Contractor of these conditions.

6.2.3 Construction Dewatering

Groundwater control during excavation within the compact glacial tills can be handled, as required, by pumping from properly constructed and filtered sumps located within the excavations. Perched groundwater may be expected in the fill materials above the groundwater tables at various depths. Groundwater control during excavation within fill materials above the groundwater tables at the site can be handled, as required, by pumping from properly constructed and filtered sumps located within the excavations. However, more significant groundwater seepage may be expected from the existing fill materials below the prevailing groundwater tables and any wet silty/sandy/granular layers/zones within the tills or at the interface of overburden and shale or in the shale. Depending upon the actual thickness of the silty/sandy/granular zones/layers within the till, ground water seepage in the shale bedrock, the groundwater tables and the finalized design pipe invert depths, some form of positive groundwater control or depressurization may be required to maintain the stability of the base and side slopes of the trench excavations, in addition to pumping from sumps. The groundwater level should be lowered to at least 1 m below the excavation base prior to excavations. It should be noted that any construction dewatering or water takings in Ontario is governed by Ontario Regulation 387/04 - the Water Taking and Transfer, an Ontario Regulation made under the Ontario Water Resources Act (OWRA), and/or Ontario Regulation 63/16 – Registrations under Part II.2 of the Act – Water Taking, made under Environmental Protection Act. Based on the regulations, water taking more

than 400,000 L/day is subject to a Permit to Take Water (PTTW) while watertaking in an amount between 50,000 L/day and 400,000 L/day is to be registered through Environmental Activity and Sector Registry (EASR).

6.2.4 Lateral Earth Pressures and Trench Boxes

It is understood that the majority of the service installations will be carried out by open excavation with the anticipated stable side slopes provided in Table 1. However, should the excavations be carried out on the existing roadways, the extent of the excavations will have to be minimized to allow for traffic to continue using a reduced portion of existing roadway. Where side slopes of excavations are steepened to limit the extent of the excavation, then some form of trench support system such as a trench box system or soldier pile shoring system will be required. The earth pressure on the shoring system for the braced excavations should be evaluated by using the pressure distribution diagram as shown on Drawing 2. Care should be taken to direct surface runoff away from the open excavations and all excavations should be carried out in accordance with the Occupational Health and Safety Act and Regulations for Construction Projects.

Where permissible under the OHSA and where its use is considered to be a safe alternative for shoring and bracing, contractors may elect to utilize trench boxes for temporary trench wall support for trenches less than 6 m deep in Type 2 and 3 soils. It must be emphasized that a trench liner box provides protection for construction personnel but does not provide any lateral support for the adjacent excavation walls, underground services or existing structures. In the case of trench box excavation work, the tolerance for disturbance of any structure founded above a 1 to 1 line projected up from the base of the excavation should be assessed prior to construction. If adjacent structures and/or utilities or existing pavement structure open for traffic are susceptible to damage from construction induced settlement, then excavation support using a strutted soldier pile and lagging wall should be considered. It is therefore, imperative that any underground services or existing structures adjacent to the excavations be accurately located prior to construction and adequate support provided where required. Care must be taken during excavation near underground structures (i.e. culvert, gas utilities, etc.) located within or adjacent to the excavation. The owner of the utility/service should also be contacted prior to excavating near their easement to confirm that the proposed excavation meets their requirements. In addition, steepened excavations should be left open for as short a duration as possible and completely backfilled at the end of each working day.

While the use of trench boxes is an effective and economical trench-support method, its use can cause increased loss of ground relative to properly braced shoring, especially when working close to granular base courses below existing pavements or along existing utility trenches backfilled with granular materials. This may lead to loss of ground below the pavement and potentially undermine and reduce the stability of the pavement structure adjacent to the open traffic lanes. In order to minimize this effect, the gap between the trench walls and trench box should be minimized during the excavation and trench box installation. Trench boxes also reduce the contractor's ability to compact backfill materials placed between the trench wall and the outer

trench box shell, thereby increasing the likelihood of post-construction settlements along the trench walls. When trench boxes are used along existing roadways, settlements frequently occur along the trench wall, which may manifest months after completion of backfilling. In such cases, following the backfilling of the trench, road reconstruction should include a provision for saw-cutting the asphalt at least 1 m back from the trench walls, recompacting the upper trench backfill, and then repaving. Where trench depths exceed 6 m (or at any trench depth in Type 4 soil), Engineered Support Systems are required under the OHSA.

The excavated material should be placed well back from the edge of the excavation and stockpiling of materials adjacent to the excavation should be prohibited, to minimize surcharge loading near the excavation crest.

6.2.5 Pipe Support and Bedding

The bedding for the service pipes should be compatible with the type and class of pipe, the surrounding subsoil and bedrock and anticipated loading conditions and should be designed in accordance with the standard specifications of the local municipality or Ontario Provincial Standard Specifications. Where granular bedding is deemed to be acceptable, it should consist of at least 150 mm of OPSS Granular A or 19 mm crusher run limestone material. The thickness of the bedding may, however, have to be increased (i.e. 300 mm to 450 mm) depending on the pipe diameter or in accordance with local standard specifications or if wet or weak subgrade conditions are encountered, especially when the soils at the trench base level consists of wet sandy/silty deposits. From springline to 300 mm above the pipe obvert, sand cover could be used or follow standard specifications of the local municipality. All bedding and cover material should be placed in 150 mm loose lifts and uniformly compacted to at least 98 percent of the materials SPMDD.

To avoid the loss of soil fines from the subgrade, clear stone bedding material should not be used in any case for pipe bedding or to stabilize the bases.

6.2.6 Backfilling of Trenches

It is understood that the majority of the proposed installations will be carried out by open excavation. The invert depths and location of the proposed utility pipes were not available at the time of preparing the report. Should settlement occur to the backfill materials, it may reflect on the pavement of the proposed extension of Livingston Avenue. In order to minimise the potential settlement of trench backfill, engineered fill shall be considered for trench backfill.

The recommended procedures of the placement of engineered trench backfill is outlined as follows:

1. The approved engineered fill must be compacted to at least 98% Standard Proctor Maximum Dry Density (SPMDD) throughout. Granular fill materials consisting of well graded cohesionless sand and gravel are preferred. Engineered fill should not be placed during winter months unless free-drained granular materials are considered. Engineered

fill compacted to 98% SPMDD will settle under its own weight approximately 0.25% to 0.75% of the fill height. This settlement will reflect on the road surface (i.e. pavement).

2. Full-time geotechnical inspection and compaction testing by GeoPro during placement of engineered fill must be required. The placement of the engineered fill must not commence or continue without the presence of the GeoPro's representative.

3. Surface water cannot be allowed to pond in any area of the engineered fill footprint.

4. Clear stone backfill must not be used in any portion of the engineered fill.

5. Upon completion of engineered fill, the surface of the pad must be protected from disturbance from traffic, rain and frost.

Engineered fill compacted to at least 98% of SPMDD will settle under its own weight approximately 0.25% to 0.75% of the fill thickness. The designer and the project engineers must be aware of this settlement. For example, where the engineered fill is 5 m in thickness, the settlement of fill under its own weight is expected to be in the range of 25 mm on a non-yielding subgrade. The settlement of the engineered fill will occur with time. For engineered fill consisting of sandy silt to silty sand material, about 75% of the settlement is expected to occur within 3 to 6 months after the placement of the engineered fill; for engineered fill consisting of clayey silt to silty clay material, about 75% of the settlement is expected to occur within 6 to 12 months or longer after the placement of the engineered fill, subject to the thickness of engineering fill and the workmanship of the contractor.

Engineered fill consisting of Granular A materials (sand and gravel) will undergo less selfweight settlement (say about 0.2% to 0.5% of the fill thickness). In addition, the settlement of engineered Granular A fill will be completed in a shorter period of time. For engineered fill consisting of Granular A materials compacted to at least 98% of SPMDD, a major portion (75% or higher) of the settlement due to the self-weight is expected to be completed during the construction stage before the placement of the pavement structures.

Excavated bedrock may be used as trench backfill provided it is crushed to form a well graded material meeting the gradation specifications of OPSS Granular A or B. No rock pieces should be placed within 300 mm of the crown of the pipe to minimize damage due to impact or point loading.

It should be noted that if the soils for trench backfilling were placed and compacted at wet of their optimum water content (>2%), pumping and rolling conditions may be encountered, which would require mitigative measures in order to construct roads and utilities. This might include significant extra thickness of granular base, base reinforcement using geogrids or importing of better quality common fill.

Normal post-construction settlement of the compacted trench backfill should be anticipated, with the majority of such settlement taking place within about 6 to 12 months following the completion

of trench backfilling operations subject to the backfill material, the thickness of backfill, the compaction and the workmanship of the contractor. If the settlement is not excessive, this settlement may be compensated for, where necessary, by placing additional granular material prior to asphalt paving. Alternatively, if the asphalt binder course is placed shortly following the completion of trench backfilling operations in these areas, any settlement that may be reflected by subsidence of the surface of the binder asphalt should be compensated for by placing an additional thickness of binder asphalt or by padding.

6.2.7 Temporary Shoring for Excavation

Vertical cuts supported with shoring such as a strutted soldier pile and timber lagging system may be anticipated at the site. The shoring system must be designed in accordance with the Canadian Foundation Engineering Manual (CFEM 4th Edition, 2016).

The lateral earth pressure distribution in the overburden soils as shown on Drawing 2 may be utilized for the design of the soldier piles with multiple struts. The hydrostatic water pressure must also be added in accordance with the groundwater levels measured in the boreholes. The surcharge must account for construction machinery and excavation spoils, if any.

Safe net bearing value for soldier pile caissons in the sound shale bedrock can be taken as q = 900 kPa, provided the caisson holes are clean and dry prior to pouring concrete. Assuming a slurry procedure and tremie concrete, then q = 500 kPa can be considered.

The soldier piles should be installed in pre-augered holes filled with concrete below the excavation level. The concrete strength must be specified by the shoring designer. Temporary liners would be required in order to help prevent the silty/sandy zones from caving-in during installation. The potential for encountering obstructions such as cobbles and boulders in the soils that may impact the soldier pile/caisson installations should be considered by the shoring contractor. The sandy/silty soils at the site are easy to be disturbed below groundwater tables and positive dewatering would be needed should the caissons be extending below the groundwater tables. No loss of ground should be permitted during augering for piles and the drilling contractor should be warned of potential obstructions within the native soils such as cobbles or boulders. Provisions may be made in contract for the removal of possible cobbles and boulders in the native soils or potential obstructions in the fill materials.

In order to install the shoring system, dewatering may be required, if wet sandy/silty zones are encountered.

Movement of the shoring system is inevitable. The magnitude of this movement can be controlled by sound construction practices.

To ensure that movements of the shoring are within an acceptable range, a monitoring program shall be carried out. GeoPro would be pleased to provide a detailed monitoring plan once the final designs are available.

If shoring is to be carried out over the winter months or if the excavation is to be left open for any period during below zero temperature, shored walls must be protected against frost penetration by means of insulation or heated hoarding.

A pre-construction condition survey of the adjacent structures within the zone of influence shall be considered prior to construction.

6.2.8 Geotechnical Quality of Excavated Soils and Rock

Reference to the borehole logs, the excavated materials at the site with respect to their compaction characteristics can be divided into the following groups:

- Group 1 soils comprise the cohesionless sandy/silty soils and sandy silt till. The compaction of these soils will require a tight control of the moisture content during placement and compaction. If moisture contents are more than 3% below the optimum, the soils will likely be dusty and "flour" like; if moisture contents are approximately 3% higher than the optimum, the soils will likely be "spongy" and will "pump".
- Group 2 soil comprises the excavated shale. These materials could be used as backfill provided they are pulverized to the sizes similar to Granular 'A' or 'B' or are blended with glacial till soils. Ripped or mechanically excavated bedrock may be too coarsely graded and open graded for reuse as compacted fill.
- Group 3 soils consist of unsuitable materials because of their high moisture contents or organic inclusions. These include some of the existing fill materials, reworked soil and existing topsoil. These soils should be either disposed off-site or should be used only in "soft" landscaping areas where they can be placed with nominal compaction, and where surface settlements are tolerable.

Where a free-draining backfill is needed, the soils at the site will not be suitable and OPSS Granular 'A' or 'B' materials should be considered.

6.3 Lateral Earth Pressure in Overburden and Bedrock

Lateral Earth Pressure in Soil

The lateral earth pressure acting on the permanent rigid walls of the underground structures in overburden soils can be evaluated by the following formula:

$$p_z = K(\gamma z + q)$$

where

p_z = unit earth pressure at depth z (kN/m^2)

K = coefficient of lateral earth pressure = 0.5

γ = unit weight of soil = 21 kN/m^3

z = depth below a horizontal ground surface (m)

q = unit surcharge load at ground surface (kN/m^2)

The hydrostatic water pressure must also be added assuming a water table at ground surfaces, as mentioned above. In this case, however, in the earth pressure calculations, the unit weight of the soil below the water level should be taken as the submerged unit weight (11.2 kN/m^3).

Lateral Earth Pressure in Bedrock

It should be noted that any structure and utility pipes that are in direct contact with the bedrock will be subject to "rock squeeze".

It has been observed both in the laboratory and in the field that upon relief of the high residual horizontal stresses within the shaly rock, time-dependent, creep-like deformations take place. These time-dependent deformations (TDD) persist well beyond the initial elastic deformations and generally exceed the magnitude of the elastic movements.

The permanent MH structure and concrete pipes should NOT be designed to resist these displacements. Rather a layer of compressible material must be placed between the structure and the rock. This compressible layer could be either a synthetic material (e.g. EPS GeoSpan Compressible Fill) or foamed "cellular grout". Properties and proposed thicknesses of the compressible material should be submitted to a qualified engineer to evaluate its stiffness and assess its suitability. Certain rigid polystyrene insulation products are considered to be excessively stiff for this application.

Provided that rock squeeze is allowed to dissipate by delaying construction of permanent concrete walls or by applying a compressible void former, the lateral earth pressures acting on this bedrock portion of the MH structure below the overburden can be assumed to be a uniform pressure equal to the maximum overburden lateral earth pressure calculated at the overburden to rock interface, plus the hydrostatic forces.

7 ENVIRONMENTAL SOIL ANALYTICAL RESULTS

7.1 Soil Sample Submission

Selected soil samples were submitted to ALS Environmental Laboratories ("ALS") in Waterloo, Ontario ("ALS") for chemical analyses. Descriptions of the selected soil samples and analytical parameters are presented in the following table:

Sample ID	Soil Depth (mBGS)	Primary Soil	Analytical Parameters
BH2-01 SS2	0.8 – 1.2	Fill: Clayey Silt	M&I; BTEX; TPH and VOCs
BH2-03 SS1A	0.1 – 0.5	Fill: Sandy Silt	M&I; BTEX; TPH and VOCs

BH2-05 SS1A	0.3 – 0.5	Fill: Compacted Weathered Shale with Sandy Silt	M&I; BTEX; TPH and VOCs
BH2-07 SS1+SS2	0.1 – 1.2	Fill: Clayey Silt	M&I; BTEX; TPH and VOCs
BH2-09 SS2+SS3	0.8 – 2.0	Fill: Compacted Weathered Shale with Sandy Silt and Probable Weathered Shale	M&I; BTEX; TPH and VOCs
BH2-13 SS2+SS3	0.8 – 2.0	Probable Weathered Shale	M&I; BTEX; TPH and VOCs
BH2-15 SS2+SS3	0.8 – 1.7	Probable Weathered Shale	M&I; BTEX; TPH and VOCs
BH2-17 SS1	0.1 – 0.6	Fill: Compacted Weathered Shale with Sandy Silt	M&I; BTEX; TPH and VOCs

Note: M&I = Metals and Inorganics
BTEX = Benzene, toluene, ethylbenzene, and xylenes
TPH = Total Petroleum Hydrocarbons
VOCs = Volatile Organic Compounds

7.2 Soil Analytical Results

Selected soil samples were analysed for M&I, BTEX, TPH and VOCs under Ontario Regulation 153/04 ("O. Reg. 153/04") as amended. A copy of the soil analytical results is provided in the Laboratory Certificates of Analysis, attached to Appendix B.

The soil analytical results were compared with the Ministry of the Environment, Conservation and Parks ("MECP") "Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act", April 2011, Table 1: Full Depth Background Site Condition Standards for Residential/Parkland/Institutional/Industrial/Commercial/Community Property Uses ("2011 MECP Table 1 Standards"); Table 2: Full Depth Generic Site Condition Standards in a Potable Ground Water Condition ("2011 MECP Table 2 Standards"), and Table 3: Full Depth Generic Site Condition Standards in a non-potable Ground Water Condition ("2011 MECP Table 3 Standards").

Based on the comparison, exceedances of MECP Table 1, Table 2 or Table 3 standards were noted. The exceedance values detected in the soil samples are summarized in the following table.

Soil Sample ID	Parameter	Detected Value / Unit	MECP Table 1 Standards Guideline Value	MECP Table 2 and 3 Standards (R/P/I) Guideline Value	MECP Table 2 and 3 Standards (I/C/C) Guideline Value
BH2-01 SS2	EC	1.4 mS/cm	**0.57** mS/cm	**0.7** mS/cm	1.4 mS/cm
	SAR	13.3	**2.4**	**5**	**12**
BH2-15 SS2+SS3	SAR	4.61	**2.4**	5	12

Note: EC = Electrical Conductivity
SAR = Sodium Absorption Ratio
R/P/I = Residential, Parkland and Institutional Property Use

I/C/C = Industrial, Commercial and Community Property Use
0.57 = standard value exceeded by the analytical result

7.3 Discussion of analytical Results

Based on the analytical results, exceedances of MECP Table 1, Table 2 or Table 3 Standards were noted for EC and SAR in the tested soil samples. It should be noted that the samples with exceedances of EC and SAR values were taken from the boreholes located on the roadway. The elevated EC and SAR values in the tested soil samples may likely be attributed to the application of de-icing salt on the road.

Based on the results of soil sample analysis, GeoPro would recommend the following disposal options:

1) The soils generated near Boreholes BH2-03, BH2-05, BH2-07, BH2-09, BH2-13 and BH2-17 at the tested depth with no indicated exceedances can be re-used at the Site or a receiving site would accept the soils as per the rest results. However, additional chemical testing may be required by these sites.
2) The soils generated at the same tested sample depth from Borehole BH2-15 can be re-used for the on-site developments, provided that the soils will not be in contact with groundwater, or re-used at a receiving site which is not considered as an environmental sensitive site and would accept soil as per the test results. However, additional chemical testing may be required by these facilities; and
3) The soils generated at the same tested sample depth from Borehole BH2-01 may be disposed at facilities, which are suitable to accept salt-impacted excess soil (i.e., certain former aggregate sites, mines, etc.) or at a licensed landfill site. However, additional chemical testing may be required by these facilities.

It should be noted that the analytical results of chemical test refer only to the soil samples tested, which were obtained from specific sampling locations and sampling depths, and that the soil chemistry may vary between and beyond the location and depth of the samples taken. Therefore, soil materials to be used on site or transported to other sites must be inspected during excavation for indication of variance in composition or any chemical/environmental constraints. If conditions indicate significant variations, further chemical testing should be carried out.

Please note that the level of testing outlined herein is meant to provide a broad indication of soil quality based on the limited soil samples tested. The analytical results contained in this report should not be considered a warranty with respect to the soil quality or the use of the soil for any specific purpose. Furthermore, it must be noted that our scope of work was only limited to the review of the analytical results of the limited number of samples. The scope of work did not include any environmental evaluation or assessment of the subject site (such as a Phase One or Phase Two Environmental Site Assessment).

Sites accepting fill may have requirements relating to its aesthetic or engineering properties in addition to its chemical quality. Some receiving sites may have specific chemical testing protocols, which may require additional tests to meet the requirements. The requirements for accepting the fill at an off-site location must be confirmed in advance. GeoPro would be pleased to assist once the receiving sites are determined and the requirements of the receiving sites are available.

8 MONITORING AND TESTING

The geotechnical aspects of the final design drawings and specifications should be reviewed by this office prior to tendering and construction, to confirm that the intent of this report has been met. During construction, full-time engineered fill monitoring and sufficient foundation inspections, subgrade inspections, in-situ density tests and materials testing should be carried out to confirm that the conditions exposed are consistent with those encountered in the boreholes, and to monitor conformance to the pertinent project specification.

9 CLOSURE

We appreciate the opportunity to be of service to you and trust that this report provides sufficient geotechnical engineering information to facilitate the detailed design of this project. We look forward to providing you with continuing service during the construction stage. Please do not hesitate to contact our office should you wish to discuss, in further detail, any aspects of this project.

Yours very truly,

GEOPRO CONSULTING LIMITED

DRAFT

Dylan Q. Xiao, M.A.Sc., P.Eng.
Geotechnical Group

DRAFT

David B. Liu, P.Eng., Principal

DRAWINGS

Legend:

Completed Work Area

Client: **Dillon Consulting Limited**		Project No.: **18-2178G03**	Drawing No.: **1A**
Drawn: **NZ**	Approved: **DL**	Title:	**Borehole Location Plan**
Date: **February 2019**	Scale: **N.T.S**	Project:	**Geotechnical Investigation Municipal Class EA Studies for Casablanca Boulevard and Livingston Avenue Grimsby, Niagara Region, Ontario**
Original Size: **Letter**	Rev: **TY**		*GeoPro* Consulting Limited

Legend:

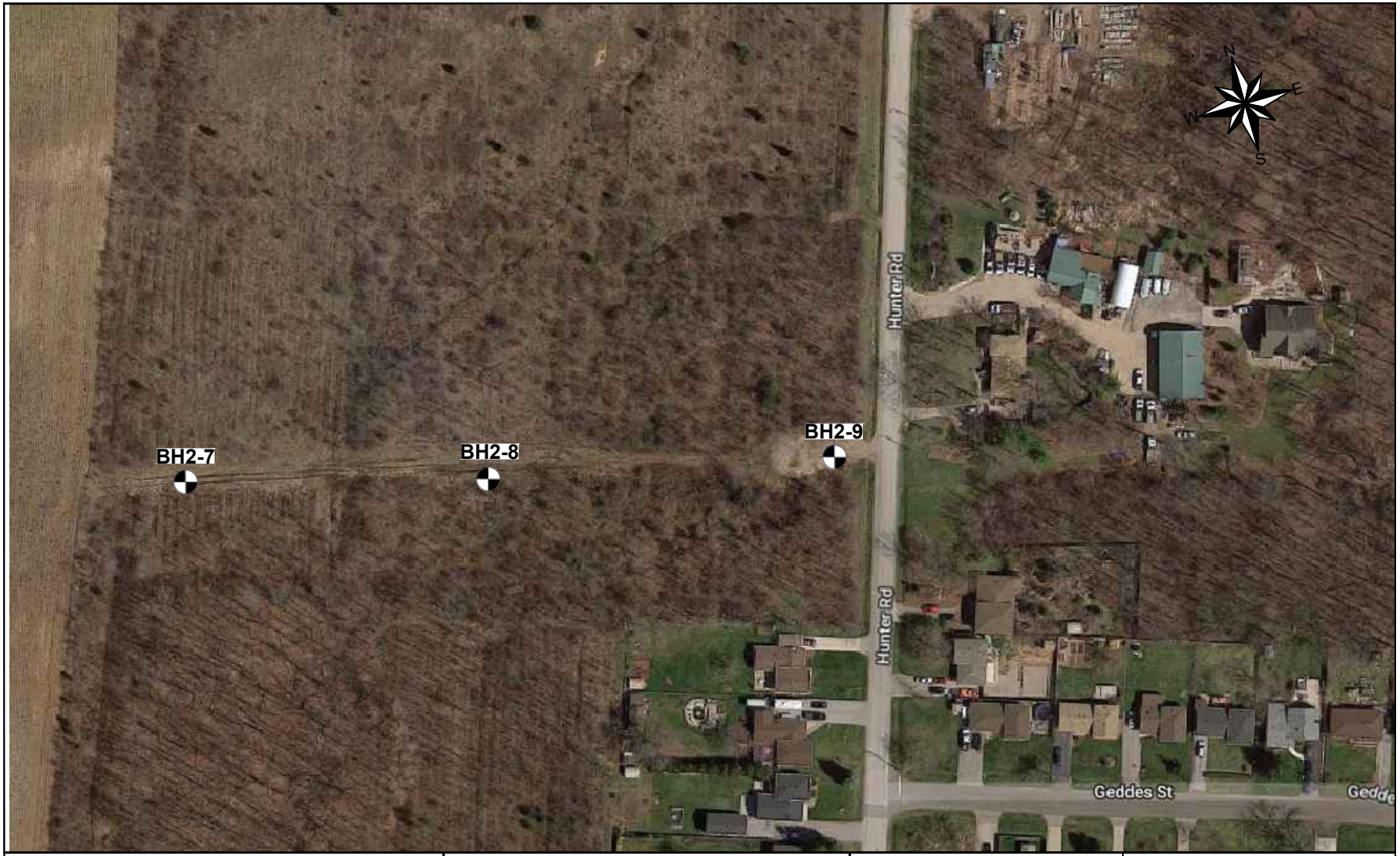
Borehole Location

Client: **Dillon Consulting Limited**		Project No.: **18-2178G03**	Drawing No.: **1B**
Drawn: **SD**	Approved: **DL**	Title: **Borehole Location Plan**	
Date: **February 2019**	Scale: **N.T.S**	Project: **Geotechnical Investigation Municipal Class EA Studies for Casablanca Boulevard and Livingston Avenue Grimsby, Niagara Region, Ontario**	
Original Size: **Letter**	Rev: **JY**	*GeoPro* Consulting Limited	

Legend:

Borehole Location

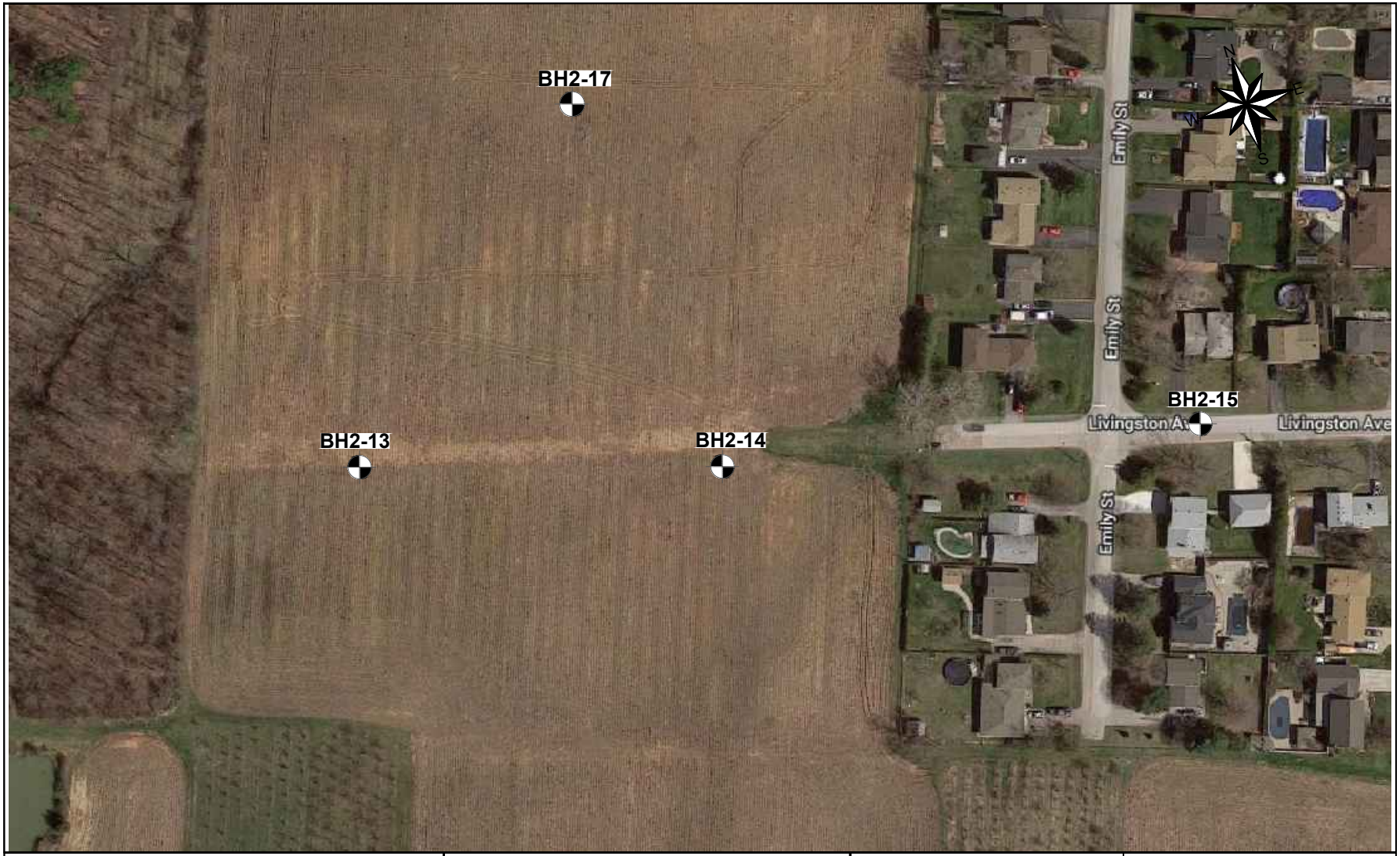
Client: **Dillon Consulting Limited**		Project No.: **18-2178G03**	Drawing No.: **1C**
Drawn: **SD**	Approved: **DL**	Title: **Borehole Location Plan**	
Date: **February 2019**	Scale: **N.T.S**	Project: **Geotechnical Investigation Municipal Class EA Studies for Casablanca Boulevard and Livingston Avenue Grimsby, Niagara Region, Ontario**	
Original Size: **Letter**	Rev: **JY**	**GeoPro Consulting Limited**	



Legend:

Borehole Location

Client: **Dillon Consulting Limited**		Project No.: **18-2178G03**	Drawing No.: **1D**
Drawn: **SD**	Approved: **DL**	Title: **Borehole Location Plan**	
Date: **February 2019**	Scale: **N.T.S**	Project: **Geotechnical Investigation Municipal Class EA Studies for Casablanca Boulevard and Livingston Avenue Grimsby, Niagara Region, Ontario**	
Original Size: **Letter**	Rev: **JY**	**GeoPro Consulting Limited**	



Legend:

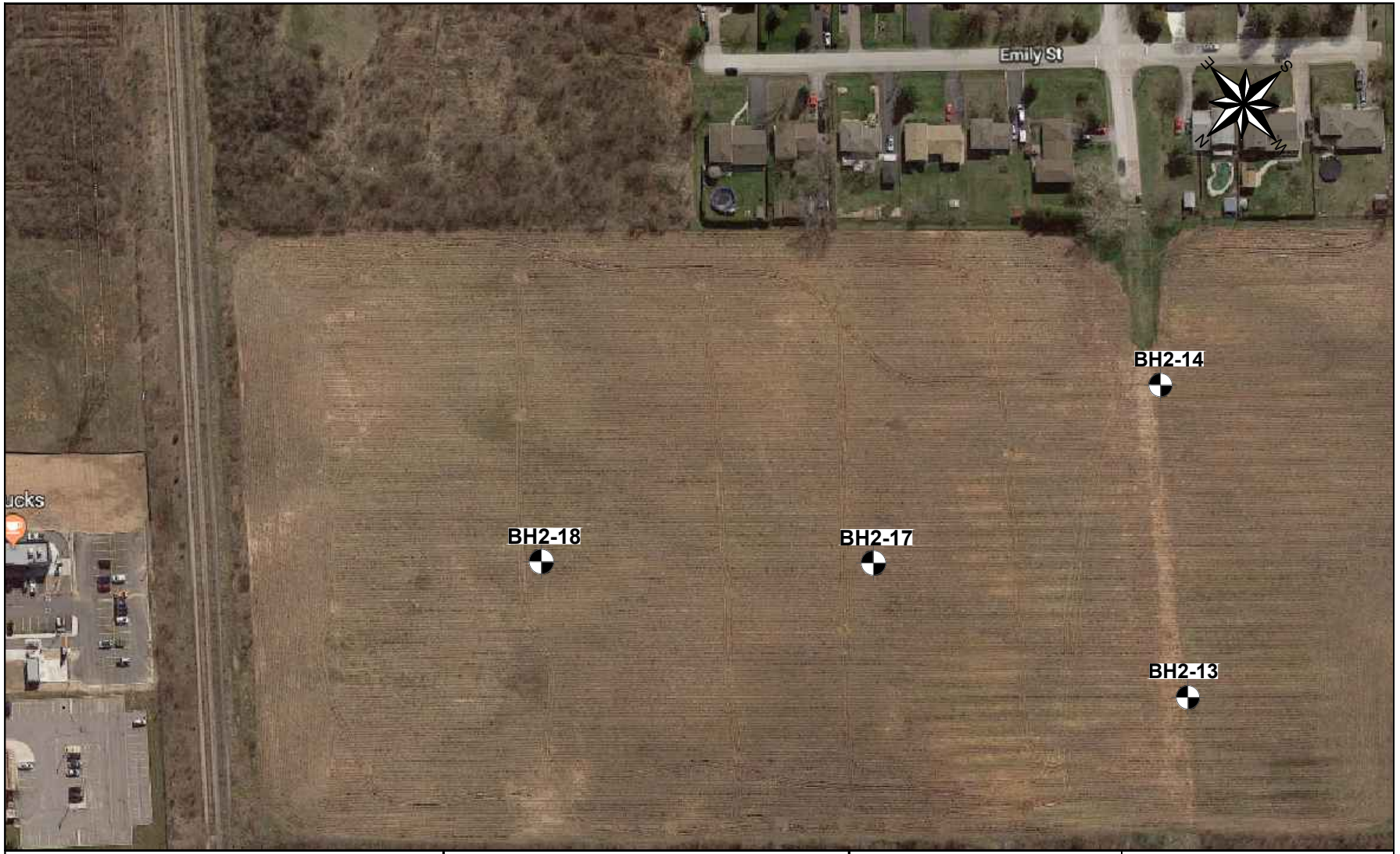
Borehole Location

Client: Dillon Consulting Limited		Project No.: 18-2178G03	Drawing No.: 1E
Drawn: SD	Approved: DL	Title: Borehole Location Plan	
Date: February 2019	Scale: N.T.S	Project: Geotechnical Investigation Municipal Class EA Studies for Casablanca Boulevard and Livingston Avenue Grimsby, Niagara Region, Ontario	
Original Size: Letter	Rev: JY	GeoPro Consulting Limited	

Legend:

Borehole Location

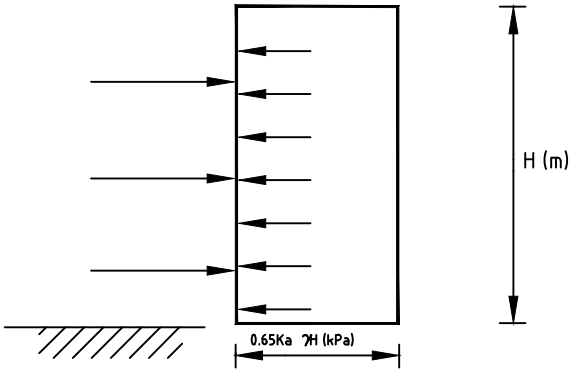
Client:	**Dillon Consulting Limited**	Project No.: **18-2178G03**	Drawing No.: **1F**
Drawn: **SD**	Approved: **DL**	Title:	**Borehole Location Plan**
Date: **February 2019**	Scale: **N.T.S**	Project:	**Geotechnical Investigation Municipal Class EA Studies for Casablanca Boulevard and Livingston Avenue Grimsby, Niagara Region, Ontario**
Original Size: **Letter**	Rev: **JY**		*GeoPro* Consulting Limited



Legend:

Borehole Location

Client: Dillon Consulting Limited		Project No.: 18-2178G03	Drawing No.: 1G
Drawn: SD	Approved: DL	Title: Borehole Location Plan	
Date: February 2019	Scale: N.T.S	Project: Geotechnical Investigation Municipal Class EA Studies for Casablanca Boulevard and Livingston Avenue Grimsby, Niagara Region, Ontario	
Original Size: Letter	Rev: JY	GeoPro Consulting Limited	

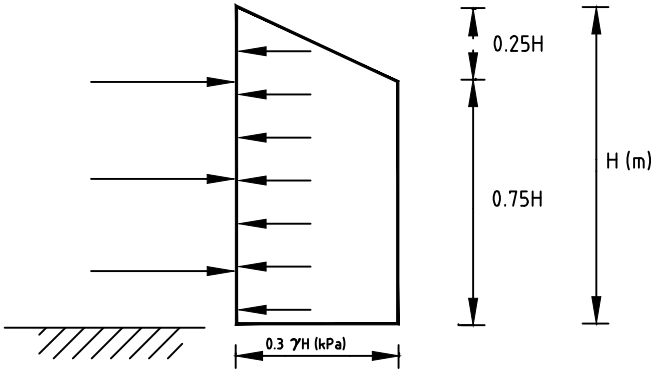


γ = Unit weight of soil = 18.5 kN/m³

γ' = Submerged Unit weight of soil (i.e. below ground water level) = 10.5 kN/m³

Ka = 0.3

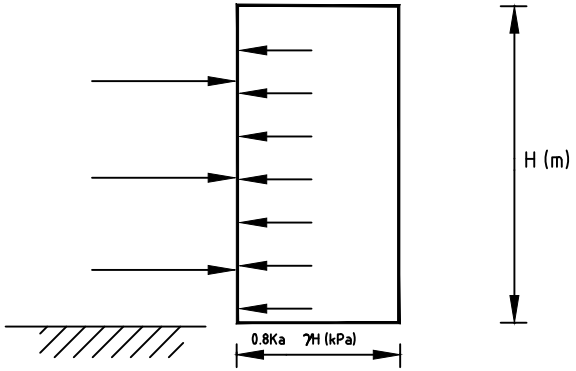
IN COMPACT TO VERY DENSE NON-COHESIVE SOILS (SANDS AND SILTS)



γ = Unit weight of soil = 18.5 kN/m³

γ' = Submerged Unit weight of soil (i.e. below ground water level) = 10.5 kN/m³

IN COHESIVE CLAYS OR CLAYEY SOILS

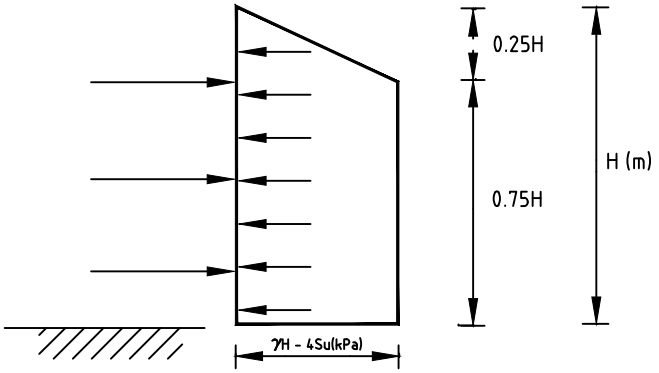


γ = Unit weight of soil = 18.5 kN/m³

γ' = Submerged Unit weight of soil (i.e. below ground water level) = 8.5 kN/m³

Ka = 0.33

IN LOOSE OR DISTURBED NON-COHESIVE SOILS (SANDS AND SILTS)



γ = Unit weight of soil = 18.5 kN/m³

γ' = Submerged Unit weight of soil (i.e. below ground water level) = 8.5 kN/m³

Su = 25 kPa

IN VERY SOFT TO FIRM COHESIVE CLAYS OR CLAYEY SOILS

Notes:

1. Check for temporary or partial excavation condition.
2. If the free water level is above the base of the excavation the hydrostatic pressure must be added to the above pressure distribution.
3. Surcharge loadings are present near the excavation the effect must be included in the lateral pressure calculation.

Client:	Dillon Consulting Limited			Project No.: **18-2178G03**	Drawing No.: **2**
Drawn:	**GH**	Approved:	**JY**	Title: **Earth Pressure Distribution on Temporary Multiple Braced Excavations**	
Date:	**July , 2018**	Scale:	**N.T.S**	Project: **Geotechnical Investigation** Municipal Class EA for Livingston Avenue From Casablanca Boulevard to Main Street West, Grimsby, Niagara Region, **Ontario**	
Original Size:	**Letter**	Rev:	**JY**	GeoPro Consulting Limited	

S:\Projects_Standard Report Drawings\EARTH PRESSURE DISTRIBUTION ON BRACED EXCAVATIONS-Aug-2012.dwg

ENCLOSURES

Enclosure 1A: Notes on Sample Descriptions

1. Each soil stratum is described according to the *Modified Unified Soil Classification System*. The compactness condition of cohesionless soils (SPT) and the consistency of cohesive soils (undrained shear strength) are defined according to Canadian Foundation Engineering Manual, 4th Edition. Different soil classification systems may be used by others. Please note that a description of the soil stratums is based on visual and tactile examination of the samples augmented with field and laboratory test results, such as a grain size analysis and/or Atterberg Limits testing. Visual classification is not sufficiently accurate to provide exact grain sizing or precise differentiation between size classification systems.

2. Fill: Where fill is designated on the borehole log it is defined as indicated by the sample recovered during the boring process. The reader is cautioned that fills are heterogeneous in nature and variable in density or degree of compaction. The borehole description may therefore not be applicable as a general description of site fill materials. All fills should be expected to contain obstruction such as wood, large concrete pieces or subsurface basements, floors, tanks, etc., none of these may have been encountered in the boreholes. Since boreholes cannot accurately define the contents of the fill, test pits are recommended to provide supplementary information. Despite the use of test pits, the heterogeneous nature of fill will leave some ambiguity as to the exact composition of the fill. Most fills contain pockets, seams, or layers of organically contaminated soil. This organic material can result in the generation of methane gas and/or significant ongoing and future settlements. Fill at this site may have been monitored for the presence of methane gas and, if so, the results are given on the borehole logs. The monitoring process does not indicate the volume of gas that can be potentially generated nor does it pinpoint the source of the gas. These readings are to advise of the presence of gas only, and a detailed study is recommended for sites where any explosive gas/methane is detected. Some fill material may be contaminated by toxic/hazardous waste that renders it unacceptable for deposition in any but designated land fill sites; unless specifically stated the fill on this site has not been tested for contaminants that may be considered toxic or hazardous. This testing and a potential hazard study can be undertaken if requested. In most residential/commercial areas undergoing reconstruction, buried oil tanks are common and are generally not detected in a conventional preliminary geotechnical site investigation.

3. Till: The term till on the borehole logs indicates that the material originates from a geological process associated with glaciation. Because of this geological process the till must be considered heterogeneous in composition and as such may contain pockets and/or seams of material such as sand, gravel, silt or clay. Till often contains cobbles (75 to 300 mm) or boulders (over 300 mm). Contractors may therefore encounter cobbles and boulders during excavation, even if they are not indicated by the borings. It should be appreciated that normal sampling equipment cannot differentiate the size or type of any obstruction. Because of the horizontal and vertical variability of till, the sample description may be applicable to a very limited zone; caution is therefore essential when dealing with sensitive excavations or dewatering programs in till materials.

Enclosure 1B: Explanation of Terms Used in the Record of Boreholes

Sample Type

AS	Auger sample
BS	Block sample
CS	Chunk sample
DO	Drive open
DS	Dimension type sample
FS	Foil sample
NR	No recovery
RC	Rock core
SC	Soil core
SS	Spoon sample
SH	Shelby tube Sample
ST	Slotted tube
TO	Thin-walled, open
TP	Thin-walled, piston
WS	Wash sample

Penetration Resistance

Standard Penetration Resistance (SPT), N:

The number of blows by a 63.5 kg (140 lb) hammer dropped 760 mm (30 in) required to drive a 50 mm (2 in) drive open sampler for a distance of 300 mm (12 in).

PM – Samples advanced by manual pressure
WR – Samples advanced by weight of sampler and rod
WH – Samples advanced by static weight of hammer

Dynamic Cone Penetration Resistance, N_d:

The number of blows by a 63.5 kg (140 lb) hammer dropped 760 mm (30 in) to drive uncased a 50 mm (2 in) diameter, 60° cone attached to "A" size drill rods for a distance of 300 mm (12 in).

Piezo-Cone Penetration Test (CPT):

An electronic cone penetrometer with a 60 degree conical tip and a projected end area of 10 cm² pushed through ground at a penetration rate of 2 cm/s. Measurement of tip resistance (Q_t), porewater pressure (PWP) and friction along a sleeve are recorded electronically at 25 mm penetration intervals.

Textural Classification of Soils (ASTM D2487)

Classification	Particle Size
Boulders	> 300 mm
Cobbles	75 mm - 300 mm
Gravel	4.75 mm - 75 mm
Sand	0.075 mm – 4.75 mm
Silt	0.002 mm-0.075 mm
Clay	<0.002 mm(*)

(*) Canadian Foundation Engineering Manual (4th Edition)

Coarse Grain Soil Description (50% greater than 0.075 mm)

Terminology	Proportion
Trace	0-10%
Some	10-20%
Adjective (e.g. silty or sandy)	20-35%
And (e.g. sand and gravel)	> 35%

Soil Description

a) Cohesive Soils (*)

Consistency	Undrained Shear Strength (kPa)	SPT "N" Value
Very soft	<12	<2
Soft	12-25	2-4
Firm	25-50	4-8
Stiff	50-100	8-15
Very stiff	100-200	15-30
Hard	>200	>30

(*) Hierarchy of Shear Strength prediction

1. Lab triaxial test
2. Field vane shear test
3. Lab. vane shear test
4. SPT "N" value
5. Pocket penetrometer

b) Cohesionless Soils (*)

Compactness Condition (Formerly Relative Density)	SPT "N" Value
Very loose	0-4
Loose	4-10
Compact	10-30
Dense	30-50
Very dense	>50

Soil Tests

w	Water content
w_p	Plastic limit
w_l	Liquid limit
C	Consolidation (oedometer) test
CID	Consolidated isotropically drained triaxial test
CIU	consolidated isotropically undrained triaxial test with porewater pressure measurement
D_R	Relative density (specific gravity, Gs)
DS	Direct shear test
ENV	Environmental/ chemical analysis
M	Sieve analysis for particle size
MH	Combined sieve and hydrometer (H) analysis
MPC	Modified proctor compaction test
SPC	Standard proctor compaction test
OC	Organic content test
U	Unconsolidated Undrained Triaxial Test
V	Field vane (LV-laboratory vane test)
γ	Unit weight

LOG OF BOREHOLE BH2-01

PROJECT: Geotechnical Investigation for Municipal Class Environmental Assessment Studies

CLIENT: Dillon Consulting Limited

PROJECT LOCATION: Livingston Ave, Grimsby, Ontario

DATUM: N/A

BH LOCATION: See Borehole Location Plan

DRILLING DATA

METHOD: Continuous Flight Auger - Auto Hammer

FIELD ENGINEER: KL

SAMPLE REVIEW: DC

CHECKED: DL

DIAMETER: 155 mm

DATE: 2018-08-16 & 10-04

REF. NO.: 18-2178G03

ENCL. NO.: 2

ELEV / DEPTH (m)	DESCRIPTION	STRATA PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" BLOWS/0.3m	GROUND WATER	ELEVATION	DYNAMIC PENETRATION TEST: SPT / Cone blows/0.3m; SHEAR STRENGTH (kPa): Unconfined, Quick Triaxial, Field Vane & Sensitivity, Penetrometer, Lab Vane	WATER CONTENT (%): Plastic Limit w_P, Natural Moisture Content w, Liquid Limit w_L	UNIT WT (kN/m^3)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	**ASPHALT:** (240 mm)										
0.2	**GRANULAR BASE/SUBBASE:** (255 mm)		1A	AS							64 35 1
0.5	**FILL:** sandy silt, trace clay, trace gravel, containing shale fragments, brown, moist to wet		1B	AS							
0.8	**FILL:** clayey silt, some sand, trace gravel, layers of compacted weathered shale, containing shale fragments, reddish brown, moist, stiff		2	SS	12						
1.4	**PROBABLE WEATHERED SHALE:** reddish brown		3	SS	51						
			4	SS	50 / 75 mm			> >100			
			5	SS	50 / 75 mm			> >100			
	--- auger grinding										
4.6	**END OF BOREHOLE**		6	SS	50 / 25 mm			> >100			

Notes:
1) Water encountered at a depth of 4.0 m below ground surface (mBGS) during drilling.
2) Borehole caved at a depth of 4.4 mBGS upon completion of drilling.

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES: $+^3$, $\times^3$: Numbers refer to Sensitivity; $\blacktriangle^{\varepsilon=3\%}$ Strain at Failure

01 - GEOPRO SOIL LOG GEOPRO 18-2178G LOG PROJECT LIVINGSTON 20190117- PJ- LAB(MYB).GPJ 2019-01-17 12:28

LOG OF BOREHOLE BH2-02

PROJECT: Geotechnical Investigation for Municipal Class Environmental Assessment Studies

CLIENT: Dillon Consulting Limited

PROJECT LOCATION: Livingston Ave, Grimsby, Ontario

DATUM: N/A

BH LOCATION: See Borehole Location Plan

DRILLING DATA

METHOD: Continuous Flight Auger - Auto Hammer

FIELD ENGINEER: RR

SAMPLE REVIEW: DC

CHECKED: DL

DIAMETER: 155 mm

DATE: 2018-08-14

REF. NO.: 18-2178G03

ENCL. NO.: 3

ELEV / DEPTH (m)	DESCRIPTION	STRATA PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" BLOWS/0.3m	GROUND WATER	ELEVATION	DYNAMIC PENETRATION TEST (○ SPT, ≈ Cone, blows/0.3m) / SHEAR STRENGTH (kPa) (● Unconfined, ▲ Quick Triaxial, ✕ Field Vane & Sensitivity, ⊠ Penetrometer, + Lab Vane)	Plastic Limit w_P / Natural Moisture Content w / Liquid Limit w_L — WATER CONTENT (%)	UNIT WT (kN/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	**TOPSOIL:** (120 mm)										
0.1	**FILL:** sandy silt, some clay, trace gravel, rootlet inclusions, layers of compacted weathered shale, reddish brown, moist, loose to compact		1	SS	10						
0.7	**PROBABLE WEATHERED SHALE:** reddish brown		2	SS	55						
			3	SS	50 / 100 mm			> >100			
			4	SS	50 / 75 mm			> >100			
			5	SS	50 / 75 mm			> >100			
	--- auger grinding										
			6	SS	79 / 225 mm			> >100			
5.0	**END OF BOREHOLE**										

Note:
1) Borehole was open and dry upon completion of drilling.

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES: + 3, × 3: Numbers refer to Sensitivity; ▲ ε=3% Strain at Failure

LOG OF BOREHOLE BH2-03

PROJECT: Geotechnical Investigation for Municipal Class Environmental Assessment Studies

CLIENT: Dillon Consulting Limited

PROJECT LOCATION: Livingston Ave, Grimsby, Ontario

DATUM: N/A

BH LOCATION: See Borehole Location Plan

DRILLING DATA

METHOD: Continuous Flight Auger - Auto Hammer

FIELD ENGINEER: RR

SAMPLE REVIEW: DC

CHECKED: DL

DIAMETER: 155 mm

DATE: 2018-08-14 & 10-04

REF. NO.: 18-2178G03

ENCL. NO.: 4

ELEV / DEPTH (m)	DESCRIPTION	NUMBER	TYPE	"N" BLOWS/0.3m	GROUND WATER	ELEVATION	DYNAMIC PENETRATION TEST (SPT / Cone, blows/0.3m)	SHEAR STRENGTH (kPa)	WATER CONTENT (%)	UNIT WT (kN/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%)
0.0	**TOPSOIL:** (70 mm)										
0.1	**FILL:** sandy silt, some clay, trace gravel, layers of compact weathered shale, containing shale fragments, reddish brown, moist, compact	1A	SS	15							
0.5		1B	SS								
	PROBABLE WEATHERED SHALE: grey to reddish brown	2	SS	50 / 125 mm	Bentonite			> >100			
		3	SS	76 / 280 mm				> >100			
		4	SS	72 / 280 mm	2.4mBGS Sep 15			> >100			
					Sand						
		5	SS	50 / 75 mm	Screen			> >100			
	--- auger grinding										
		6	SS	50 / 75 mm	Natural Pack			> >100			
3.9	**END OF BOREHOLE:**										

Notes:
1) Borehole was open and dry upon completion of drilling.
2) 51 mm dia. monitoring well was installed in borehole upon completion of drilling.

Water Level Reading:

Date	W.L Depth (mBGS)
Sep.15 2018	2.37

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES: +3, ×3: Numbers refer to Sensitivity; ▲ε=3% Strain at Failure

LOG OF BOREHOLE BH2-04

PROJECT: Geotechnical Investigation for Municipal Class Environmental Assessment Studies

CLIENT: Dillon Consulting Limited

PROJECT LOCATION: Livingston Ave, Grimsby, Ontario

DATUM: N/A

BH LOCATION: See Borehole Location Plan

DRILLING DATA

METHOD: Continuous Flight Auger - Auto Hammer

FIELD ENGINEER: CK

SAMPLE REVIEW: DC

CHECKED: DL

DIAMETER: 155 mm

DATE: 2018-08-14

REF. NO.: 18-2178G03

ENCL. NO.: 5

ELEV / DEPTH (m)	DESCRIPTION	NUMBER	TYPE	"N" BLOWS/0.3m
0.0	**TOPSOIL:** (130 mm)			
0.1	**FILL:** compacted weathered shale with sandy silt, trace clay, trace gravel, rootlet inclusions, reddish brown, moist, compact	1A	SS	12
0.5	**PROBABLE WEATHERED SHALE:** grey to reddish brown	1B	SS	
		2	SS	33
		3	SS	50 / 125 mm
		4	SS	78 / 225 mm
		5	SS	33
		6	SS	25
5.0	**END OF BOREHOLE:**			

Notes:
1) Water encountered at a depth of 4.9 m below ground surface (mBGS) during drilling.
2) Borehole was open and dry upon completion of drilling.

DYNAMIC PENETRATION TEST: ○ SPT, ≳ Cone, blows/0.3m; 20, 40, 60, 80

SHEAR STRENGTH (kPa): ● Unconfined, ✕ Field Vane & Sensitivity, ▲ Quick Triaxial, ⊠ Penetrometer, + Lab Vane; 20, 40, 60, 80

> >100

Plastic Limit (w_P), Natural Moisture Content (w), Liquid Limit (w_L)

WATER CONTENT (%): 10, 20, 30, 40

UNIT WT (kN/m³)

REMARKS AND GRAIN SIZE DISTRIBUTION (%): GR SA SI CL

GROUNDWATER ELEVATIONS

Measurement: 1st, 2nd, 3rd, 4th

GRAPH NOTES: +³, ×³: Numbers refer to Sensitivity; ▲ ε=3% Strain at Failure

LOG OF BOREHOLE BH2-05

PROJECT: Geotechnical Investigation for Municipal Class Environmental Assessment Studies
CLIENT: Dillon Consulting Limited
PROJECT LOCATION: Livingston Ave, Grimsby, Ontario
DATUM: N/A
BH LOCATION: See Borehole Location Plan

DRILLING DATA
METHOD: Continuous Flight Auger - Auto Hammer
FIELD ENGINEER: RR
SAMPLE REVIEW: DC
CHECKED: DL
DIAMETER: 155 mm
DATE: 2018-08-14 & 10-04
REF. NO.: 18-2178G03
ENCL. NO.: 6

ELEV / DEPTH (m)	DESCRIPTION	NUMBER	TYPE	"N" BLOWS/0.3m	ELEVATION
0.0	**TOPSOIL:** (280 mm)	1A	SS	10	
0.3	**FILL:** compacted weathered shale with sandy silt, trace clay, trace gravel, rootlet inclusions, reddish brown, moist, loose to compact	1B	SS		
0.5	**PROBABLE WEATHERED SHALE**: grey to reddish brown	2	SS	25	
		3	SS	50 / 75 mm	
		4	SS	69	
		5	SS	57 / 250 mm	
		6	SS	50 / 50 mm	
5.5	**END OF BOREHOLE**				

Bentonite 1.7mBGS Sep 15
Sand
Screen
Natural Pack

DYNAMIC PENETRATION TEST: SPT, Cone, blows/0.3m; 20 40 60 80
SHEAR STRENGTH (kPa): Unconfined, Field Vane & Sensitivity, Quick Triaxial, Penetrometer, Lab Vane; 20 40 60 80
WATER CONTENT (%): Plastic Limit (w_P), Natural Moisture Content (w), Liquid Limit (w_L); 10 20 30 40
> >100

Notes:
1) Water was at a depth of 4.0 m below ground surface (mBGS) upon completion of drilling.
2) Borehole was open upon completion of drilling.
3) 51 dia. monitoring well was installed in borehole upon completion of drilling.

Water Level Reading:

Date	W.L Depth (mBGS)
Sep.15 2018	1.74

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES: +3, ×3: Numbers refer to Sensitivity; ε=3% Strain at Failure

LOG OF BOREHOLE BH2-06

PROJECT: Geotechnical Investigation for Municipal Class Environmental Assessment Studies

CLIENT: Dillon Consulting Limited

PROJECT LOCATION: Livingston Ave, Grimsby, Ontario

DATUM: N/A

BH LOCATION: See Borehole Location Plan

DRILLING DATA

METHOD: Continuous Flight Auger - Auto Hammer

FIELD ENGINEER: CK

SAMPLE REVIEW: DC

CHECKED: DL

DIAMETER: 155 mm

DATE: 2018-08-14

REF. NO.: 18-2178G03

ENCL. NO.: 7

ELEV / DEPTH (m)	DESCRIPTION	STRATA PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" BLOWS/0.3m	GROUND WATER ELEVATION
0.0	**TOPSOIL:** (60 mm)					
0.1	**FILL:** compacted weathered shale with sandy silt, some clay, trace gravel, rootlet inclusions, reddish brown, moist, loose to compact		1	SS	10	
0.7	**PROBABLE WEATHERED SHALE:** grey to reddish brown		2	SS	50	
			3	SS	67	
			4	SS	17	
			5	SS	50 / 50 mm	
			6	SS	50 / 75 mm	
4.7	**END OF BOREHOLE**					

DYNAMIC PENETRATION TEST
○ SPT ≳ Cone blows/0.3m
20 40 60 80

SHEAR STRENGTH (kPa)
● Unconfined ✕ Field Vane & Sensitivity
▲ Quick Triaxial ⊠ Penetrometer + Lab Vane
20 40 60 80

> >100

Plastic Limit / Natural Moisture Content / Liquid Limit
w_P w w_L
WATER CONTENT (%)
10 20 30 40

UNIT WT (kN/m³)

REMARKS AND GRAIN SIZE DISTRIBUTION (%)
GR SA SI CL

Notes:
1) Water encountered at a depth of 4.6 m below ground level (mBGS) during drilling.
2) Water was at a depth of 4.4 mBGS upon completion of drilling.
3) Borehole was open upon completion of drilling.

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES
+ 3, × 3: Numbers refer to Sensitivity
▲ ε=3% Strain at Failure

LOG OF BOREHOLE BH2-07

PROJECT: Geotechnical Investigation for Municipal Class Environmental Assessment Studies

CLIENT: Dillon Consulting Limited

PROJECT LOCATION: Livingston Ave, Grimsby, Ontario

DATUM: N/A

BH LOCATION: See Borehole Location Plan

DRILLING DATA

METHOD: Continuous Flight Auger - Auto Hammer

FIELD ENGINEER: RR

SAMPLE REVIEW: DC

CHECKED: DL

DIAMETER: 155 mm

DATE: 2018-08-14 & 10-04

REF. NO.: 18-2178G03

ENCL. NO.: 8

ELEV / DEPTH (m)	DESCRIPTION	STRATA PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: "N" BLOWS/0.3m	GROUND WATER	ELEVATION	DYNAMIC PENETRATION TEST: SPT / Cone blows/0.3m (20 40 60 80)	SHEAR STRENGTH (kPa): Unconfined, Field Vane & Sensitivity, Quick Triaxial, Penetrometer, Lab Vane (20 40 60 80)	Plastic Limit w_P / Natural Moisture Content w / Liquid Limit w_L — WATER CONTENT (%) (10 20 30 40)	UNIT WT (kN/m^3)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	**TOPSOIL:** (110 mm)											
0.1	**FILL:** clayey silt, trace sand, rootlet inclusions, layers of compacted weathered shale, layers of organic silt, reddish brown, moist, firm to stiff		1	SS	10							
1			2	SS	8							0 4 52 44
1.2	**END OF BOREHOLE:** Note: 1) Borehole was open and dry upon completion of drilling.											

GROUNDWATER ELEVATIONS

Measurement 1st 2nd 3rd 4th

GRAPH NOTES: $+^3$, $\times^3$: Numbers refer to Sensitivity; ▲ ε=3% Strain at Failure

LOG OF BOREHOLE BH2-08

PROJECT: Geotechnical Investigation for Municipal Class Environmental Assessment Studies
CLIENT: Dillon Consulting Limited
PROJECT LOCATION: Livingston Ave, Grimsby, Ontario
DATUM: N/A
BH LOCATION: See Borehole Location Plan

DRILLING DATA
METHOD: Continuous Flight Auger - Auto Hammer
FIELD ENGINEER: KL
SAMPLE REVIEW: DC
CHECKED: DL
DIAMETER: 155 mm
DATE: 2018-08-16
REF. NO.: 18-2178G03
ENCL. NO.: 9

ELEV / DEPTH (m)	DESCRIPTION	NUMBER	TYPE	"N" BLOWS/0.3m	GROUND WATER	ELEVATION	DYNAMIC PENETRATION TEST (SPT / Cone, blows/0.3m)	SHEAR STRENGTH (kPa)	WATER CONTENT (%)	UNIT WT (kN/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%)
0.0	**TOPSOIL:** (300 mm)										
0.3	**FILL:** sandy silt, trace to some clay, trace gravel, layers of silty sand, reddish brown to brown, moist, loose	1	SS	9							
0.7	**PROBABLE WEATHERED SHALE:** reddish brown	2	SS	32	Bentonite						
		3	SS	54							
		4	SS	50 / 100 mm	3.0mBGS Sep 15				> >100		
		5	SS	50 / 125 mm	Sand				> >100		
					Screen						
		6	SS	50 / 75 mm	Natural Pack				> >100		
4.7	**END OF BOREHOLE**										

Notes:
1) Borehole was open and dry upon completion of drilling.
2) 51 mm dia. monitoring well is installed in borehole upon completion of drilling.

Water Level Reading:

Date	W.L Depth (mBGS)
Sep.15 2018	2.96

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES: +3, ×3: Numbers refer to Sensitivity; ▲ε=3% Strain at Failure

01 - GEOPRO SOIL LOG GEOPRO 18-2178G LOG PROJECT LIVINGSTON 20190117- PJ - LAB(MYB).GPJ 2019-01-17 12:28

LOG OF BOREHOLE BH2-09

PROJECT: Geotechnical Investigation for Municipal Class Environmental Assessment Studies
CLIENT: Dillon Consulting Limited
PROJECT LOCATION: Livingston Ave, Grimsby, Ontario
DATUM: N/A
BH LOCATION: See Borehole Location Plan

DRILLING DATA
METHOD: Continuous Flight Auger - Auto Hammer
FIELD ENGINEER: KL
SAMPLE REVIEW: DC
CHECKED: DL
DIAMETER: 155 mm
DATE: 2018-08-16 & 10-10
REF. NO.: 18-2178G03
ENCL. NO.: 10

ELEV / DEPTH (m)	DESCRIPTION	STRATA PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" BLOWS/0.3m	GROUND WATER ELEVATION
0.0	**FILL:** sandy silt, trace clay, trace gravel, organic inclusions, containing asphalt fragments, dark brown, moist, loose		1A	SS	9	
0.2			1B	SS		
	FILL: sandy silt, some clay, trace gravel, layers of clayey silt, layers of organic clayey silt, brown, moist, loose		2A	SS	22	
0.7			2B	SS		
0.9	**FILL:** compacted weathered shale with sandy silt, trace clay, trace gravel, reddish brown, moist, compact		3	SS	66	
	PROBABLE WEATHERED SHALE: grey to reddish brown		4	SS	75 / 265 mm	
			5	SS	50 / 25 mm	
4.7	END OF BOREHOLE		6	SS	50 / 50 mm	

Notes:
1) Water encountered at a depth of 4.6 m below ground surface (mBGS) during drilling.
2) Borehole caved at 4.1 mBGS upon completion of drilling.

DYNAMIC PENETRATION TEST
○ SPT ≳ Cone blows/0.3m
20 40 60 80
SHEAR STRENGTH (kPa)
● Unconfined ✕ Field Vane & Sensitivity
▲ Quick Triaxial ⊠ Penetrometer + Lab Vane
20 40 60 80
> >100
> >100
> >100

Plastic Limit w_P | Natural Moisture Content w | Liquid Limit w_L
WATER CONTENT (%)
10 20 30 40

UNIT WT (kN/m³)

REMARKS AND GRAIN SIZE DISTRIBUTION (%)
GR SA SI CL

GROUNDWATER ELEVATIONS
Measurement 1st ▽ 2nd ▼ 3rd ▼ 4th ▼

GRAPH NOTES
+ 3, × 3: Numbers refer to Sensitivity
▲ ε=3% Strain at Failure

01 - GEOPRO SOIL LOG GEOPRO 18-2178G LOG PROJECT LIVINGSTON 20190117- PJ- LAB(MYB).GPJ 2019-01-17 12:28

LOG OF BOREHOLE BH2-13

PROJECT: Geotechnical Investigation for Municipal Class Environmental Assessment Studies

CLIENT: Dillon Consulting Limited

PROJECT LOCATION: Livingston Ave, Grimsby, Ontario

DATUM: N/A

BH LOCATION: See Borehole Location Plan

DRILLING DATA

METHOD: Continuous Flight Auger - Auto Hammer

FIELD ENGINEER: KL

SAMPLE REVIEW: DC

CHECKED: DL

DIAMETER: 155 mm

DATE: 2018-08-16 & 10-11

REF. NO.: 18-2178G03

ENCL. NO.: 11

ELEV / DEPTH (m)	DESCRIPTION	STRATA PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" BLOWS/0.3m	GROUND WATER ELEVATION	DYNAMIC PENETRATION TEST / SHEAR STRENGTH (kPa)	WATER CONTENT (%)	UNIT WT (kN/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	**TOPSOIL:** (90 mm)									
0.1	**FILL:** sandy silt, some clay, trace gravel, organic inclusions, rootlet inclusions, layers of clayey silt, layers of compacted weathered shale, brown to reddish brown, moist, loose		1	SS	8					
0.7	**PROBABLE WEATHERED SHALE:** reddish brown		2	SS	18					
1			3	SS	56					
2			4	SS	50 / 65 mm		> >100			
3			5	SS	50 / 125 mm		> >100			
4										
4.6	**END OF BOREHOLE** Note: 1) Borehole caved at a depth of 3.9 m below ground surface (mBGS) upon completion of drilling.		6	SS	50 / 25 mm		> >100			

DYNAMIC PENETRATION TEST: ○ SPT, ≈ Cone, blows/0.3m; 20, 40, 60, 80

SHEAR STRENGTH (kPa): ● Unconfined, ✕ Field Vane & Sensitivity, ▲ Quick Triaxial, ⊠ Penetrometer, + Lab Vane; 20, 40, 60, 80

Plastic Limit (w_P), Natural Moisture Content (w), Liquid Limit (w_L)

WATER CONTENT (%): 10, 20, 30, 40

GROUNDWATER ELEVATIONS

Measurement: 1st ▽, 2nd ▼, 3rd ▼, 4th ▼

GRAPH NOTES: +³, ×³: Numbers refer to Sensitivity; ▲ ε=3% Strain at Failure

LOG OF BOREHOLE BH2-14

PROJECT: Geotechnical Investigation for Municipal Class Environmental Assessment Studies
CLIENT: Dillon Consulting Limited
PROJECT LOCATION: Livingston Ave, Grimsby, Ontario
DATUM: N/A
BH LOCATION: See Borehole Location Plan

DRILLING DATA
METHOD: Continuous Flight Auger - Auto Hammer
FIELD ENGINEER: KL
SAMPLE REVIEW: DC
CHECKED: DL
DIAMETER: 155 mm
DATE: 2018-08-16
REF. NO.: 18-2178G03
ENCL. NO.: 12

ELEV / DEPTH (m)	DESCRIPTION	STRATA PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" BLOWS/0.3m	GROUND WATER ELEVATION	DYNAMIC PENETRATION TEST (SPT / Cone, blows/0.3m) & SHEAR STRENGTH (kPa) (Unconfined, Quick Triaxial, Field Vane & Sensitivity, Penetrometer, Lab Vane)	WATER CONTENT (%) (Plastic Limit w_P, Natural Moisture Content w, Liquid Limit w_L)	UNIT WT (kN/m^3)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	**TOPSOIL:** (130 mm)									
0.1	**FILL:** sandy silt, some clay, trace gravel, rootlet inclusions, brown, moist, loose to compact		1	SS	9					
1			2	SS	19					
1.4	**PROBABLE WEATHERED SHALE:** grey to reddish brown		3	SS	50 / 50 mm		> >100			
2			4	SS	50 / 115 mm		> >100			
3			5	SS	50 / 100 mm		> >100			
4			6	SS	50 / 115 mm		> >100			
4.7	**END OF BOREHOLE:**									

Notes:
1) Water was at a depth of 4.6 m below ground surface (mBGS) during drilling.
2) Borehole was open and dry upon completion of drilling.

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES: $+^3$, $\times^3$: Numbers refer to Sensitivity; ▲$^{\varepsilon=3\%}$ Strain at Failure

LOG OF BOREHOLE BH2-15

PROJECT: Geotechnical Investigation for Municipal Class Environmental Assessment Studies
CLIENT: Dillon Consulting Limited
PROJECT LOCATION: Livingston Ave, Grimsby, Ontario
DATUM: N/A
BH LOCATION: See Borehole Location Plan

DRILLING DATA
METHOD: Continuous Flight Auger - Auto Hammer
FIELD ENGINEER: KL
SAMPLE REVIEW: DC
CHECKED: DL
DIAMETER: 155 mm
DATE: 2018-08-16 & 10-12
REF. NO.: 18-2178G03
ENCL. NO.: 13

ELEV / DEPTH (m)	DESCRIPTION	STRATA PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" BLOWS/0.3m	GROUND WATER ELEVATION	DYNAMIC PENETRATION TEST / SHEAR STRENGTH (kPa)	WATER CONTENT (%)	UNIT WT (kN/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	**ASPHALT:** (140 mm)									
0.1	**GRANULAR BASE/SUBBASE:** (250 mm)		1A	AS						76 24 0
0.4	**FILL:** compacted weathered shale with sandy silt, trace clay, trace gravel, grey to reddish brown, moist		1B	AS						
0.8	**PROBABLE WEATHERED SHALE:** reddish brown, moist		2	SS	28					
			3	SS	50 / 25 mm		> >100			
1.7	**END OF BOREHOLE**									

Note:
1) Borehole was caved at a depth of 1.3 m below ground surface (mBGS) upon completion of drilling.

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES
+3, ×3: Numbers refer to Sensitivity
▲ε=3% Strain at Failure

LOG OF BOREHOLE BH2-16

PROJECT: Geotechnical Investigation for Municipal Class Environmental Assessment Studies
CLIENT: Dillon Consulting Limited
PROJECT LOCATION: Livingston Ave, Grimsby, Ontario
DATUM: N/A
BH LOCATION: See Borehole Location Plan

DRILLING DATA
METHOD: Continuous Flight Auger - Auto Hammer
FIELD ENGINEER: KL
SAMPLE REVIEW: DC
CHECKED: DL
DIAMETER: 155 mm
DATE: 2018-08-16
REF. NO.: 18-2178G03
ENCL. NO.: 14

ELEV / DEPTH (m)	DESCRIPTION	STRATA PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" BLOWS/0.3m	GROUND WATER	ELEVATION	DYNAMIC PENETRATION TEST: SPT / Cone blows/0.3m; SHEAR STRENGTH (kPa): Unconfined, Quick Triaxial, Field Vane & Sensitivity, Penetrometer, Lab Vane	Plastic Limit / Natural Moisture Content / Liquid Limit; WATER CONTENT (%)	UNIT WT (kN/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	**ASPHALT:** (150 mm)										
0.2	**GRANULAR BASE/SUBBASE** (190 mm)		1A	AS							
0.3	**FILL:** sandy silt, trace clay, trace gravel, organic inclusions, pockets of clayey silt, layers of clayey silt, dark brown, moist		1B	AS							
0.8	**FILL:** clayey silt, trace clay, trace gravel, organic inclusions, organic odour, layers of sandy silt, layers of organic silt, brown, moist, compact		2	SS	13						
1.4	**SANDY SILT TILL:** some clay, trace gravel, layers of clayey silt till, containing shale fragments/pieces, containing cobbles and boulders, brown, moist, compact		3	SS	29						4 20 61 15
2.0	**END OF BOREHOLE** Note: 1) Borehole caved at a depth of 1.4 m below ground surface (mBGS) upon completion of drilling.										

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES: + 3, × 3: Numbers refer to Sensitivity; ▲ ε=3% Strain at Failure

LOG OF BOREHOLE BH2-17

PROJECT: Geotechnical Investigation for Municipal Class Environmental Assessment Studies
CLIENT: Dillon Consulting Limited
PROJECT LOCATION: Livingston Ave, Grimsby, Ontario
DATUM: N/A
BH LOCATION: See Borehole Location Plan

DRILLING DATA
METHOD: Continuous Flight Auger - Auto Hammer
FIELD ENGINEER: KL
SAMPLE REVIEW: DC
CHECKED: DL
DIAMETER: 155 mm
DATE: 2018-08-16 & 10-13
REF. NO.: 18-2178G03
ENCL. NO.: 15

ELEV / DEPTH (m)	DESCRIPTION	NUMBER	TYPE	"N" BLOWS/0.3m	GROUND WATER ELEVATION	DYNAMIC PENETRATION TEST (SPT / Cone, blows/0.3m)	SHEAR STRENGTH (kPa) (Unconfined, Quick Triaxial, Field Vane & Sensitivity, Penetrometer, Lab Vane)	Plastic Limit w_P	Natural Moisture Content w	Liquid Limit w_L	WATER CONTENT (%)	UNIT WT (kN/m^3)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	**TOPSOIL:** (55mm)												
0.1	**FILL:** compacted weathered shale with sandy silt, trace clay, trace gravel, rootlet inclusions, reddish brown, loose	1	SS	8									
0.7	**PROBABLE WEATHERED SHALE:** reddish brown	2	SS	56	Bentonite								
		3	SS	55									
		4	SS	50 / 25 mm	2.6mBGS Sep 15		> >100						
		5	SS	50 / 125 mm	Sand, Screen		> >100						
		6	SS	50 / 50 mm	Natural Pack		> >100						
4.6	**END OF BOREHOLE**												

Notes:
1) Water encountered at a depth of about 4.0 m below ground surface (mBGS) during drilling.
2) Water was at a depth of 4.5 mBGS upon completion of drilling.
3) Borehole was open upon completion of drilling.
4) 51 mm dia. monitoring well was installed in borehole upon completion of drilling.

Water Level Reading:

Date	W.L Depth (mBGS)
Sep.15 2018	2.56

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES: $+^3$, $\times^3$: Numbers refer to Sensitivity; $\blacktriangle^{\varepsilon=3\%}$ Strain at Failure

LOG OF BOREHOLE BH2-18

PROJECT: Geotechnical Investigation for Municipal Class Environmental Assessment Studies

CLIENT: Dillon Consulting Limited

PROJECT LOCATION: Livingston Ave, Grimsby, Ontario

DATUM: N/A

BH LOCATION: See Borehole Location Plan

DRILLING DATA

METHOD: Continuous Flight Auger - Auto Hammer

FIELD ENGINEER: KL

SAMPLE REVIEW: DC

CHECKED: DL

DIAMETER: 155 mm

DATE: 2018-08-16

REF. NO.: 18-2178G03

ENCL. NO.: 16

ELEV / DEPTH (m)	DESCRIPTION	NUMBER	TYPE	"N" BLOWS/0.3m
0.0	**TOPSOIL:** (60 mm)			
0.1	**FILL:** sandy silt, trace clay, trace gravel, organic inclusions, rootlet inclusions, brown, moist, loose to compact	1A	SS	
0.2		1B	SS	10
0.7	**FILL:** compacted weathered shale with sandy silt, trace clay, trace gravel, reddish brown, loose to compact			
1	**PROBABLE WEATHERED SHALE:** grey to reddish brown	2	SS	59
		3	SS	79 / 115 mm
2		4	SS	50 / 50 mm
3		5	SS	50 / 50 mm
4		6	SS	50 / 75 mm
4.7	**END OF BOREHOLE**			

Notes:
1) Water encountered at a depth of 4.6 m below ground surface (mBGS) during drilling.
2) Borehole caved at a depth of 4.3 mBGS upon completion of drilling.

DYNAMIC PENETRATION TEST: SPT, Cone, blows/0.3m; SHEAR STRENGTH (kPa): Unconfined, Field Vane & Sensitivity, Quick Triaxial, Penetrometer, Lab Vane

WATER CONTENT (%): Plastic Limit (w_P), Natural Moisture Content (w), Liquid Limit (w_L)

UNIT WT (kN/m^3)

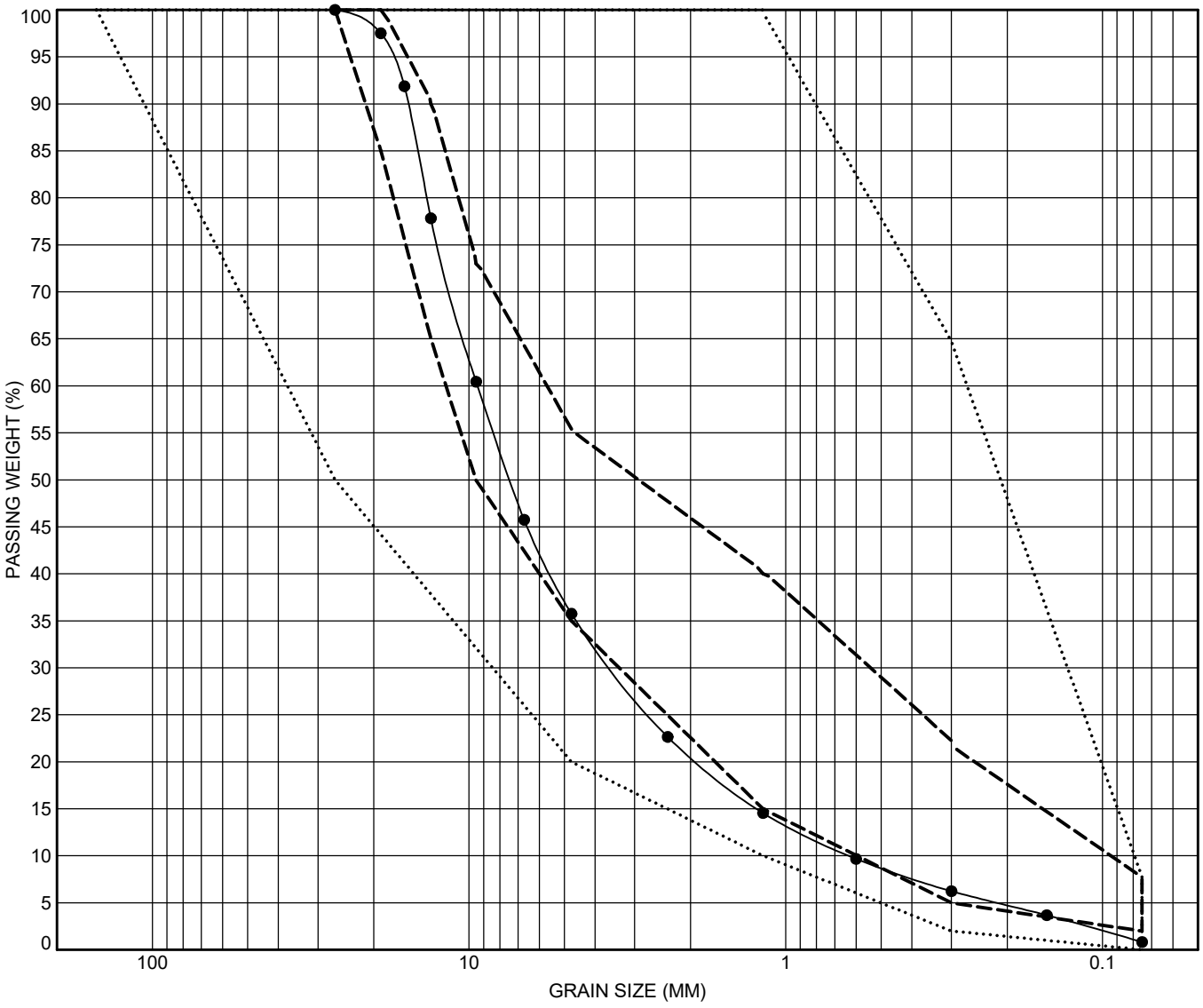
REMARKS AND GRAIN SIZE DISTRIBUTION (%): GR SA SI CL

GROUNDWATER ELEVATIONS

Measurement: 1st, 2nd, 3rd, 4th

GRAPH NOTES: $+^3$, $\times^3$: Numbers refer to Sensitivity; ▲ ε=3% Strain at Failure

FIGURES



COBBLES	GRAVEL		SAND			FINES
	coarse	fine	coarse	medium	fine	

OPSS 1010 GRANULAR A

OPSS 1010 GRANULAR B TYPE I

Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Fines
● **BH2-01 AS1A 0.24**	**26.5**	**9.401**	**3.494**	**0.628**	**64.2**	**34.9**	**0.8**

GeoPro CONSULTING LIMITED

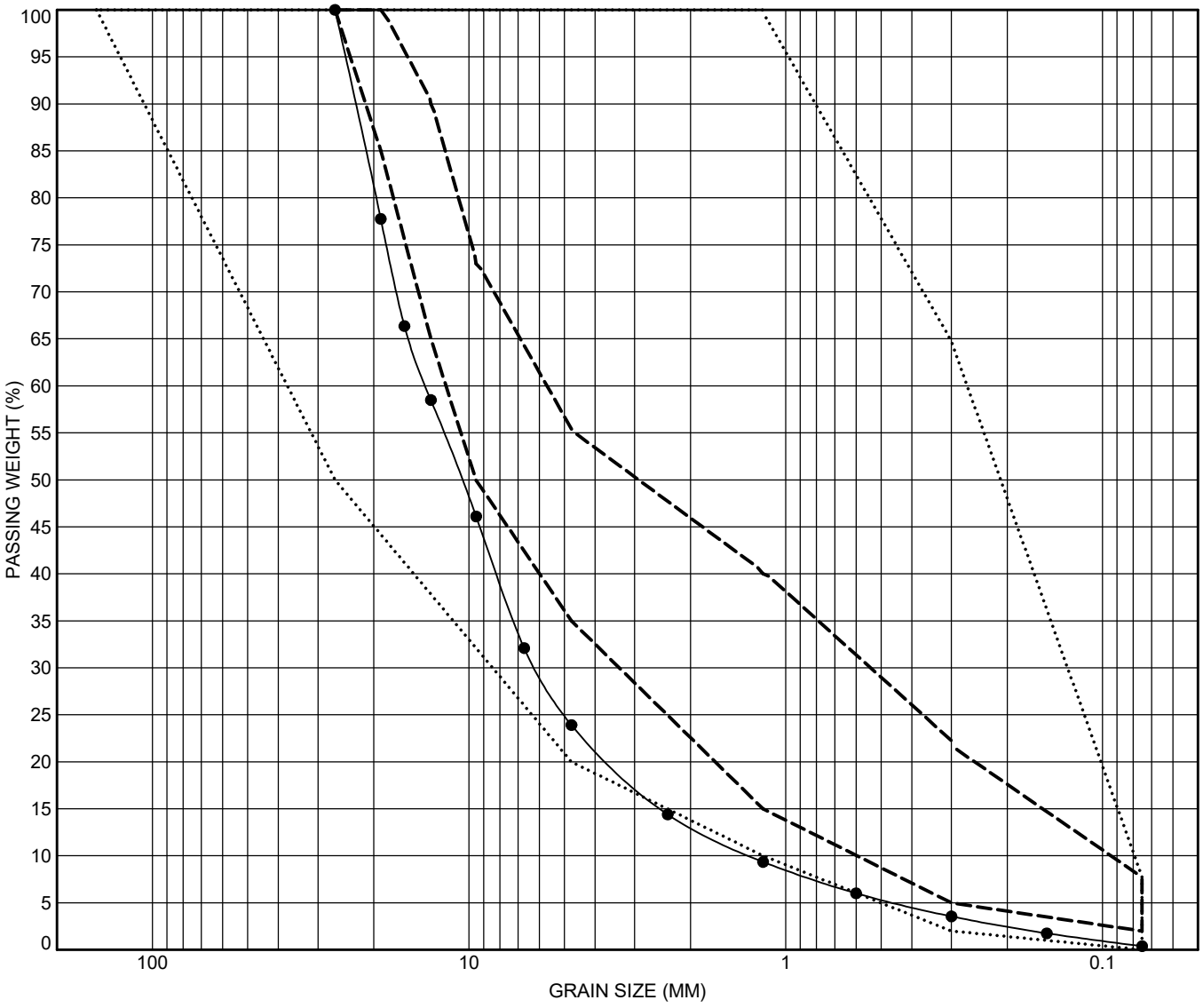
Unit 57, 40 Vogell Road, Richmond Hill, Ontario L4B 3N6
Tel: 905-237-8336 Fax: 905-248-3699
office@geoproconsulting.ca www.geoproconsulting.ca

GRAIN SIZE DISTRIBUTION

PROJECT: Geotechnical Investigation for Municipal Class Environmental Assessment Studies

LOCATION: Livingston Ave, Grimsby, Ontario

PROJECT NO.: 18-2178G03	SAMPLED ON: 2018-08-16
FIGURE NO.: 1	TESTED ON:



COBBLES	GRAVEL		SAND			FINES
	coarse	fine	coarse	medium	fine	

OPSS 1010 GRANULAR A

OPSS 1010 GRANULAR B TYPE I

Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Fines
● **BH2-15 AS1A 0.14**	**26.5**	**13.698**	**6.136**	**1.291**	**76.1**	**23.5**	**0.4**

GeoPro CONSULTING LIMITED

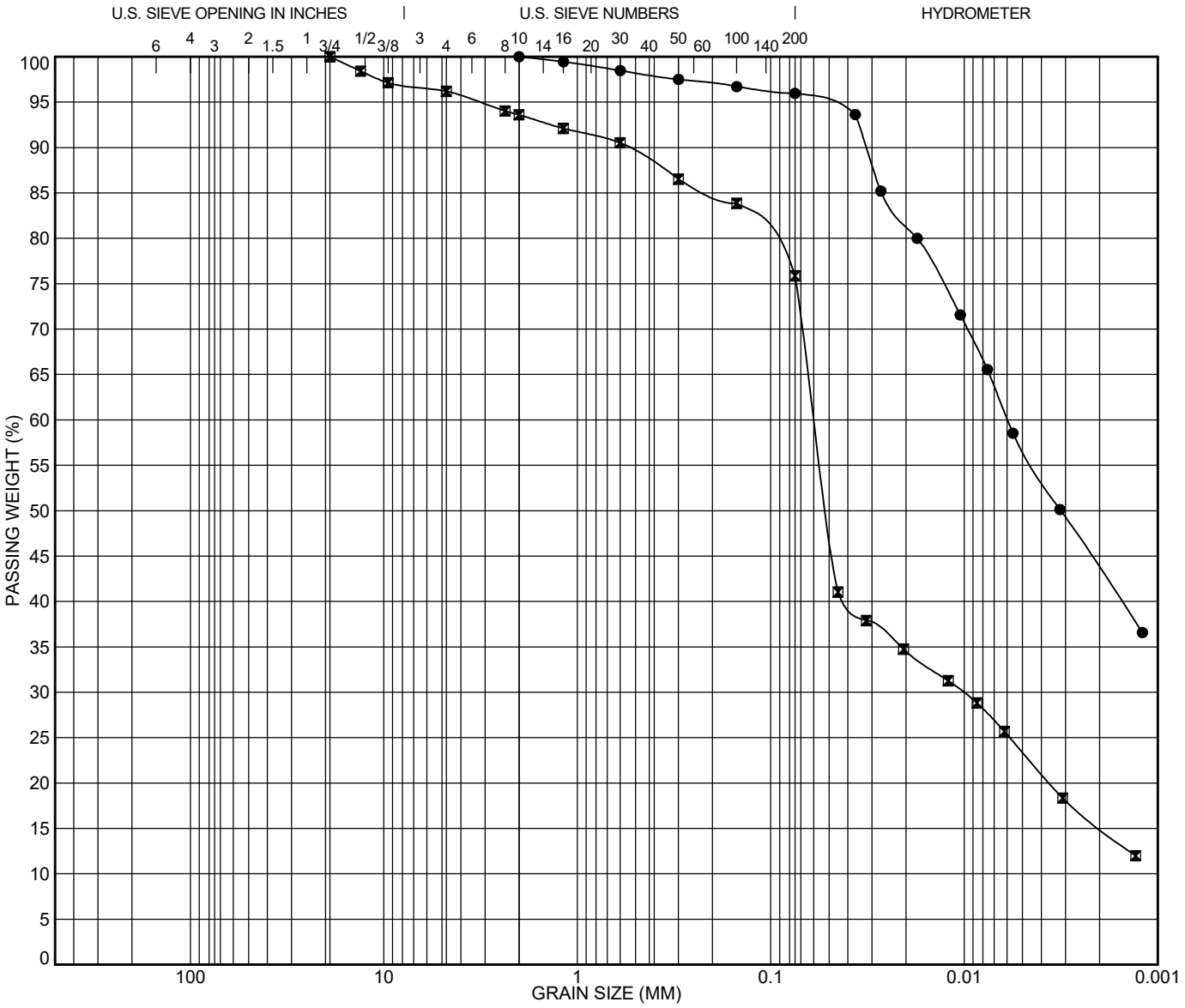
Unit 57, 40 Vogell Road, Richmond Hill, Ontario L4B 3N6
Tel: 905-237-8336 Fax: 905-248-3699
office@geoproconsulting.ca www.geoproconsulting.ca

GRAIN SIZE DISTRIBUTION

PROJECT: Geotechnical Investigation for Municipal Class Environmental Assessment Studies

LOCATION: Livingston Ave, Grimsby, Ontario

PROJECT NO.: 18-2178G03	SAMPLED ON: 2018-08-16
FIGURE NO.:2	TESTED ON:



COBBLES	GRAVEL		SAND			SILT	CLAY
	coarse	fine	coarse	medium	fine		

	Specimen Identification			Classification	LL	PL	PI	Cc	Cu
●	**BH2-07**	**SS2**	**0.76**						
⊠	**BH2-16**	**SS3**	**1.52**						

	Specimen Identification			D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**BH2-07**	**SS2**	**0.76**	**2**	**0.006**			**0.0**	**4.0**	**52.3**	**43.6**
⊠	**BH2-16**	**SS3**	**1.52**	**19**	**0.059**	**0.01**		**3.8**	**20.3**	**60.7**	**15.1**

GeoPro CONSULTING LIMITED
Unit 57, 40 Vogell Road, Richmond Hill, Ontario L4B 3N6
Tel: 905-237-8336 Fax: 905-248-3699
office@geoproconsulting.ca www.geoproconsulting.ca

GRAIN SIZE DISTRIBUTION

PROJECT: Geotechnical Investigation for Municipal Class Environmental Assessment Studies

LOCATION: Livingston Ave, Grimsby, Ontario

PROJECT NO.: 18-2178G03 | SAMPLED ON: 2018-08-16

FIGURE NO.: 3 | TESTED ON:

APPENDIX A

Photograph 1 – Livingston Avenue, westbound, about 10 m west of Casablanca Boulevard, looking east, showing moderate longitudinal and transverse cracking associate with moderate depression, moderate patching and slight alligator cracking.

Photograph 2 – Livingston Avenue, westbound, about 60 m west of Casablanca Boulevard, looking east, showing slight road edge cracking.

Photograph 3 – Livingston Avenue, westbound, about 40 m west of Rosedale Street, looking east, showing slight road edge cracking.

Photograph 4 – Livingston Avenue, westbound, west end of Emily Street, looking east, showing moderate patching and slight road edge cracking.

APPENDIX B

GeoPro Consulting Limited (Richmond Hill)
ATTN: Sarena Medina
40 Vogell Road
Unit 22
Richmond Hill ON L4B 3N6

Date Received: 11-OCT-18
Report Date: 18-OCT-18 14:00 (MT)
Version: FINAL

Client Phone: 905-237-8336

Certificate of Analysis

Lab Work Order #: L2179925

Project P.O. #:	NOT SUBMITTED
Job Reference:	18-2178G
C of C Numbers:	18-2178G-20181010
Legal Site Desc:	MISSISSAUGA, ONTARIO

Rick Hawthorne
Account Manager

Summary of Guideline Exceedances

ALS ID	Client ID	Grouping	Analyte	Result	Guideline Limit	Unit
Guideline						
Ontario Regulation 153/04 - April 15, 2011 Standards - T1-Soil-Res/Park/Inst/Ind/Com/Commu Property Use						
L2179925-2	BH 1-4, SS2 + SS3	Saturated Paste Extractables	SAR	8.89	2.4	SAR
L2179925-3	BH 1-5, SS2 + SS3	Physical Tests	Conductivity	1.67	0.57	mS/cm
L2179925-4	BH 1-8, SS2 + SS3A	Physical Tests	Conductivity	2.11	0.57	mS/cm
		Saturated Paste Extractables	SAR	8.95	2.4	SAR
L2179925-5	BH 1-11, SS2	Physical Tests	Conductivity	1.57	0.57	mS/cm
		Saturated Paste Extractables	SAR	13.1	2.4	SAR
L2179925-6	BH 1-14, SS2 + SS3	Physical Tests	Conductivity	0.712	0.57	mS/cm
		Saturated Paste Extractables	SAR	8.16	2.4	SAR
L2179925-7	BH 1-16, SS2 + SS3	Physical Tests	Conductivity	4.43	0.57	mS/cm
		Saturated Paste Extractables	SAR	36.4	2.4	SAR
L2179925-8	BH 1-23, SS2	Physical Tests	Conductivity	2.49	0.57	mS/cm
		Saturated Paste Extractables	SAR	2.63	2.4	SAR
L2179925-9	BH 2-1, SS2	Physical Tests	Conductivity	1.40	0.57	mS/cm
		Saturated Paste Extractables	SAR	13.3	2.4	SAR
L2179925-15	BH 2-15, SS2 + SS3	Saturated Paste Extractables	SAR	4.61	2.4	SAR

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

Physical Tests - SOIL

Analyte	Unit	Guide Limits #1	Guide Limits #2	Lab ID	L2179925-1	L2179925-2	L2179925-3	L2179925-4	L2179925-5	L2179925-6	L2179925-7	L2179925-8	L2179925-9
				Sample Date	01-OCT-18	01-OCT-18	01-OCT-18	01-OCT-18	02-OCT-18	02-OCT-18	03-OCT-18	03-OCT-18	04-OCT-18
				Sample ID	BH 1-1, SS2 + SS3	BH 1-4, SS2 + SS3	BH 1-5, SS2 + SS3	BH 1-8, SS2 + SS3A	BH 1-11, SS2	BH 1-14, SS2 + SS3	BH 1-16, SS2 + SS3	BH 1-23, SS2	BH 2-1, SS2
Conductivity	mS/cm	0.57	-		0.305	0.219	1.67	2.11	1.57	0.712	4.43	2.49	1.40
% Moisture	%	-	-		7.68	7.95	11.0	12.3	10.1	15.1	12.5	9.14	12.3
pH	pH units	-	-		7.79	7.85	7.79	7.76	7.88	7.77	7.94	7.96	8.09

Guide Limit #1: T1-Soil-Res/Park/Inst/Ind/Com/Commu Property Use

Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

Physical Tests - SOIL

Analyte	Unit	Guide Limits #1	Guide Limits #2	Lab ID	L2179925-10	L2179925-11	L2179925-12	L2179925-13	L2179925-14	L2179925-15	L2179925-16
				Sample Date	04-OCT-18	04-OCT-18	04-OCT-18	10-OCT-18	11-OCT-18	11-OCT-18	11-OCT-18
				Sample ID	BH 2-3, SS1A	BH 2-5, SS1A	BH 2-7, SS1 + SS2	BH 2-9, SS2 + SS3	BH 2-13, SS2 + SS3	BH 2-15, SS2 + SS3	BH 2-17, SS1
Conductivity	mS/cm	0.57	-		0.132	0.201	0.188	0.293	0.130	0.362	0.113
% Moisture	%	-	-		12.7	14.0	12.1	7.82	11.0	8.99	12.3
pH	pH units	-	-		7.78	7.55	7.77	7.83	7.95	7.83	5.72

Guide Limit #1: T1-Soil-Res/Park/Inst/Ind/Com/Commu Property Use

Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

Cyanides - SOIL

		Guide Limits									
				Lab ID	L2179925-1	L2179925-2	L2179925-3	L2179925-4	L2179925-5	L2179925-6	L2179925-7	L2179925-8	L2179925-9
				Sample Date	01-OCT-18	01-OCT-18	01-OCT-18	01-OCT-18	02-OCT-18	02-OCT-18	03-OCT-18	03-OCT-18	04-OCT-18
				Sample ID	BH 1-1, SS2 + SS3	BH 1-4, SS2 + SS3	BH 1-5, SS2 + SS3	BH 1-8, SS2 + SS3A	BH 1-11, SS2	BH 1-14, SS2 + SS3	BH 1-16, SS2 + SS3	BH 1-23, SS2	BH 2-1, SS2
Analyte	Unit	#1	#2										
Cyanide, Weak Acid Diss	ug/g	0.051	-		<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050

Guide Limit #1: T1-Soil-Res/Park/Inst/Ind/Com/Commu Property Use

Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

Cyanides - SOIL

Analyte	Unit	Guide Limits #1	Guide Limits #2	Lab ID	L2179925-10	L2179925-11	L2179925-12	L2179925-13	L2179925-14	L2179925-15	L2179925-16
				Sample Date	04-OCT-18	04-OCT-18	04-OCT-18	10-OCT-18	11-OCT-18	11-OCT-18	11-OCT-18
				Sample ID	BH 2-3, SS1A	BH 2-5, SS1A	BH 2-7, SS1 + SS2	BH 2-9, SS2 + SS3	BH 2-13, SS2 + SS3	BH 2-15, SS2 + SS3	BH 2-17, SS1
Cyanide, Weak Acid Diss	ug/g	0.051	-		<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050

Guide Limit #1: T1-Soil-Res/Park/Inst/Ind/Com/Commu Property Use

Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

Saturated Paste Extractables - SOIL

Analyte	Unit	Guide Limits #1	Guide Limits #2	Lab ID	L2179925-1	L2179925-2	L2179925-3	L2179925-4	L2179925-5	L2179925-6	L2179925-7	L2179925-8	L2179925-9
				Sample Date	01-OCT-18	01-OCT-18	01-OCT-18	01-OCT-18	02-OCT-18	02-OCT-18	03-OCT-18	03-OCT-18	04-OCT-18
				Sample ID	BH 1-1, SS2 + SS3	BH 1-4, SS2 + SS3	BH 1-5, SS2 + SS3	BH 1-8, SS2 + SS3A	BH 1-11, SS2	BH 1-14, SS2 + SS3	BH 1-16, SS2 + SS3	BH 1-23, SS2	BH 2-1, SS2
SAR	SAR	2.4	-		>9.9 SAR:L	8.89 SAR:M	2.21 SAR:M	8.95	13.1	8.16	36.4	2.63	13.3
Calcium (Ca)	mg/L	-	-		<1.0	1.1	4.0	105	35.2	13.2	38.3	281	22.6
Magnesium (Mg)	mg/L	-	-		<1.0	<1.0	<1.0	9.6	5.0	1.2	4.3	126	5.3
Sodium (Na)	mg/L	-	-		58.2	34.4	16.0	357	313	116	891	212	270

Guide Limit #1: T1-Soil-Res/Park/Inst/Ind/Com/Commu Property Use

Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

Saturated Paste Extractables - SOIL

Analyte	Unit	Guide Limits #1	Guide Limits #2	Lab ID	L2179925-10	L2179925-11	L2179925-12	L2179925-13	L2179925-14	L2179925-15	L2179925-16
				Sample Date	04-OCT-18	04-OCT-18	04-OCT-18	10-OCT-18	11-OCT-18	11-OCT-18	11-OCT-18
				Sample ID	BH 2-3, SS1A	BH 2-5, SS1A	BH 2-7, SS1 + SS2	BH 2-9, SS2 + SS3	BH 2-13, SS2 + SS3	BH 2-15, SS2 + SS3	BH 2-17, SS1
SAR	SAR	2.4	-		1.51 SAR:M	0.57 SAR:M	1.46	0.78	0.57	4.61	1.95
Calcium (Ca)	mg/L	-	-		6.1	12.4	7.7	16.8	6.2	8.7	3.4
Magnesium (Mg)	mg/L	-	-		<1.0	<1.0	2.5	3.9	2.7	1.3	3.4
Sodium (Na)	mg/L	-	-		13.6	7.3	18.3	13.6	6.7	55.3	21.3

Guide Limit #1: T1-Soil-Res/Park/Inst/Ind/Com/Commu Property Use

Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

Metals - SOIL

Analyte	Unit	Guide Limits #1	Guide Limits #2	Lab ID	L2179925-1	L2179925-2	L2179925-3	L2179925-4	L2179925-5	L2179925-6	L2179925-7	L2179925-8	L2179925-9
				Sample Date	01-OCT-18	01-OCT-18	01-OCT-18	01-OCT-18	02-OCT-18	02-OCT-18	03-OCT-18	03-OCT-18	04-OCT-18
				Sample ID	BH 1-1, SS2 + SS3	BH 1-4, SS2 + SS3	BH 1-5, SS2 + SS3	BH 1-8, SS2 + SS3A	BH 1-11, SS2	BH 1-14, SS2 + SS3	BH 1-16, SS2 + SS3	BH 1-23, SS2	BH 2-1, SS2
Antimony (Sb)	ug/g	1.3	-		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Arsenic (As)	ug/g	18	-		3.4	3.6	6.8	7.6	7.8	8.6	11.0	4.6	3.8
Barium (Ba)	ug/g	220	-		26.6	19.5	37.8	88.4	116	204	157	78.1	171
Beryllium (Be)	ug/g	2.5	-		<0.50	<0.50	<0.50	<0.50	0.86	0.74	0.79	0.70	0.93
Boron (B)	ug/g	36	-		<5.0	<5.0	<5.0	5.5	11.7	9.9	12.1	18.1	21.3
Boron (B), Hot Water Ext.	ug/g	36	-		<0.10	<0.10	<0.10	0.30	0.41	0.28	0.37	1.07	0.24
Cadmium (Cd)	ug/g	1.2	-		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Chromium (Cr)	ug/g	70	-		9.1	6.8	11.9	13.4	26.9	24.5	23.3	20.0	27.1
Cobalt (Co)	ug/g	21	-		3.8	4.5	6.9	8.0	13.9	12.8	12.7	12.2	16.4
Copper (Cu)	ug/g	92	-		23.7	20.6	42.0	33.2	35.2	37.7	41.3	7.4	9.8
Lead (Pb)	ug/g	120	-		5.1	5.7	11.5	13.0	39.7	17.4	23.6	16.2	13.4
Mercury (Hg)	ug/g	0.27	-		0.0125	<0.0050	0.0129	0.0218	0.0219	0.0214	0.0234	<0.0050	<0.0050
Molybdenum (Mo)	ug/g	2	-		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.0	1.2
Nickel (Ni)	ug/g	82	-		9.2	9.3	13.9	16.8	30.4	27.0	27.9	27.1	35.9
Selenium (Se)	ug/g	1.5	-		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Silver (Ag)	ug/g	0.5	-		<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Thallium (Tl)	ug/g	1	-		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Uranium (U)	ug/g	2.5	-		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Vanadium (V)	ug/g	86	-		13.6	12.2	20.6	22.1	37.5	35.0	34.6	24.0	33.1
Zinc (Zn)	ug/g	290	-		26.1	25.9	47.8	70.8	87.9	87.5	75.2	119	75.5

Guide Limit #1: T1-Soil-Res/Park/Inst/Ind/Com/Commu Property Use

Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ANALYTICAL REPORT

Metals - SOIL

Analyte	Unit	Guide Limits #1	Guide Limits #2	Lab ID	L2179925-10	L2179925-11	L2179925-12	L2179925-13	L2179925-14	L2179925-15	L2179925-16
				Sample Date	04-OCT-18	04-OCT-18	04-OCT-18	10-OCT-18	11-OCT-18	11-OCT-18	11-OCT-18
				Sample ID	BH 2-3, SS1A	BH 2-5, SS1A	BH 2-7, SS1 + SS2	BH 2-9, SS2 + SS3	BH 2-13, SS2 + SS3	BH 2-15, SS2 + SS3	BH 2-17, SS1
Antimony (Sb)	ug/g	1.3	-		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Arsenic (As)	ug/g	18	-		4.4	9.5	5.9	5.1	9.0	8.7	5.5
Barium (Ba)	ug/g	220	-		96.5	76.9	193	93.8	198	179	172
Beryllium (Be)	ug/g	2.5	-		1.02	0.90	1.06	1.00	0.80	0.78	0.98
Boron (B)	ug/g	36	-		25.3	10.3	22.5	14.7	18.9	18.5	19.5
Boron (B), Hot Water Ext.	ug/g	36	-		0.16	0.14	0.22	0.13	0.20	0.27	0.16
Cadmium (Cd)	ug/g	1.2	-		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Chromium (Cr)	ug/g	70	-		27.3	23.8	31.5	26.5	25.4	26.3	28.4
Cobalt (Co)	ug/g	21	-		15.6	15.2	18.5	16.4	15.7	16.8	15.8
Copper (Cu)	ug/g	92	-		8.6	13.4	9.7	10.1	8.4	8.4	12.4
Lead (Pb)	ug/g	120	-		10.5	31.3	10.3	7.9	7.4	8.2	8.6
Mercury (Hg)	ug/g	0.27	-		<0.0050	0.0211	<0.0050	<0.0050	<0.0050	<0.0050	0.0067
Molybdenum (Mo)	ug/g	2	-		1.2	<1.0	1.1	<1.0	1.2	1.5	1.1
Nickel (Ni)	ug/g	82	-		34.2	28.6	40.3	39.1	33.4	35.6	37.1
Selenium (Se)	ug/g	1.5	-		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Silver (Ag)	ug/g	0.5	-		<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Thallium (Tl)	ug/g	1	-		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Uranium (U)	ug/g	2.5	-		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Vanadium (V)	ug/g	86	-		36.4	33.9	43.6	32.2	28.0	29.4	34.1
Zinc (Zn)	ug/g	290	-		69.7	74.9	80.9	71.6	66.4	69.8	70.6

Guide Limit #1: T1-Soil-Res/Park/Inst/Ind/Com/Commu Property Use

Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ANALYTICAL REPORT

Speciated Metals - SOIL

Analyte	Unit	Guide Limits #1	Guide Limits #2	Lab ID	L2179925-1	L2179925-2	L2179925-3	L2179925-4	L2179925-5	L2179925-6	L2179925-7	L2179925-8	L2179925-9
				Sample Date	01-OCT-18	01-OCT-18	01-OCT-18	01-OCT-18	02-OCT-18	02-OCT-18	03-OCT-18	03-OCT-18	04-OCT-18
				Sample ID	BH 1-1, SS2 + SS3	BH 1-4, SS2 + SS3	BH 1-5, SS2 + SS3	BH 1-8, SS2 + SS3A	BH 1-11, SS2	BH 1-14, SS2 + SS3	BH 1-16, SS2 + SS3	BH 1-23, SS2	BH 2-1, SS2
Chromium, Hexavalent	ug/g	0.66	-		<0.20	<0.20	<0.20	<0.20	<0.20	0.21	<0.20	<0.20	<0.20

Guide Limit #1: T1-Soil-Res/Park/Inst/Ind/Com/Commu Property Use

Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

Speciated Metals - SOIL

Analyte	Unit	Guide Limits #1	Guide Limits #2	Lab ID	Sample Date	Sample ID					
				L2179925-10	L2179925-11	L2179925-12	L2179925-13	L2179925-14	L2179925-15	L2179925-16
				04-OCT-18	04-OCT-18	04-OCT-18	10-OCT-18	11-OCT-18	11-OCT-18	11-OCT-18
				BH 2-3, SS1A	BH 2-5, SS1A	BH 2-7, SS1 + SS2	BH 2-9, SS2 + SS3	BH 2-13, SS2 + SS3	BH 2-15, SS2 + SS3	BH 2-17, SS1
Chromium, Hexavalent	ug/g	0.66	-	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	0.26

Guide Limit #1: T1-Soil-Res/Park/Inst/Ind/Com/Commu Property Use

Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

Reference Information

Qualifiers for Individual Parameters Listed:

Qualifier	Description
SAR:L	SAR is incalculable due to Ca and Mg below DL. Lowest possible SAR is reported as minimum value.
SAR:M	Reported SAR represents a maximum value. Actual SAR may be lower if both Ca and Mg were detectable.

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Method Reference**
B-HWS-R511-WT	Soil	Boron-HWE-O.Reg 153/04 (July 2011)	HW EXTR, EPA 6010B

A dried solid sample is extracted with calcium chloride, the sample undergoes a heating process. After cooling the sample is filtered and analyzed by ICP/OES.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

CN-WAD-R511-WT	Soil	Cyanide (WAD)-O.Reg 153/04 (July 2011)	MOE 3015/APHA 4500CN I-WAD

The sample is extracted with a strong base for 16 hours, and then filtered. The filtrate is then distilled where the cyanide is converted to cyanogen chloride by reacting with chloramine-T, the cyanogen chloride then reacts with a combination of barbituric acid and isonicotinic acid to form a highly colored complex.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

CR-CR6-IC-WT	Soil	Hexavalent Chromium in Soil	SW846 3060A/7199

This analysis is carried out using procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846, Method 7199, published by the United States Environmental Protection Agency (EPA). The procedure involves analysis for chromium (VI) by ion chromatography using diphenylcarbazide in a sulphuric acid solution.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

EC-WT	Soil	Conductivity (EC)	MOEE E3138

A representative subsample is tumbled with de-ionized (DI) water. The ratio of water to soil is 2:1 v/w. After tumbling the sample is then analyzed by a conductivity meter.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

HG-200.2-CVAA-WT	Soil	Mercury in Soil by CVAAS	EPA 200.2/1631E (mod)

Soil samples are digested with nitric and hydrochloric acids, followed by analysis by CVAAS.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

MET-200.2-CCMS-WT	Soil	Metals in Soil by CRC ICPMS	EPA 200.2/6020A (mod)

Soil/sediment is dried, disaggregated, and sieved (2 mm). For tests intended to support Ontario regulations, the <2mm fraction is ground to pass through a 0.355 mm sieve. Strong Acid Leachable Metals in the <2mm fraction are solubilized by heated digestion with nitric and hydrochloric acids. Instrumental analysis is by Collision / Reaction Cell ICPMS.

Limitations: This method is intended to liberate environmentally available metals. Silicate minerals are not solubilized. Some metals may be only partially recovered (matrix dependent), including Al, Ba, Be, Cr, S, Sr, Ti, Tl, V, W, and Zr. Elemental Sulfur may be poorly recovered by this method. Volatile forms of sulfur (e.g. sulfide, H2S) may be excluded if lost during sampling, storage, or digestion.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011), unless a subset of the Analytical Test Group (ATG) has been requested (the Protocol states that all analytes in an ATG must be reported).

Reference Information

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Method Reference**
MOISTURE-WT	Soil	% Moisture	Gravimetric: Oven Dried
PH-WT	Soil	pH	MOEE E3137A

A minimum 10g portion of the sample is extracted with 20mL of 0.01M calcium chloride solution by shaking for at least 30 minutes. The aqueous layer is separated from the soil and then analyzed using a pH meter and electrode.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

SAR-R511-WT	Soil	SAR-O.Reg 153/04 (July 2011)	SW846 6010C

A dried, disaggregated solid sample is extracted with deionized water, the aqueous extract is separated from the solid, acidified and then analyzed using a ICP/OES. The concentrations of Na, Ca and Mg are reported as per CALA requirements for calculated parameters. These individual parameters are not for comparison to any guideline.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

**ALS test methods may incorporate modifications from specified reference methods to improve performance.

Chain of Custody Numbers:

18-2178G-20181010

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Application of guidelines is provided "as is" without warranty of any kind, either expressed or implied, including, but not limited to, fitness for a particular purpose, or non-infringement. ALS assumes no responsibility for errors or omissions in the information. Guideline limits are not adjusted for the hardness, pH or temperature of the sample (the most conservative values are used). Measurement uncertainty is not applied to test results prior to comparison with specified criteria values.

Quality Control Report

Workorder: L2179925 Report Date: 18-OCT-18

Client: GeoPro Consulting Limited (Richmond Hill)
40 Vogell Road Unit 22
Richmond Hill ON L4B 3N6
Contact: Sarena Medina

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
B-HWS-R511-WT	**Soil**							
Batch R4282372								
WG2904435-4 DUP		**L2179925-5**						
Boron (B), Hot Water Ext.		0.41	0.41		ug/g	0.1	30	16-OCT-18
WG2904435-2 IRM		**HOTB-SAL_SOIL5**						
Boron (B), Hot Water Ext.			99.2		%		70-130	16-OCT-18
WG2904435-3 LCS								
Boron (B), Hot Water Ext.			102.9		%		70-130	16-OCT-18
WG2904435-1 MB								
Boron (B), Hot Water Ext.			<0.10		ug/g		0.1	16-OCT-18
Batch R4282376								
WG2904434-4 DUP		**L2179629-5**						
Boron (B), Hot Water Ext.		0.10	0.10		ug/g	0.6	30	16-OCT-18
WG2904434-2 IRM		**HOTB-SAL_SOIL5**						
Boron (B), Hot Water Ext.			92.4		%		70-130	16-OCT-18
WG2904434-3 LCS								
Boron (B), Hot Water Ext.			99.6		%		70-130	16-OCT-18
WG2904434-1 MB								
Boron (B), Hot Water Ext.			<0.10		ug/g		0.1	16-OCT-18
CN-WAD-R511-WT	**Soil**							
Batch R4281774								
WG2903554-3 DUP		**L2179786-2**						
Cyanide, Weak Acid Diss		<0.050	<0.050	RPD-NA	ug/g	N/A	35	16-OCT-18
WG2904098-3 DUP		**L2179642-1**						
Cyanide, Weak Acid Diss		<0.050	<0.050	RPD-NA	ug/g	N/A	35	16-OCT-18
WG2903554-2 LCS								
Cyanide, Weak Acid Diss			95.5		%		80-120	16-OCT-18
WG2904098-2 LCS								
Cyanide, Weak Acid Diss			100.3		%		80-120	16-OCT-18
WG2903554-1 MB								
Cyanide, Weak Acid Diss			<0.050		ug/g		0.05	16-OCT-18
WG2904098-1 MB								
Cyanide, Weak Acid Diss			<0.050		ug/g		0.05	16-OCT-18
WG2903554-4 MS		**L2179786-2**						
Cyanide, Weak Acid Diss			85.0		%		70-130	16-OCT-18
WG2904098-4 MS		**L2179642-1**						
Cyanide, Weak Acid Diss			84.0		%		70-130	16-OCT-18
CR-CR6-IC-WT	**Soil**							

Quality Control Report

Client: GeoPro Consulting Limited (Richmond Hill)
40 Vogell Road Unit 22
Richmond Hill ON L4B 3N6
Contact: Sarena Medina

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
CR-CR6-IC-WT	**Soil**							
Batch R4281430								
WG2902479-4 CRM		**WT-SQC012**						
Chromium, Hexavalent			85.9		%		70-130	16-OCT-18
WG2903762-4 CRM		**WT-SQC012**						
Chromium, Hexavalent			87.6		%		70-130	16-OCT-18
WG2902479-3 DUP		**L2179925-1**						
Chromium, Hexavalent		<0.20	0.31	RPD-NA	ug/g	N/A	35	16-OCT-18
WG2903762-3 DUP		**WG2903762-5**						
Chromium, Hexavalent		<0.40	<0.40	RPD-NA	ug/g	N/A	35	16-OCT-18
WG2902479-2 LCS								
Chromium, Hexavalent			102.8		%		80-120	16-OCT-18
WG2903762-2 LCS								
Chromium, Hexavalent			100.2		%		80-120	16-OCT-18
WG2902479-1 MB								
Chromium, Hexavalent			<0.20		ug/g		0.2	16-OCT-18
WG2903762-1 MB								
Chromium, Hexavalent			<0.20		ug/g		0.2	16-OCT-18
EC-WT	**Soil**							
Batch R4282029								
WG2904426-4 DUP		**WG2904426-3**						
Conductivity		0.0679	0.0682		mS/cm	0.4	20	16-OCT-18
WG2904426-2 IRM		**WT SAR2**						
Conductivity			97.8		%		70-130	16-OCT-18
WG2904611-1 LCS								
Conductivity			95.5		%		90-110	16-OCT-18
WG2904426-1 MB								
Conductivity			<0.0040		mS/cm		0.004	16-OCT-18
Batch R4283531								
WG2905652-4 DUP		**WG2905652-3**						
Conductivity		0.0859	0.0823		mS/cm	4.3	20	17-OCT-18
WG2905652-2 IRM		**WT SAR2**						
Conductivity			94.2		%		70-130	17-OCT-18
WG2905917-1 LCS								
Conductivity			99.1		%		90-110	17-OCT-18
WG2905652-1 MB								
Conductivity			<0.0040		mS/cm		0.004	17-OCT-18
HG-200.2-CVAA-WT	**Soil**							

Quality Control Report

Client: GeoPro Consulting Limited (Richmond Hill)
40 Vogell Road Unit 22
Richmond Hill ON L4B 3N6
Contact: Sarena Medina

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
HG-200.2-CVAA-WT	**Soil**							
Batch R4281329								
WG2904395-2 CRM		**WT-CANMET-TILL1**						
Mercury (Hg)			109.3		%		70-130	16-OCT-18
WG2904395-6 DUP		**WG2904395-5**						
Mercury (Hg)		0.0218	0.0215		ug/g	1.4	40	16-OCT-18
WG2904395-3 LCS								
Mercury (Hg)			100.0		%		80-120	16-OCT-18
WG2904395-1 MB								
Mercury (Hg)			<0.0050		mg/kg		0.005	16-OCT-18
Batch R4281331								
WG2904391-2 CRM		**WT-CANMET-TILL1**						
Mercury (Hg)			102.6		%		70-130	16-OCT-18
WG2904391-6 DUP		**WG2904391-5**						
Mercury (Hg)		0.0096	0.0107		ug/g	11	40	16-OCT-18
WG2904391-3 LCS								
Mercury (Hg)			113.0		%		80-120	16-OCT-18
WG2904391-1 MB								
Mercury (Hg)			<0.0050		mg/kg		0.005	16-OCT-18
MET-200.2-CCMS-WT	**Soil**							
Batch R4283630								
WG2904395-2 CRM		**WT-CANMET-TILL1**						
Antimony (Sb)			128.1		%		70-130	16-OCT-18
Arsenic (As)			124.3		%		70-130	16-OCT-18
Barium (Ba)			120.6		%		70-130	16-OCT-18
Beryllium (Be)			112.3		%		70-130	16-OCT-18
Boron (B)			3.0		mg/kg		0-8.2	16-OCT-18
Cadmium (Cd)			117.4		%		70-130	16-OCT-18
Chromium (Cr)			112.1		%		70-130	16-OCT-18
Cobalt (Co)			114.0		%		70-130	16-OCT-18
Copper (Cu)			118.1		%		70-130	16-OCT-18
Lead (Pb)			119.8		%		70-130	16-OCT-18
Molybdenum (Mo)			111.5		%		70-130	16-OCT-18
Nickel (Ni)			113.9		%		70-130	16-OCT-18
Selenium (Se)			0.38		mg/kg		0.11-0.51	16-OCT-18
Silver (Ag)			0.27		mg/kg		0.13-0.33	16-OCT-18
Thallium (Tl)			0.140		mg/kg		0.077-0.18	16-OCT-18
Uranium (U)			117.7		%		70-130	16-OCT-18

Quality Control Report

Client: GeoPro Consulting Limited (Richmond Hill)
40 Vogell Road Unit 22
Richmond Hill ON L4B 3N6
Contact: Sarena Medina

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-WT	**Soil**							
Batch R4283630								
WG2904395-2 CRM		**WT-CANMET-TILL1**						
Vanadium (V)			113.4		%		70-130	16-OCT-18
Zinc (Zn)			114.3		%		70-130	16-OCT-18
WG2904395-6 DUP		**WG2904395-5**						
Antimony (Sb)		0.18	0.16		ug/g	10	30	16-OCT-18
Arsenic (As)		7.89	7.57		ug/g	4.1	30	16-OCT-18
Barium (Ba)		99.1	87.6		ug/g	12	40	16-OCT-18
Beryllium (Be)		0.47	0.39		ug/g	18	30	16-OCT-18
Boron (B)		6.6	5.4		ug/g	19	30	16-OCT-18
Cadmium (Cd)		0.174	0.207		ug/g	17	30	16-OCT-18
Chromium (Cr)		14.2	13.3		ug/g	6.6	30	16-OCT-18
Cobalt (Co)		8.48	7.93		ug/g	6.6	30	16-OCT-18
Copper (Cu)		34.7	32.9		ug/g	5.3	30	16-OCT-18
Lead (Pb)		15.1	12.9		ug/g	16	40	16-OCT-18
Molybdenum (Mo)		0.75	0.68		ug/g	9.3	40	16-OCT-18
Nickel (Ni)		17.6	16.7		ug/g	5.4	30	16-OCT-18
Selenium (Se)		0.28	0.23		ug/g	19	30	16-OCT-18
Silver (Ag)		<0.10	<0.10	RPD-NA	ug/g	N/A	40	16-OCT-18
Thallium (Tl)		0.084	0.076		ug/g	10	30	16-OCT-18
Uranium (U)		0.651	0.535		ug/g	20	30	16-OCT-18
Vanadium (V)		23.8	21.9		ug/g	8.3	30	16-OCT-18
Zinc (Zn)		60.4	70.2		ug/g	15	30	16-OCT-18
WG2904395-4 LCS								
Antimony (Sb)			105.5		%		80-120	16-OCT-18
Arsenic (As)			106.5		%		80-120	16-OCT-18
Barium (Ba)			108.1		%		80-120	16-OCT-18
Beryllium (Be)			98.1		%		80-120	16-OCT-18
Boron (B)			93.4		%		80-120	16-OCT-18
Cadmium (Cd)			100.3		%		80-120	16-OCT-18
Chromium (Cr)			100.8		%		80-120	16-OCT-18
Cobalt (Co)			98.8		%		80-120	16-OCT-18
Copper (Cu)			98.1		%		80-120	16-OCT-18
Lead (Pb)			102.3		%		80-120	16-OCT-18
Molybdenum (Mo)			104.2		%		80-120	16-OCT-18

Quality Control Report

Client: GeoPro Consulting Limited (Richmond Hill)
40 Vogell Road Unit 22
Richmond Hill ON L4B 3N6
Contact: Sarena Medina

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-WT	**Soil**							
Batch R4283630								
WG2904395-4 LCS								
Nickel (Ni)			98.6		%		80-120	16-OCT-18
Selenium (Se)			101.4		%		80-120	16-OCT-18
Silver (Ag)			97.3		%		80-120	16-OCT-18
Thallium (Tl)			99.1		%		80-120	16-OCT-18
Uranium (U)			103.8		%		80-120	16-OCT-18
Vanadium (V)			104.6		%		80-120	16-OCT-18
Zinc (Zn)			99.5		%		80-120	16-OCT-18
WG2904395-1 MB								
Antimony (Sb)			<0.10		mg/kg		0.1	16-OCT-18
Arsenic (As)			<0.10		mg/kg		0.1	16-OCT-18
Barium (Ba)			<0.50		mg/kg		0.5	16-OCT-18
Beryllium (Be)			<0.10		mg/kg		0.1	16-OCT-18
Boron (B)			<5.0		mg/kg		5	16-OCT-18
Cadmium (Cd)			<0.020		mg/kg		0.02	16-OCT-18
Chromium (Cr)			<0.50		mg/kg		0.5	16-OCT-18
Cobalt (Co)			<0.10		mg/kg		0.1	16-OCT-18
Copper (Cu)			<0.50		mg/kg		0.5	16-OCT-18
Lead (Pb)			<0.50		mg/kg		0.5	16-OCT-18
Molybdenum (Mo)			<0.10		mg/kg		0.1	16-OCT-18
Nickel (Ni)			<0.50		mg/kg		0.5	16-OCT-18
Selenium (Se)			<0.20		mg/kg		0.2	16-OCT-18
Silver (Ag)			<0.10		mg/kg		0.1	16-OCT-18
Thallium (Tl)			<0.050		mg/kg		0.05	16-OCT-18
Uranium (U)			<0.050		mg/kg		0.05	16-OCT-18
Vanadium (V)			<0.20		mg/kg		0.2	16-OCT-18
Zinc (Zn)			<2.0		mg/kg		2	16-OCT-18
Batch R4283768								
WG2904391-2 CRM		**WT-CANMET-TILL1**						
Antimony (Sb)			125.3		%		70-130	16-OCT-18
Arsenic (As)			127.9		%		70-130	16-OCT-18
Barium (Ba)			126.2		%		70-130	16-OCT-18
Beryllium (Be)			119.9		%		70-130	16-OCT-18
Boron (B)			3.6		mg/kg		0-8.2	16-OCT-18
Cadmium (Cd)			122.0		%		70-130	16-OCT-18

Quality Control Report

Client: GeoPro Consulting Limited (Richmond Hill)
40 Vogell Road Unit 22
Richmond Hill ON L4B 3N6
Contact: Sarena Medina

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-WT	**Soil**							
Batch R4283768								
WG2904391-2 CRM		**WT-CANMET-TILL1**						
Chromium (Cr)			120.1		%		70-130	16-OCT-18
Cobalt (Co)			119.6		%		70-130	16-OCT-18
Copper (Cu)			122.6		%		70-130	16-OCT-18
Lead (Pb)			122.4		%		70-130	16-OCT-18
Molybdenum (Mo)			122.5		%		70-130	16-OCT-18
Nickel (Ni)			119.8		%		70-130	16-OCT-18
Selenium (Se)			0.39		mg/kg		0.11-0.51	16-OCT-18
Silver (Ag)			0.26		mg/kg		0.13-0.33	16-OCT-18
Thallium (Tl)			0.149		mg/kg		0.077-0.18	16-OCT-18
Uranium (U)			119.1		%		70-130	16-OCT-18
Vanadium (V)			121.1		%		70-130	16-OCT-18
Zinc (Zn)			121.6		%		70-130	16-OCT-18
WG2904391-6 DUP		**WG2904391-5**						
Antimony (Sb)		<0.10	<0.10	RPD-NA	ug/g	N/A	30	16-OCT-18
Arsenic (As)		2.34	2.17		ug/g	7.4	30	16-OCT-18
Barium (Ba)		80.4	74.4		ug/g	7.7	40	16-OCT-18
Beryllium (Be)		0.44	0.41		ug/g	7.0	30	16-OCT-18
Boron (B)		5.9	5.9		ug/g	0.0	30	16-OCT-18
Cadmium (Cd)		0.086	0.072		ug/g	18	30	16-OCT-18
Chromium (Cr)		17.9	16.6		ug/g	7.8	30	16-OCT-18
Cobalt (Co)		5.71	5.46		ug/g	4.6	30	16-OCT-18
Copper (Cu)		11.8	11.0		ug/g	6.9	30	16-OCT-18
Lead (Pb)		5.32	5.15		ug/g	3.3	40	16-OCT-18
Molybdenum (Mo)		0.22	0.20		ug/g	7.1	40	16-OCT-18
Nickel (Ni)		12.2	11.5		ug/g	5.8	30	16-OCT-18
Selenium (Se)		<0.20	<0.20	RPD-NA	ug/g	N/A	30	16-OCT-18
Silver (Ag)		<0.10	<0.10	RPD-NA	ug/g	N/A	40	16-OCT-18
Thallium (Tl)		0.108	0.107		ug/g	0.5	30	16-OCT-18
Uranium (U)		0.518	0.494		ug/g	4.8	30	16-OCT-18
Vanadium (V)		29.4	28.2		ug/g	4.4	30	16-OCT-18
Zinc (Zn)		31.4	30.0		ug/g	4.7	30	16-OCT-18
WG2904391-4 LCS								
Antimony (Sb)			103.3		%		80-120	17-OCT-18

Quality Control Report

Client: GeoPro Consulting Limited (Richmond Hill)
40 Vogell Road Unit 22
Richmond Hill ON L4B 3N6
Contact: Sarena Medina

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-WT	**Soil**							
Batch R4283768								
WG2904391-4 LCS								
Arsenic (As)			99.1		%		80-120	17-OCT-18
Barium (Ba)			96.3		%		80-120	17-OCT-18
Beryllium (Be)			92.2		%		80-120	17-OCT-18
Boron (B)			88.5		%		80-120	17-OCT-18
Cadmium (Cd)			95.3		%		80-120	17-OCT-18
Chromium (Cr)			94.5		%		80-120	17-OCT-18
Cobalt (Co)			93.0		%		80-120	17-OCT-18
Copper (Cu)			92.2		%		80-120	17-OCT-18
Lead (Pb)			96.8		%		80-120	17-OCT-18
Molybdenum (Mo)			98.7		%		80-120	17-OCT-18
Nickel (Ni)			92.3		%		80-120	17-OCT-18
Selenium (Se)			94.9		%		80-120	17-OCT-18
Silver (Ag)			93.1		%		80-120	17-OCT-18
Thallium (Tl)			98.2		%		80-120	17-OCT-18
Uranium (U)			91.3		%		80-120	17-OCT-18
Vanadium (V)			97.9		%		80-120	17-OCT-18
Zinc (Zn)			91.7		%		80-120	17-OCT-18
WG2904391-1 MB								
Antimony (Sb)			<0.10		mg/kg		0.1	16-OCT-18
Arsenic (As)			<0.10		mg/kg		0.1	16-OCT-18
Barium (Ba)			<0.50		mg/kg		0.5	16-OCT-18
Beryllium (Be)			<0.10		mg/kg		0.1	16-OCT-18
Boron (B)			<5.0		mg/kg		5	16-OCT-18
Cadmium (Cd)			<0.020		mg/kg		0.02	16-OCT-18
Chromium (Cr)			<0.50		mg/kg		0.5	16-OCT-18
Cobalt (Co)			<0.10		mg/kg		0.1	16-OCT-18
Copper (Cu)			<0.50		mg/kg		0.5	16-OCT-18
Lead (Pb)			<0.50		mg/kg		0.5	16-OCT-18
Molybdenum (Mo)			<0.10		mg/kg		0.1	16-OCT-18
Nickel (Ni)			<0.50		mg/kg		0.5	16-OCT-18
Selenium (Se)			<0.20		mg/kg		0.2	16-OCT-18
Silver (Ag)			<0.10		mg/kg		0.1	16-OCT-18
Thallium (Tl)			<0.050		mg/kg		0.05	16-OCT-18
Uranium (U)			<0.050		mg/kg		0.05	16-OCT-18

Quality Control Report

Client: GeoPro Consulting Limited (Richmond Hill)
40 Vogell Road Unit 22
Richmond Hill ON L4B 3N6
Contact: Sarena Medina

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-WT	**Soil**							
Batch R4283768								
WG2904391-1 MB								
Vanadium (V)			<0.20		mg/kg		0.2	16-OCT-18
Zinc (Zn)			<2.0		mg/kg		2	16-OCT-18
MOISTURE-WT	**Soil**							
Batch R4276494								
WG2902083-3 DUP		**L2179925-1**						
% Moisture		7.68	7.78		%	1.4	20	13-OCT-18
WG2902083-2 LCS								
% Moisture			100.6		%		90-110	13-OCT-18
WG2902083-1 MB								
% Moisture			<0.10		%		0.1	13-OCT-18
Batch R4277639								
WG2902739-3 DUP		**L2180364-4**						
% Moisture		8.00	7.89		%	1.4	20	14-OCT-18
WG2902739-2 LCS								
% Moisture			100.0		%		90-110	14-OCT-18
WG2902739-1 MB								
% Moisture			<0.10		%		0.1	14-OCT-18
PH-WT	**Soil**							
Batch R4282024								
WG2903484-1 DUP		**L2178622-1**						
pH		7.35	7.30	J	pH units	0.05	0.3	16-OCT-18
WG2903580-1 LCS								
pH			6.96		pH units		6.9-7.1	16-OCT-18
Batch R4283526								
WG2903451-1 DUP		**L2179629-8**						
pH		7.80	7.96	J	pH units	0.16	0.3	17-OCT-18
WG2903578-1 LCS								
pH			6.95		pH units		6.9-7.1	17-OCT-18
SAR-R511-WT	**Soil**							
Batch R4282377								
WG2904426-4 DUP		**WG2904426-3**						
Calcium (Ca)		2.3	2.3		mg/L	0.3	30	16-OCT-18
Sodium (Na)		2.6	2.5		mg/L	4.1	30	16-OCT-18
Magnesium (Mg)		<1.0	<1.0	RPD-NA	mg/L	N/A	30	16-OCT-18
WG2904426-2 IRM		**WT SAR2**						
Calcium (Ca)			101.0		%		70-130	16-OCT-18

Quality Control Report

Client: GeoPro Consulting Limited (Richmond Hill)
40 Vogell Road Unit 22
Richmond Hill ON L4B 3N6
Contact: Sarena Medina

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SAR-R511-WT	**Soil**							
Batch R4282377								
WG2904426-2 IRM		**WT SAR2**						
Sodium (Na)			102.2		%		70-130	16-OCT-18
Magnesium (Mg)			95.8		%		70-130	16-OCT-18
WG2904426-1 MB								
Calcium (Ca)			<1.0		mg/L		1	16-OCT-18
Sodium (Na)			<1.0		mg/L		1	16-OCT-18
Magnesium (Mg)			<1.0		mg/L		1	16-OCT-18
Batch R4283958								
WG2905652-4 DUP		**WG2905652-3**						
Calcium (Ca)		3.3	3.4		mg/L	2.7	30	17-OCT-18
Sodium (Na)		6.2	6.3		mg/L	1.6	30	17-OCT-18
Magnesium (Mg)		1.3	1.2		mg/L	7.3	30	17-OCT-18
Magnesium (Mg)		1.3	1.2		mg/L	7.3	30	17-OCT-18
WG2905652-2 IRM		**WT SAR2**						
Calcium (Ca)			85.5		%		70-130	17-OCT-18
Sodium (Na)			112.0		%		70-130	17-OCT-18
Magnesium (Mg)			87.5		%		70-130	17-OCT-18
WG2905652-1 MB								
Calcium (Ca)			<1.0		mg/L		1	17-OCT-18
Sodium (Na)			<1.0		mg/L		1	17-OCT-18
Magnesium (Mg)			<1.0		mg/L		1	17-OCT-18

Quality Control Report

Workorder: L2179925 Report Date: 18-OCT-18

Client: GeoPro Consulting Limited (Richmond Hill)
40 Vogell Road Unit 22
Richmond Hill ON L4B 3N6
Contact: Sarena Medina

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
J	Duplicate results and limits are expressed in terms of absolute difference.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

Chain of Custody (COC) / Analytical Request Form

ALS Environmental

Canada Toll Free: 1 800 668 9878

www.alsglobal.com

L2179925-COFC

COC Number: 18-2178G-20181010

Page 1 of 2

Report To	Contact and company name below will appear on the final report	Report Format	Confirm all E&P TATs with your AM - surcharges will apply
Company:	GeoPro Consulting Ltd.	Select Report Format: ☑ PDF ☑ EXCEL ☐ EDD (DIGITAL)	Regular [R]* ☑ Standard TAT if received by 3 pm - business days - no surcharges apply
Contact:	Sarena Medina sarenm@geoproconsulting.ca	Quality Control (QC) Report with Report ☑ YES ☐ NO	PRIORITY (Business Days): 4 day [P4] ☐ / 3 day [P3] ☐ / 2 day [P2] ☐ — EMERGENCY: 1 Business day [E1] ☐ / Same Day, Weekend or Statutory holiday [E0] ☐
Phone:	(905) 237-8336	☑ Compare Results to Criteria on Report - provide details below if box checked	
	Company address below will appear on the final report	Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX	Date and Time Required for all E&P TATs:
Street:	40 Vogell Road, Unit 57	Email 1 or Fax dylanx@geoproconsulting.ca	For tests that can not be performed according to the service level selected, you will be contacted.
City/Province:	Richmond Hill, ON	Email 2 timy@geoproconsulting.ca	
Postal Code:	L4B 3N6	Email 3 sarenam@geoproconsulting.ca	
Invoice To	Same as Report To ☑ YES ☐ NO	**Invoice Distribution**	**Analysis Request**
	Copy of Invoice with Report ☐ YES ☑ NO	Select Invoice Distribution: ☑ EMAIL ☑ MAIL ☐ FAX	Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below
Company:		Email 1 or Fax office@geoproconsulting.ca	
Contact:		Email 2 sarenam@geoproconsulting.ca	

Project Information		Oil and Gas Required Fields (client use)	
ALS Account # / Quote #:	Q66183	AFE/Cost Center:	PO#
Job #:	18-2178G	Major/Minor Code:	Routing Code:
PO / AFE:		Requisitioner:	
LSD:	Mississauga, Ontario	Location:	

ALS Lab Work Order # (lab use only): L2179925 R | ALS Contact: Rick | Sampler: R.R

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Metals and Inorganics	Number of Containers
	BH 1-1, SS2 + SS3	1-Oct-18	AM	Soil	R	1
	BH 1-4, SS2 + SS3	1-Oct-18	AM	Soil	R	1
	BH 1-5, SS2 + SS3	1-Oct-18	AM	Soil	R	1
	BH 1-8, SS2 + SS3A	1-Oct-18	AM	Soil	R	1
	BH 1-11, SS2	2-Oct-18	AM	Soil	R	1
	BH 1-14, SS2 + SS3	2-Oct-18	AM	Soil	R	1
	BH 1-16, SS2 + SS3	3-Oct-18	AM	Soil	R	1
	BH 1-23, SS2	3-Oct-18	AM	Soil	R	1
	BH 2-1, SS2	4-Oct-18	AM	Soil	R	1
	BH 2-3, SS1A	4-Oct-18	AM	Soil	R	1
	Bh 2-5, SS1A	4-Oct-18	AM	Soil	R	1
	BH 2-7, SS1 + SS2	4-Oct-18	AM	Soil	R	1

Drinking Water (DW) Samples[1] (client use)	Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)	SAMPLE CONDITION AS RECEIVED (lab use only)
Are samples taken from a Regulated DW System? ☐ YES ☑ NO	MOECC Table 1	Frozen ☐ SIF Observations Yes ☐ No ☐
Are samples for human drinking water use? ☐ YES ☑ NO		Ice Packs ☐ Ice Cubes ☐ Custody seal intact Yes ☐ No ☐
		Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C	
			13.5°C	

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: Junrong Li	Date:2018/10/10	Time:	Received by:	Date:	Time:	Received by:	Date: 11-Oct-18	Time: 17:45

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION — WHITE - LABORATORY COPY — YELLOW - CLIENT COPY — OCTOBER 2015 FRONT

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a **Regulated Drinking Water (DW) System**, please submit using an **Authorized DW COC form**.

Chain of Custody (COC) / Analytical Request Form

ALS Environmental

Canada Toll Free: 1 800 668 9878

www.alsglobal.com

L2179925-COFC

COC Number: 18-2178G-20181010

Report To	Contact and company name below will appear on the final report	Report Format / Distribution	rm all E&P TATs with your AM - surcharges will apply
Company:	GeoPro Consulting Ltd.	Select Report Format: ☑ PDF ☑ EXCEL ☐ EDD (DIGITAL)	Regular [R] ☑ Standard TAT if received by 3 pm - business days - no surcharges apply
Contact:	Sarena Medina sarenam@geoproconsulting.ca	Quality Control (QC) Report with Report ☑ YES ☐ NO	PRIORITY (Business Days): 4 day [P4] ☐ / 3 day [P3] ☐ / 2 day [P2] ☐ — EMERGENCY: 1 Business day [E1] ☐ / Same Day, Weekend or Statutory holiday [E0] ☐
Phone:	(905) 237-8336	☑ Compare Results to Criteria on Report - provide details below if box checked	
	Company address below will appear on the final report	Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX	
Street:	40 Vogell Road, Unit 57	Email 1 or Fax dylanx@geoproconsulting.ca	Date and Time Required for all E&P TATs:
City/Province:	Richmond Hill, ON	Email 2 timy@geoproconsulting.ca	For tests that can not be performed according to the service level selected, you will be contacted.
Postal Code:	L4B 3N6	Email 3 sarenam@geoproconsulting.ca	Analysis Request
Invoice To	Same as Report To ☑ YES ☐ NO	Invoice Distribution	Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below
	Copy of Invoice with Report ☐ YES ☑ NO	Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX	
Company:		Email 1 or Fax office@geoproconsulting.ca	
Contact:		Email 2 sarenam@geoproconsulting.ca	

Project Information		Oil and Gas Required Fields (client use)	
ALS Account # / Quote #:	Q66183	AFE/Cost Center:	PO#
Job #:	18-2178G	Major/Minor Code:	Routing Code:
PO / AFE:		Requisitioner:	
LSD:	Mississauga, Ontario	Location:	
ALS Lab Work Order # (lab use only)		ALS Contact: Rick	Sampler: R.R

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Metals and Inorganics	Number of Containers
	BH 2-9, SS2 + SS3	10-Oct-18	AM	Soil	R	1
	BH 2-13, SS2 + SS3	11-Oct-18	AM	Soil	R	1
	BH 2-15, SS2 + SS3	12-Oct-18	AM	Soil	R	1
	BH 2-17, SS1	13-Oct-18	AM	Soil	R	1

Drinking Water (DW) Samples[1] (client use)	Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)	SAMPLE CONDITION AS RECEIVED (lab use only)
Are samples taken from a Regulated DW System? ☐ YES ☑ NO	MOECC Table 1	Frozen ☐ SIF Observations Yes ☐ No ☐
Are samples for human drinking water use? ☐ YES ☑ NO		Ice Packs ☐ Ice Cubes ☐ Custody seal intact Yes ☐ No ☐
		Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C	
			13.5°C	

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: Junrong Li	Date:2018/10/10	Time:	Received by:	Date:	Time:	Received by:	Date: 11-Oct-18	Time: 17:49

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

OCTOBER 2015 FRONT

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white report copy.

1. If any water samples are taken from a **Regulated Drinking Water (DW) System**, please submit using an **Authorized DW COC form**.

Chain of Custody (COC) / Analytical Request Form

ALS Environmental

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

Affix ALS barcode label here
(lab use only)

COC Number: 18-2178G-20181010

Report To	Contact and company name below will appear on the final report
Company:	GeoPro Consulting Ltd.
Contact:	Sarena Medina sarenm@geoproconsulting.ca
Phone:	(905) 237-8336
Company address below will appear on the final report	
Street:	40 Vogell Road, Unit 57
City/Province:	Richmond Hill, ON
Postal Code:	L4B 3N6
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☐ YES ☑ NO
Company:	
Contact:	

Report Format / Distribution

Select Report Format: ☑ PDF ☑ EXCEL ☐ EDD (DIGITAL)
Quality Control (QC) Report with Report ☑ YES ☐ NO
☑ Compare Results to Criteria on Report - provide details below if box checked
Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax dylanx@geoproconsulting.ca
Email 2 timy@geoproconsulting.ca
Email 3 sarenam@geoproconsulting.ca

Invoice Distribution

Select Invoice Distribution: ☑ EMAIL ☑ MAIL ☐ FAX
Email 1 or Fax office@geoproconsulting.ca
Email 2 sarenam@geoproconsulting.ca

Select Service Level Below - Please confirm all E&P TATs with your AM - surcharges will apply

Regular [R] ☑ Standard TAT if received by 3 pm - business days - no surcharges apply

PRIORITY (Business Days): **4 day [P4]** ☐ | **3 day [P3]** ☐ | **2 day [P2]** ☐

EMERGENCY: **1 Business day [E1]** ☐ | **Same Day, Weekend or Statutory holiday [E0]** ☐

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm

For tests that can not be performed according to the service level selected, you will be contacted.

Project Information

ALS Account # / Quote #: Q66183
Job #: 18-2178G
PO / AFE:
LSD: Mississauga, Ontario

Oil and Gas Required Fields (client use)

AFE/Cost Center: | PO#
Major/Minor Code: | Routing Code:
Requisitioner:
Location:

ALS Lab Work Order # (lab use only)

ALS Contact: Rick **Sampler:** R.R

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Metals and Inorganics												Number of Containers
	BH 1-1, SS2 + SS3	1-Oct-18	AM	Soil	R												1
	BH 1-4, SS2 + SS3	1-Oct-18	AM	Soil	R												1
	BH 1-5, SS2 + SS3	1-Oct-18	AM	Soil	R												1
	BH 1-8, SS2 + SS3A	1-Oct-18	AM	Soil	R												1
	BH 1-11, SS2	2-Oct-18	AM	Soil	R												1
	BH 1-14, SS2 + SS3	2-Oct-18	AM	Soil	R												1
	BH 1-16, SS2 + SS3	3-Oct-18	AM	Soil	R												1
	BH 1-23, SS2	3-Oct-18	AM	Soil	R												1
	BH 2-1, SS2	4-Oct-18	AM	Soil	R												1
	BH 2-3, SS1A	4-Oct-18	AM	Soil	R												1
	Bh 2-5, SS1A	4-Oct-18	AM	Soil	R												1
	BH 2-7, SS1 + SS2	4-Oct-18	AM	Soil	R												1

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System?
☐ YES ☑ NO

Are samples for human drinking water use?
☐ YES ☑ NO

Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)

MOECC Table 1

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ | SIF Observations Yes ☐ No ☐
Ice Packs ☐ Ice Cubes ☐ | Custody seal intact Yes ☐ No ☐
Cooling Initiated ☐

INIIITIAL COOLER TEMPERATURES ºC			FINAL COOLER TEMPERATURES ºC		

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: Junrong Li	Date:2018/10/10	Time:	Received by:	Date:	Time:	Received by:	Date:	Time:

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a **Regulated Drinking Water (DW) System**, please submit using an **Authorized DW COC form**.

ALS Environmental

www.alsglobal.com

Chain of Custody (COC) / Analytical Request Form

Canada Toll Free: 1 800 668 9878

Affix ALS barcode label here
(lab use only)

COC Number: 18-2178G-20181010

Report To	Contact and company name below will appear on the final report
Company:	GeoPro Consulting Ltd.
Contact:	Sarena Medina sarenam@geoproconsulting.ca
Phone:	(905) 237-8336
Company address below will appear on the final report	
Street:	40 Vogell Road, Unit 57
City/Province:	Richmond Hill, ON
Postal Code:	L4B 3N6
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☐ YES ☑ NO
Company:	
Contact:	

Report Format / Distribution	
Select Report Format:	☑ PDF ☑ EXCEL ☐ EDD (DIGITAL)
Quality Control (QC) Report with Report	☑ YES ☐ NO
☑ Compare Results to Criteria on Report - provide details below if box checked	
Select Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	dylanx@geoproconsulting.ca
Email 2	timy@geoproconsulting.ca
Email 3	sarenam@geoproconsulting.ca
Invoice Distribution	
Select Invoice Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	office@geoproconsulting.ca
Email 2	sarenam@geoproconsulting.ca

Select Service Level Below - Please confirm all E&P TATs with your AM - surcharges will apply

Regular [R] ☑ Standard TAT if received by 3 pm - business days - no surcharges apply

PRIORITY (Business Days)		EMERGENCY	
4 day [P4]	☐	**1 Business day [E1]**	☐
3 day [P3]	☐	**Same Day, Weekend or Statutory holiday [E0]**	☐
2 day [P2]	☐		

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm

For tests that can not be performed according to the service level selected, you will be contacted.

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

Project Information		**Oil and Gas Required Fields (client use)**	
ALS Account # / Quote #:	Q66183	AFE/Cost Center:	PO#
Job #:	18-2178G	Major/Minor Code:	Routing Code:
PO / AFE:		Requisitioner:	
LSD:	Mississauga, Ontario	Location:	
ALS Lab Work Order # (lab use only)		**ALS Contact:** Rick	**Sampler:** R.R

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Metals and Inorganics												Number of Containers
	BH 2-9, SS2 + SS3	10-Oct-18	AM	Soil	R												1
	BH 2-13, SS2 + SS3	11-Oct-18	AM	Soil	R												1
	BH 2-15, SS2 + SS3	12-Oct-18	AM	Soil	R												1
	BH 2-17, SS1	13-Oct-18	AM	Soil	R												1

Drinking Water (DW) Samples[1] (client use)	**Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)**
Are samples taken from a Regulated DW System? ☐ YES ☑ NO	MOECC Table 1
Are samples for human drinking water use? ☐ YES ☑ NO	

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐

Ice Packs ☐ Ice Cubes ☐ Custody seal intact Yes ☐ No ☐

Cooling Initiated ☐

INIITIAL COOLER TEMPERATURES ºC			FINAL COOLER TEMPERATURES ºC		

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: Junrong Li	Date:2018/10/10	Time:	Received by:	Date:	Time:	Received by:	Date:	Time:

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION WHITE - LABORATORY COPY YELLOW - CLIENT COPY

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a **Regulated Drinking Water (DW) System**, please submit using an **Authorized DW COC form**.

GENERAL TERMS AND CONDITIONS:

These terms and conditions are incorporated in and form part of the Agreement between ALS Group's Environmental Division and the party named in the Offer (the "Client").

1. Definitions. Capitalized Terms not defined in these Terms and Conditions have the definitions set out in the other Agreement documents.
2. The Services. ALS will provide the Services to the Client as described in the Offer and in any chain of custody form provided with any sample.
3. Prices. ALS may review and change all prices, fees, surcharges or other charges set out in the Agreement if there are changes to ALS's cost beyond ALS's control, including changes in legislative requirements, Client variations of sample numbers and Client requests for changes to standard reporting requirements. Notwithstanding Condition 3, all quotations are reviewed and updated on a yearly basis or expire after one year.
4. Payment Terms. The Client shall pay ALS within 30 days of the invoice date OAC. ALS may, for reasonable business reasons, require the Client to arrange for payment in advance.
5. Quotation Numbers. The Client shall provide the quotation number to ALS (where applicable) to ensure correct pricing.
6. Taxes. Applicable taxes are not included in prices - surcharges and additional fees will be added at the time of invoicing.
7. Quality Control. ALS has an extensive QA/QC program. Clients' samples are analyzed using approved, referenced procedures followed by thorough data validation prior to reporting the analytical results.
8. Test Results are Not Guaranteed. Results are obtained from analytical measurements that are subject to inherent variability. Measurement results reflect characteristics of submitted test samples at time of analysis. The Client is responsible for informing itself on the limitation of test results and acknowledges that test results are not guaranteed.
9. Standard of Care. ALS will use reasonable care and diligence as required by the laws of the province or territory where the sample is tested.
10. Storage. Where possible, ALS will store samples for 30 days from the date a final report is issued to the Client, after which ALS may discard the samples.
11. Holds. If the Client requests a sample to be placed on hold, ALS will store the sample for 30 days from date of receipt, after which ALS will invoice the Client and discard the sample. Longer hold periods are available upon request.
12. Archives. If the Client requests a sample be archived, ALS will invoice in advance and store the sample for the period requested, after which ALS may discard the sample.
13. Handling Protocol. Legal sample handling protocol must be arranged before samples are collected. ALS charges a surcharge on the list price plus the hourly technologist or chemist rates for legal sample protocol. Additional charges will apply for samples that require storage by ALS.
14. Samples. The quality, condition, content and source of samples stored and tested are not known to ALS except as declared and described on the chain of custody form completed and submitted by the Client and accompanying the sample.
15. Risk of Loss. ALS will use reasonable care to protect samples during storage, however all samples are stored at the Client's risk and the Client is responsible for obtaining appropriate insurance, if desired. The Client acknowledges that during the performance of the Services samples may be altered, lost, damaged or destroyed and the Client releases ALS from any claim the Client may have for any loss or damage to the sample.
16. Environmental. The Client must comply with all applicable environment legislation, including labeling all hazardous samples to comply with WHMIS and TDG regulations, and must provide appropriate Safety Data Sheets (previously referred to as 'MSDS") that include the nature of the hazard and a contact name and phone number to call for information. The Client will indemnify ALS for all loss or damages, including any fine or cost of complying with an order of any government authority, resulting from the Client's breach of this paragraph.
17. Hazardous Materials Disposal. ALS may return, at the Client's cost, hazardous material to the Client for disposal.
18. Hazardous Materials Surcharge. ALS may apply an additional surcharge for handling of hazardous samples or samples with Naturally Occurring Radioactive Materials (NORM), H_2S, CN, etc.
19. Sample Containers. ALS may ship sample containers to the Client's location by the most cost effective means using ALS preferred courier suppliers, within the specified project timeline.
20. Additional Charges. ALS may charge the Client (a) its cost for emergency bottle shipments and shipments to and from a remote site, and (b) where pick up and delivery services are provided, subject in each instance to a minimum charge of $25.00.
21. Re-Tests. ALS reserves the right to re-test any samples that remain in its possession. Re-tests requested by the Client may be charged.
22. Waiver. The Client is responsible for making any assessment regarding the suitability of the Services and the intended results for the Client's purposes and waives any claims against ALS it may have as a result of the interpretation of the results. The Client shall indemnify ALS for all claims made by any third party against ALS in respect of all losses however arising from the performance of the Services or the use of any report provided in the performance of the Services.
23. Limitation of Liability. In no event shall ALS be liable for any consequential, indirect, incidental, special, exemplary or punitive damages, whether foreseeable or unforeseeable, (including claims for loss of profits or revenue or losses caused by stoppage of other work or impairment of other assets) incurred by the Client arising out of breach or failure of express or implied warranty, breach of contract, breach of warranty, misrepresentation, negligence, strict liability in tort or otherwise. In any event, the liability of ALS to the Client shall be limited to the cost of testing the sample as requested in the chain of custody form under which the sample was originally deposited. For the purposes of this paragraph and paragraphs 8, 15, 16, 22 and 24, as the applicable, "ALS" includes without limitations its directors, officers, employees and affiliates and the "Client" includes without limitation any third party that may have a claim against ALS through the Client.
24. Notice of Liability. Notwithstanding paragraph 23, ALS shall not be liable to the Client unless the Client provides notice in writing to ALS of such loss or damage, together with full particulars thereof, within 30 days of the Client's receipt of the report of the analysis of the sample giving rise to such liability. The provisions of this paragraph allocate the risk under the Agreement between the Client and ALS, and the fees to be paid by the Client to ALS reflect this allocation of risks and the limitations of liability in this Agreement.
25. Entire Agreement. The Agreement is the entire agreement between the parties and supersedes and takes precedence over any terms and conditions contained in any documentation provided by the Client. ALS's execution of any subsequent documentation from the Client only acknowledges receipt and not acceptance of any terms or conditions therein. If there is a conflict between these terms and conditions and any other Agreement document, these terms and conditions prevail.
26. Term. Providing the first batch of samples to which this tender refers is submitted within three months of the starting date of this quotation, the following prices, terms and conditions will remain firm until the closing date. This offer and terms and conditions will automatically lapse if the offer has not been accepted and samples not delivered to ALS within the Closing Date.
27. Termination. (a) Either party may terminate this Agreement for any reason by giving the other party thirty (30) days written notice (Notice Period).(b) If the Agreement is terminated pursuant to clause (a), then the Client must pay ALS for all Services performed up to the expiry of the Notice Period.

ALS Environmental

Canadian Locations (Toll Free 1-800-668-9878)

EMERGENCY SPILL RESPONSE: +1 855 838 LABS (5227)

British Columbia / Yukon

Vancouver, BC
8081 Lougheed Hwy
Burnaby, BC
V5A 1W9
After Hours / Emergency
Ph: 604-253-4188
Fax: 604-253-6700
Ph: 604-220-4188

Fort St. John, BC
10345A Dogwood Street
Fort St. John , BC
V1J 6W7
After Hours / Emergency
Ph: 250-261-5517
Fax: 250-261-5587
Ph: 250-261-4947

Kamloops, BC
1445 McGill Rd, Unit 2B
Kamloops, BC
V2C 6K7
After Hours / Emergency
Ph: 250-372-3588
Fax: 250-372-3670
Ph: 250-572-1458

Victoria, BC
#104-1027 Pandora Avenue
Victoria, BC
V8V 3P6
Ph: 250-413-3243

Terrace, BC
2912 Molitor Street
Terrace, BC
V2C6K7
Ph: 250-635-3309

Whitehorse, YT
12 - 151 Industrial Road
Whitehorse, YT
Y1A 2V3
After Hours / Emergency
Ph: 867-668-6689
Ph2: 867-668-6684
Ph: 867-335-5416

Prairies / NWT

Edmonton, AB
9936-67 Avenue NW
Edmonton, AB
T6E 0P5
After Hours / Emergency
Ph: 780-413-5227
Fax: 780-437-2311
Ph: 780-913-2299

Calgary, AB
2559-29th Street NE
Calgary, AB
T1Y 7B5
After Hours / Emergency
Ph: 403-407-1800
Fax: 403-291-0298
Ph: 403-651-1471

Fort McMurray, AB
Bay 1, 245 MacDonald Crescent
Fort McMurray, AB
T9H 4B5
After Hours / Emergency
Ph: 780-791-1524
Fax: 780-791-1586
Ph: 780-714-8482

Grande Prairie, AB
9505-111th Street
T8V 5W1
After Hours / Emergency
Ph: 780-539-5196
Fax: 780-513-2191
Ph: 780-512-4343

Saskatoon, SK
819 - 58 Street East
Saskatoon, SK
S7K 6X5
After Hours / Emergency
Ph: 306-668-8370
Fax: 306-668-8383
Ph: 306-221-7147

Regina, SK
1119 Osler Street
Regina, SK
S4R 8R4
After Hours / Emergency
Ph: 306-525-0970
Ph: 306-216-2480

Winnipeg, MB
1329 Niakwa Road East, Unit 12
Winnipeg, MB
R2J 3T4
After Hours / Emergency
Ph: 204-255-9720
Fax: 204-255-9721
Ph: 204-784-6677

Yellowknife, NT
116 - 314 Old Airport Road
Yellowknife, NT
X1A 3T3
After Hours / Emergency
Ph: 867-873-5593
Fax: 867-920-4238
Ph: 867-446-5593

Ontario

Thunder Bay, ON
1081 Barton Street
Thunder Bay, ON
P7B 5N3
After Hours / Emergency
Ph: 807-623-6463
Fax: 807-623-7598
Ph: 807-624-4482

Burlington, ON
1435 Norjohn Court, Unit 1
Burlington, ON
L7L 0E6
Ph: 905-331-3111
Fax: 905-331-4567

Waterloo, ON
60 Northland Road, Unit 1
Waterloo, ON
N2V 2B8
After Hours / Emergency
Ph: 519-886-6910
Fax: 519-886-9047
Ph: 519-589-0044

London, ON
309 Exeter Road, Unit #29
London, ON
N6L 1C1
Ph: 519-652-6044
Fax: 519-652-0671

Mississauga, ON
5730 Coopers Avenue, Unit 30
Mississauga, ON
L4Z 2E9
Ph: 905-507-6910
Fax: 905-507-6927

Ottawa, ON
190 Colonnade Road, Unit 7
Nepean, ON
K2E 7J5
Ph: 613-225-8279
Fax: 613-225-2801

Richmond Hill, ON
95 West Beaver Creek Road, Unit 1
Richmond Hill, ON
L4B 1H2
Ph: 905-881-9887
Fax: 905-881-8062

Sample Container, Preservation and Holding Time Table. Keep samples cool (4ºC) and ship to an ALS location as soon as possible.

Note: Specific container, preservation and holding times may vary based on regulatory requirements - consult your local ALS laboratory for assistance prior to sampling.

Inorganics	Analysis [1]	Water Container	Water Preservation	Additional Notes	Soil Container	Water / Soil Hold Time
ROUTINE INORGANICS AND PHYSICALS	Acidity and Alkalinity	0.5-1 L Plastic			125-250 mL Jar or Bag	14 Days / NA
	Anions (Br, Cl, SO4, F) and Electrical Conductivity	0.5-1 L Plastic			125-250 mL Jar or Bag	28 Days [7] / Unlimited
	Bromate[19], Chlorate and Chlorite	125 mL Plastic	EDA (Ethylenediamine)		NA	28 Days (Chlorite 14 Days) / NA
	BOD, Colour and Turbidity	0.5-1 L Plastic			NA	2-4 Days [8] / NA
	COD and Phenols (4AAP)	125-250 mL Glass	1:1 Sulfuric Acid (H_2SO_4)		NA	28 Days / NA
	Cyanide, Total ,Weak Acid Dissociable,Free	145 mL Plastic	6N NaOH		125-250 mL Jar or Bag	14 Days / 14 Days
	Dissolved Oxygen	300 mL BOD bottle	1 each; $MnSO_4$ & alkaline iodide azide pillows		NA	8 Hours [20] / NA
	Dissolved or Total Inorganic Carbon (DIC or TIC)	125-250 mL Glass	.	Field Filter for Dissolved	125-250 mL Jar or Bag	14 Days / 28 Days
	Dissolved or Total Organic Carbon (DOC or TOC)	125-250 mL Glass	1:1 Sulfuric Acid (H_2SO_4)	Field Filter for Dissolved	125-250 mL Jar or Bag	28 Days / 28 Days
	Flashpoint	2 x 100-250 mL Amber Glass		Zero Headspace	125-250 mL Jar	7 Days / 7 Days
	pH	0.5-1 L Plastic			125-250 mL Jar or Bag	0.25 Hours / 30 Days [9]
	Solids (TS, TSS, TDS)	0.5-1 L Plastic			NA	7 Days / NA
	Sulfide	125 - 150 mL Plastic	Zinc Acetate & 6N NaOH		125-250 mL Jar or Bag	7 Days / 7 Days
	Sulfite	125 mL Plastic			NA	0.25 Hours / NA
NUTRIENTS	Ammonia Nitrogen	250 mL Glass or Plastic	1:1 Sulfuric Acid (H_2SO_4)		125-250 mL Jar or Bag	28 Days / 72 Hours
	Nitrate or Nitrite Nitrogen (and Ammonia unpreserved)	0.5-1 L Plastic			NA	2-7 Days [10] / 72 Hours
	Nitrogen, Kjeldahl, Organic, Total or Dissolved	250 mL Glass or Plastic	1:1 Sulfuric Acid (H_2SO_4)	Field Filter for Dissolved	NA	28 Days / NA
	Nutrients, Available (N,P,K,S)	NA			125-250 mL Jar or Bag	NA / 3 Days [11]
	Phosphorus, Reactive (orthophosphate)	0.5-1 L Plastic			NA	2-7 Days [12] / NA
	Phosphorus, Total Dissolved	250 mL Glass or Plastic	1:1 Sulfuric Acid (H_2SO_4)	Field Filter for Dissolved	NA	28 Days / NA
	Phosphorus, Total	250 mL Glass or Plastic	1:1 Sulfuric Acid (H_2SO_4)		NA	28 Days / NA
METALS	Chromium VI (Hexavalent)	125 mL Plastic	50 % NaOH (BC MoE) or 6N NaOH + Ammonium Buffer (OMoE)		125-250 mL Jar or Bag	28 Days / 30 Days
	Mercury, Methyl	250 mL FLPE	1:1 Hydrochloric Acid (HCl)[21]	Field Filter for Dissolved	125-250 mL Jar or Bag	6 Months / 28 Days
	Mercury, Total or Dissolved	40 mL Glass Vial	1:1 Hydrochloric Acid (HCl)	Field Filter for Dissolved	125-250 mL Jar or Bag	28 Days / 28 Days
	Metals, Total or Dissolved	125-250 mL Plastic	1:3 Nitric Acid (HNO_3) to pH<2	Field Filter for Dissolved	125-250 mL Jar or Bag	6 Months / 6 Months
Organics						
HYDRO-CARBONS	F1, Volatile Organic Compounds (VOCs), THMs, 1,4-Dioxane, Volatile Petroleum Hydrocarbons (VPH)	2 or 3 x 40 mL Glass Vials [2]	Sodium Bisulfate [4]	Zero Headspace	Field Methanol Kit [6]	14 Days / 40 Days [13]
		2 or 3 x 40 mL Glass Vials [2]	Sodium Bisulfate [4]	Zero Headspace	Hermetic Sampler kit [6]	14 Days / 48 Hours
	CCME CWS F1, BTEX	2 or 3 x 40 mL Glass Vials [2]	Sodium Bisulfate [4]	Zero Headspace	125 - 500 mL Jar	14 Days / 7 Days
	CCME CWS F2-F4	2 x 60 mL Amber Glass Vials [3]	Sodium Bisulfate		125 - 500 mL Jar	14 Days [14] / 14 Days
	EPH or LEPH/HEPH	2 x 250 mL Amber Glass with Septa Cap	Sodium Bisulfate		125 - 500 mL Jar	14 Days / 14 Days
	Polycyclic Aromatic Hydrocarbons (PAHs)	2 x 0.25 - 1 L Amber Glass [5]	Sodium Bisulfate		125 - 500 mL Jar	14 Days / 14 Days
	Oil & Grease or Mineral Oil & Grease	2 x 0.25 - 1 L Glass	1:1 HCl or H_2SO_4		125 - 500 mL Jar	28 Days / 28 Days
TRACE ORGANICS	Alcohols	2 x 40 mL Glass Vials		Zero Headspace	125 - 500 mL Jar	7 Days / 7 Days
	Alkanolamines (MEA, DEA, DIPA)	250 mL Amber Glass			125 - 500 mL Jar	7 Days / 14 Days
	AOX	40 - 250 mL Amber Glass	1:3 Nitric Acid (HNO_3) to pH<2		125 - 500 mL Jar	6 months [15] / 28 Days
	C1 - C5 Gases	3 x 40 mL Blue Septa Vials	Sodium Bisulfate [4]	Zero Headspace	NA	14 Days / NA
	Dioxins and Furans, PBDE and PBB	2 x 1 L Amber Glass			125 - 500 mL Jar	Unlimited / Unlimited
	Formaldehyde/Aldehydes	2 x 40 mL Amber Glass Vials [2]	Ammonium Chloride+Copper Sulfate	Zero Headspace	125 - 500 mL Jar	7 Days / 5 Days
	Glycols	2 x 40 mL Amber Glass Vials			125 - 500 mL Jar	7 Days / 14 Days
	Hormones and Steroids	1 L Plastic			NA	28 Days / NA
	Naphthenic Acids	2 x 250 mL Amber Glass			125 - 500 mL Jar	14 Days / 14 Days
	Nitroaromatics and Nitrosamines (Explosives)	1 L Amber Glass			125 - 500 mL Jar	7 Days / 14 Days
	Nonylphenol & Ethoxylates, Bisphenol A (BPA)	1 L Amber Glass			125 - 500 mL Jar	28 Days / 14 Days
	PCB	2 x 0.25 - 1 L Amber Glass			125 - 500 mL Jar	Unlimited / Unlimited [16]
	Perfluorinated Chemicals (PFCs), PFOS, PFOA	1 L Plastic (PTFE free)			125-250 mL Jar or Bag	14 Days / 14 Days
	Phenolics, Chlorinated and Non-Chlorinated	2 x 0.5 - 1 L Amber Glass	Ascorbic Acid & Sodium Bisulfate [4]		125 - 500 mL Jar	14 Days / 14 Days
	Priority Pollutants (EPA 625 list) or SVOCs	2 x 1 L Amber Glass			125 - 500 mL Jar	7 Days / 14 Days [17]
	Resin Acids & Fatty Acids	2 x 0.5 - 1 L Amber Glass	Ascorbic Acid & NaOH		125 mL Jar	14 Days / 14 Days
	Sulfolane	2 x 0.5 - 1 L Amber Glass	Sodium Bisulfate [4]		125 mL Jar	14 Days / 14 Days
PESTICIDE RESIDUES	Carbamate Pesticides	1 L Amber Glass	Use Sodium Thiosulfate if chlorinated		125 - 500 mL Jar	7 Days / 14 Days
	Glyphosate / AMPA	1 L Plastic	Use Sodium Thiosulfate if chlorinated		125 - 500 mL Jar	14 Days / 14 Days
	Herbicides, Acidic	2 x 1 L Amber Glass	Sodium Bisulfate [4]		125 - 500 mL Jar	14 Days / 14 Days
	Organochlorine or Organophosphate Pesticides	2 x 1 L Amber Glass			125 - 500 mL Jar	7 Days / 14 Days
	Soil Sterilant Scan	1 L Amber Glass			250 g Poly Bag	7 Days / 14 Days
Micro						
MICRO-BIOLOGICAL	Coliforms-Fecal, Total, E-coli & HPC	100 - 300 mL Sterilized Plastic	Sodium Thiosulfate		500 mL Sterilized Jar	24-48 Hours [18] (24 - HPC) / NA
	Microtox	1 L Amber Glass			125-250 mL Jar or Bag	3 Days / 3 Days

1. Additional analyses with the same container type and preservation may be possible - consult the lab for details.

2. The number of 40 mL glass vials required (2 or 3) for BTEX & VOC varies by lab based on instrumentation. Consult the lab for details.

3. Please fill to the top of the marked line on the 60 mL Amber Glass Vials.

4. Use Sodium Thiosulfate instead of Sodium Bisulfate if sample is chlorinated.

5. OMoE has no preservation requirement for PAHs. 2 X 250 mL Amber Glass required for BC MoE and OMoE. For AB and SK and for Alkylated PAHs, ALS requires 2 x 1 L Amber Glass.

6. Soil sampling options depend on soil location and condition of soil. Field Methanol Kit consists of one 5g TerraCore® sampler or similar sampling device, two pre-weighed 40 mL glass vials with methanol preservative and a 125mL soil jar for moisture. Hermetic sampler kit consists of a T-handle, two 5g hermetic samplers and a 125mL soil jar for moisture. One additional parameter, such as metals or hydrocarbons can also be obtained from the 125mL soil jar.

7. 4 Days hold time for Electrical Conductivity only as per Ontario MISA.

8. 3 Days hold time for British Columbia as per BC Ministry of Environment (BC MoE), 4 Days hold time as per OMoE.

9. pH in water should be taken in the field as per BC MoE, 4 Days hold time for Ontario MISA and 28 Days hold time for OMoE. 30 Days hold time as received for pH in soil as per OMoE. One year hold time once soil is dried.

10. 3 Days hold time as per BC MoE, 5 Days hold time as per Ontario MISA and 7 Days hold time as per OMoE.

11. 3 Days hold time until received. Unlimited hold time once soil is dried.

12. 3 Days hold time as per BC MoE and 7 Days hold time as per OMoE.

13. 40 Days hold time as per BC MoE and 14 Days hold time as per OMoE. Recovered methanol extract from laboratory has a 40 Days hold time as per OMoE.

14. 40 Days hold time as per OMoE.

15 14 Days hold time as per Ontario MISA.

16. 14 Days hold time as per OMoE. Consult lab for container size if limited sample volume is available.

17. 14 Days hold time for water and 60 Days hold time for soil as per OMoE. Ontario labs require 2 x 250 mL Amber Glass + 500 mL Amber Glass.

18. 30 Hours hold time as per BC Drinking Water Regulation and 48 Hours as per OMoE.

19. Bromate alone does not require preservative.

20. 15 Minutes hold time as per OMoE - Field measurement by meter is recommended.

21. Use 1:1 Sulfuric Acid (H_2SO_4) for preservation of marine or brackish samples.

GeoPro Consulting Limited (Richmond Hill)
ATTN: Sarena Medina
40 Vogell Road
Unit 22
Richmond Hill ON L4B 3N6

Date Received: 19-OCT-18
Report Date: 29-OCT-18 14:01 (MT)
Version: FINAL

Client Phone: 905-237-8336

Certificate of Analysis

Lab Work Order #: L2184462

Project P.O. #:	NOT SUBMITTED
Job Reference:	18-2178G
C of C Numbers:	18-2178G-20181018
Legal Site Desc:	MISSISSAUGA, ONTARIO

Rick Hawthorne
Account Manager

Summary of Guideline Exceedances

ALS ID	Client ID	Grouping	Analyte	Result	Guideline Limit	Unit
Ontario Regulation 153/04 - April 15, 2011 Standards - T1-Soil-Res/Park/Inst/Ind/Com/Commu Property Use						
L2184462-3	BH 1-5, SS2 + SS3	Volatile Organic Compounds	Trichloroethylene	0.075	0.05	ug/g
L2184462-4	BH 1-8, SS2 + SS3A	Volatile Organic Compounds	Trichloroethylene	0.058	0.05	ug/g
L2184462-5	BH 1-11, SS2	Volatile Organic Compounds	Trichloroethylene	0.084	0.05	ug/g
		Hydrocarbons	F2 (C10-C16)	12	10	ug/g
			F4 (C34-C50)	505	120	ug/g
			F4G-SG (GHH-Silica)	1290	120	ug/g
L2184462-7	BH 1-16, SS2 + SS3	Volatile Organic Compounds	Trichloroethylene	0.081	0.05	ug/g

ANALYTICAL REPORT

Physical Tests - SOIL

Analyte	Unit	Guide Limits #1	Guide Limits #2	Lab ID	Sample Date	Sample ID
				L2184462-1	17-OCT-18	BH 1-1, SS2 + SS3
				L2184462-2	17-OCT-18	BH 1-4, SS2 + SS3
				L2184462-3	17-OCT-18	BH 1-5, SS2 + SS3
				L2184462-4	17-OCT-18	BH 1-8, SS2 + SS3A
				L2184462-5	17-OCT-18	BH 1-11, SS2
				L2184462-6	17-OCT-18	BH 1-14, SS2 + SS3
				L2184462-7	17-OCT-18	BH 1-16, SS2 + SS3
				L2184462-8	17-OCT-18	BH 1-23, SS2
				L2184462-9	04-OCT-18	BH 2-1, SS2
% Moisture	%	-	-	10.3	9.10	14.1	9.51	12.3	15.1	11.0	7.70	14.0

Guide Limit #1: T1-Soil-Res/Park/Inst/Ind/Com/Commu Property Use

Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

Physical Tests - SOIL

Analyte	Unit	Guide Limits #1	Guide Limits #2	Lab ID	Sample Date	Sample ID				
				L2184462-10	L2184462-11	L2184462-12	L2184462-13	L2184462-14	L2184462-15	L2184462-16
				04-OCT-18	04-OCT-18	04-OCT-18	10-OCT-18	11-OCT-18	12-OCT-18	13-OCT-18
				BH 2-3, SS1A	BH 2-5, SS1A	BH 2-7, SS1 + SS2	BH 2-9, SS2 + SS3	BH 2-13, SS2 +SS3	BH 2-15, SS2 + SS3	BH 2-17, SS1
% Moisture	%	-	-	7.96	10.0	17.6	8.33	8.81	8.44	12.2

Guide Limit #1: T1-Soil-Res/Park/Inst/Ind/Com/Commu Property Use

Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

Volatile Organic Compounds - SOIL

		Lab ID	L2184462-1	L2184462-2	L2184462-3	L2184462-4	L2184462-5	L2184462-6	L2184462-7	L2184462-8	L2184462-9
		Sample Date	17-OCT-18	17-OCT-18	17-OCT-18	17-OCT-18	17-OCT-18	17-OCT-18	17-OCT-18	17-OCT-18	04-OCT-18
		Sample ID	BH 1-1, SS2 + SS3	BH 1-4, SS2 + SS3	BH 1-5, SS2 + SS3	BH 1-8, SS2 + SS3A	BH 1-11, SS2	BH 1-14, SS2 + SS3	BH 1-16, SS2 + SS3	BH 1-23, SS2	BH 2-1, SS2
		Guide Limits									
Analyte	Unit	#1	#2								
Acetone	ug/g	0.5	-	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Benzene	ug/g	0.02	-	<0.0068	<0.0068	<0.0068	<0.0068	<0.0068	<0.0068	<0.0068	<0.0068	<0.0068
Bromodichloromethane	ug/g	0.05	-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Bromoform	ug/g	0.05	-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Bromomethane	ug/g	0.05	-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Carbon tetrachloride	ug/g	0.05	-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Chlorobenzene	ug/g	0.05	-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Dibromochloromethane	ug/g	0.05	-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Chloroform	ug/g	0.05	-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
1,2-Dibromoethane	ug/g	0.05	-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
1,2-Dichlorobenzene	ug/g	0.05	-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
1,3-Dichlorobenzene	ug/g	0.05	-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
1,4-Dichlorobenzene	ug/g	0.05	-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Dichlorodifluoromethane	ug/g	0.05	-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
1,1-Dichloroethane	ug/g	0.05	-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
1,2-Dichloroethane	ug/g	0.05	-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
1,1-Dichloroethylene	ug/g	0.05	-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
cis-1,2-Dichloroethylene	ug/g	0.05	-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
trans-1,2-Dichloroethylene	ug/g	0.05	-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Methylene Chloride	ug/g	0.05	-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
1,2-Dichloropropane	ug/g	0.05	-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
cis-1,3-Dichloropropene	ug/g	-	-	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030
trans-1,3-Dichloropropene	ug/g	-	-	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030
1,3-Dichloropropene (cis & trans)	ug/g	0.05	-	<0.042	<0.042	<0.042	<0.042	<0.042	<0.042	<0.042	<0.042	<0.042
Ethylbenzene	ug/g	0.05	-	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018
n-Hexane	ug/g	0.05	-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Methyl Ethyl Ketone	ug/g	0.5	-	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Methyl Isobutyl Ketone	ug/g	0.5	-	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
MTBE	ug/g	0.05	-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Styrene	ug/g	0.05	-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050

Guide Limit #1: T1-Soil-Res/Park/Inst/Ind/Com/Commu Property Use

Volatile Organic Compounds - SOIL

Analyte	Unit	Guide Limits #1	Guide Limits #2	Lab ID	L2184462-10	L2184462-11	L2184462-12	L2184462-13	L2184462-14	L2184462-15	L2184462-16
				Sample Date	04-OCT-18	04-OCT-18	04-OCT-18	10-OCT-18	11-OCT-18	12-OCT-18	13-OCT-18
				Sample ID	BH 2-3, SS1A	BH 2-5, SS1A	BH 2-7, SS1 + SS2	BH 2-9, SS2 + SS3	BH 2-13, SS2 +SS3	BH 2-15, SS2 + SS3	BH 2-17, SS1
Acetone	ug/g	0.5	-		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Benzene	ug/g	0.02	-		<0.0068	<0.0068	<0.0068	<0.0068	<0.0068	<0.0068	<0.0068
Bromodichloromethane	ug/g	0.05	-		<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Bromoform	ug/g	0.05	-		<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Bromomethane	ug/g	0.05	-		<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Carbon tetrachloride	ug/g	0.05	-		<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Chlorobenzene	ug/g	0.05	-		<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Dibromochloromethane	ug/g	0.05	-		<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Chloroform	ug/g	0.05	-		<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
1,2-Dibromoethane	ug/g	0.05	-		<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
1,2-Dichlorobenzene	ug/g	0.05	-		<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
1,3-Dichlorobenzene	ug/g	0.05	-		<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
1,4-Dichlorobenzene	ug/g	0.05	-		<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Dichlorodifluoromethane	ug/g	0.05	-		<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
1,1-Dichloroethane	ug/g	0.05	-		<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
1,2-Dichloroethane	ug/g	0.05	-		<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
1,1-Dichloroethylene	ug/g	0.05	-		<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
cis-1,2-Dichloroethylene	ug/g	0.05	-		<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
trans-1,2-Dichloroethylene	ug/g	0.05	-		<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Methylene Chloride	ug/g	0.05	-		<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
1,2-Dichloropropane	ug/g	0.05	-		<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
cis-1,3-Dichloropropene	ug/g	-	-		<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030
trans-1,3-Dichloropropene	ug/g	-	-		<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030
1,3-Dichloropropene (cis & trans)	ug/g	0.05	-		<0.042	<0.042	<0.042	<0.042	<0.042	<0.042	<0.042
Ethylbenzene	ug/g	0.05	-		<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018
n-Hexane	ug/g	0.05	-		<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Methyl Ethyl Ketone	ug/g	0.5	-		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Methyl Isobutyl Ketone	ug/g	0.5	-		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
MTBE	ug/g	0.05	-		<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Styrene	ug/g	0.05	-		<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050

Guide Limit #1: T1-Soil-Res/Park/Inst/Ind/Com/Commu Property Use

Volatile Organic Compounds - SOIL

Analyte	Unit	Guide Limits #1	Guide Limits #2	Lab ID	L2184462-1	L2184462-2	L2184462-3	L2184462-4	L2184462-5	L2184462-6	L2184462-7	L2184462-8	L2184462-9
				Sample Date	17-OCT-18	17-OCT-18	17-OCT-18	17-OCT-18	17-OCT-18	17-OCT-18	17-OCT-18	17-OCT-18	04-OCT-18
				Sample ID	BH 1-1, SS2 + SS3	BH 1-4, SS2 + SS3	BH 1-5, SS2 + SS3	BH 1-8, SS2 + SS3A	BH 1-11, SS2	BH 1-14, SS2 + SS3	BH 1-16, SS2 + SS3	BH 1-23, SS2	BH 2-1, SS2
1,1,1,2-Tetrachloroethane	ug/g	0.05	-		<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
1,1,2,2-Tetrachloroethane	ug/g	0.05	-		<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Tetrachloroethylene	ug/g	0.05	-		<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Toluene	ug/g	0.2	-		<0.080	<0.080	<0.080	<0.080	<0.080	<0.080	<0.080	<0.080	<0.080
1,1,1-Trichloroethane	ug/g	0.05	-		<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
1,1,2-Trichloroethane	ug/g	0.05	-		<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Trichloroethylene	ug/g	0.05	-		0.035	0.016	0.075	0.058	0.084	0.042	0.081	0.027	0.014
Trichlorofluoromethane	ug/g	0.25	-		<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Vinyl chloride	ug/g	0.02	-		<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
o-Xylene	ug/g	-	-		<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
m+p-Xylenes	ug/g	-	-		<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030
Xylenes (Total)	ug/g	0.05	-		<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Surrogate: 4-Bromofluorobenzene	%	-	-		106.9	99.4	101.5	97.6	102.4	98.4	113.2	103.6	98.8
Surrogate: 1,4-Difluorobenzene	%	-	-		113.6	106.2	109.0	106.4	109.0	105.3	114.9	108.9	104.9

Guide Limit #1: T1-Soil-Res/Park/Inst/Ind/Com/Commu Property Use

Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

Volatile Organic Compounds - SOIL

Analyte	Unit	Guide Limits #1	Guide Limits #2	Lab ID	L2184462-10	L2184462-11	L2184462-12	L2184462-13	L2184462-14	L2184462-15	L2184462-16
				Sample Date	04-OCT-18	04-OCT-18	04-OCT-18	10-OCT-18	11-OCT-18	12-OCT-18	13-OCT-18
				Sample ID	BH 2-3, SS1A	BH 2-5, SS1A	BH 2-7, SS1 + SS2	BH 2-9, SS2 + SS3	BH 2-13, SS2 +SS3	BH 2-15, SS2 + SS3	BH 2-17, SS1
1,1,1,2-Tetrachloroethane	ug/g	0.05	-		<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
1,1,2,2-Tetrachloroethane	ug/g	0.05	-		<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Tetrachloroethylene	ug/g	0.05	-		<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Toluene	ug/g	0.2	-		<0.080	<0.080	<0.080	<0.080	<0.080	<0.080	<0.080
1,1,1-Trichloroethane	ug/g	0.05	-		<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
1,1,2-Trichloroethane	ug/g	0.05	-		<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Trichloroethylene	ug/g	0.05	-		<0.010	0.012	0.030	<0.010	<0.010	<0.010	0.011
Trichlorofluoromethane	ug/g	0.25	-		<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Vinyl chloride	ug/g	0.02	-		<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
o-Xylene	ug/g	-	-		<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
m+p-Xylenes	ug/g	-	-		<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030
Xylenes (Total)	ug/g	0.05	-		<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Surrogate: 4-Bromofluorobenzene	%	-	-		92.1	97.9	103.8	105.9	101.0	99.0	108.6
Surrogate: 1,4-Difluorobenzene	%	-	-		97.3	108.2	114.0	114.2	107.6	106.8	109.1

Guide Limit #1: T1-Soil-Res/Park/Inst/Ind/Com/Commu Property Use

Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

Hydrocarbons - SOIL

Analyte	Unit	Guide Limits #1	Guide Limits #2	Lab ID	L2184462-1	L2184462-2	L2184462-3	L2184462-4	L2184462-5	L2184462-6	L2184462-7	L2184462-8	L2184462-9
				Sample Date	17-OCT-18	17-OCT-18	17-OCT-18	17-OCT-18	17-OCT-18	17-OCT-18	17-OCT-18	17-OCT-18	04-OCT-18
				Sample ID	BH 1-1, SS2 + SS3	BH 1-4, SS2 + SS3	BH 1-5, SS2 + SS3	BH 1-8, SS2 + SS3A	BH 1-11, SS2	BH 1-14, SS2 + SS3	BH 1-16, SS2 + SS3	BH 1-23, SS2	BH 2-1, SS2
F1 (C6-C10)	ug/g	25	-		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
F1-BTEX	ug/g	25	-		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
F2 (C10-C16)	ug/g	10	-		<10	<10	<10	<10	12	<10	<10	<10	<10
F3 (C16-C34)	ug/g	240	-		71	<50	<50	<50	169	<50	<50	<50	<50
F4 (C34-C50)	ug/g	120	-		93	<50	<50	<50	505	59	<50	<50	<50
F4G-SG (GHH-Silica)	ug/g	120	-						1290				
Total Hydrocarbons (C6-C50)	ug/g	-	-		164	<72	<72	<72	686	<72	<72	<72	<72
Chrom. to baseline at nC50		-	-		YES	YES	YES	YES	NO	YES	YES	YES	YES
Surrogate: 2-Bromobenzotrifluoride	%	-	-		92.0	89.4	88.4	95.4	88.3	90.0	102.3	93.1	98.8
Surrogate: 3,4-Dichlorotoluene	%	-	-		74.4	78.7	85.2	80.3	77.9	81.9	88.0	85.8	78.4

Guide Limit #1: T1-Soil-Res/Park/Inst/Ind/Com/Commu Property Use

Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

Hydrocarbons - SOIL

			Lab ID	L2184462-10	L2184462-11	L2184462-12	L2184462-13	L2184462-14	L2184462-15	L2184462-16
			Sample Date	04-OCT-18	04-OCT-18	04-OCT-18	10-OCT-18	11-OCT-18	12-OCT-18	13-OCT-18
			Sample ID	BH 2-3, SS1A	BH 2-5, SS1A	BH 2-7, SS1 + SS2	BH 2-9, SS2 + SS3	BH 2-13, SS2 +SS3	BH 2-15, SS2 + SS3	BH 2-17, SS1
		Guide Limits								
Analyte	Unit	#1	#2							
F1 (C6-C10)	ug/g	25	-	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
F1-BTEX	ug/g	25	-	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
F2 (C10-C16)	ug/g	10	-	<10	<10	<10	<10	<10	<10	<10
F3 (C16-C34)	ug/g	240	-	<50	<50	<50	<50	<50	<50	<50
F4 (C34-C50)	ug/g	120	-	<50	<50	<50	<50	<50	<50	<50
F4G-SG (GHH-Silica)	ug/g	120	-							
Total Hydrocarbons (C6-C50)	ug/g	-	-	<72	<72	<72	<72	<72	<72	<72
Chrom. to baseline at nC50		-	-	YES	YES	YES	YES	YES	YES	YES
Surrogate: 2-Bromobenzotrifluoride	%	-	-	97.0	94.9	97.1	95.2	99.8	96.8	102.1
Surrogate: 3,4-Dichlorotoluene	%	-	-	75.0	78.6	75.6	80.0	86.3	75.4	81.9

Guide Limit #1: T1-Soil-Res/Park/Inst/Ind/Com/Commu Property Use

Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

Reference Information

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Method Reference**
F1-F4-511-CALC-WT	Soil	F1-F4 Hydrocarbon Calculated Parameters	CCME CWS-PHC, Pub #1310, Dec 2001-S

Analytical methods used for analysis of CCME Petroleum Hydrocarbons have been validated and comply with the Reference Method for the CWS PHC.

Hydrocarbon results are expressed on a dry weight basis.

In cases where results for both F4 and F4G are reported, the greater of the two results must be used in any application of the CWS PHC guidelines and the gravimetric heavy hydrocarbons cannot be added to the C6 to C50 hydrocarbons.
In samples where BTEX and F1 were analyzed , F1-BTEX represents a value where the sum of Benzene, Toluene, Ethylbenzene and total Xylenes has been subtracted from F1.

In samples where PAHs, F2 and F3 were analyzed, F2-Naphth represents the result where Naphthalene has been subtracted from F2. F3-PAH represents a result where the sum of Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Dibenzo(a,h)anthracene, Fluoranthene, Indeno(1,2,3-cd)pyrene, Phenanthrene, and Pyrene has been subtracted from F3.

Unless otherwise qualified, the following quality control criteria have been met for the F1 hydrocarbon range:
1. All extraction and analysis holding times were met.
2. Instrument performance showing response factors for C6 and C10 within 30% of the response factor for toluene.
3. Linearity of gasoline response within 15% throughout the calibration range.

Unless otherwise qualified, the following quality control criteria have been met for the F2-F4 hydrocarbon ranges:
1. All extraction and analysis holding times were met.
2. Instrument performance showing C10, C16 and C34 response factors within 10% of their average.
3. Instrument performance showing the C50 response factor within 30% of the average of the C10, C16 and C34 response factors.
4. Linearity of diesel or motor oil response within 15% throughout the calibration range.

F1-HS-511-WT	Soil	F1-O.Reg 153/04 (July 2011)	E3398/CCME TIER 1-HS

Fraction F1 is determined by extracting a soil or sediment sample as received with methanol, then analyzing by headspace-GC/FID.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011), unless a subset of the Analytical Test Group (ATG) has been requested (the Protocol states that all analytes in an ATG must be reported).

F2-F4-511-WT	Soil	F2-F4-O.Reg 153/04 (July 2011)	CCME Tier 1

Petroleum Hydrocarbons (F2-F4 fractions) are extracted from soil with 1:1 hexane:acetone using a rotary extractor. Extracts are treated with silica gel to remove polar organic interferences. F2, F3, & F4 are analyzed by GC-FID. F4G-sg is analyzed gravimetrically.

Notes:
1. F2 (C10-C16): Sum of all hydrocarbons that elute between nC10 and nC16.
2. F3 (C16-C34): Sum of all hydrocarbons that elute between nC16 and nC34.
3. F4 (C34-C50): Sum of all hydrocarbons that elute between nC34 and nC50.
4. F4G: Gravimetric Heavy Hydrocarbons
5. F4G-sg: Gravimetric Heavy Hydrocarbons (F4G) after silica gel treatment.
6. Where both F4 (C34-C50) and F4G-sg are reported for a sample, the larger of the two values is used for comparison against the relevant CCME guideline for F4.
7. F4G-sg cannot be added to the C6 to C50 hydrocarbon results to obtain an estimate of total extractable hydrocarbons.
8. This method is validated for use.
9. Data from analysis of validation and quality control samples is available upon request.
10. Reported results are expressed as milligrams per dry kilogram, unless otherwise indicated.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011), unless a subset of the Analytical Test Group (ATG) has been requested (the Protocol states that all analytes in an ATG must be reported).

F4G-ADD-511-WT	Soil	F4G SG-O.Reg 153/04 (July 2011)	MOE DECPH-E3398/CCME TIER 1

F4G, gravimetric analysis, is determined if the chromatogram does not return to baseline at or before C50. A soil sample is extracted with a solvent mix, the solvent is evaporated and the weight of

Reference Information

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Method Reference**
		the residue is determined.	
		Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).	
MOISTURE-WT	Soil	% Moisture	Gravimetric: Oven Dried
VOC-1,3-DCP-CALC-WT	Soil	Regulation 153 VOCs	SW8260B/SW8270C
VOC-511-HS-WT	Soil	VOC-O.Reg 153/04 (July 2011)	SW846 8260 (511)
		Soil and sediment samples are extracted in methanol and analyzed by headspace-GC/MS.	
		Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011), unless a subset of the Analytical Test Group (ATG) has been requested (the Protocol states that all analytes in an ATG must be reported).	
XYLENES-SUM-CALC-WT	Soil	Sum of Xylene Isomer Concentrations	CALCULATION
		Total xylenes represents the sum of o-xylene and m&p-xylene.	

**ALS test methods may incorporate modifications from specified reference methods to improve performance.

Chain of Custody Numbers:

18-2178G-20181018

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Application of guidelines is provided "as is" without warranty of any kind, either expressed or implied, including, but not limited to, fitness for a particular purpose, or non-infringement. ALS assumes no responsibility for errors or omissions in the information. Guideline limits are not adjusted for the hardness, pH or temperature of the sample (the most conservative values are used). Measurement uncertainty is not applied to test results prior to comparison with specified criteria values.

Quality Control Report

Workorder: L2184462 Report Date: 29-OCT-18

Client: GeoPro Consulting Limited (Richmond Hill)
40 Vogell Road Unit 22
Richmond Hill ON L4B 3N6
Contact: Sarena Medina

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
F1-HS-511-WT	**Soil**							
Batch R4292068								
WG2910094-4 DUP		**WG2910094-3**						
F1 (C6-C10)		<5.0	<5.0	RPD-NA	ug/g	N/A	30	24-OCT-18
WG2910094-2 LCS								
F1 (C6-C10)			107.1		%		80-120	22-OCT-18
WG2910094-1 MB								
F1 (C6-C10)			<5.0		ug/g		5	22-OCT-18
Surrogate: 3,4-Dichlorotoluene			113.1		%		60-140	22-OCT-18
WG2910094-6 MS		**L2184417-9**						
F1 (C6-C10)			85.4		%		60-140	24-OCT-18
Batch R4295525								
WG2910080-4 DUP		**WG2910080-3**						
F1 (C6-C10)		<5.0	<5.0	RPD-NA	ug/g	N/A	30	25-OCT-18
WG2910080-2 LCS								
F1 (C6-C10)			115.2		%		80-120	24-OCT-18
WG2910080-1 MB								
F1 (C6-C10)			<5.0		ug/g		5	24-OCT-18
Surrogate: 3,4-Dichlorotoluene			108.6		%		60-140	24-OCT-18
WG2910080-6 MS		**L2184462-8**						
F1 (C6-C10)			100.5		%		60-140	24-OCT-18
Batch R4295749								
WG2910071-4 DUP		**WG2910071-3**						
F1 (C6-C10)		<5.0	<5.0	RPD-NA	ug/g	N/A	30	24-OCT-18
WG2910071-2 LCS								
F1 (C6-C10)			104.5		%		80-120	24-OCT-18
WG2910071-1 MB								
F1 (C6-C10)			<5.0		ug/g		5	24-OCT-18
Surrogate: 3,4-Dichlorotoluene			98.9		%		60-140	24-OCT-18
WG2910071-6 MS		**L2184462-12**						
F1 (C6-C10)			92.8		%		60-140	24-OCT-18
Batch R4298848								
WG2910044-4 DUP		**WG2910044-3**						
F1 (C6-C10)		<5.0	<5.0	RPD-NA	ug/g	N/A	30	25-OCT-18
WG2910044-2 LCS								
F1 (C6-C10)			102.9		%		80-120	25-OCT-18
WG2910044-1 MB								
F1 (C6-C10)			<5.0		ug/g		5	25-OCT-18
Surrogate: 3,4-Dichlorotoluene			88.1		%		60-140	25-OCT-18
WG2910044-6 MS		**L2184462-4**						

Quality Control Report

Client: GeoPro Consulting Limited (Richmond Hill)
40 Vogell Road Unit 22
Richmond Hill ON L4B 3N6
Contact: Sarena Medina

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
F1-HS-511-WT	**Soil**							
Batch R4298848								
WG2910044-6 MS		**L2184462-4**						
F1 (C6-C10)			120.0		%		60-140	25-OCT-18
F2-F4-511-WT	**Soil**							
Batch R4295673								
WG2909984-3 DUP		**WG2909984-5**						
F2 (C10-C16)		90	53	DUP-H	ug/g	53	30	23-OCT-18
F3 (C16-C34)		<50	<50	RPD-NA	ug/g	N/A	30	23-OCT-18
F4 (C34-C50)		<50	<50	RPD-NA	ug/g	N/A	30	23-OCT-18
WG2909984-2 LCS								
F2 (C10-C16)			113.4		%		80-120	23-OCT-18
F3 (C16-C34)			112.8		%		80-120	23-OCT-18
F4 (C34-C50)			115.4		%		80-120	23-OCT-18
WG2909984-1 MB								
F2 (C10-C16)			<10		ug/g		10	23-OCT-18
F3 (C16-C34)			<50		ug/g		50	23-OCT-18
F4 (C34-C50)			<50		ug/g		50	23-OCT-18
Surrogate: 2-Bromobenzotrifluoride			86.8		%		60-140	23-OCT-18
WG2909984-4 MS		**WG2909984-5**						
F2 (C10-C16)			94.0		%		60-140	23-OCT-18
F3 (C16-C34)			103.7		%		60-140	23-OCT-18
F4 (C34-C50)			107.6		%		60-140	23-OCT-18
Batch R4295745								
WG2910036-3 DUP		**WG2910036-5**						
F2 (C10-C16)		<10	<10	RPD-NA	ug/g	N/A	30	23-OCT-18
F3 (C16-C34)		<50	<50	RPD-NA	ug/g	N/A	30	23-OCT-18
F4 (C34-C50)		<50	<50	RPD-NA	ug/g	N/A	30	23-OCT-18
WG2910036-2 LCS								
F2 (C10-C16)			106.9		%		80-120	23-OCT-18
F3 (C16-C34)			107.1		%		80-120	23-OCT-18
F4 (C34-C50)			110.3		%		80-120	23-OCT-18
WG2910036-1 MB								
F2 (C10-C16)			<10		ug/g		10	23-OCT-18
F3 (C16-C34)			<50		ug/g		50	23-OCT-18
F4 (C34-C50)			<50		ug/g		50	23-OCT-18
Surrogate: 2-Bromobenzotrifluoride			81.9		%		60-140	23-OCT-18

Quality Control Report

Client: GeoPro Consulting Limited (Richmond Hill)
40 Vogell Road Unit 22
Richmond Hill ON L4B 3N6
Contact: Sarena Medina

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
F2-F4-511-WT	**Soil**							
Batch R4295745								
WG2910036-4 MS		**WG2910036-5**						
F2 (C10-C16)			111.4		%		60-140	23-OCT-18
F3 (C16-C34)			111.1		%		60-140	23-OCT-18
F4 (C34-C50)			106.0		%		60-140	23-OCT-18
Batch R4295770								
WG2910076-3 DUP		**WG2910076-5**						
F2 (C10-C16)		<10	<10	RPD-NA	ug/g	N/A	30	23-OCT-18
F3 (C16-C34)		<50	<50	RPD-NA	ug/g	N/A	30	23-OCT-18
F4 (C34-C50)		<50	<50	RPD-NA	ug/g	N/A	30	23-OCT-18
WG2910076-2 LCS								
F2 (C10-C16)			103.8		%		80-120	23-OCT-18
F3 (C16-C34)			104.7		%		80-120	23-OCT-18
F4 (C34-C50)			108.4		%		80-120	23-OCT-18
WG2910076-1 MB								
F2 (C10-C16)			<10		ug/g		10	23-OCT-18
F3 (C16-C34)			<50		ug/g		50	23-OCT-18
F4 (C34-C50)			<50		ug/g		50	23-OCT-18
Surrogate: 2-Bromobenzotrifluoride			92.6		%		60-140	23-OCT-18
WG2910076-4 MS		**WG2910076-5**						
F2 (C10-C16)			97.9		%		60-140	23-OCT-18
F3 (C16-C34)			98.0		%		60-140	23-OCT-18
F4 (C34-C50)			93.2		%		60-140	23-OCT-18
Batch R4298396								
WG2910182-7 DUP		**WG2910182-9**						
F2 (C10-C16)		<10	<10	RPD-NA	ug/g	N/A	30	24-OCT-18
F3 (C16-C34)		<50	<50	RPD-NA	ug/g	N/A	30	24-OCT-18
F4 (C34-C50)		<50	<50	RPD-NA	ug/g	N/A	30	24-OCT-18
WG2910182-6 LCS								
F2 (C10-C16)			110.4		%		80-120	24-OCT-18
F3 (C16-C34)			115.9		%		80-120	24-OCT-18
F4 (C34-C50)			120.9	LCS-H	%		80-120	24-OCT-18
WG2910182-5 MB								
F2 (C10-C16)			<10		ug/g		10	24-OCT-18
F3 (C16-C34)			<50		ug/g		50	24-OCT-18
F4 (C34-C50)			<50		ug/g		50	24-OCT-18
Surrogate: 2-Bromobenzotrifluoride			78.6		%		60-140	24-OCT-18

Quality Control Report

Client: GeoPro Consulting Limited (Richmond Hill)
40 Vogell Road Unit 22
Richmond Hill ON L4B 3N6
Contact: Sarena Medina

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
F2-F4-511-WT	**Soil**							
Batch R4298396								
WG2910182-8 MS		**WG2910182-9**						
F2 (C10-C16)			113.8		%		60-140	24-OCT-18
F3 (C16-C34)			115.5		%		60-140	24-OCT-18
F4 (C34-C50)			120.7		%		60-140	24-OCT-18
Batch R4301270								
WG2914509-3 DUP		**WG2914509-5**						
F2 (C10-C16)		<10	<10	RPD-NA	ug/g	N/A	30	26-OCT-18
F3 (C16-C34)		<50	<50	RPD-NA	ug/g	N/A	30	26-OCT-18
F4 (C34-C50)		<50	<50	RPD-NA	ug/g	N/A	30	26-OCT-18
WG2914509-2 LCS								
F2 (C10-C16)			94.7		%		80-120	26-OCT-18
F3 (C16-C34)			91.9		%		80-120	26-OCT-18
F4 (C34-C50)			98.0		%		80-120	26-OCT-18
WG2914509-1 MB								
F2 (C10-C16)			<10		ug/g		10	26-OCT-18
F3 (C16-C34)			<50		ug/g		50	26-OCT-18
F4 (C34-C50)			<50		ug/g		50	26-OCT-18
Surrogate: 2-Bromobenzotrifluoride			94.0		%		60-140	26-OCT-18
WG2914509-4 MS		**WG2914509-5**						
F2 (C10-C16)			98.0		%		60-140	26-OCT-18
F3 (C16-C34)			98.2		%		60-140	26-OCT-18
F4 (C34-C50)			105.6		%		60-140	26-OCT-18
F4G-ADD-511-WT	**Soil**							
Batch R4304369								
WG2917039-2 LCS								
F4G-SG (GHH-Silica)			67.0		%		60-140	26-OCT-18
WG2917039-1 MB								
F4G-SG (GHH-Silica)			<250		ug/g		250	26-OCT-18
MOISTURE-WT	**Soil**							
Batch R4292092								
WG2910109-3 DUP		**L2184462-8**						
% Moisture		7.70	7.86		%	2.1	20	23-OCT-18
WG2910109-2 LCS								
% Moisture			101.2		%		90-110	23-OCT-18
WG2910109-1 MB								
% Moisture			<0.10		%		0.1	23-OCT-18

Quality Control Report

Client: GeoPro Consulting Limited (Richmond Hill)
40 Vogell Road Unit 22
Richmond Hill ON L4B 3N6
Contact: Sarena Medina

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MOISTURE-WT	**Soil**							
Batch R4292127								
WG2910055-3 DUP		**L2184387-1**						
% Moisture		14.9	16.7		%	11	20	23-OCT-18
WG2910055-2 LCS								
% Moisture			100.4		%		90-110	23-OCT-18
WG2910055-1 MB								
% Moisture			<0.10		%		0.1	23-OCT-18
VOC-511-HS-WT	**Soil**							
Batch R4292068								
WG2910094-4 DUP		**WG2910094-3**						
1,1,1,2-Tetrachloroethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	24-OCT-18
1,1,2,2-Tetrachloroethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	24-OCT-18
1,1,1-Trichloroethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	24-OCT-18
1,1,2-Trichloroethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	24-OCT-18
1,1-Dichloroethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	24-OCT-18
1,1-Dichloroethylene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	24-OCT-18
1,2-Dibromoethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	24-OCT-18
1,2-Dichlorobenzene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	24-OCT-18
1,2-Dichloroethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	24-OCT-18
1,2-Dichloropropane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	24-OCT-18
1,3-Dichlorobenzene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	24-OCT-18
1,4-Dichlorobenzene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	24-OCT-18
Acetone		<0.50	<0.50	RPD-NA	ug/g	N/A	40	24-OCT-18
Benzene		<0.0068	<0.0068	RPD-NA	ug/g	N/A	40	24-OCT-18
Bromodichloromethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	24-OCT-18
Bromoform		<0.050	<0.050	RPD-NA	ug/g	N/A	40	24-OCT-18
Bromomethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	24-OCT-18
Carbon tetrachloride		<0.050	<0.050	RPD-NA	ug/g	N/A	40	24-OCT-18
Chlorobenzene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	24-OCT-18
Chloroform		<0.050	<0.050	RPD-NA	ug/g	N/A	40	24-OCT-18
cis-1,2-Dichloroethylene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	24-OCT-18
cis-1,3-Dichloropropene		<0.030	<0.030	RPD-NA	ug/g	N/A	40	24-OCT-18
Dibromochloromethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	24-OCT-18
Dichlorodifluoromethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	24-OCT-18
Ethylbenzene		<0.018	<0.018	RPD-NA	ug/g	N/A	40	24-OCT-18

Quality Control Report

Client: GeoPro Consulting Limited (Richmond Hill)
40 Vogell Road Unit 22
Richmond Hill ON L4B 3N6
Contact: Sarena Medina

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-511-HS-WT	**Soil**							
Batch R4292068								
WG2910094-4 DUP		**WG2910094-3**						
n-Hexane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	24-OCT-18
Methylene Chloride		<0.050	<0.050	RPD-NA	ug/g	N/A	40	24-OCT-18
MTBE		<0.050	<0.050	RPD-NA	ug/g	N/A	40	24-OCT-18
m+p-Xylenes		<0.030	<0.030	RPD-NA	ug/g	N/A	40	24-OCT-18
Methyl Ethyl Ketone		<0.50	<0.50	RPD-NA	ug/g	N/A	40	24-OCT-18
Methyl Isobutyl Ketone		<0.50	<0.50	RPD-NA	ug/g	N/A	40	24-OCT-18
o-Xylene		<0.020	<0.020	RPD-NA	ug/g	N/A	40	24-OCT-18
Styrene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	24-OCT-18
Tetrachloroethylene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	24-OCT-18
Toluene		<0.080	<0.080	RPD-NA	ug/g	N/A	40	24-OCT-18
trans-1,2-Dichloroethylene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	24-OCT-18
trans-1,3-Dichloropropene		<0.030	<0.030	RPD-NA	ug/g	N/A	40	24-OCT-18
Trichloroethylene		<0.010	<0.010	RPD-NA	ug/g	N/A	40	24-OCT-18
Trichlorofluoromethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	24-OCT-18
Vinyl chloride		<0.020	<0.020	RPD-NA	ug/g	N/A	40	24-OCT-18
WG2910094-2 LCS								
1,1,1,2-Tetrachloroethane			109.7		%		60-130	22-OCT-18
1,1,2,2-Tetrachloroethane			117.4		%		60-130	22-OCT-18
1,1,1-Trichloroethane			112.8		%		60-130	22-OCT-18
1,1,2-Trichloroethane			113.0		%		60-130	22-OCT-18
1,1-Dichloroethane			116.1		%		60-130	22-OCT-18
1,1-Dichloroethylene			109.5		%		60-130	22-OCT-18
1,2-Dibromoethane			111.1		%		70-130	22-OCT-18
1,2-Dichlorobenzene			117.3		%		70-130	22-OCT-18
1,2-Dichloroethane			116.4		%		60-130	22-OCT-18
1,2-Dichloropropane			117.7		%		70-130	22-OCT-18
1,3-Dichlorobenzene			115.5		%		70-130	22-OCT-18
1,4-Dichlorobenzene			117.9		%		70-130	22-OCT-18
Acetone			109.0		%		60-140	22-OCT-18
Benzene			118.3		%		70-130	22-OCT-18
Bromodichloromethane			115.8		%		50-140	22-OCT-18
Bromoform			101.9		%		70-130	22-OCT-18
Bromomethane			106.3		%		50-140	22-OCT-18

Quality Control Report

Client: GeoPro Consulting Limited (Richmond Hill)
40 Vogell Road Unit 22
Richmond Hill ON L4B 3N6
Contact: Sarena Medina

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-511-HS-WT	**Soil**							
Batch R4292068								
WG2910094-2 LCS								
Carbon tetrachloride			110.4		%		70-130	22-OCT-18
Chlorobenzene			116.4		%		70-130	22-OCT-18
Chloroform			116.9		%		70-130	22-OCT-18
cis-1,2-Dichloroethylene			117.1		%		70-130	22-OCT-18
cis-1,3-Dichloropropene			121.1		%		70-130	22-OCT-18
Dibromochloromethane			106.7		%		60-130	22-OCT-18
Dichlorodifluoromethane			63.7		%		50-140	22-OCT-18
Ethylbenzene			116.7		%		70-130	22-OCT-18
n-Hexane			89.4		%		70-130	22-OCT-18
Methylene Chloride			114.4		%		70-130	22-OCT-18
MTBE			117.8		%		70-130	22-OCT-18
m+p-Xylenes			116.4		%		70-130	22-OCT-18
Methyl Ethyl Ketone			117.0		%		60-140	22-OCT-18
Methyl Isobutyl Ketone			117.4		%		60-140	22-OCT-18
o-Xylene			113.4		%		70-130	22-OCT-18
Styrene			117.8		%		70-130	22-OCT-18
Tetrachloroethylene			112.7		%		60-130	22-OCT-18
Toluene			115.6		%		70-130	22-OCT-18
trans-1,2-Dichloroethylene			119.2		%		60-130	22-OCT-18
trans-1,3-Dichloropropene			116.8		%		70-130	22-OCT-18
Trichloroethylene			119.2		%		60-130	22-OCT-18
Trichlorofluoromethane			107.7		%		50-140	22-OCT-18
Vinyl chloride			102.5		%		60-140	22-OCT-18
WG2910094-1 MB								
1,1,1,2-Tetrachloroethane			<0.050		ug/g		0.05	22-OCT-18
1,1,2,2-Tetrachloroethane			<0.050		ug/g		0.05	22-OCT-18
1,1,1-Trichloroethane			<0.050		ug/g		0.05	22-OCT-18
1,1,2-Trichloroethane			<0.050		ug/g		0.05	22-OCT-18
1,1-Dichloroethane			<0.050		ug/g		0.05	22-OCT-18
1,1-Dichloroethylene			<0.050		ug/g		0.05	22-OCT-18
1,2-Dibromoethane			<0.050		ug/g		0.05	22-OCT-18
1,2-Dichlorobenzene			<0.050		ug/g		0.05	22-OCT-18
1,2-Dichloroethane			<0.050		ug/g		0.05	22-OCT-18
1,2-Dichloropropane			<0.050		ug/g		0.05	22-OCT-18

Quality Control Report

Client: GeoPro Consulting Limited (Richmond Hill)
40 Vogell Road Unit 22
Richmond Hill ON L4B 3N6
Contact: Sarena Medina

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-511-HS-WT	**Soil**							
Batch R4292068								
WG2910094-1 MB								
1,3-Dichlorobenzene			<0.050		ug/g		0.05	22-OCT-18
1,4-Dichlorobenzene			<0.050		ug/g		0.05	22-OCT-18
Acetone			<0.50		ug/g		0.5	22-OCT-18
Benzene			<0.0068		ug/g		0.0068	22-OCT-18
Bromodichloromethane			<0.050		ug/g		0.05	22-OCT-18
Bromoform			<0.050		ug/g		0.05	22-OCT-18
Bromomethane			<0.050		ug/g		0.05	22-OCT-18
Carbon tetrachloride			<0.050		ug/g		0.05	22-OCT-18
Chlorobenzene			<0.050		ug/g		0.05	22-OCT-18
Chloroform			<0.050		ug/g		0.05	22-OCT-18
cis-1,2-Dichloroethylene			<0.050		ug/g		0.05	22-OCT-18
cis-1,3-Dichloropropene			<0.030		ug/g		0.03	22-OCT-18
Dibromochloromethane			<0.050		ug/g		0.05	22-OCT-18
Dichlorodifluoromethane			<0.050		ug/g		0.05	22-OCT-18
Ethylbenzene			<0.018		ug/g		0.018	22-OCT-18
n-Hexane			<0.050		ug/g		0.05	22-OCT-18
Methylene Chloride			<0.050		ug/g		0.05	22-OCT-18
MTBE			<0.050		ug/g		0.05	22-OCT-18
m+p-Xylenes			<0.030		ug/g		0.03	22-OCT-18
Methyl Ethyl Ketone			<0.50		ug/g		0.5	22-OCT-18
Methyl Isobutyl Ketone			<0.50		ug/g		0.5	22-OCT-18
o-Xylene			<0.020		ug/g		0.02	22-OCT-18
Styrene			<0.050		ug/g		0.05	22-OCT-18
Tetrachloroethylene			<0.050		ug/g		0.05	22-OCT-18
Toluene			<0.080		ug/g		0.08	22-OCT-18
trans-1,2-Dichloroethylene			<0.050		ug/g		0.05	22-OCT-18
trans-1,3-Dichloropropene			<0.030		ug/g		0.03	22-OCT-18
Trichloroethylene			<0.010		ug/g		0.01	22-OCT-18
Trichlorofluoromethane			<0.050		ug/g		0.05	22-OCT-18
Vinyl chloride			<0.020		ug/g		0.02	22-OCT-18
Surrogate: 1,4-Difluorobenzene			132.1		%		50-140	22-OCT-18
Surrogate: 4-Bromofluorobenzene			124.8		%		50-140	22-OCT-18
WG2910094-5 MS		**L2184417-5**						
1,1,1,2-Tetrachloroethane			106.1		%		50-140	24-OCT-18

Quality Control Report

Client: GeoPro Consulting Limited (Richmond Hill)
40 Vogell Road Unit 22
Richmond Hill ON L4B 3N6
Contact: Sarena Medina

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-511-HS-WT	**Soil**							
Batch R4292068								
WG2910094-5 MS		**L2184417-5**						
1,1,2,2-Tetrachloroethane			107.8		%		50-140	24-OCT-18
1,1,1-Trichloroethane			105.4		%		50-140	24-OCT-18
1,1,2-Trichloroethane			113.3		%		50-140	24-OCT-18
1,1-Dichloroethane			105.0		%		50-140	24-OCT-18
1,1-Dichloroethylene			96.1		%		50-140	24-OCT-18
1,2-Dibromoethane			114.5		%		50-140	24-OCT-18
1,2-Dichlorobenzene			107.3		%		50-140	24-OCT-18
1,2-Dichloroethane			114.9		%		50-140	24-OCT-18
1,2-Dichloropropane			108.0		%		50-140	24-OCT-18
1,3-Dichlorobenzene			104.7		%		50-140	24-OCT-18
1,4-Dichlorobenzene			106.6		%		50-140	24-OCT-18
Acetone			126.8		%		50-140	24-OCT-18
Benzene			106.0		%		50-140	24-OCT-18
Bromodichloromethane			110.6		%		50-140	24-OCT-18
Bromoform			109.1		%		50-140	24-OCT-18
Bromomethane			97.4		%		50-140	24-OCT-18
Carbon tetrachloride			101.8		%		50-140	24-OCT-18
Chlorobenzene			107.1		%		50-140	24-OCT-18
Chloroform			108.2		%		50-140	24-OCT-18
cis-1,2-Dichloroethylene			105.4		%		50-140	24-OCT-18
cis-1,3-Dichloropropene			105.8		%		50-140	24-OCT-18
Dibromochloromethane			109.6		%		50-140	24-OCT-18
Dichlorodifluoromethane			76.1		%		50-140	24-OCT-18
Ethylbenzene			103.9		%		50-140	24-OCT-18
n-Hexane			80.4		%		50-140	24-OCT-18
Methylene Chloride			109.3		%		50-140	24-OCT-18
MTBE			105.8		%		50-140	24-OCT-18
m+p-Xylenes			102.3		%		50-140	24-OCT-18
Methyl Ethyl Ketone			113.6		%		50-140	24-OCT-18
Methyl Isobutyl Ketone			112.2		%		50-140	24-OCT-18
o-Xylene			101.8		%		50-140	24-OCT-18
Styrene			103.4		%		50-140	24-OCT-18
Tetrachloroethylene			101.3		%		50-140	24-OCT-18

Quality Control Report

Client: GeoPro Consulting Limited (Richmond Hill)
40 Vogell Road Unit 22
Richmond Hill ON L4B 3N6
Contact: Sarena Medina

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-511-HS-WT	**Soil**							
Batch R4292068								
WG2910094-5 MS		**L2184417-5**						
Toluene			103.3		%		50-140	24-OCT-18
trans-1,2-Dichloroethylene			101.3		%		50-140	24-OCT-18
trans-1,3-Dichloropropene			106.7		%		50-140	24-OCT-18
Trichloroethylene			105.9		%		50-140	24-OCT-18
Trichlorofluoromethane			104.0		%		50-140	24-OCT-18
Vinyl chloride			98.9		%		50-140	24-OCT-18
Batch R4295525								
WG2910080-4 DUP		**WG2910080-3**						
1,1,1,2-Tetrachloroethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	25-OCT-18
1,1,2,2-Tetrachloroethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	25-OCT-18
1,1,1-Trichloroethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	25-OCT-18
1,1,2-Trichloroethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	25-OCT-18
1,1-Dichloroethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	25-OCT-18
1,1-Dichloroethylene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	25-OCT-18
1,2-Dibromoethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	25-OCT-18
1,2-Dichlorobenzene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	25-OCT-18
1,2-Dichloroethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	25-OCT-18
1,2-Dichloropropane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	25-OCT-18
1,3-Dichlorobenzene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	25-OCT-18
1,4-Dichlorobenzene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	25-OCT-18
Acetone		<0.50	<0.50	RPD-NA	ug/g	N/A	40	25-OCT-18
Benzene		<0.0068	<0.0068	RPD-NA	ug/g	N/A	40	25-OCT-18
Bromodichloromethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	25-OCT-18
Bromoform		<0.050	<0.050	RPD-NA	ug/g	N/A	40	25-OCT-18
Bromomethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	25-OCT-18
Carbon tetrachloride		<0.050	<0.050	RPD-NA	ug/g	N/A	40	25-OCT-18
Chlorobenzene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	25-OCT-18
Chloroform		<0.050	<0.050	RPD-NA	ug/g	N/A	40	25-OCT-18
cis-1,2-Dichloroethylene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	25-OCT-18
cis-1,3-Dichloropropene		<0.030	<0.030	RPD-NA	ug/g	N/A	40	25-OCT-18
Dibromochloromethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	25-OCT-18
Dichlorodifluoromethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	25-OCT-18
Ethylbenzene		<0.018	<0.018	RPD-NA	ug/g	N/A	40	25-OCT-18

Quality Control Report

Client: GeoPro Consulting Limited (Richmond Hill)
40 Vogell Road Unit 22
Richmond Hill ON L4B 3N6
Contact: Sarena Medina

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-511-HS-WT	**Soil**							
Batch R4295525								
WG2910080-4 DUP		**WG2910080-3**						
n-Hexane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	25-OCT-18
Methylene Chloride		<0.050	<0.050	RPD-NA	ug/g	N/A	40	25-OCT-18
MTBE		<0.050	<0.050	RPD-NA	ug/g	N/A	40	25-OCT-18
m+p-Xylenes		<0.030	<0.030	RPD-NA	ug/g	N/A	40	25-OCT-18
Methyl Ethyl Ketone		<0.50	<0.50	RPD-NA	ug/g	N/A	40	25-OCT-18
Methyl Isobutyl Ketone		<0.50	<0.50	RPD-NA	ug/g	N/A	40	25-OCT-18
o-Xylene		<0.020	<0.020	RPD-NA	ug/g	N/A	40	25-OCT-18
Styrene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	25-OCT-18
Tetrachloroethylene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	25-OCT-18
Toluene		<0.080	<0.080	RPD-NA	ug/g	N/A	40	25-OCT-18
trans-1,2-Dichloroethylene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	25-OCT-18
trans-1,3-Dichloropropene		<0.030	<0.030	RPD-NA	ug/g	N/A	40	25-OCT-18
Trichloroethylene		0.081	0.082		ug/g	1.2	40	25-OCT-18
Trichlorofluoromethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	25-OCT-18
Vinyl chloride		<0.020	<0.020	RPD-NA	ug/g	N/A	40	25-OCT-18
WG2910080-2 LCS								
1,1,1,2-Tetrachloroethane			113.3		%		60-130	24-OCT-18
1,1,2,2-Tetrachloroethane			86.0		%		60-130	24-OCT-18
1,1,1-Trichloroethane			114.0		%		60-130	24-OCT-18
1,1,2-Trichloroethane			116.4		%		60-130	24-OCT-18
1,1-Dichloroethane			114.7		%		60-130	24-OCT-18
1,1-Dichloroethylene			104.6		%		60-130	24-OCT-18
1,2-Dibromoethane			126.0		%		70-130	24-OCT-18
1,2-Dichlorobenzene			116.5		%		70-130	24-OCT-18
1,2-Dichloroethane			122.8		%		60-130	24-OCT-18
1,2-Dichloropropane			115.5		%		70-130	24-OCT-18
1,3-Dichlorobenzene			114.1		%		70-130	24-OCT-18
1,4-Dichlorobenzene			116.8		%		70-130	24-OCT-18
Acetone			125.9		%		60-140	24-OCT-18
Benzene			115.5		%		70-130	24-OCT-18
Bromodichloromethane			123.7		%		50-140	24-OCT-18
Bromoform			126.1		%		70-130	24-OCT-18
Bromomethane			108.7		%		50-140	24-OCT-18

Quality Control Report

Client: GeoPro Consulting Limited (Richmond Hill)
40 Vogell Road Unit 22
Richmond Hill ON L4B 3N6
Contact: Sarena Medina

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-511-HS-WT	**Soil**							
Batch R4295525								
WG2910080-2 LCS								
Carbon tetrachloride			113.0		%		70-130	24-OCT-18
Chlorobenzene			112.1		%		70-130	24-OCT-18
Chloroform			119.7		%		70-130	24-OCT-18
cis-1,2-Dichloroethylene			115.7		%		70-130	24-OCT-18
cis-1,3-Dichloropropene			122.3		%		70-130	24-OCT-18
Dibromochloromethane			118.5		%		60-130	24-OCT-18
Dichlorodifluoromethane			62.6		%		50-140	24-OCT-18
Ethylbenzene			103.1		%		70-130	24-OCT-18
n-Hexane			84.6		%		70-130	24-OCT-18
Methylene Chloride			120.4		%		70-130	24-OCT-18
MTBE			112.1		%		70-130	24-OCT-18
m+p-Xylenes			105.5		%		70-130	24-OCT-18
Methyl Ethyl Ketone			138.0		%		60-140	24-OCT-18
Methyl Isobutyl Ketone			124.7		%		60-140	24-OCT-18
o-Xylene			103.5		%		70-130	24-OCT-18
Styrene			109.1		%		70-130	24-OCT-18
Tetrachloroethylene			109.5		%		60-130	24-OCT-18
Toluene			104.7		%		70-130	24-OCT-18
trans-1,2-Dichloroethylene			113.7		%		60-130	24-OCT-18
trans-1,3-Dichloropropene			113.9		%		70-130	24-OCT-18
Trichloroethylene			121.9		%		60-130	24-OCT-18
Trichlorofluoromethane			108.0		%		50-140	24-OCT-18
Vinyl chloride			96.5		%		60-140	24-OCT-18
WG2910080-1 MB								
1,1,1,2-Tetrachloroethane			<0.050		ug/g		0.05	24-OCT-18
1,1,2,2-Tetrachloroethane			<0.050		ug/g		0.05	24-OCT-18
1,1,1-Trichloroethane			<0.050		ug/g		0.05	24-OCT-18
1,1,2-Trichloroethane			<0.050		ug/g		0.05	24-OCT-18
1,1-Dichloroethane			<0.050		ug/g		0.05	24-OCT-18
1,1-Dichloroethylene			<0.050		ug/g		0.05	24-OCT-18
1,2-Dibromoethane			<0.050		ug/g		0.05	24-OCT-18
1,2-Dichlorobenzene			<0.050		ug/g		0.05	24-OCT-18
1,2-Dichloroethane			<0.050		ug/g		0.05	24-OCT-18
1,2-Dichloropropane			<0.050		ug/g		0.05	24-OCT-18

Quality Control Report

Client: GeoPro Consulting Limited (Richmond Hill)
40 Vogell Road Unit 22
Richmond Hill ON L4B 3N6
Contact: Sarena Medina

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-511-HS-WT	**Soil**							
Batch R4295525								
WG2910080-1 MB								
1,3-Dichlorobenzene			<0.050		ug/g		0.05	24-OCT-18
1,4-Dichlorobenzene			<0.050		ug/g		0.05	24-OCT-18
Acetone			<0.50		ug/g		0.5	24-OCT-18
Benzene			<0.0068		ug/g		0.0068	24-OCT-18
Bromodichloromethane			<0.050		ug/g		0.05	24-OCT-18
Bromoform			<0.050		ug/g		0.05	24-OCT-18
Bromomethane			<0.050		ug/g		0.05	24-OCT-18
Carbon tetrachloride			<0.050		ug/g		0.05	24-OCT-18
Chlorobenzene			<0.050		ug/g		0.05	24-OCT-18
Chloroform			<0.050		ug/g		0.05	24-OCT-18
cis-1,2-Dichloroethylene			<0.050		ug/g		0.05	24-OCT-18
cis-1,3-Dichloropropene			<0.030		ug/g		0.03	24-OCT-18
Dibromochloromethane			<0.050		ug/g		0.05	24-OCT-18
Dichlorodifluoromethane			<0.050		ug/g		0.05	24-OCT-18
Ethylbenzene			<0.018		ug/g		0.018	24-OCT-18
n-Hexane			<0.050		ug/g		0.05	24-OCT-18
Methylene Chloride			<0.050		ug/g		0.05	24-OCT-18
MTBE			<0.050		ug/g		0.05	24-OCT-18
m+p-Xylenes			<0.030		ug/g		0.03	24-OCT-18
Methyl Ethyl Ketone			<0.50		ug/g		0.5	24-OCT-18
Methyl Isobutyl Ketone			<0.50		ug/g		0.5	24-OCT-18
o-Xylene			<0.020		ug/g		0.02	24-OCT-18
Styrene			<0.050		ug/g		0.05	24-OCT-18
Tetrachloroethylene			<0.050		ug/g		0.05	24-OCT-18
Toluene			<0.080		ug/g		0.08	24-OCT-18
trans-1,2-Dichloroethylene			<0.050		ug/g		0.05	24-OCT-18
trans-1,3-Dichloropropene			<0.030		ug/g		0.03	24-OCT-18
Trichloroethylene			<0.010		ug/g		0.01	24-OCT-18
Trichlorofluoromethane			<0.050		ug/g		0.05	24-OCT-18
Vinyl chloride			<0.020		ug/g		0.02	24-OCT-18
Surrogate: 1,4-Difluorobenzene			124.1		%		50-140	24-OCT-18
Surrogate: 4-Bromofluorobenzene			118.2		%		50-140	24-OCT-18
WG2910080-5 MS		**L2184462-7**						
1,1,1,2-Tetrachloroethane			105.5		%		50-140	25-OCT-18

Quality Control Report

Client: GeoPro Consulting Limited (Richmond Hill)
40 Vogell Road Unit 22
Richmond Hill ON L4B 3N6
Contact: Sarena Medina

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-511-HS-WT	**Soil**							
Batch R4295525								
WG2910080-5 MS		**L2184462-7**						
1,1,2,2-Tetrachloroethane			106.4		%		50-140	25-OCT-18
1,1,1-Trichloroethane			99.5		%		50-140	25-OCT-18
1,1,2-Trichloroethane			109.1		%		50-140	25-OCT-18
1,1-Dichloroethane			92.9		%		50-140	25-OCT-18
1,1-Dichloroethylene			89.5		%		50-140	25-OCT-18
1,2-Dibromoethane			106.4		%		50-140	25-OCT-18
1,2-Dichlorobenzene			103.5		%		50-140	25-OCT-18
1,2-Dichloroethane			101.1		%		50-140	25-OCT-18
1,2-Dichloropropane			106.2		%		50-140	25-OCT-18
1,3-Dichlorobenzene			102.2		%		50-140	25-OCT-18
1,4-Dichlorobenzene			101.0		%		50-140	25-OCT-18
Acetone			105.5		%		50-140	25-OCT-18
Benzene			103.7		%		50-140	25-OCT-18
Bromodichloromethane			104.8		%		50-140	25-OCT-18
Bromoform			104.8		%		50-140	25-OCT-18
Bromomethane			89.1		%		50-140	25-OCT-18
Carbon tetrachloride			96.7		%		50-140	25-OCT-18
Chlorobenzene			105.1		%		50-140	25-OCT-18
Chloroform			102.8		%		50-140	25-OCT-18
cis-1,2-Dichloroethylene			102.1		%		50-140	25-OCT-18
cis-1,3-Dichloropropene			106.1		%		50-140	25-OCT-18
Dibromochloromethane			103.6		%		50-140	25-OCT-18
Dichlorodifluoromethane			52.4		%		50-140	25-OCT-18
Ethylbenzene			110.8		%		50-140	25-OCT-18
n-Hexane			75.0		%		50-140	25-OCT-18
Methylene Chloride			100.1		%		50-140	25-OCT-18
MTBE			103.8		%		50-140	25-OCT-18
m+p-Xylenes			109.2		%		50-140	25-OCT-18
Methyl Ethyl Ketone			114.3		%		50-140	25-OCT-18
Methyl Isobutyl Ketone			114.8		%		50-140	25-OCT-18
o-Xylene			108.8		%		50-140	25-OCT-18
Styrene			108.3		%		50-140	25-OCT-18
Tetrachloroethylene			103.4		%		50-140	25-OCT-18

Quality Control Report

Client: GeoPro Consulting Limited (Richmond Hill)
40 Vogell Road Unit 22
Richmond Hill ON L4B 3N6
Contact: Sarena Medina

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-511-HS-WT	**Soil**							
Batch R4295525								
WG2910080-5 MS		**L2184462-7**						
Toluene			104.6		%		50-140	25-OCT-18
trans-1,2-Dichloroethylene			100.1		%		50-140	25-OCT-18
trans-1,3-Dichloropropene			109.1		%		50-140	25-OCT-18
Trichloroethylene			105.6		%		50-140	25-OCT-18
Trichlorofluoromethane			93.7		%		50-140	25-OCT-18
Vinyl chloride			88.6		%		50-140	25-OCT-18
Batch R4295749								
WG2910071-4 DUP		**WG2910071-3**						
1,1,1,2-Tetrachloroethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	24-OCT-18
1,1,2,2-Tetrachloroethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	24-OCT-18
1,1,1-Trichloroethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	24-OCT-18
1,1,2-Trichloroethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	24-OCT-18
1,1-Dichloroethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	24-OCT-18
1,1-Dichloroethylene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	24-OCT-18
1,2-Dibromoethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	24-OCT-18
1,2-Dichlorobenzene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	24-OCT-18
1,2-Dichloroethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	24-OCT-18
1,2-Dichloropropane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	24-OCT-18
1,3-Dichlorobenzene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	24-OCT-18
1,4-Dichlorobenzene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	24-OCT-18
Acetone		<0.50	<0.50	RPD-NA	ug/g	N/A	40	24-OCT-18
Benzene		<0.0068	<0.0068	RPD-NA	ug/g	N/A	40	24-OCT-18
Bromodichloromethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	24-OCT-18
Bromoform		<0.050	<0.050	RPD-NA	ug/g	N/A	40	24-OCT-18
Bromomethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	24-OCT-18
Carbon tetrachloride		<0.050	<0.050	RPD-NA	ug/g	N/A	40	24-OCT-18
Chlorobenzene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	24-OCT-18
Chloroform		<0.050	<0.050	RPD-NA	ug/g	N/A	40	24-OCT-18
cis-1,2-Dichloroethylene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	24-OCT-18
cis-1,3-Dichloropropene		<0.030	<0.030	RPD-NA	ug/g	N/A	40	24-OCT-18
Dibromochloromethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	24-OCT-18
Dichlorodifluoromethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	24-OCT-18
Ethylbenzene		<0.018	<0.018	RPD-NA	ug/g	N/A	40	24-OCT-18

Quality Control Report

Client: GeoPro Consulting Limited (Richmond Hill)
40 Vogell Road Unit 22
Richmond Hill ON L4B 3N6
Contact: Sarena Medina

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-511-HS-WT	**Soil**							
Batch R4295749								
WG2910071-4 DUP		**WG2910071-3**						
n-Hexane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	24-OCT-18
Methylene Chloride		<0.050	<0.050	RPD-NA	ug/g	N/A	40	24-OCT-18
MTBE		<0.050	<0.050	RPD-NA	ug/g	N/A	40	24-OCT-18
m+p-Xylenes		<0.030	<0.030	RPD-NA	ug/g	N/A	40	24-OCT-18
Methyl Ethyl Ketone		<0.50	<0.50	RPD-NA	ug/g	N/A	40	24-OCT-18
Methyl Isobutyl Ketone		<0.50	<0.50	RPD-NA	ug/g	N/A	40	24-OCT-18
o-Xylene		<0.020	<0.020	RPD-NA	ug/g	N/A	40	24-OCT-18
Styrene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	24-OCT-18
Tetrachloroethylene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	24-OCT-18
Toluene		<0.080	<0.080	RPD-NA	ug/g	N/A	40	24-OCT-18
trans-1,2-Dichloroethylene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	24-OCT-18
trans-1,3-Dichloropropene		<0.030	<0.030	RPD-NA	ug/g	N/A	40	24-OCT-18
Trichloroethylene		<0.010	<0.010	RPD-NA	ug/g	N/A	40	24-OCT-18
Trichlorofluoromethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	24-OCT-18
Vinyl chloride		<0.020	<0.020	RPD-NA	ug/g	N/A	40	24-OCT-18
WG2910071-2 LCS								
1,1,1,2-Tetrachloroethane			103.6		%		60-130	24-OCT-18
1,1,2,2-Tetrachloroethane			104.6		%		60-130	24-OCT-18
1,1,1-Trichloroethane			108.2		%		60-130	24-OCT-18
1,1,2-Trichloroethane			104.9		%		60-130	24-OCT-18
1,1-Dichloroethane			109.2		%		60-130	24-OCT-18
1,1-Dichloroethylene			105.2		%		60-130	24-OCT-18
1,2-Dibromoethane			102.4		%		70-130	24-OCT-18
1,2-Dichlorobenzene			111.3		%		70-130	24-OCT-18
1,2-Dichloroethane			108.4		%		60-130	24-OCT-18
1,2-Dichloropropane			109.3		%		70-130	24-OCT-18
1,3-Dichlorobenzene			110.5		%		70-130	24-OCT-18
1,4-Dichlorobenzene			112.5		%		70-130	24-OCT-18
Acetone			100.1		%		60-140	24-OCT-18
Benzene			111.7		%		70-130	24-OCT-18
Bromodichloromethane			108.4		%		50-140	24-OCT-18
Bromoform			92.0		%		70-130	24-OCT-18
Bromomethane			100.5		%		50-140	24-OCT-18

Quality Control Report

Client: GeoPro Consulting Limited (Richmond Hill)
40 Vogell Road Unit 22
Richmond Hill ON L4B 3N6
Contact: Sarena Medina

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-511-HS-WT	**Soil**							
Batch R4295749								
WG2910071-2 LCS								
Carbon tetrachloride			106.4		%		70-130	24-OCT-18
Chlorobenzene			110.0		%		70-130	24-OCT-18
Chloroform			110.4		%		70-130	24-OCT-18
cis-1,2-Dichloroethylene			109.8		%		70-130	24-OCT-18
cis-1,3-Dichloropropene			110.7		%		70-130	24-OCT-18
Dibromochloromethane			99.7		%		60-130	24-OCT-18
Dichlorodifluoromethane			64.3		%		50-140	24-OCT-18
Ethylbenzene			112.2		%		70-130	24-OCT-18
n-Hexane			85.9		%		70-130	24-OCT-18
Methylene Chloride			106.4		%		70-130	24-OCT-18
MTBE			110.3		%		70-130	24-OCT-18
m+p-Xylenes			111.7		%		70-130	24-OCT-18
Methyl Ethyl Ketone			102.9		%		60-140	24-OCT-18
Methyl Isobutyl Ketone			102.4		%		60-140	24-OCT-18
o-Xylene			108.0		%		70-130	24-OCT-18
Styrene			110.6		%		70-130	24-OCT-18
Tetrachloroethylene			108.7		%		60-130	24-OCT-18
Toluene			110.7		%		70-130	24-OCT-18
trans-1,2-Dichloroethylene			113.5		%		60-130	24-OCT-18
trans-1,3-Dichloropropene			108.1		%		70-130	24-OCT-18
Trichloroethylene			112.5		%		60-130	24-OCT-18
Trichlorofluoromethane			105.2		%		50-140	24-OCT-18
Vinyl chloride			98.9		%		60-140	24-OCT-18
WG2910071-1 MB								
1,1,1,2-Tetrachloroethane			<0.050		ug/g		0.05	24-OCT-18
1,1,2,2-Tetrachloroethane			<0.050		ug/g		0.05	24-OCT-18
1,1,1-Trichloroethane			<0.050		ug/g		0.05	24-OCT-18
1,1,2-Trichloroethane			<0.050		ug/g		0.05	24-OCT-18
1,1-Dichloroethane			<0.050		ug/g		0.05	24-OCT-18
1,1-Dichloroethylene			<0.050		ug/g		0.05	24-OCT-18
1,2-Dibromoethane			<0.050		ug/g		0.05	24-OCT-18
1,2-Dichlorobenzene			<0.050		ug/g		0.05	24-OCT-18
1,2-Dichloroethane			<0.050		ug/g		0.05	24-OCT-18
1,2-Dichloropropane			<0.050		ug/g		0.05	24-OCT-18

Quality Control Report

Client: GeoPro Consulting Limited (Richmond Hill)
40 Vogell Road Unit 22
Richmond Hill ON L4B 3N6
Contact: Sarena Medina

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-511-HS-WT	**Soil**							
Batch R4295749								
WG2910071-1 MB								
1,3-Dichlorobenzene			<0.050		ug/g		0.05	24-OCT-18
1,4-Dichlorobenzene			<0.050		ug/g		0.05	24-OCT-18
Acetone			<0.50		ug/g		0.5	24-OCT-18
Benzene			<0.0068		ug/g		0.0068	24-OCT-18
Bromodichloromethane			<0.050		ug/g		0.05	24-OCT-18
Bromoform			<0.050		ug/g		0.05	24-OCT-18
Bromomethane			<0.050		ug/g		0.05	24-OCT-18
Carbon tetrachloride			<0.050		ug/g		0.05	24-OCT-18
Chlorobenzene			<0.050		ug/g		0.05	24-OCT-18
Chloroform			<0.050		ug/g		0.05	24-OCT-18
cis-1,2-Dichloroethylene			<0.050		ug/g		0.05	24-OCT-18
cis-1,3-Dichloropropene			<0.030		ug/g		0.03	24-OCT-18
Dibromochloromethane			<0.050		ug/g		0.05	24-OCT-18
Dichlorodifluoromethane			<0.050		ug/g		0.05	24-OCT-18
Ethylbenzene			<0.018		ug/g		0.018	24-OCT-18
n-Hexane			<0.050		ug/g		0.05	24-OCT-18
Methylene Chloride			<0.050		ug/g		0.05	24-OCT-18
MTBE			<0.050		ug/g		0.05	24-OCT-18
m+p-Xylenes			<0.030		ug/g		0.03	24-OCT-18
Methyl Ethyl Ketone			<0.50		ug/g		0.5	24-OCT-18
Methyl Isobutyl Ketone			<0.50		ug/g		0.5	24-OCT-18
o-Xylene			<0.020		ug/g		0.02	24-OCT-18
Styrene			<0.050		ug/g		0.05	24-OCT-18
Tetrachloroethylene			<0.050		ug/g		0.05	24-OCT-18
Toluene			<0.080		ug/g		0.08	24-OCT-18
trans-1,2-Dichloroethylene			<0.050		ug/g		0.05	24-OCT-18
trans-1,3-Dichloropropene			<0.030		ug/g		0.03	24-OCT-18
Trichloroethylene			<0.010		ug/g		0.01	24-OCT-18
Trichlorofluoromethane			<0.050		ug/g		0.05	24-OCT-18
Vinyl chloride			<0.020		ug/g		0.02	24-OCT-18
Surrogate: 1,4-Difluorobenzene			122.4		%		50-140	24-OCT-18
Surrogate: 4-Bromofluorobenzene			113.9		%		50-140	24-OCT-18
WG2910071-5 MS		**L2184462-15**						
1,1,1,2-Tetrachloroethane			109.1		%		50-140	24-OCT-18

Quality Control Report

Client: GeoPro Consulting Limited (Richmond Hill)
40 Vogell Road Unit 22
Richmond Hill ON L4B 3N6
Contact: Sarena Medina

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-511-HS-WT	**Soil**							
Batch R4295749								
WG2910071-5 MS		**L2184462-15**						
1,1,2,2-Tetrachloroethane			102.1		%		50-140	24-OCT-18
1,1,1-Trichloroethane			116.4		%		50-140	24-OCT-18
1,1,2-Trichloroethane			104.7		%		50-140	24-OCT-18
1,1-Dichloroethane			114.1		%		50-140	24-OCT-18
1,1-Dichloroethylene			112.3		%		50-140	24-OCT-18
1,2-Dibromoethane			101.4		%		50-140	24-OCT-18
1,2-Dichlorobenzene			116.5		%		50-140	24-OCT-18
1,2-Dichloroethane			104.8		%		50-140	24-OCT-18
1,2-Dichloropropane			111.4		%		50-140	24-OCT-18
1,3-Dichlorobenzene			115.9		%		50-140	24-OCT-18
1,4-Dichlorobenzene			117.0		%		50-140	24-OCT-18
Acetone			103.9		%		50-140	24-OCT-18
Benzene			117.1		%		50-140	24-OCT-18
Bromodichloromethane			109.8		%		50-140	24-OCT-18
Bromoform			92.1		%		50-140	24-OCT-18
Bromomethane			101.5		%		50-140	24-OCT-18
Carbon tetrachloride			115.4		%		50-140	24-OCT-18
Chlorobenzene			114.6		%		50-140	24-OCT-18
Chloroform			115.1		%		50-140	24-OCT-18
cis-1,2-Dichloroethylene			113.7		%		50-140	24-OCT-18
cis-1,3-Dichloropropene			100.5		%		50-140	24-OCT-18
Dibromochloromethane			101.4		%		50-140	24-OCT-18
Dichlorodifluoromethane			71.8		%		50-140	24-OCT-18
Ethylbenzene			119.5		%		50-140	24-OCT-18
n-Hexane			94.7		%		50-140	24-OCT-18
Methylene Chloride			109.1		%		50-140	24-OCT-18
MTBE			115.5		%		50-140	24-OCT-18
m+p-Xylenes			118.2		%		50-140	24-OCT-18
Methyl Ethyl Ketone			93.0		%		50-140	24-OCT-18
Methyl Isobutyl Ketone			93.7		%		50-140	24-OCT-18
o-Xylene			114.1		%		50-140	24-OCT-18
Styrene			113.3		%		50-140	24-OCT-18
Tetrachloroethylene			116.8		%		50-140	24-OCT-18

Quality Control Report

Workorder: L2184462 Report Date: 29-OCT-18

Client: GeoPro Consulting Limited (Richmond Hill)
40 Vogell Road Unit 22
Richmond Hill ON L4B 3N6
Contact: Sarena Medina

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-511-HS-WT	**Soil**							
Batch R4295749								
WG2910071-5 MS		**L2184462-15**						
Toluene			118.2		%		50-140	24-OCT-18
trans-1,2-Dichloroethylene			115.5		%		50-140	24-OCT-18
trans-1,3-Dichloropropene			95.7		%		50-140	24-OCT-18
Trichloroethylene			118.7		%		50-140	24-OCT-18
Trichlorofluoromethane			115.9		%		50-140	24-OCT-18
Vinyl chloride			105.5		%		50-140	24-OCT-18
Batch R4298848								
WG2910044-4 DUP		**WG2910044-3**						
1,1,1,2-Tetrachloroethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	25-OCT-18
1,1,2,2-Tetrachloroethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	25-OCT-18
1,1,1-Trichloroethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	25-OCT-18
1,1,2-Trichloroethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	25-OCT-18
1,1-Dichloroethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	25-OCT-18
1,1-Dichloroethylene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	25-OCT-18
1,2-Dibromoethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	25-OCT-18
1,2-Dichlorobenzene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	25-OCT-18
1,2-Dichloroethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	25-OCT-18
1,2-Dichloropropane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	25-OCT-18
1,3-Dichlorobenzene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	25-OCT-18
1,4-Dichlorobenzene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	25-OCT-18
Acetone		<0.50	<0.50	RPD-NA	ug/g	N/A	40	25-OCT-18
Benzene		<0.0068	<0.0068	RPD-NA	ug/g	N/A	40	25-OCT-18
Bromodichloromethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	25-OCT-18
Bromoform		<0.050	<0.050	RPD-NA	ug/g	N/A	40	25-OCT-18
Bromomethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	25-OCT-18
Carbon tetrachloride		<0.050	<0.050	RPD-NA	ug/g	N/A	40	25-OCT-18
Chlorobenzene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	25-OCT-18
Chloroform		<0.050	<0.050	RPD-NA	ug/g	N/A	40	25-OCT-18
cis-1,2-Dichloroethylene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	25-OCT-18
cis-1,3-Dichloropropene		<0.030	<0.030	RPD-NA	ug/g	N/A	40	25-OCT-18
Dibromochloromethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	25-OCT-18
Dichlorodifluoromethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	25-OCT-18
Ethylbenzene		<0.018	<0.018	RPD-NA	ug/g	N/A	40	25-OCT-18

Quality Control Report

Client: GeoPro Consulting Limited (Richmond Hill)
40 Vogell Road Unit 22
Richmond Hill ON L4B 3N6
Contact: Sarena Medina

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-511-HS-WT	**Soil**							
Batch R4298848								
WG2910044-4 DUP		**WG2910044-3**						
n-Hexane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	25-OCT-18
Methylene Chloride		<0.050	<0.050	RPD-NA	ug/g	N/A	40	25-OCT-18
MTBE		<0.050	<0.050	RPD-NA	ug/g	N/A	40	25-OCT-18
m+p-Xylenes		<0.030	<0.030	RPD-NA	ug/g	N/A	40	25-OCT-18
Methyl Ethyl Ketone		<0.50	<0.50	RPD-NA	ug/g	N/A	40	25-OCT-18
Methyl Isobutyl Ketone		<0.50	<0.50	RPD-NA	ug/g	N/A	40	25-OCT-18
o-Xylene		<0.020	<0.020	RPD-NA	ug/g	N/A	40	25-OCT-18
Styrene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	25-OCT-18
Tetrachloroethylene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	25-OCT-18
Toluene		<0.080	<0.080	RPD-NA	ug/g	N/A	40	25-OCT-18
trans-1,2-Dichloroethylene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	25-OCT-18
trans-1,3-Dichloropropene		<0.030	<0.030	RPD-NA	ug/g	N/A	40	25-OCT-18
Trichloroethylene		0.084	0.088		ug/g	5.0	40	25-OCT-18
Trichlorofluoromethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	25-OCT-18
Vinyl chloride		<0.020	<0.020	RPD-NA	ug/g	N/A	40	25-OCT-18
WG2910044-2 LCS								
1,1,1,2-Tetrachloroethane			111.6		%		60-130	25-OCT-18
1,1,2,2-Tetrachloroethane			107.3		%		60-130	25-OCT-18
1,1,1-Trichloroethane			116.7		%		60-130	25-OCT-18
1,1,2-Trichloroethane			107.8		%		60-130	25-OCT-18
1,1-Dichloroethane			114.3		%		60-130	25-OCT-18
1,1-Dichloroethylene			112.1		%		60-130	25-OCT-18
1,2-Dibromoethane			104.1		%		70-130	25-OCT-18
1,2-Dichlorobenzene			120.7		%		70-130	25-OCT-18
1,2-Dichloroethane			107.4		%		60-130	25-OCT-18
1,2-Dichloropropane			113.2		%		70-130	25-OCT-18
1,3-Dichlorobenzene			120.9		%		70-130	25-OCT-18
1,4-Dichlorobenzene			122.8		%		70-130	25-OCT-18
Acetone			91.4		%		60-140	25-OCT-18
Benzene			118.7		%		70-130	25-OCT-18
Bromodichloromethane			112.3		%		50-140	25-OCT-18
Bromoform			95.7		%		70-130	25-OCT-18
Bromomethane			107.2		%		50-140	25-OCT-18

Quality Control Report

Client: GeoPro Consulting Limited (Richmond Hill)
40 Vogell Road Unit 22
Richmond Hill ON L4B 3N6
Contact: Sarena Medina

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-511-HS-WT	**Soil**							
Batch R4298848								
WG2910044-2 LCS								
Carbon tetrachloride			115.7		%		70-130	25-OCT-18
Chlorobenzene			118.8		%		70-130	25-OCT-18
Chloroform			116.6		%		70-130	25-OCT-18
cis-1,2-Dichloroethylene			117.1		%		70-130	25-OCT-18
cis-1,3-Dichloropropene			115.3		%		70-130	25-OCT-18
Dibromochloromethane			104.3		%		60-130	25-OCT-18
Dichlorodifluoromethane			69.8		%		50-140	25-OCT-18
Ethylbenzene			122.4		%		70-130	25-OCT-18
n-Hexane			93.0		%		70-130	25-OCT-18
Methylene Chloride			111.7		%		70-130	25-OCT-18
MTBE			119.3		%		70-130	25-OCT-18
m+p-Xylenes			121.8		%		70-130	25-OCT-18
Methyl Ethyl Ketone			97.3		%		60-140	25-OCT-18
Methyl Isobutyl Ketone			95.4		%		60-140	25-OCT-18
o-Xylene			117.2		%		70-130	25-OCT-18
Styrene			118.5		%		70-130	25-OCT-18
Tetrachloroethylene			121.1		%		60-130	25-OCT-18
Toluene			119.8		%		70-130	25-OCT-18
trans-1,2-Dichloroethylene			120.0		%		60-130	25-OCT-18
trans-1,3-Dichloropropene			110.2		%		70-130	25-OCT-18
Trichloroethylene			123.7		%		60-130	25-OCT-18
Trichlorofluoromethane			113.7		%		50-140	25-OCT-18
Vinyl chloride			105.2		%		60-140	25-OCT-18
WG2910044-1 MB								
1,1,1,2-Tetrachloroethane			<0.050		ug/g		0.05	25-OCT-18
1,1,2,2-Tetrachloroethane			<0.050		ug/g		0.05	25-OCT-18
1,1,1-Trichloroethane			<0.050		ug/g		0.05	25-OCT-18
1,1,2-Trichloroethane			<0.050		ug/g		0.05	25-OCT-18
1,1-Dichloroethane			<0.050		ug/g		0.05	25-OCT-18
1,1-Dichloroethylene			<0.050		ug/g		0.05	25-OCT-18
1,2-Dibromoethane			<0.050		ug/g		0.05	25-OCT-18
1,2-Dichlorobenzene			<0.050		ug/g		0.05	25-OCT-18
1,2-Dichloroethane			<0.050		ug/g		0.05	25-OCT-18
1,2-Dichloropropane			<0.050		ug/g		0.05	25-OCT-18

Quality Control Report

Client: GeoPro Consulting Limited (Richmond Hill)
40 Vogell Road Unit 22
Richmond Hill ON L4B 3N6
Contact: Sarena Medina

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-511-HS-WT	**Soil**							
Batch R4298848								
WG2910044-1 MB								
1,3-Dichlorobenzene			<0.050		ug/g		0.05	25-OCT-18
1,4-Dichlorobenzene			<0.050		ug/g		0.05	25-OCT-18
Acetone			<0.50		ug/g		0.5	25-OCT-18
Benzene			<0.0068		ug/g		0.0068	25-OCT-18
Bromodichloromethane			<0.050		ug/g		0.05	25-OCT-18
Bromoform			<0.050		ug/g		0.05	25-OCT-18
Bromomethane			<0.050		ug/g		0.05	25-OCT-18
Carbon tetrachloride			<0.050		ug/g		0.05	25-OCT-18
Chlorobenzene			<0.050		ug/g		0.05	25-OCT-18
Chloroform			<0.050		ug/g		0.05	25-OCT-18
cis-1,2-Dichloroethylene			<0.050		ug/g		0.05	25-OCT-18
cis-1,3-Dichloropropene			<0.030		ug/g		0.03	25-OCT-18
Dibromochloromethane			<0.050		ug/g		0.05	25-OCT-18
Dichlorodifluoromethane			<0.050		ug/g		0.05	25-OCT-18
Ethylbenzene			<0.018		ug/g		0.018	25-OCT-18
n-Hexane			<0.050		ug/g		0.05	25-OCT-18
Methylene Chloride			<0.050		ug/g		0.05	25-OCT-18
MTBE			<0.050		ug/g		0.05	25-OCT-18
m+p-Xylenes			<0.030		ug/g		0.03	25-OCT-18
Methyl Ethyl Ketone			<0.50		ug/g		0.5	25-OCT-18
Methyl Isobutyl Ketone			<0.50		ug/g		0.5	25-OCT-18
o-Xylene			<0.020		ug/g		0.02	25-OCT-18
Styrene			<0.050		ug/g		0.05	25-OCT-18
Tetrachloroethylene			<0.050		ug/g		0.05	25-OCT-18
Toluene			<0.080		ug/g		0.08	25-OCT-18
trans-1,2-Dichloroethylene			<0.050		ug/g		0.05	25-OCT-18
trans-1,3-Dichloropropene			<0.030		ug/g		0.03	25-OCT-18
Trichloroethylene			<0.010		ug/g		0.01	25-OCT-18
Trichlorofluoromethane			<0.050		ug/g		0.05	25-OCT-18
Vinyl chloride			<0.020		ug/g		0.02	25-OCT-18
Surrogate: 1,4-Difluorobenzene			120.6		%		50-140	25-OCT-18
Surrogate: 4-Bromofluorobenzene			112.2		%		50-140	25-OCT-18
WG2910044-5 MS		**L2184462-5**						
1,1,1,2-Tetrachloroethane			107.6		%		50-140	25-OCT-18

Quality Control Report

Client: GeoPro Consulting Limited (Richmond Hill)
40 Vogell Road Unit 22
Richmond Hill ON L4B 3N6
Contact: Sarena Medina

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-511-HS-WT	**Soil**							
Batch R4298848								
WG2910044-5 MS		**L2184462-5**						
1,1,2,2-Tetrachloroethane			106.6		%		50-140	25-OCT-18
1,1,1-Trichloroethane			111.7		%		50-140	25-OCT-18
1,1,2-Trichloroethane			108.4		%		50-140	25-OCT-18
1,1-Dichloroethane			111.2		%		50-140	25-OCT-18
1,1-Dichloroethylene			107.0		%		50-140	25-OCT-18
1,2-Dibromoethane			105.8		%		50-140	25-OCT-18
1,2-Dichlorobenzene			114.6		%		50-140	25-OCT-18
1,2-Dichloroethane			108.1		%		50-140	25-OCT-18
1,2-Dichloropropane			111.0		%		50-140	25-OCT-18
1,3-Dichlorobenzene			112.7		%		50-140	25-OCT-18
1,4-Dichlorobenzene			114.5		%		50-140	25-OCT-18
Acetone			102.0		%		50-140	25-OCT-18
Benzene			115.0		%		50-140	25-OCT-18
Bromodichloromethane			110.1		%		50-140	25-OCT-18
Bromoform			96.3		%		50-140	25-OCT-18
Bromomethane			101.9		%		50-140	25-OCT-18
Carbon tetrachloride			110.5		%		50-140	25-OCT-18
Chlorobenzene			112.8		%		50-140	25-OCT-18
Chloroform			113.6		%		50-140	25-OCT-18
cis-1,2-Dichloroethylene			113.6		%		50-140	25-OCT-18
cis-1,3-Dichloropropene			102.8		%		50-140	25-OCT-18
Dibromochloromethane			103.3		%		50-140	25-OCT-18
Dichlorodifluoromethane			69.8		%		50-140	25-OCT-18
Ethylbenzene			114.6		%		50-140	25-OCT-18
n-Hexane			88.6		%		50-140	25-OCT-18
Methylene Chloride			110.8		%		50-140	25-OCT-18
MTBE			113.9		%		50-140	25-OCT-18
m+p-Xylenes			113.1		%		50-140	25-OCT-18
Methyl Ethyl Ketone			97.8		%		50-140	25-OCT-18
Methyl Isobutyl Ketone			97.1		%		50-140	25-OCT-18
o-Xylene			110.0		%		50-140	25-OCT-18
Styrene			110.9		%		50-140	25-OCT-18
Tetrachloroethylene			110.8		%		50-140	25-OCT-18

Quality Control Report

Client: GeoPro Consulting Limited (Richmond Hill)
40 Vogell Road Unit 22
Richmond Hill ON L4B 3N6
Contact: Sarena Medina

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-511-HS-WT	**Soil**							
Batch R4298848								
WG2910044-5 MS		**L2184462-5**						
Toluene			114.8		%		50-140	25-OCT-18
trans-1,2-Dichloroethylene			111.3		%		50-140	25-OCT-18
trans-1,3-Dichloropropene			98.9		%		50-140	25-OCT-18
Trichloroethylene			117.6		%		50-140	25-OCT-18
Trichlorofluoromethane			109.9		%		50-140	25-OCT-18
Vinyl chloride			101.0		%		50-140	25-OCT-18

Quality Control Report

Workorder: L2184462 Report Date: 29-OCT-18

Client: GeoPro Consulting Limited (Richmond Hill)
40 Vogell Road Unit 22
Richmond Hill ON L4B 3N6
Contact: Sarena Medina

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
DUP-H	Duplicate results outside ALS DQO, due to sample heterogeneity.
LCS-H	Lab Control Sample recovery was above ALS DQO. Non-detected sample results are considered reliable. Other results, if reported, have been qualified.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Quality Control Report

Workorder: L2184462 Report Date: 29-OCT-18

Client: GeoPro Consulting Limited (Richmond Hill)
40 Vogell Road Unit 22
Richmond Hill ON L4B 3N6
Contact: Sarena Medina

Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
% Moisture							
	9	04-OCT-18	23-OCT-18 10:20	14	19	days	EHTR
	10	04-OCT-18	23-OCT-18 10:21	14	19	days	EHTR
	11	04-OCT-18	23-OCT-18 10:22	14	19	days	EHTR
	12	04-OCT-18	23-OCT-18 10:23	14	19	days	EHTR
Volatile Organic Compounds							
VOC-O.Reg 153/04 (July 2011)							
	9	04-OCT-18	22-OCT-18 10:07	14	18	days	EHTR
	10	04-OCT-18	22-OCT-18 10:08	14	18	days	EHTR
	11	04-OCT-18	22-OCT-18 09:49	14	18	days	EHTR
	12	04-OCT-18	22-OCT-18 09:50	14	18	days	EHTR
Hydrocarbons							
F1-O.Reg 153/04 (July 2011)							
	9	04-OCT-18	22-OCT-18 10:07	14	18	days	EHTR
	10	04-OCT-18	22-OCT-18 10:08	14	18	days	EHTR
	11	04-OCT-18	22-OCT-18 09:49	14	18	days	EHTR
	12	04-OCT-18	22-OCT-18 09:50	14	18	days	EHTR
F2-F4-O.Reg 153/04 (July 2011)							
	9	04-OCT-18	22-OCT-18 03:00	14	18	days	EHTR
	10	04-OCT-18	22-OCT-18 03:00	14	18	days	EHTR
	11	04-OCT-18	22-OCT-18 08:00	14	18	days	EHTR
	12	04-OCT-18	22-OCT-18 08:00	14	18	days	EHTR

Legend & Qualifier Definitions:

EHTR-FM: Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR: Exceeded ALS recommended hold time prior to sample receipt.
EHTL: Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT: Exceeded ALS recommended hold time prior to analysis.
Rec. HT: ALS recommended hold time (see units).

Notes*:
Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L2184462 were received on 19-OCT-18 09:00.

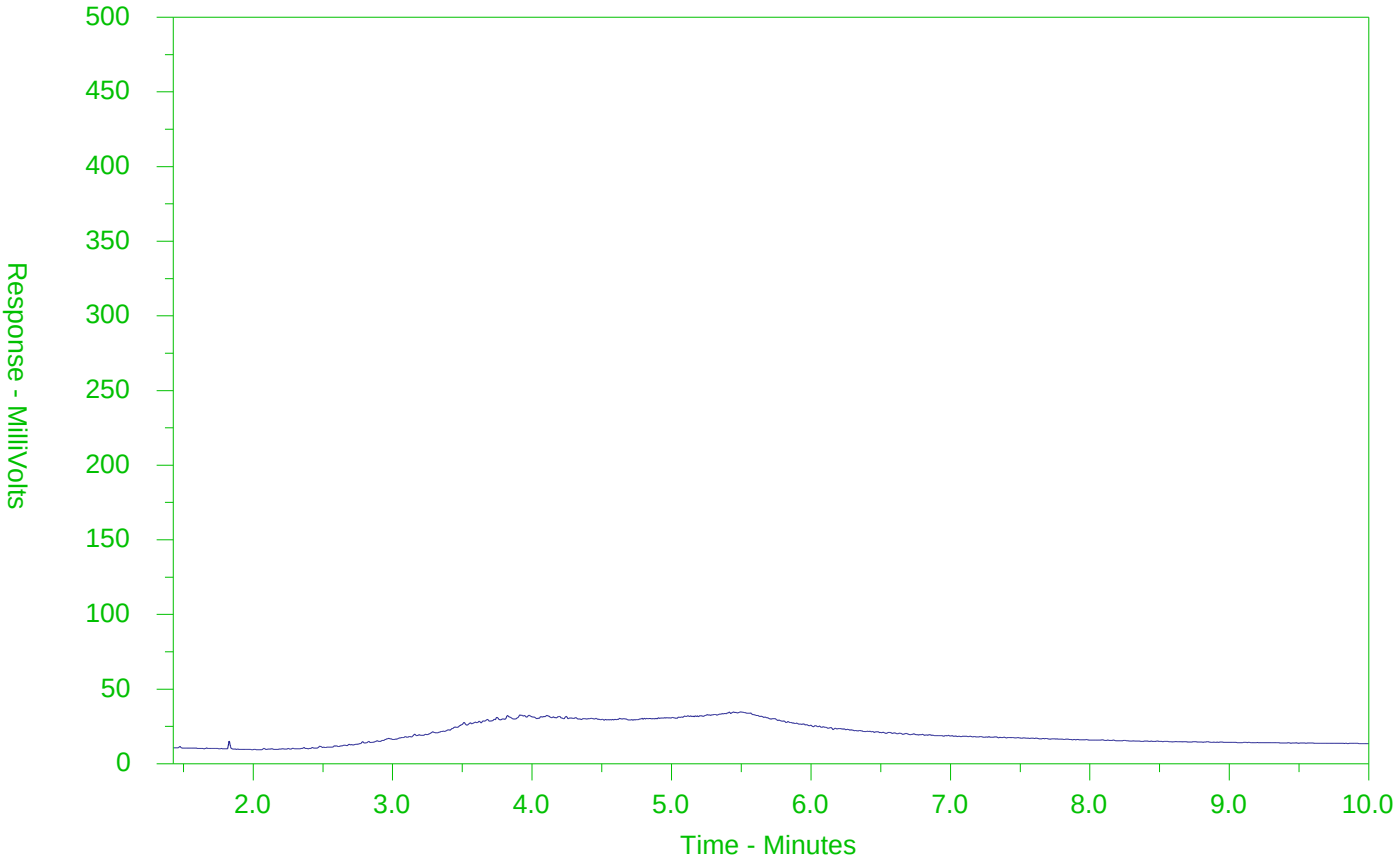
ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L2184462-1
Client Sample ID: BH 1-1, SS2 + SS3



←F2→	←F3→	←F4→	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
Gasoline →		← Motor Oils/Lube Oils/Grease →	
← Diesel/Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

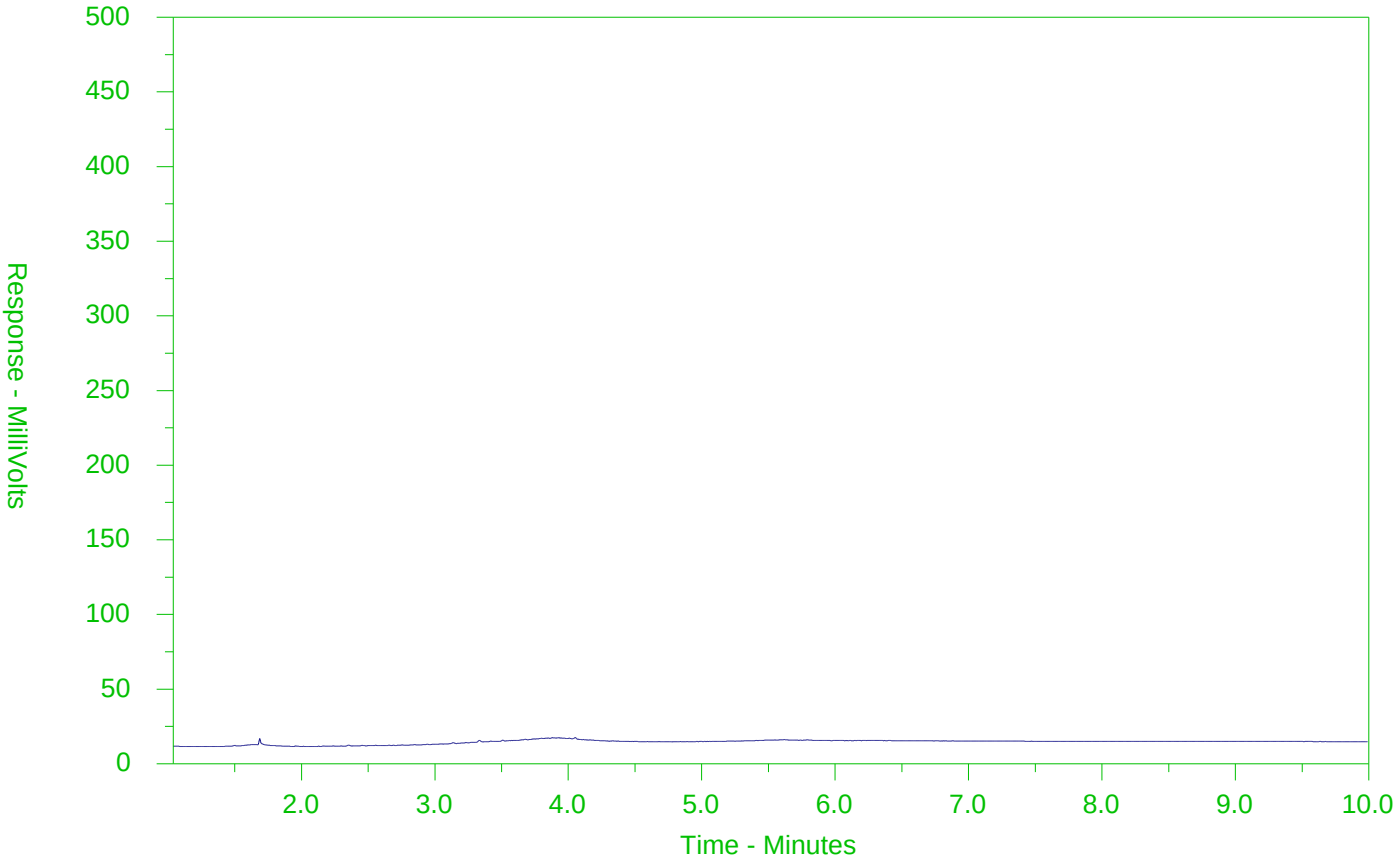
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L2184462-2
Client Sample ID: BH 1-4, SS2 + SS3



←F2→	←F3→	←F4→	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
Gasoline →		← Motor Oils/Lube Oils/Grease →	
← Diesel/Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

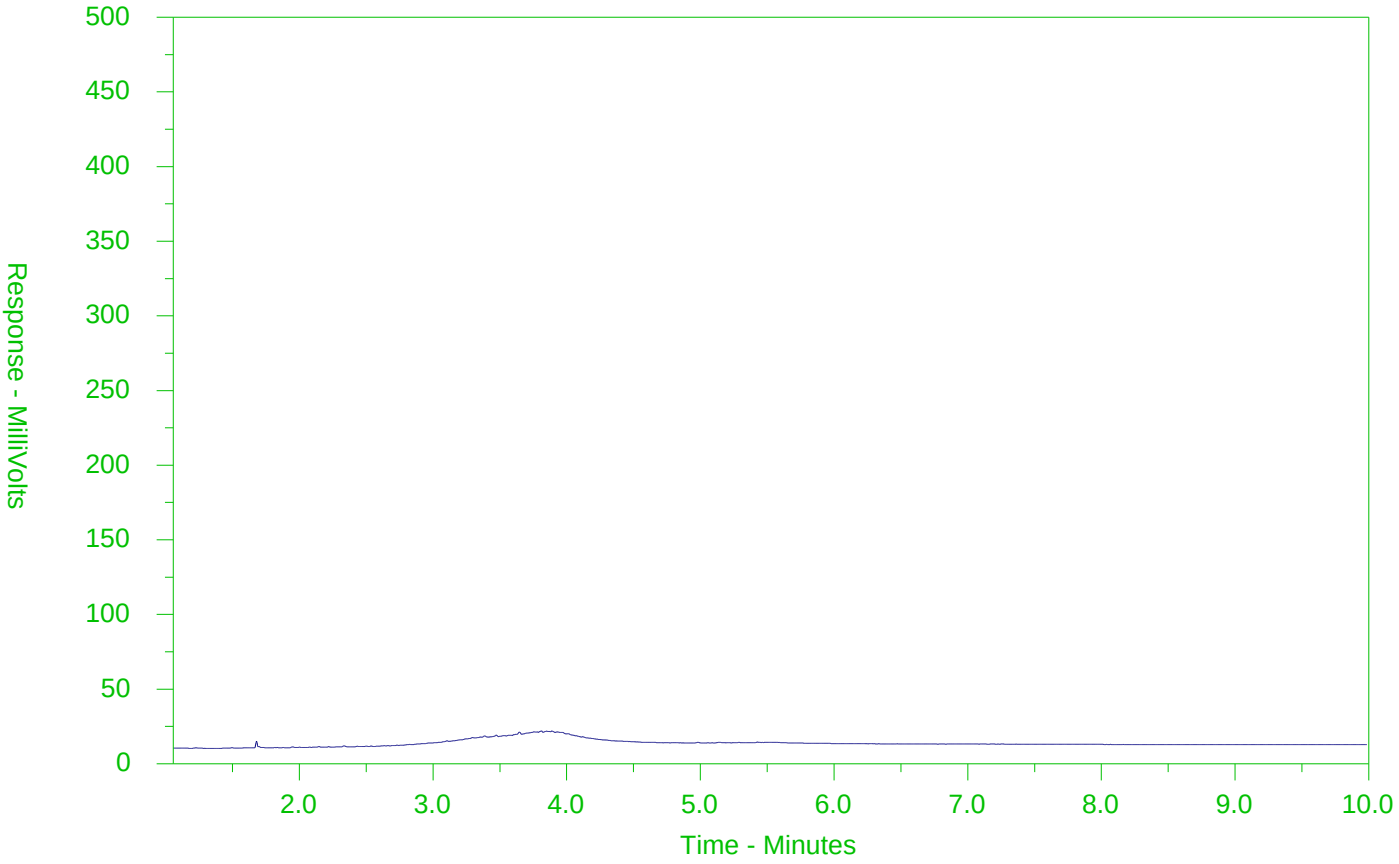
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L2184462-3
Client Sample ID: BH 1-5, SS2 + SS3



←F2→	←F3→	←F4→	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
Gasoline →	← Motor Oils/Lube Oils/Grease →		
← Diesel/Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

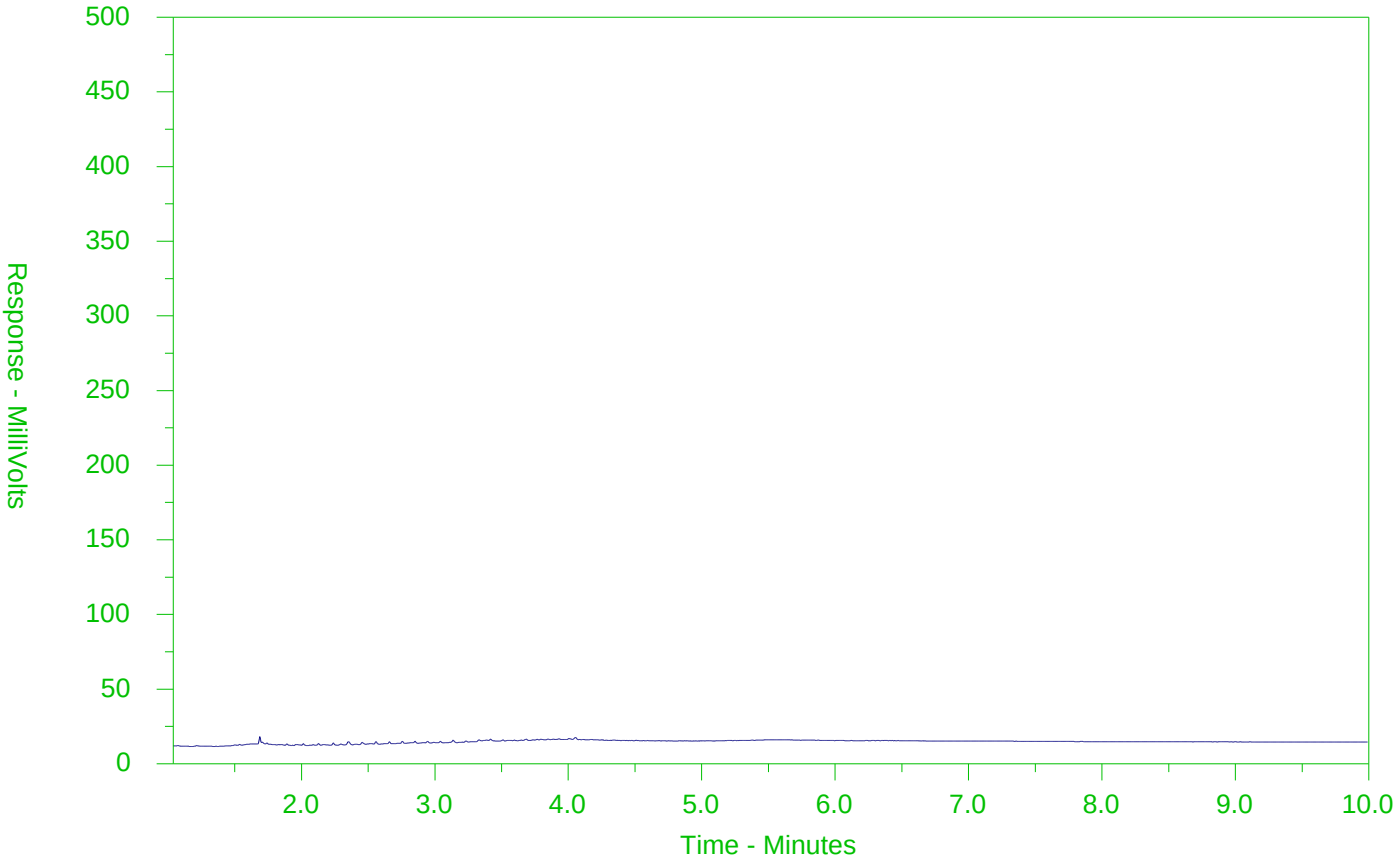
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L2184462-4
Client Sample ID: BH 1-8, SS2 + SS3A



←F2→	←F3→	←F4→	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
Gasoline →		← Motor Oils/Lube Oils/Grease →	
← Diesel/Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

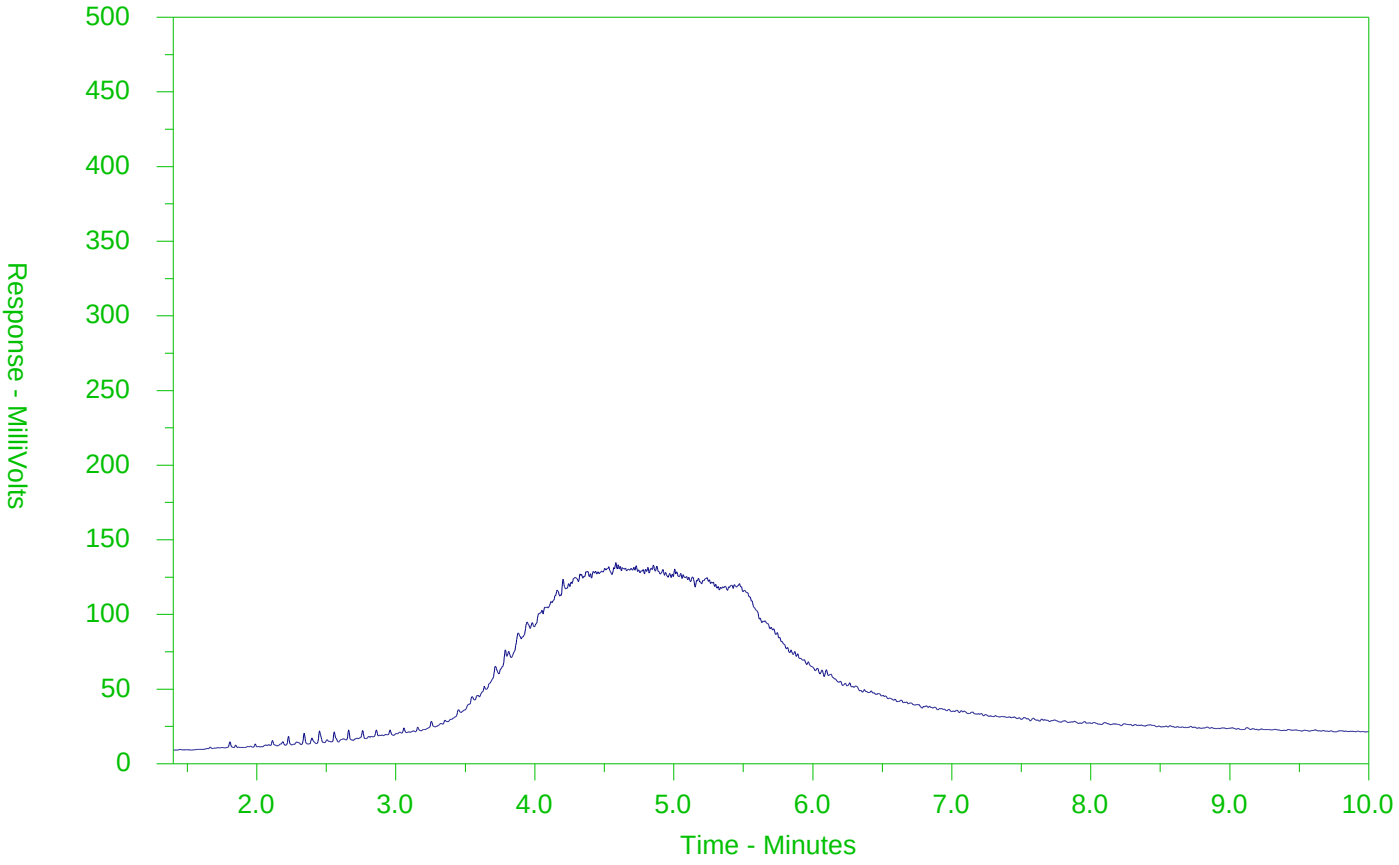
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L2184462-5
Client Sample ID: BH 1-11, SS2



←F2→	←F3→	←F4→	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
Gasoline →		← Motor Oils/Lube Oils/Grease →	
←Diesel/Jet Fuels→			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

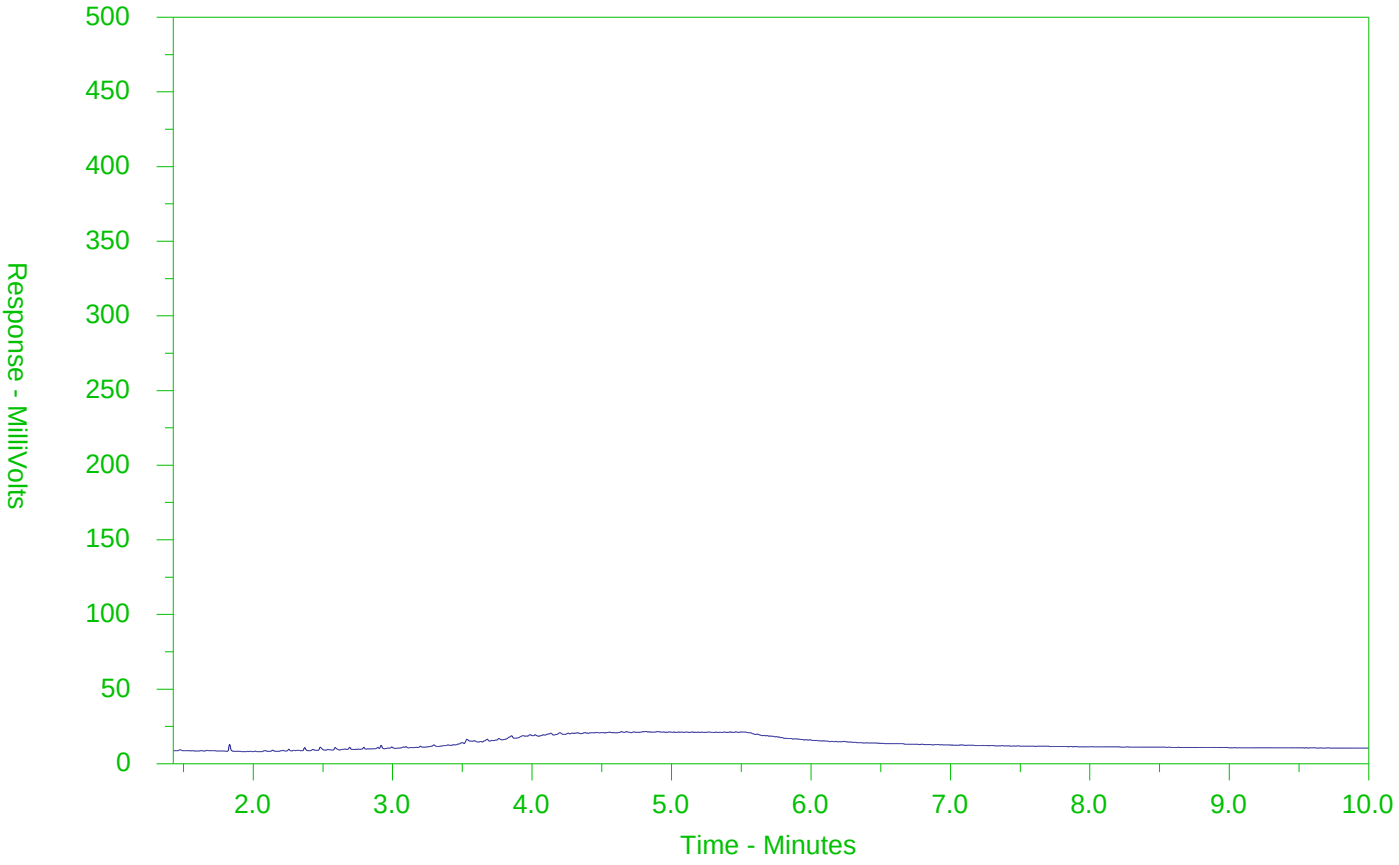
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L2184462-6
Client Sample ID: BH 1-14, SS2 + SS3



←F2→	←F3→	←F4→	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
Gasoline →		← Motor Oils/Lube Oils/Grease →	
←Diesel/Jet Fuels→			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

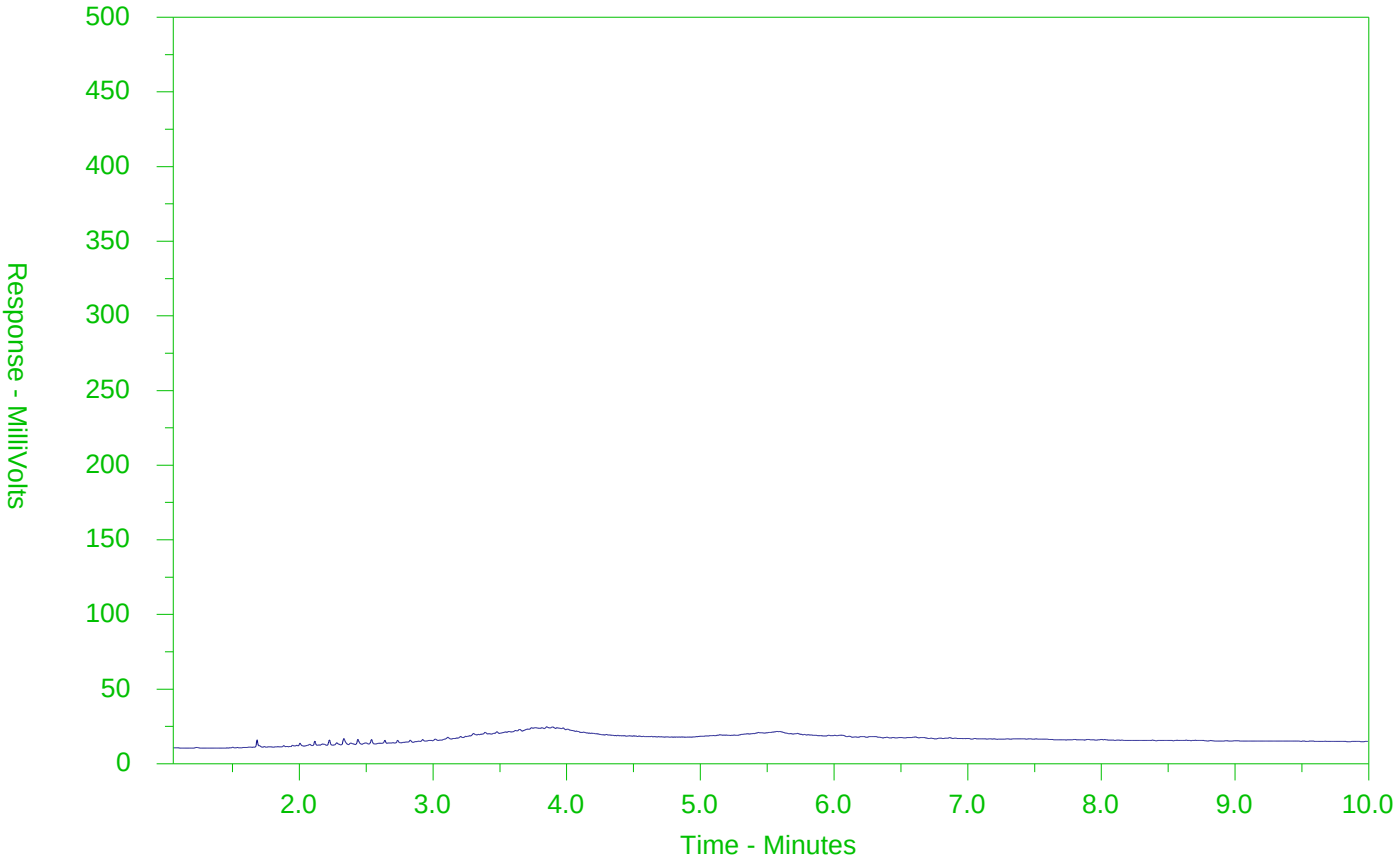
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L2184462-7
Client Sample ID: BH 1-16, SS2 + SS3



←F2→	←F3→	←F4→	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
Gasoline →		← Motor Oils/Lube Oils/Grease →	
← Diesel/Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

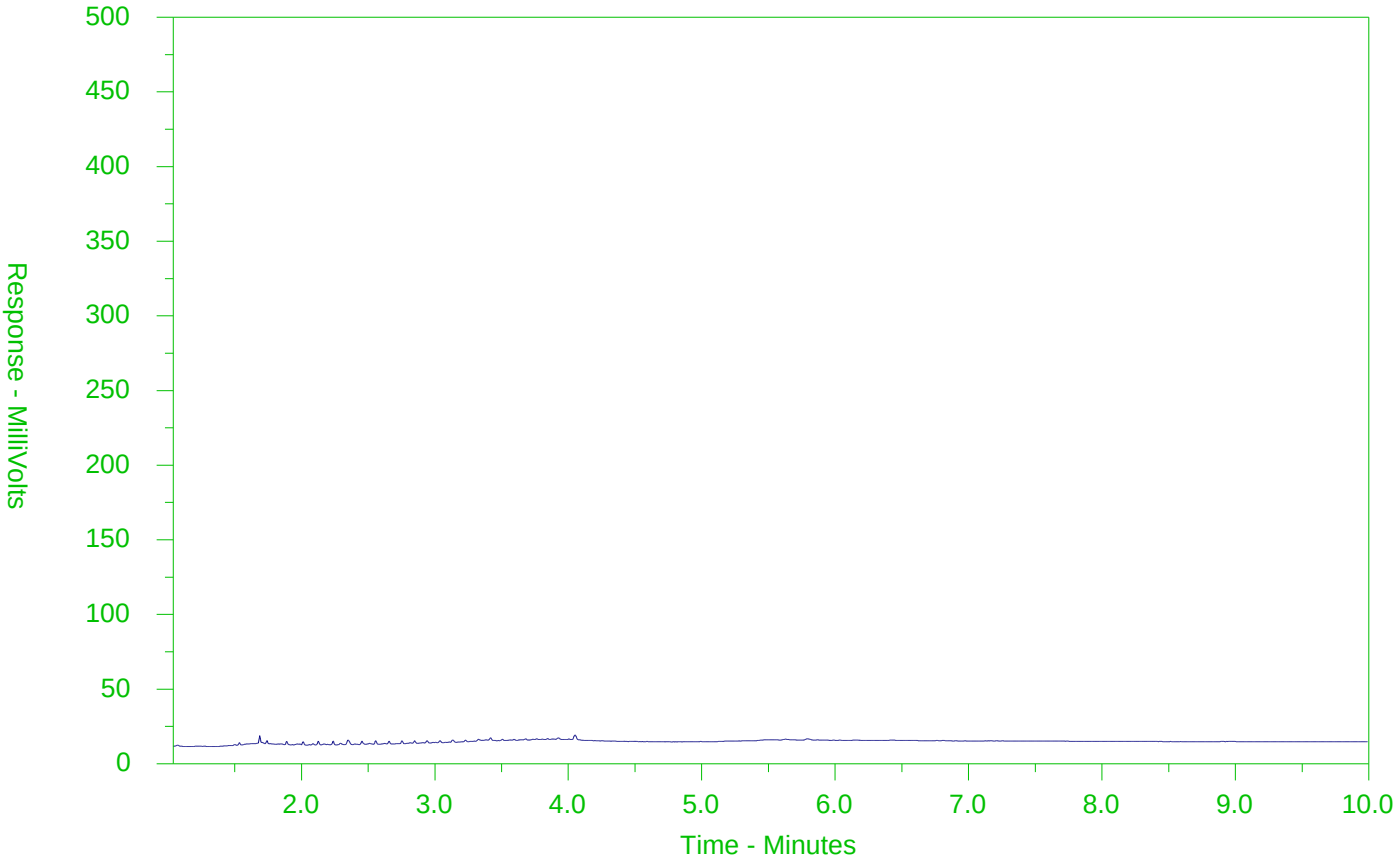
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L2184462-8
Client Sample ID: BH 1-23, SS2



←F2→	←F3→	←F4→	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
Gasoline →	← Motor Oils/Lube Oils/Grease →		
← Diesel/Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

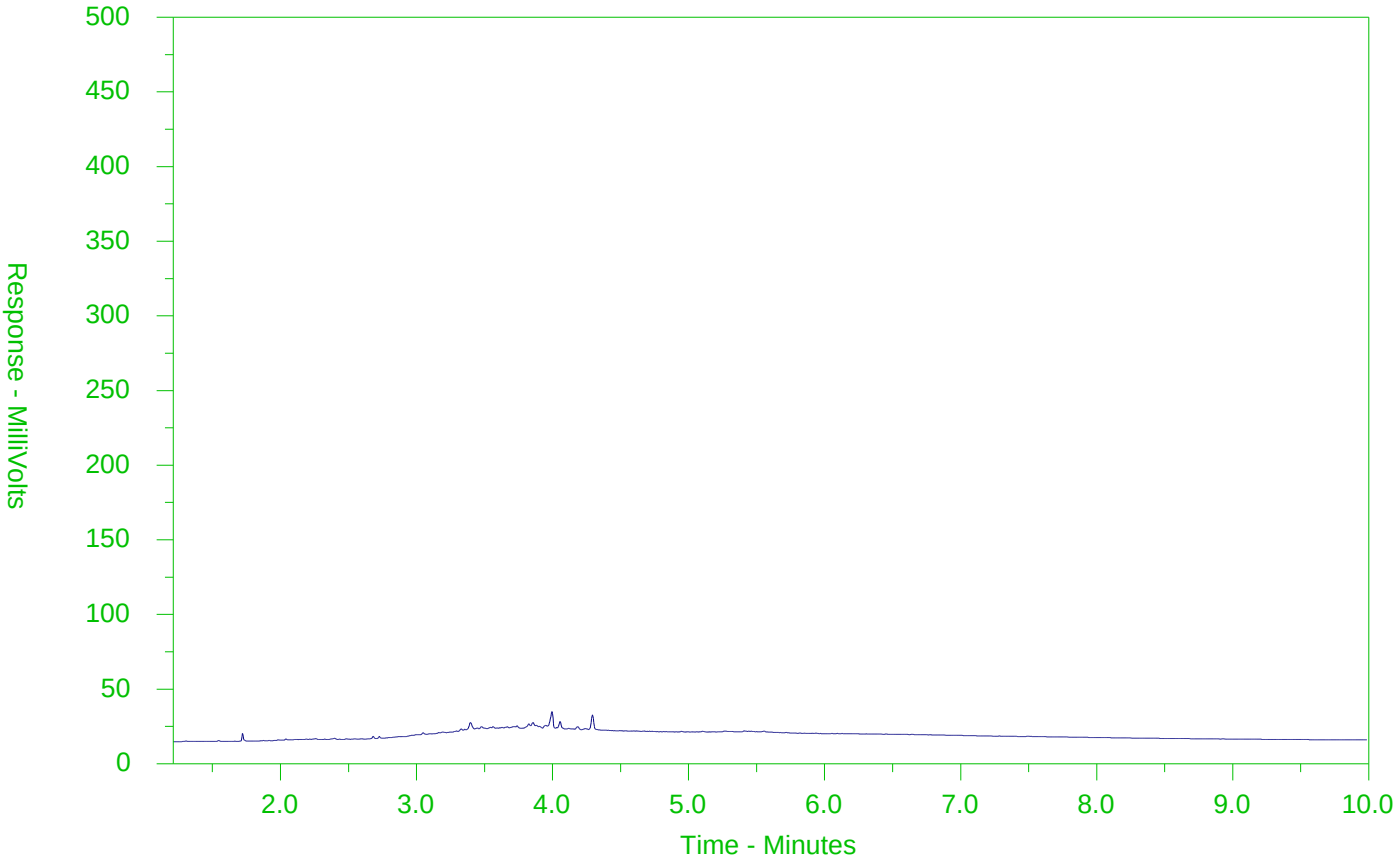
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L2184462-9
Client Sample ID: BH 2-1, SS2



←F2→	←F3→	←F4→	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
Gasoline →		← Motor Oils/Lube Oils/Grease →	
← Diesel/Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

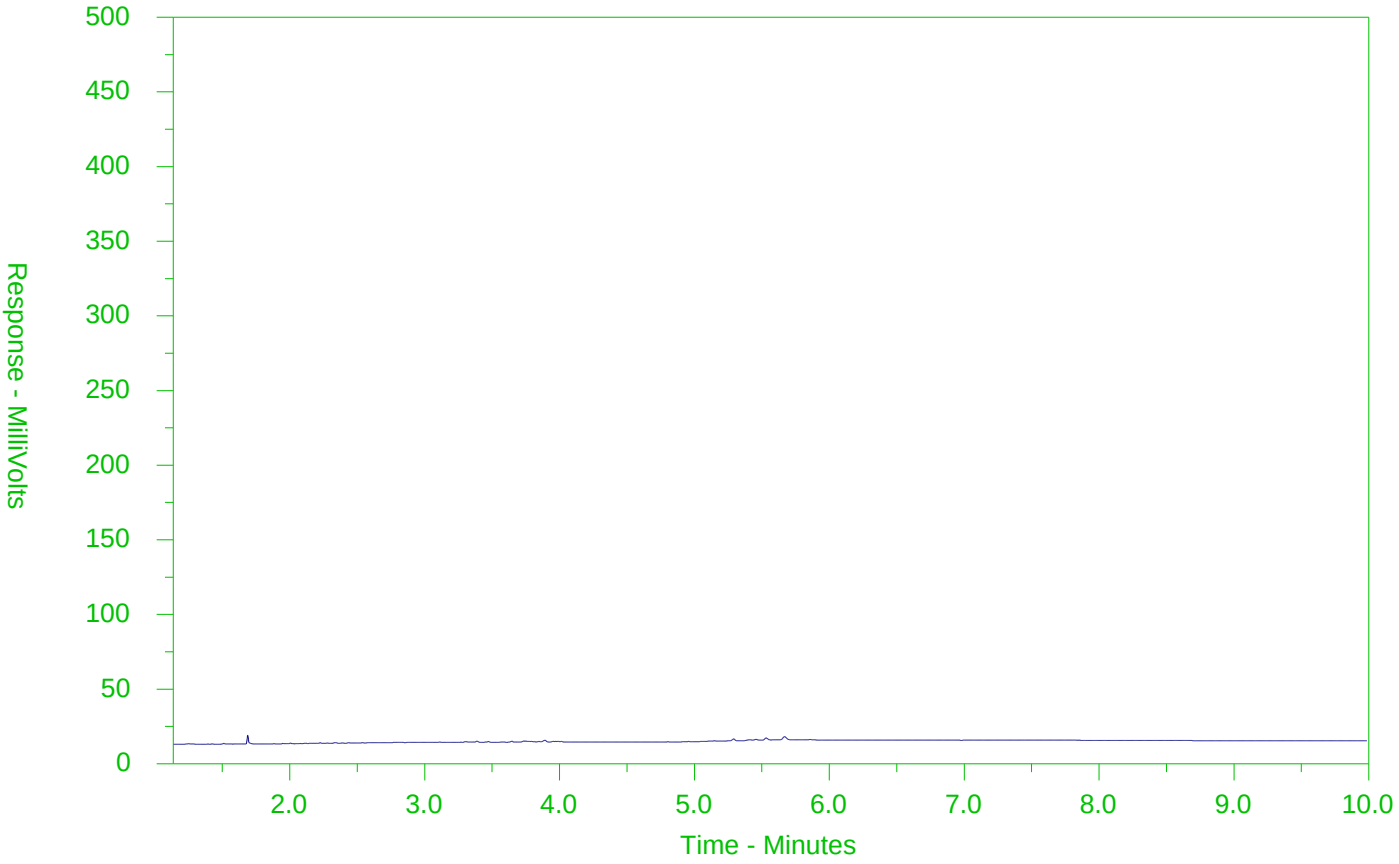
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L2184462-10
Client Sample ID: BH 2-3, SS1A



←F2→	←F3→	←F4→	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
Gasoline →	← Motor Oils/Lube Oils/Grease →		
← Diesel/Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

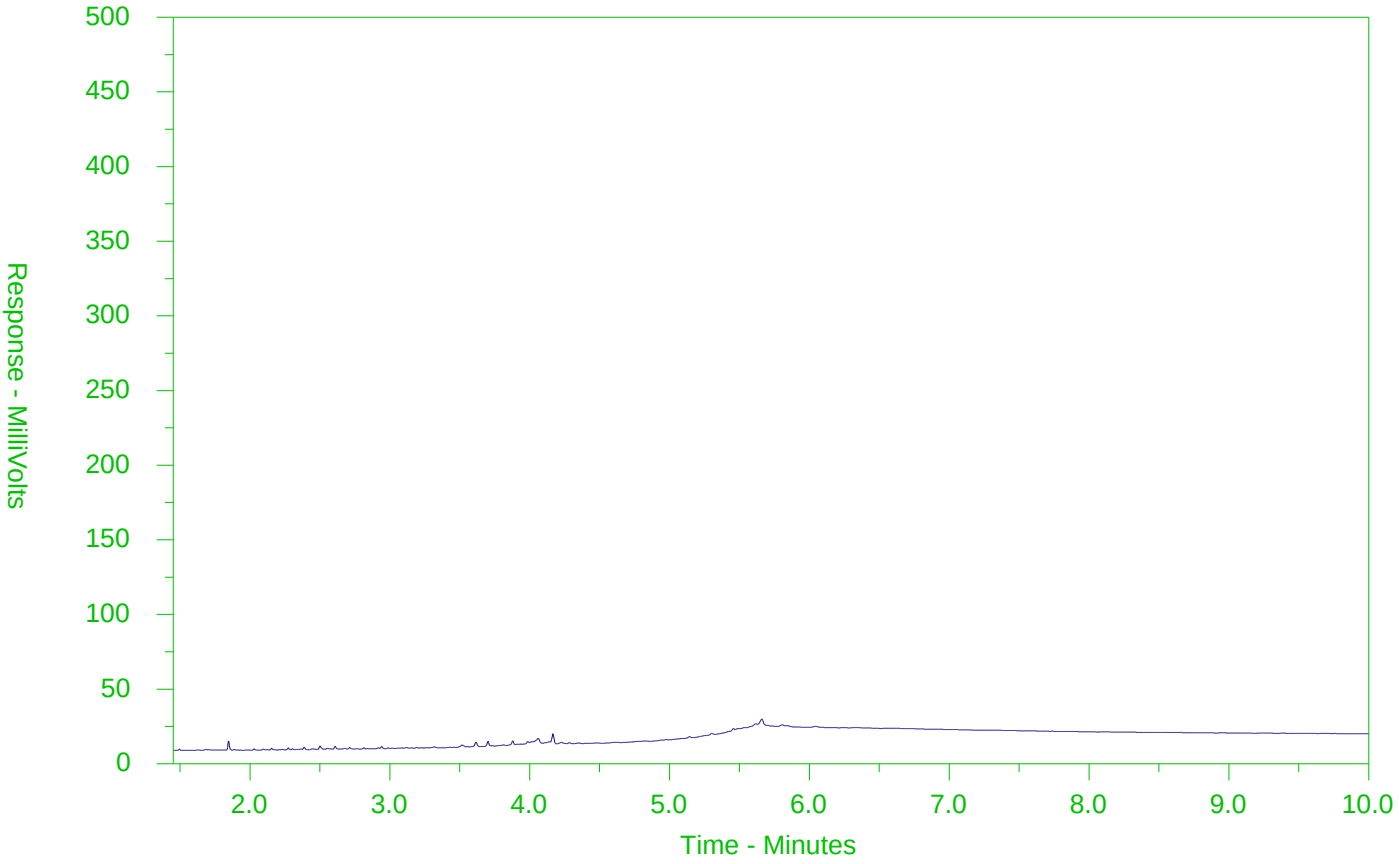
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L2184462-11
Client Sample ID: BH 2-5, SS1A



←F2→	←F3→	←F4→	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
Gasoline →		← Motor Oils/Lube Oils/Grease →	
← Diesel/Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

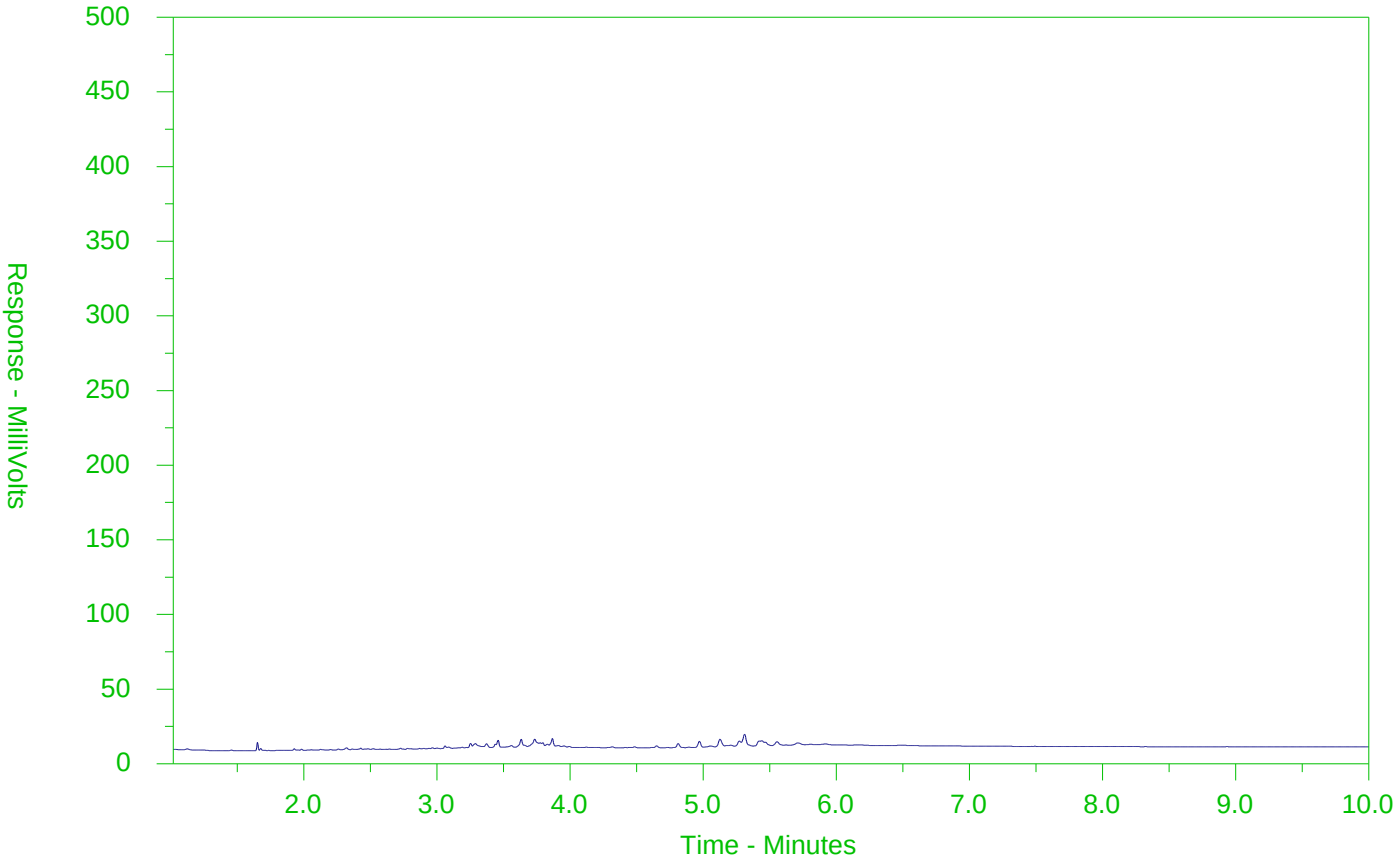
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L2184462-12
Client Sample ID: BH 2-7, SS1 + SS2



←F2→	←F3→	←F4→	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
Gasoline →		← Motor Oils/Lube Oils/Grease →	
← Diesel/Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

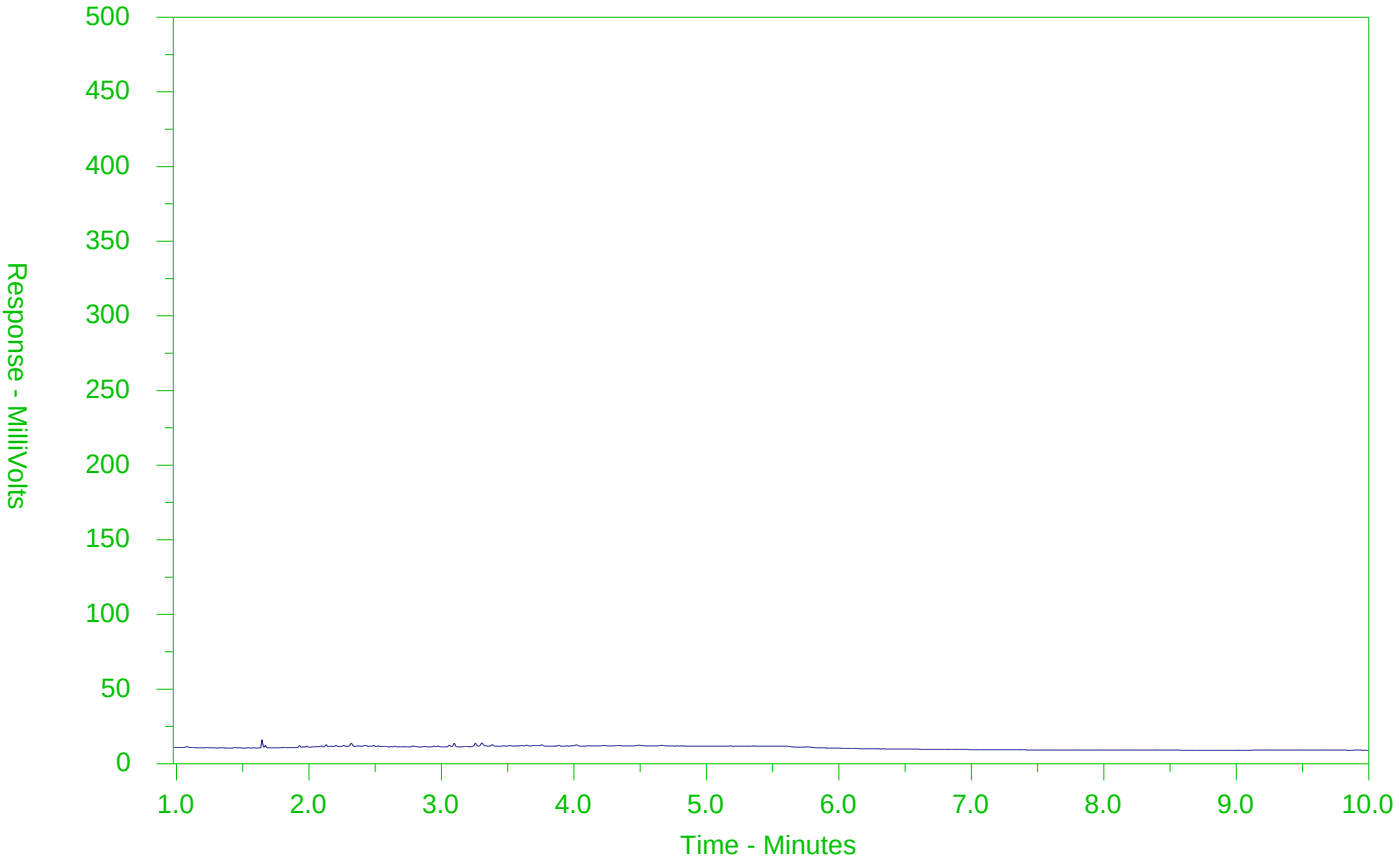
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L2184462-13
Client Sample ID: BH 2-9, SS2 + SS3



←F2→	←F3→	←F4→	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
Gasoline →	← Motor Oils/Lube Oils/Grease →		
← Diesel/Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

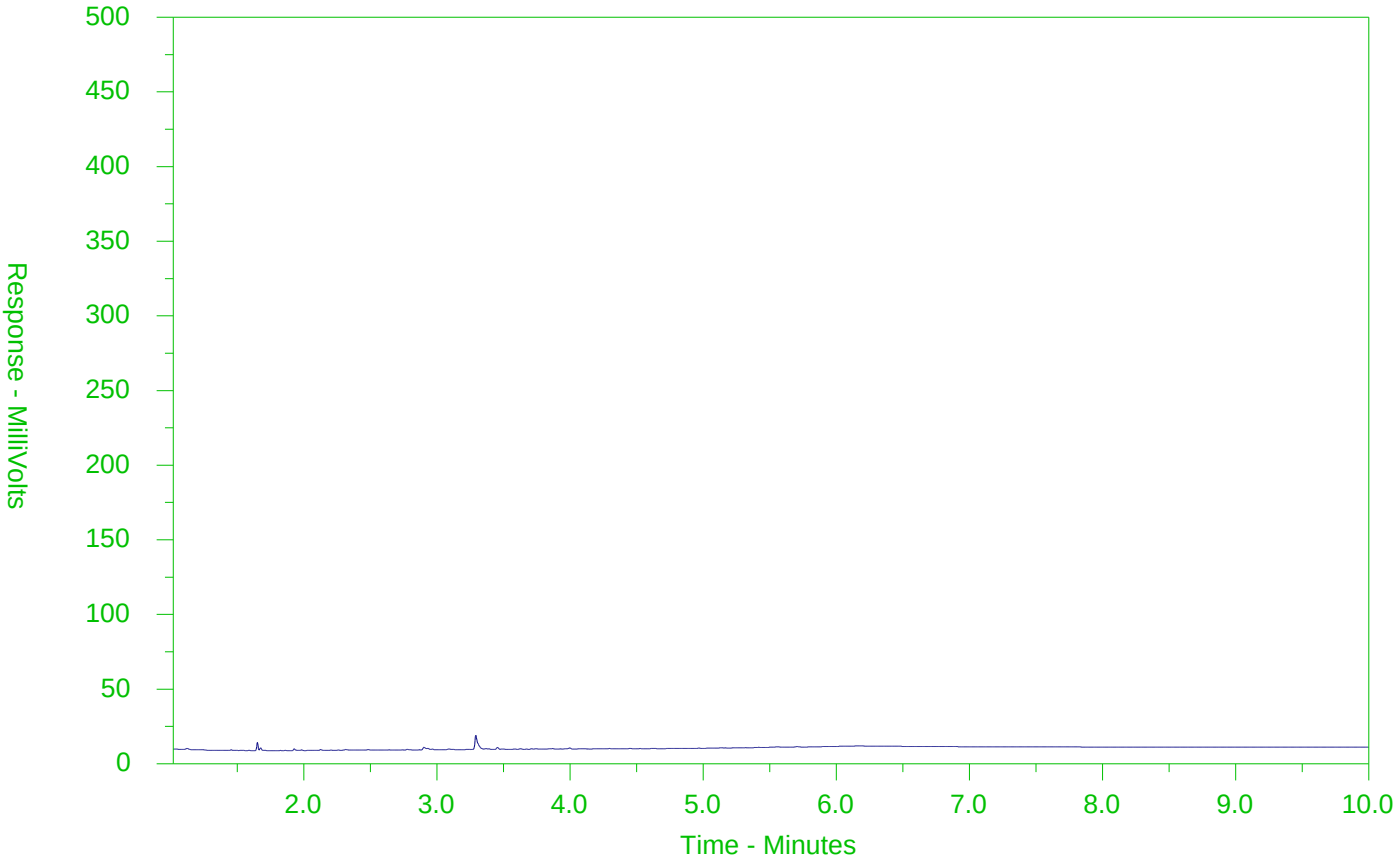
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L2184462-14
Client Sample ID: BH 2-13, SS2 +SS3



←F2→	←F3→	←F4→	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
Gasoline →		← Motor Oils/Lube Oils/Grease →	
← Diesel/Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

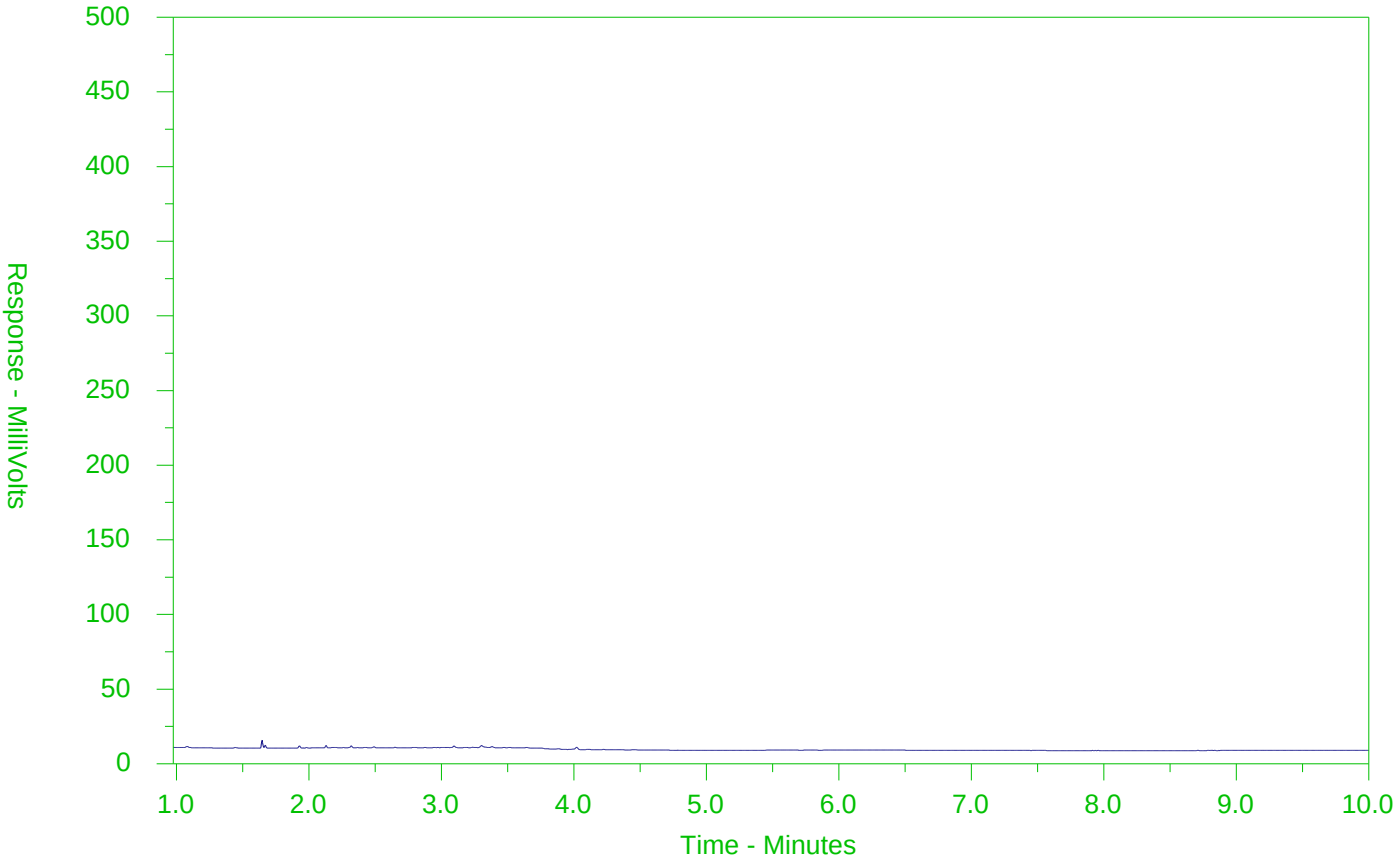
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L2184462-15
Client Sample ID: BH 2-15, SS2 + SS3



←F2→	←F3→	←F4→	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
Gasoline →	← Motor Oils/Lube Oils/Grease →		
← Diesel/Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

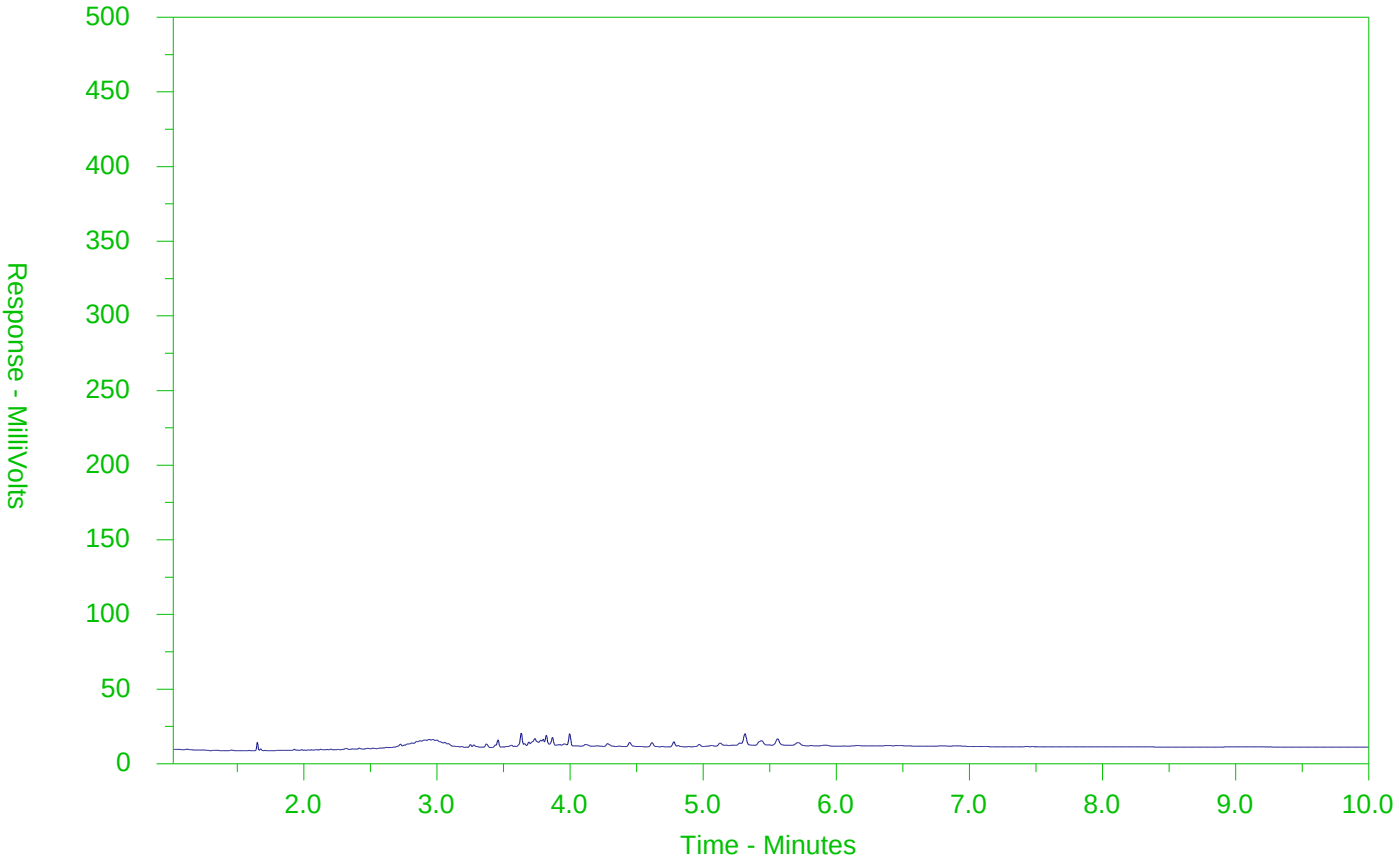
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L2184462-16
Client Sample ID: BH 2-17, SS1



←F2→	←F3→	←F4→	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
Gasoline →	← Motor Oils/Lube Oils/Grease →		
← Diesel/Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

Chain of Custody (COC) / Analytical Request Form

COC Number: 18-2178G-20181018

L2184462-COFC

ALS Environmental

Canada Toll Free: 1 800 668 9878

www.alsglobal.com

Report To	Contact and company name below will appear on the final report
Company:	GeoPro Consulting Ltd.
Contact:	Sarena Medina sarenm@geoproconsulting.ca
Phone:	(905) 237-8336
	Company address below will appear on the final report
Street:	40 Vogell Road, Unit 57
City/Province:	Richmond Hill, ON
Postal Code:	L4B 3N6
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☐ YES ☑ NO
Company:	
Contact:	

Report Format / Distribution	
Select Report Format:	☑ PDF ☑ EXCEL ☐ EDD (DIGITAL)
Quality Control (QC) Report with Report	☑ YES ☐ NO
☑ Compare Results to Criteria on Report - provide details below if box checked	
Select Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	dylanx@geoproconsulting.ca
Email 2	timy@geoproconsulting.ca
Email 3	sarenam@geoproconsulting.ca

Invoice Distribution	
Select Invoice Distribution:	☑ EMAIL ☑ MAIL ☐ FAX
Email 1 or Fax	office@geoproconsulting.ca
Email 2	sarenam@geoproconsulting.ca

Project Information	
ALS Account # / Quote #:	Q66183
Job #:	18-2178G
PO / AFE:	
LSD:	Mississauga, Ontario
ALS Lab Work Order # (lab use only)	L2184462

Oil and Gas Required Fields (client use)			
AFE/Cost Center:		PO#	
Major/Minor Code:		Routing Code:	
Requisitioner:			
Location:			
ALS Contact:	Rick	Sampler:	R.R

Select Service Level Below - Please confirm all E&P TATs with your AM - surcharges will apply

Regular [R] ☑ Standard TAT if received by 3 pm - business days - no surcharges apply

PRIORITY (Business Days)		EMERGENCY	
4 day [P4]	☐	1 Business day [E1]	☐
3 day [P3]	☐	Same Day, Weekend or Statutory holiday [E0]	☐
2 day [P2]	☐		

Date and Time Required for all E&P TATs:

For tests that can not be performed according to the service level selected, you will be contacted.

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	BTEX	VOCs	TPH	Number of Containers
	BH 1-1, SS2 + SS3	17-Oct-18	AM	Soil	R	R	R	1
	BH 1-4, SS2 + SS3	17-Oct-18	AM	Soil	R	R	R	1
	BH 1-5, SS2 + SS3	17-Oct-18	AM	Soil	R	R	R	1
	BH 1-8, SS2 + SS3A	17-Oct-18	AM	Soil	R	R	R	1
	BH 1-11, SS2	17-Oct-18	AM	Soil	R	R	R	1
	BH 1-14, SS2 + SS3	17-Oct-18	AM	Soil	R	R	R	1
	BH 1-16, SS2 + SS3	17-Oct-18	AM	Soil	R	R	R	1
	BH 1-23, SS2	17-Oct-18	AM	Soil	R	R	R	1
	BH 2-1, SS2	4-Oct-18	AM	Soil	R	R	R	1
	BH 2-3, SS1A	4-Oct-18	AM	Soil	R	R	R	1
	Bh 2-5, SS1A	4-Oct-18	AM	Soil	R	R	R	1
	BH 2-7, SS1 + SS2	4-Oct-18	AM	Soil	R	R	R	1

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ YES ☑ NO

Are samples for human drinking water use? ☐ YES ☑ NO

Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)

MOECC Table 1

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐

Ice Packs ☒ Ice Cubes ☐ Custody seal intact Yes ☐ No ☐

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		
1.9			12.3		

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: Junrong Li	Date: 2018/10/18	Time: 1830	Received by:	Date: Oct 19/18	Time: 9:09	Received by:	Date: 10/19/2018	Time: 17:30

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

OCTOBER 2015 FRONT

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a **Regulated Drinking Water (DW) System**, please submit using an **Authorized DW COC form**.

Chain of Custody (COC) / Analytical Request Form

ALS Environmental

Canada Toll Free: 1 800 668 9878

www.alsglobal.com

L2184462-COFC

COC Number: 18-2178G-20181018

Report To	Contact and company name below will appear on the final report
Company:	GeoPro Consulting Ltd.
Contact:	Sarena Medina sarenam@geoproconsulting.ca
Phone:	(905) 237-8336
	Company address below will appear on the final report
Street:	40 Vogell Road, Unit 57
City/Province:	Richmond Hill, ON
Postal Code:	L4B 3N6
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☐ YES ☑ NO
Company:	
Contact:	

Report Format / Distribution	
Select Report Format:	☑ PDF ☑ EXCEL ☐ EDD (DIGITAL)
Quality Control (QC) Report with Report	☑ YES ☐ NO
☑ Compare Results to Criteria on Report - provide details below if box checked	
Select Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	dylanx@geoproconsulting.ca
Email 2	timy@geoproconsulting.ca
Email 3	sarenam@geoproconsulting.ca

Invoice Distribution	
Select Invoice Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	office@geoproconsulting.ca
Email 2	sarenam@geoproconsulting.ca

Project Information	
ALS Account # / Quote #:	Q66183
Job #:	18-2178G
PO / AFE:	
LSD:	Mississauga, Ontario

Oil and Gas Required Fields (client use)	
AFE/Cost Center:	PO#:
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	

ALS Lab Work Order # (lab use only): L2184462 **ALS Contact:** Rick **Sampler:** R.R

Select Service Level Below - Please confirm all E&P TATs with your AM - surcharges will apply

Regular [R] ☑ Standard TAT if received by 3 pm - business days - no surcharges apply

PRIORITY (Business Days)		EMERGENCY	
	4 day [P4] ☐		1 Business day [E1] ☐
	3 day [P3] ☐		Same Day, Weekend or Statutory holiday [E0] ☐
	2 day [P2] ☐		

Date and Time Required for all E&P TATs:

For tests that can not be performed according to the service level selected, you will be contacted.

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	BTEX	VOCs	TPH	Number of Containers
	BH 2-9, SS2 + SS3	10-Oct-18	AM	Soil	R	R	R	1
	BH 2-13, SS2 + SS3	11-Oct-18	AM	Soil	R	R	R	1
	BH 2-15, SS2 + SS3	12-Oct-18	AM	Soil	R	R	R	1
	BH 2-17, SS1	13-Oct-18	AM	Soil	R	R	R	1

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ YES ☑ NO

Are samples for human drinking water use? ☐ YES ☑ NO

Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)

MOECC Table 1

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐

Ice Packs ☐ Ice Cubes ☐ Custody seal intact Yes ☐ No ☐

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		
			12.3		

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: Junrong Li	Date: 2018/10/18	Time: 0:30 PM	Received by: GS	Date: Oct 19/18	Time: 9:00	Received by: SB	Date: 10/19/2018	Time: 17:30

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

[1] If any water samples are taken from a **Regulated Drinking Water (DW) System**, please submit using an **Authorized DW COC form**.

ALS Environmental

www.alsglobal.com

Chain of Custody (COC) / Analytical Request Form

Canada Toll Free: 1 800 668 9878

Affix ALS barcode label here
(lab use only)

COC Number: 18-2178G-20181018

Report To	Contact and company name below will appear on the final report
Company:	GeoPro Consulting Ltd.
Contact:	Sarena Medina sarenm@geoproconsulting.ca
Phone:	(905) 237-8336
Company address below will appear on the final report	
Street:	40 Vogell Road, Unit 57
City/Province:	Richmond Hill, ON
Postal Code:	L4B 3N6
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☐ YES ☑ NO
Company:	
Contact:	

Report Format / Distribution	
Select Report Format:	☑ PDF ☑ EXCEL ☐ EDD (DIGITAL)
Quality Control (QC) Report with Report	☑ YES ☐ NO
☑ Compare Results to Criteria on Report - provide details below if box checked	
Select Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	dylanx@geoproconsulting.ca
Email 2	timy@geoproconsulting.ca
Email 3	sarenam@geoproconsulting.ca
Invoice Distribution	
Select Invoice Distribution:	☑ EMAIL ☑ MAIL ☐ FAX
Email 1 or Fax	office@geoproconsulting.ca
Email 2	sarenam@geoproconsulting.ca

Select Service Level Below - Please confirm all E&P TATs with your AM - surcharges will apply

Regular [R] ☑ Standard TAT if received by 3 pm - business days - no surcharges apply

PRIORITY (Business Days)		EMERGENCY	
4 day [P4]	☐	**1 Business day [E1]**	☐
3 day [P3]	☐	**Same Day, Weekend or Statutory holiday [E0]**	☐
2 day [P2]	☐		

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm

For tests that can not be performed according to the service level selected, you will be contacted.

Project Information		**Oil and Gas Required Fields (client use)**	
ALS Account # / Quote #:	Q66183	AFE/Cost Center:	PO#
Job #:	18-2178G	Major/Minor Code:	Routing Code:
PO / AFE:		Requisitioner:	
LSD:	Mississauga, Ontario	Location:	
ALS Lab Work Order # (lab use only)		**ALS Contact:** Rick	**Sampler:** R.R

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	BTEX	VOCs	TPH											Number of Containers
	BH 1-1, SS2 + SS3	17-Oct-18	AM	Soil	R	R	R											1
	BH 1-4, SS2 + SS3	17-Oct-18	AM	Soil	R	R	R											1
	BH 1-5, SS2 + SS3	17-Oct-18	AM	Soil	R	R	R											1
	BH 1-8, SS2 + SS3A	17-Oct-18	AM	Soil	R	R	R											1
	BH 1-11, SS2	2-Oct-18	AM	Soil	R	R	R											1
	BH 1-14, SS2 + SS3	2-Oct-18	AM	Soil	R	R	R											1
	BH 1-16, SS2 + SS3	3-Oct-18	AM	Soil	R	R	R											1
	BH 1-23, SS2	3-Oct-18	AM	Soil	R	R	R											1
	BH 2-1, SS2	4-Oct-18	AM	Soil	R	R	R											1
	BH 2-3, SS1A	4-Oct-18	AM	Soil	R	R	R											1
	Bh 2-5, SS1A	4-Oct-18	AM	Soil	R	R	R											1
	BH 2-7, SS1 + SS2	4-Oct-18	AM	Soil	R	R	R											1

Drinking Water (DW) Samples[1] (client use)	**Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)**
Are samples taken from a Regulated DW System? ☐ YES ☑ NO	MOECC Table 1
Are samples for human drinking water use? ☐ YES ☑ NO	

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen	☐	SIF Observations	Yes ☐	No	☐
Ice Packs ☐	Ice Cubes ☐	Custody seal intact	Yes ☐	No	☐
Cooling Initiated ☐					

INIITIAL COOLER TEMPERATURES ºC			FINAL COOLER TEMPERATURES ºC		

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: Junrong Li	Date:2018/10/18	Time:	Received by:	Date:	Time:	Received by:	Date:	Time:

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION WHITE - LABORATORY COPY YELLOW - CLIENT COPY

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a **Regulated Drinking Water (DW) System**, please submit using an **Authorized DW COC form**.

ALS Environmental

www.alsglobal.com

Chain of Custody (COC) / Analytical Request Form

Canada Toll Free: 1 800 668 9878

Affix ALS barcode label here
(lab use only)

COC Number: 18-2178G-20181018

Report To	Contact and company name below will appear on the final report
Company:	GeoPro Consulting Ltd.
Contact:	Sarena Medina sarenam@geoproconsulting.ca
Phone:	(905) 237-8336
Company address below will appear on the final report	
Street:	40 Vogell Road, Unit 57
City/Province:	Richmond Hill, ON
Postal Code:	L4B 3N6
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☐ YES ☑ NO
Company:	
Contact:	

Report Format / Distribution	
Select Report Format:	☑ PDF ☑ EXCEL ☐ EDD (DIGITAL)
Quality Control (QC) Report with Report	☑ YES ☐ NO
☑ Compare Results to Criteria on Report - provide details below if box checked	
Select Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	dylanx@geoproconsulting.ca
Email 2	timy@geoproconsulting.ca
Email 3	sarenam@geoproconsulting.ca
Invoice Distribution	
Select Invoice Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	office@geoproconsulting.ca
Email 2	sarenam@geoproconsulting.ca

Select Service Level Below - Please confirm all E&P TATs with your AM - surcharges will apply

Regular [R] ☑ Standard TAT if received by 3 pm - business days - no surcharges apply

PRIORITY (Business Days)		EMERGENCY	
	4 day [P4] ☐		**1 Business day [E1]** ☐
	3 day [P3] ☐		**Same Day, Weekend or Statutory holiday [E0]** ☐
	2 day [P2] ☐		

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm

For tests that can not be performed according to the service level selected, you will be contacted.

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

Project Information		**Oil and Gas Required Fields (client use)**	
ALS Account # / Quote #:	Q66183	AFE/Cost Center:	PO#
Job #:	18-2178G	Major/Minor Code:	Routing Code:
PO / AFE:		Requisitioner:	
LSD:	Mississauga, Ontario	Location:	
ALS Lab Work Order # (lab use only)		**ALS Contact:** Rick	**Sampler:** R.R

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	BTEX	VOCs	TPH											Number of Containers
	BH 2-9, SS2 + SS3	10-Oct-18	AM	Soil	R	R	R											1
	BH 2-13, SS2 + SS3	11-Oct-18	AM	Soil	R	R	R											1
	BH 2-15, SS2 + SS3	12-Oct-18	AM	Soil	R	R	R											1
	BH 2-17, SS1	13-Oct-18	AM	Soil	R	R	R											1

Drinking Water (DW) Samples[1] (client use)	**Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)**
Are samples taken from a Regulated DW System? ☐ YES ☑ NO	MOECC Table 1
Are samples for human drinking water use? ☐ YES ☑ NO	

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen	☐	SIF Observations	Yes ☐	No	☐
Ice Packs ☐	Ice Cubes ☐	Custody seal intact	Yes ☐	No	☐
Cooling Initiated ☐					

INIITIAL COOLER TEMPERATURES ºC			FINAL COOLER TEMPERATURES ºC		

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: Junrong Li	Date:2018/10/18	Time:	Received by:	Date:	Time:	Received by:	Date:	Time:

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION WHITE - LABORATORY COPY YELLOW - CLIENT COPY

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a **Regulated Drinking Water (DW) System**, please submit using an **Authorized DW COC form**.

GENERAL TERMS AND CONDITIONS:

These terms and conditions are incorporated in and form part of the Agreement between ALS Group's Environmental Division and the party named in the Offer (the "Client").

1. Definitions. Capitalized Terms not defined in these Terms and Conditions have the definitions set out in the other Agreement documents.
2. The Services. ALS will provide the Services to the Client as described in the Offer and in any chain of custody form provided with any sample.
3. Prices. ALS may review and change all prices, fees, surcharges or other charges set out in the Agreement if there are changes to ALS's cost beyond ALS's control, including changes in legislative requirements, Client variations of sample numbers and Client requests for changes to standard reporting requirements. Notwithstanding Condition 3, all quotations are reviewed and updated on a yearly basis or expire after one year.
4. Payment Terms. The Client shall pay ALS within 30 days of the invoice date OAC. ALS may, for reasonable business reasons, require the Client to arrange for payment in advance.
5. Quotation Numbers. The Client shall provide the quotation number to ALS (where applicable) to ensure correct pricing.
6. Taxes. Applicable taxes are not included in prices - surcharges and additional fees will be added at the time of invoicing.
7. Quality Control. ALS has an extensive QA/QC program. Clients' samples are analyzed using approved, referenced procedures followed by thorough data validation prior to reporting the analytical results.
8. Test Results are Not Guaranteed. Results are obtained from analytical measurements that are subject to inherent variability. Measurement results reflect characteristics of submitted test samples at time of analysis. The Client is responsible for informing itself on the limitation of test results and acknowledges that test results are not guaranteed.
9. Standard of Care. ALS will use reasonable care and diligence as required by the laws of the province or territory where the sample is tested.
10. Storage. Where possible, ALS will store samples for 30 days from the date a final report is issued to the Client, after which ALS may discard the samples.
11. Holds. If the Client requests a sample to be placed on hold, ALS will store the sample for 30 days from date of receipt, after which ALS will invoice the Client and discard the sample. Longer hold periods are available upon request.
12. Archives. If the Client requests a sample be archived, ALS will invoice in advance and store the sample for the period requested, after which ALS may discard the sample.
13. Handling Protocol. Legal sample handling protocol must be arranged before samples are collected. ALS charges a surcharge on the list price plus the hourly technologist or chemist rates for legal sample protocol. Additional charges will apply for samples that require storage by ALS.
14. Samples. The quality, condition, content and source of samples stored and tested are not known to ALS except as declared and described on the chain of custody form completed and submitted by the Client and accompanying the sample.
15. Risk of Loss. ALS will use reasonable care to protect samples during storage, however all samples are stored at the Client's risk and the Client is responsible for obtaining appropriate insurance, if desired. The Client acknowledges that during the performance of the Services samples may be altered, lost, damaged or destroyed and the Client releases ALS from any claim the Client may have for any loss or damage to the sample.
16. Environmental. The Client must comply with all applicable environment legislation, including labeling all hazardous samples to comply with WHMIS and TDG regulations, and must provide appropriate Safety Data Sheets (previously referred to as 'MSDS") that include the nature of the hazard and a contact name and phone number to call for information. The Client will indemnify ALS for all loss or damages, including any fine or cost of complying with an order of any government authority, resulting from the Client's breach of this paragraph.
17. Hazardous Materials Disposal. ALS may return, at the Client's cost, hazardous material to the Client for disposal.
18. Hazardous Materials Surcharge. ALS may apply an additional surcharge for handling of hazardous samples or samples with Naturally Occurring Radioactive Materials (NORM), H_2S, CN, etc.
19. Sample Containers. ALS may ship sample containers to the Client's location by the most cost effective means using ALS preferred courier suppliers, within the specified project timeline.
20. Additional Charges. ALS may charge the Client (a) its cost for emergency bottle shipments and shipments to and from a remote site, and (b) where pick up and delivery services are provided, subject in each instance to a minimum charge of $25.00.
21. Re-Tests. ALS reserves the right to re-test any samples that remain in its possession. Re-tests requested by the Client may be charged.
22. Waiver. The Client is responsible for making any assessment regarding the suitability of the Services and the intended results for the Client's purposes and waives any claims against ALS it may have as a result of the interpretation of the results. The Client shall indemnify ALS for all claims made by any third party against ALS in respect of all losses however arising from the performance of the Services or the use of any report provided in the performance of the Services.
23. Limitation of Liability. In no event shall ALS be liable for any consequential, indirect, incidental, special, exemplary or punitive damages, whether foreseeable or unforeseeable, (including claims for loss of profits or revenue or losses caused by stoppage of other work or impairment of other assets) incurred by the Client arising out of breach or failure of express or implied warranty, breach of contract, breach of warranty, misrepresentation, negligence, strict liability in tort or otherwise. In any event, the liability of ALS to the Client shall be limited to the cost of testing the sample as requested in the chain of custody form under which the sample was originally deposited. For the purposes of this paragraph and paragraphs 8, 15, 16, 22 and 24, as the applicable, "ALS" includes without limitations its directors, officers, employees and affiliates and the "Client" includes without limitation any third party that may have a claim against ALS through the Client.
24. Notice of Liability. Notwithstanding paragraph 23, ALS shall not be liable to the Client unless the Client provides notice in writing to ALS of such loss or damage, together with full particulars thereof, within 30 days of the Client's receipt of the report of the analysis of the sample giving rise to such liability. The provisions of this paragraph allocate the risk under the Agreement between the Client and ALS, and the fees to be paid by the Client to ALS reflect this allocation of risks and the limitations of liability in this Agreement.
25. Entire Agreement. The Agreement is the entire agreement between the parties and supersedes and takes precedence over any terms and conditions contained in any documentation provided by the Client. ALS's execution of any subsequent documentation from the Client only acknowledges receipt and not acceptance of any terms or conditions therein. If there is a conflict between these terms and conditions and any other Agreement document, these terms and conditions prevail.
26. Term. Providing the first batch of samples to which this tender refers is submitted within three months of the starting date of this quotation, the following prices, terms and conditions will remain firm until the closing date. This offer and terms and conditions will automatically lapse if the offer has not been accepted and samples not delivered to ALS within the Closing Date.
27. Termination. (a) Either party may terminate this Agreement for any reason by giving the other party thirty (30) days written notice (Notice Period).(b) If the Agreement is terminated pursuant to clause (a), then the Client must pay ALS for all Services performed up to the expiry of the Notice Period.

ALS Environmental

Canadian Locations (Toll Free 1-800-668-9878)

EMERGENCY SPILL RESPONSE: +1 855 838 LABS (5227)

British Columbia / Yukon

Vancouver, BC
8081 Lougheed Hwy
Burnaby, BC
V5A 1W9
After Hours / Emergency
Ph: 604-253-4188
Fax: 604-253-6700
Ph: 604-220-4188

Fort St. John, BC
10345A Dogwood Street
Fort St. John , BC
V1J 6W7
After Hours / Emergency
Ph: 250-261-5517
Fax: 250-261-5587
Ph: 250-261-4947

Kamloops, BC
1445 McGill Rd, Unit 2B
Kamloops, BC
V2C 6K7
After Hours / Emergency
Ph: 250-372-3588
Fax: 250-372-3670
Ph: 250-572-1458

Victoria, BC
#104-1027 Pandora Avenue
Victoria, BC
V8V 3P6
Ph: 250-413-3243

Terrace, BC
2912 Molitor Street
Terrace, BC
V2C6K7
Ph: 250-635-3309

Whitehorse, YT
12 - 151 Industrial Road
Whitehorse, YT
Y1A 2V3
After Hours / Emergency
Ph: 867-668-6689
Ph2: 867-668-6684
Ph: 867-335-5416

Prairies / NWT

Edmonton, AB
9936-67 Avenue NW
Edmonton, AB
T6E 0P5
After Hours / Emergency
Ph: 780-413-5227
Fax: 780-437-2311
Ph: 780-913-2299

Calgary, AB
2559-29th Street NE
Calgary, AB
T1Y 7B5
After Hours / Emergency
Ph: 403-407-1800
Fax: 403-291-0298
Ph: 403-651-1471

Fort McMurray, AB
Bay 1, 245 MacDonald Crescent
Fort McMurray, AB
T9H 4B5
After Hours / Emergency
Ph: 780-791-1524
Fax: 780-791-1586
Ph: 780-714-8482

Grande Prairie, AB
9505-111th Street
T8V 5W1
After Hours / Emergency
Ph: 780-539-5196
Fax: 780-513-2191
Ph: 780-512-4343

Saskatoon, SK
819 - 58 Street East
Saskatoon, SK
S7K 6X5
After Hours / Emergency
Ph: 306-668-8370
Fax: 306-668-8383
Ph: 306-221-7147

Regina, SK
1119 Osler Street
Regina, SK
S4R 8R4
After Hours / Emergency
Ph: 306-525-0970
Ph: 306-216-2480

Winnipeg, MB
1329 Niakwa Road East, Unit 12
Winnipeg, MB
R2J 3T4
After Hours / Emergency
Ph: 204-255-9720
Fax: 204-255-9721
Ph: 204-784-6677

Yellowknife, NT
116 - 314 Old Airport Road
Yellowknife, NT
X1A 3T3
After Hours / Emergency
Ph: 867-873-5593
Fax: 867-920-4238
Ph: 867-446-5593

Ontario

Thunder Bay, ON
1081 Barton Street
Thunder Bay, ON
P7B 5N3
After Hours / Emergency
Ph: 807-623-6463
Fax: 807-623-7598
Ph: 807-624-4482

Burlington, ON
1435 Norjohn Court, Unit 1
Burlington, ON
L7L 0E6
Ph: 905-331-3111
Fax: 905-331-4567

Waterloo, ON
60 Northland Road, Unit 1
Waterloo, ON
N2V 2B8
After Hours / Emergency
Ph: 519-886-6910
Fax: 519-886-9047
Ph: 519-589-0044

London, ON
309 Exeter Road, Unit #29
London, ON
N6L 1C1
Ph: 519-652-6044
Fax: 519-652-0671

Mississauga, ON
5730 Coopers Avenue, Unit 30
Mississauga, ON
L4Z 2E9
Ph: 905-507-6910
Fax: 905-507-6927

Ottawa, ON
190 Colonnade Road, Unit 7
Nepean, ON
K2E 7J5
Ph: 613-225-8279
Fax: 613-225-2801

Richmond Hill, ON
95 West Beaver Creek Road, Unit 1
Richmond Hill, ON
L4B 1H2
Ph: 905-881-9887
Fax: 905-881-8062

Sample Container, Preservation and Holding Time Table. Keep samples cool (4ºC) and ship to an ALS location as soon as possible.

Note: Specific container, preservation and holding times may vary based on regulatory requirements - consult your local ALS laboratory for assistance prior to sampling.

Inorganics	Analysis [1]	Water Container	Water Preservation	Additional Notes	Soil Container	Water / Soil Hold Time
ROUTINE INORGANICS AND PHYSICALS	Acidity and Alkalinity	0.5-1 L Plastic			125-250 mL Jar or Bag	14 Days / NA
	Anions (Br, Cl, SO4, F) and Electrical Conductivity	0.5-1 L Plastic			125-250 mL Jar or Bag	28 Days [7] / Unlimited
	Bromate[19], Chlorate and Chlorite	125 mL Plastic	EDA (Ethylenediamine)		NA	28 Days (Chlorite 14 Days) / NA
	BOD, Colour and Turbidity	0.5-1 L Plastic			NA	2-4 Days [8] / NA
	COD and Phenols (4AAP)	125-250 mL Glass	1:1 Sulfuric Acid (H_2SO_4)		NA	28 Days / NA
	Cyanide, Total ,Weak Acid Dissociable,Free	145 mL Plastic	6N NaOH		125-250 mL Jar or Bag	14 Days / 14 Days
	Dissolved Oxygen	300 mL BOD bottle	1 each; $MnSO_4$ & alkaline iodide azide pillows		NA	8 Hours [20] / NA
	Dissolved or Total Inorganic Carbon (DIC or TIC)	125-250 mL Glass	.	Field Filter for Dissolved	125-250 mL Jar or Bag	14 Days / 28 Days
	Dissolved or Total Organic Carbon (DOC or TOC)	125-250 mL Glass	1:1 Sulfuric Acid (H_2SO_4)	Field Filter for Dissolved	125-250 mL Jar or Bag	28 Days / 28 Days
	Flashpoint	2 x 100-250 mL Amber Glass		Zero Headspace	125-250 mL Jar	7 Days / 7 Days
	pH	0.5-1 L Plastic			125-250 mL Jar or Bag	0.25 Hours / 30 Days [9]
	Solids (TS, TSS, TDS)	0.5-1 L Plastic			NA	7 Days / NA
	Sulfide	125 - 150 mL Plastic	Zinc Acetate & 6N NaOH		125-250 mL Jar or Bag	7 Days / 7 Days
	Sulfite	125 mL Plastic			NA	0.25 Hours / NA
NUTRIENTS	Ammonia Nitrogen	250 mL Glass or Plastic	1:1 Sulfuric Acid (H_2SO_4)		125-250 mL Jar or Bag	28 Days / 72 Hours
	Nitrate or Nitrite Nitrogen (and Ammonia unpreserved)	0.5-1 L Plastic			NA	2-7 Days [10] / 72 Hours
	Nitrogen, Kjeldahl, Organic, Total or Dissolved	250 mL Glass or Plastic	1:1 Sulfuric Acid (H_2SO_4)	Field Filter for Dissolved	NA	28 Days / NA
	Nutrients, Available (N,P,K,S)	NA			125-250 mL Jar or Bag	NA / 3 Days [11]
	Phosphorus, Reactive (orthophosphate)	0.5-1 L Plastic			NA	2-7 Days [12] / NA
	Phosphorus, Total Dissolved	250 mL Glass or Plastic	1:1 Sulfuric Acid (H_2SO_4)	Field Filter for Dissolved	NA	28 Days / NA
	Phosphorus, Total	250 mL Glass or Plastic	1:1 Sulfuric Acid (H_2SO_4)		NA	28 Days / NA
METALS	Chromium VI (Hexavalent)	125 mL Plastic	50 % NaOH (BC MoE) or 6N NaOH + Ammonium Buffer (OMoE)		125-250 mL Jar or Bag	28 Days / 30 Days
	Mercury, Methyl	250 mL FLPE	1:1 Hydrochloric Acid (HCl)[21]	Field Filter for Dissolved	125-250 mL Jar or Bag	6 Months / 28 Days
	Mercury, Total or Dissolved	40 mL Glass Vial	1:1 Hydrochloric Acid (HCl)	Field Filter for Dissolved	125-250 mL Jar or Bag	28 Days / 28 Days
	Metals, Total or Dissolved	125-250 mL Plastic	1:3 Nitric Acid (HNO_3) to pH<2	Field Filter for Dissolved	125-250 mL Jar or Bag	6 Months / 6 Months
Organics						
HYDRO-CARBONS	F1, Volatile Organic Compounds (VOCs), THMs, 1,4-Dioxane, Volatile Petroleum Hydrocarbons (VPH)	2 or 3 x 40 mL Glass Vials [2]	Sodium Bisulfate [4]	Zero Headspace	Field Methanol Kit [6]	14 Days / 40 Days [13]
		2 or 3 x 40 mL Glass Vials [2]	Sodium Bisulfate [4]	Zero Headspace	Hermetic Sampler kit [6]	14 Days / 48 Hours
	CCME CWS F1, BTEX	2 or 3 x 40 mL Glass Vials [2]	Sodium Bisulfate [4]	Zero Headspace	125 - 500 mL Jar	14 Days / 7 Days
	CCME CWS F2-F4	2 x 60 mL Amber Glass Vials [3]	Sodium Bisulfate		125 - 500 mL Jar	14 Days [14] / 14 Days
	EPH or LEPH/HEPH	2 x 250 mL Amber Glass with Septa Cap	Sodium Bisulfate		125 - 500 mL Jar	14 Days / 14 Days
	Polycyclic Aromatic Hydrocarbons (PAHs)	2 x 0.25 - 1 L Amber Glass [5]	Sodium Bisulfate		125 - 500 mL Jar	14 Days / 14 Days
	Oil & Grease or Mineral Oil & Grease	2 x 0.25 - 1 L Glass	1:1 HCl or H_2SO_4		125 - 500 mL Jar	28 Days / 28 Days
TRACE ORGANICS	Alcohols	2 x 40 mL Glass Vials		Zero Headspace	125 - 500 mL Jar	7 Days / 7 Days
	Alkanolamines (MEA, DEA, DIPA)	250 mL Amber Glass			125 - 500 mL Jar	7 Days / 14 Days
	AOX	40 - 250 mL Amber Glass	1:3 Nitric Acid (HNO_3) to pH<2		125 - 500 mL Jar	6 months [15] / 28 Days
	C1 - C5 Gases	3 x 40 mL Blue Septa Vials	Sodium Bisulfate [4]	Zero Headspace	NA	14 Days / NA
	Dioxins and Furans, PBDE and PBB	2 x 1 L Amber Glass			125 - 500 mL Jar	Unlimited / Unlimited
	Formaldehyde/Aldehydes	2 x 40 mL Amber Glass Vials [2]	Ammonium Chloride+Copper Sulfate	Zero Headspace	125 - 500 mL Jar	7 Days / 5 Days
	Glycols	2 x 40 mL Amber Glass Vials			125 - 500 mL Jar	7 Days / 14 Days
	Hormones and Steroids	1 L Plastic			NA	28 Days / NA
	Naphthenic Acids	2 x 250 mL Amber Glass			125 - 500 mL Jar	14 Days / 14 Days
	Nitroaromatics and Nitrosamines (Explosives)	1 L Amber Glass			125 - 500 mL Jar	7 Days / 14 Days
	Nonylphenol & Ethoxylates, Bisphenol A (BPA)	1 L Amber Glass			125 - 500 mL Jar	28 Days / 14 Days
	PCB	2 x 0.25 - 1 L Amber Glass			125 - 500 mL Jar	Unlimited / Unlimited [16]
	Perfluorinated Chemicals (PFCs), PFOS, PFOA	1 L Plastic (PTFE free)			125-250 mL Jar or Bag	14 Days / 14 Days
	Phenolics, Chlorinated and Non-Chlorinated	2 x 0.5 - 1 L Amber Glass	Ascorbic Acid & Sodium Bisulfate [4]		125 - 500 mL Jar	14 Days / 14 Days
	Priority Pollutants (EPA 625 list) or SVOCs	2 x 1 L Amber Glass			125 - 500 mL Jar	7 Days / 14 Days [17]
	Resin Acids & Fatty Acids	2 x 0.5 - 1 L Amber Glass	Ascorbic Acid & NaOH		125 mL Jar	14 Days / 14 Days
	Sulfolane	2 x 0.5 - 1 L Amber Glass	Sodium Bisulfate [4]		125 mL Jar	14 Days / 14 Days
PESTICIDE RESIDUES	Carbamate Pesticides	1 L Amber Glass	Use Sodium Thiosulfate if chlorinated		125 - 500 mL Jar	7 Days / 14 Days
	Glyphosate / AMPA	1 L Plastic	Use Sodium Thiosulfate if chlorinated		125 - 500 mL Jar	14 Days / 14 Days
	Herbicides, Acidic	2 x 1 L Amber Glass	Sodium Bisulfate [4]		125 - 500 mL Jar	14 Days / 14 Days
	Organochlorine or Organophosphate Pesticides	2 x 1 L Amber Glass			125 - 500 mL Jar	7 Days / 14 Days
	Soil Sterilant Scan	1 L Amber Glass			250 g Poly Bag	7 Days / 14 Days
Micro						
MICRO-BIOLOGICAL	Coliforms-Fecal, Total, E-coli & HPC	100 - 300 mL Sterilized Plastic	Sodium Thiosulfate		500 mL Sterilized Jar	24-48 Hours [18] (24 - HPC) / NA
	Microtox	1 L Amber Glass			125-250 mL Jar or Bag	3 Days / 3 Days

1. Additional analyses with the same container type and preservation may be possible - consult the lab for details.

2. The number of 40 mL glass vials required (2 or 3) for BTEX & VOC varies by lab based on instrumentation. Consult the lab for details.

3. Please fill to the top of the marked line on the 60 mL Amber Glass Vials.

4. Use Sodium Thiosulfate instead of Sodium Bisulfate if sample is chlorinated.

5. OMoE has no preservation requirement for PAHs. 2 X 250 mL Amber Glass required for BC MoE and OMoE. For AB and SK and for Alkylated PAHs, ALS requires 2 x 1 L Amber Glass.

6. Soil sampling options depend on soil location and condition of soil. Field Methanol Kit consists of one 5g TerraCore® sampler or similar sampling device, two pre-weighed 40 mL glass vials with methanol preservative and a 125mL soil jar for moisture. Hermetic sampler kit consists of a T-handle, two 5g hermetic samplers and a 125mL soil jar for moisture. One additional parameter, such as metals or hydrocarbons can also be obtained from the 125mL soil jar.

7. 4 Days hold time for Electrical Conductivity only as per Ontario MISA.

8. 3 Days hold time for British Columbia as per BC Ministry of Environment (BC MoE), 4 Days hold time as per OMoE.

9. pH in water should be taken in the field as per BC MoE, 4 Days hold time for Ontario MISA and 28 Days hold time for OMoE. 30 Days hold time as received for pH in soil as per OMoE. One year hold time once soil is dried.

10. 3 Days hold time as per BC MoE, 5 Days hold time as per Ontario MISA and 7 Days hold time as per OMoE.

11. 3 Days hold time until received. Unlimited hold time once soil is dried.

12. 3 Days hold time as per BC MoE and 7 Days hold time as per OMoE.

13. 40 Days hold time as per BC MoE and 14 Days hold time as per OMoE. Recovered methanol extract from laboratory has a 40 Days hold time as per OMoE.

14. 40 Days hold time as per OMoE.

15 14 Days hold time as per Ontario MISA.

16. 14 Days hold time as per OMoE. Consult lab for container size if limited sample volume is available.

17. 14 Days hold time for water and 60 Days hold time for soil as per OMoE. Ontario labs require 2 x 250 mL Amber Glass + 500 mL Amber Glass.

18. 30 Hours hold time as per BC Drinking Water Regulation and 48 Hours as per OMoE.

19. Bromate alone does not require preservative.

20. 15 Minutes hold time as per OMoE - Field measurement by meter is recommended.

21. Use 1:1 Sulfuric Acid (H_2SO_4) for preservation of marine or brackish samples.

LIMITATIONS TO THE REPORT

This report is intended solely for the Client named. The report is prepared based on the work has been undertaken in accordance with normally accepted geotechnical engineering practices in Ontario.

The comments and recommendations given in this report are based on information determined at the limited number of the test hole and test pit locations. The boundaries between the various strata as shown on the borehole logs are based on non-continuous sampling and represent an inferred transition between the various strata and their lateral continuation rather than a precise plane of geological change. Subsurface and groundwater conditions between and beyond the test holes and test pits may differ significantly from those encountered at the test hole and test pit locations. The benchmark and elevations used in this report are primarily to establish relative elevation differences between the test hole and test pit locations and should not be used for other purposes, such as grading, excavating, planning, development, etc.

It should be noted that the results of the designated substance and chemical analysis refer only to the sample analyzed which was obtained from specific sampling location and sampling depth, and the presence of designated substance and soil chemistry may vary between and beyond the location and depth of the sample taken. Please note that the level of chemical testing outlined herein is meant to provide a broad indication of soil quality based on the limited soil samples tested. The analytical results contained in this report should not be considered a warranty with respect to the soil quality or the use of the soil for any specific purpose or the acceptability of the soils for any excess soil receiving sites.

The report reflects our best judgment based on the information available to GeoPro Consulting Limited at the time of preparation. Unless otherwise agreed in writing by GeoPro Consulting Limited, it shall not be used to express or imply warranty as to any other purposes. No portion of this report shall be used as a separate entity, it is written to be read in its entirety. The information contained herein in no way reflects on the environment aspects of the project, unless otherwise stated.

The design recommendations given in this report are applicable only to the project designed and constructed completely in accordance with the details stated in this report. Otherwise, our responsibility is limited to interpreting the subsurface information at the borehole or test pit locations.

Should any comments and recommendations provided in this report be made on any construction related issues, they are intended only for the guidance of the designers. The number of test holes and test pits may not be sufficient to determine all the factors that may affect construction activities, methods and costs. Such as, the thickness of surficial topsoil or fill layers may vary significantly and unpredictably; the amount of the cobbles and boulders may vary significantly than what described in the report; unexpected water bearing zones/layers with various thickness and extent may be encountered in the fill and native soils. The contractors bidding on this project or undertaking the construction should, therefore, make their own interpretation of the factual information presented and make their own conclusions as to how the subsurface conditions may affect their work and determine the proper construction methods.

Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. GeoPro Consulting Limited accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

We accept no responsibility for any decisions made or actions taken as a result of this report unless we are specifically advised of and participate in such action, in which case our responsibility will be as agreed to at that time.