



PHASE TWO ENVIRONMENTAL SITE ASSESSMENT  
**506249 HIGHWAY 89,  
PRIMROSE, ONTARIO**

DELTINI (MULMUR) INC.

PROJECT NO.: 191-06184-00

DATE: JUNE 2019

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June 25, 2019

Marika Zigon  
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Dear Madam:

WSP is pleased to present our Phase Two Environmental Site Assessment report for the above-noted property. This Phase Two Environmental Site Assessment was generally completed in accordance with Ontario Regulation 153/04, as amended. The report describes the interpreted environmental conditions at the property and provides conclusions for your consideration.

We trust that this information is sufficient for your current needs. If you have any questions or require further information, please contact us.

Kind regards,

A handwritten signature in black ink, appearing to read 'Jay Dolan', with a large, stylized flourish above the name.

Jay Dolan, P.Eng.  
Senior Project Engineer, Environment

WSP ref.: 191-06184-00

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# ACRONYMS AND ABBREVIATIONS

µm	micrometre(s)
APEC	area(s) of potential environmental concern as defined in O.Reg. 153/04, “the area on, in or under a phase one property where one or more contaminants are potentially present, as determined through the phase one environmental site assessment, including through (a) identification of past or present uses on, in or under the phase one property, and (b) identification of potentially contaminating activity”
As	arsenic
B-HWS	boron (hot water soluble)
BTEX	benzene, toluene, ethylbenzene, and xylenes
CALA	Canadian Association for Laboratory Accreditation
Cl-	chlorine
CN-	cyanide
Cr (VI)	hexavalent chromium
CSM	conceptual site model
DNAPL	dense non-aqueous phase liquid(s)
EC	electrical conductivity
ESA	environmental site assessment
ha	hectare(s)
Hg	mercury
ICC	Industrial/Commercial/Community
km	kilometre(s)
L	litre(s)
LNAPL	light non-aqueous phase liquid(s)
m	metre(s)
masl	metres above sea level
mbgss	metres below ground surface
MDL	method detection limit
MNRF	Ministry of Natural Resources and Forestry
MECP	Ministry of the Environment and Climate Change
N/S	Not Specified
Na	sodium
O.Reg. 153/04	Ontario Regulation 153/04, as amended
O.Reg. 347	Ontario Regulation 347, as amended



O.Reg. 903	Ontario Regulation 903, as amended
ORPs	other regulated parameter
PAH	polycyclic aromatic hydrocarbon
PCA	potentially contaminating activity as defined in O.Reg. 153/04, “a use or activity set out in Column A of Table 2 of Schedule D that is occurring or has occurred in a Phase One study area”
PCB	polychlorinated biphenyl
PCOC	potential contaminant(s) of concern
PHC	petroleum hydrocarbon
PID	photoionization detector
PIN	property identification number
ppm	parts per million
QA	quality assurance
QC	quality control
QPESA	Qualified Person for ESAs according to MECP O.Reg. 153/04
RA	Risk Assessment
RDL	reporting detection limit
RPI	Residential/Parkland/Institution
RPIICC	Residential/Parkland/Institution/Industrial/Commercial/Community
RSC	Record of Site Condition
SAP	Sampling and Analysis Plan
SAR	sodium adsorption ratio
Sb	antimony
Se	selenium
SOP	standard operating procedure(s)
SCS	Site Condition Standard
THM	trihalomethane
TOV	total organic vapours
UST	underground storage tank
VOC	volatile organic compound

# 1 EXECUTIVE SUMMARY

WSP was retained by Mr. Ray Duhamel of The Jones Consulting Group Ltd. on behalf of Deltini (Mulmur) Inc. to conduct a Phase Two Environmental Site Assessment (ESA) of 506249 Highway 89 in the Town of Primrose, Ontario (hereafter referred to as the “Phase Two Property” or “Site”). It is our understanding that this Phase Two ESA was undertaken to assess the soil and groundwater conditions prior to a property transaction, and that a Record of Site Condition (RSC) for the Phase Two Property is not required at this time.

The rectangular-shaped Site is located on the north side of Highway 89 in a primarily commercial and agricultural area in the Town of Primrose, Township of Mulmur, Ontario. The Phase Two Property currently contains a business known as “Steven’s BBQ Restaurant” and occupies a total surface area of approximately 0.8 ha (2.0 acres).

Based on a Phase One ESA completed by WSP in May 2019, the Phase Two Property is considered to have areas of potential environmental concern (APEC) due to the potentially contaminating activities (PCAs) shown in Table 1.1 below:

**Table 1.1 Phase One Environmental Assessment - PCA Summary**

PCAs	DESCRIPTION
PCA No. 28 (O. Reg. 153/04) Gasoline and Associated Products Storage in Fixed Tanks	<p><b>Phase One Study Area –</b> One (1) above ground storage tank was observed on the property abutting the north Site boundary. This tank was likely used to store fuel for agricultural equipment such as tractors. Due to this PCA being located to the north of the Site, and due the assumed groundwater direction flowing to the northwest, this PCA in WSP’s opinion does not contribute to an APEC.</p> <p><b>Phase One Study Area –</b> The property abutting the Site to the southeast (506255 Highway 89) contained a now-demolished Petro Canada Gas Bar. A gravel patch and groundwater monitoring well currently remain on the property, possibly indicating that the tanks have been removed. Three (3) gasoline tanks with capacities of 50,000L and one (1) diesel tank with a capacity of 25,000L were reported to have been installed in 2007. Four (4) single wall USTs had previously been removed from this location; three (3) of which had capacities of 35,000L with the remaining tank having a capacity of 22,700L. These former single-wall USTs had been installed between 1983 and 1989. This PCA contributes to <b>APEC-1</b> due to the environmental risk presented by leaking fuel tanks and piping, and due to the close proximity of this PCA to the Phase One Property.</p> <p><b>Phase One Study Area –</b> One (1) of the properties in the southeast portion of the Phase One Study Area (635721 Highway 10/24) is currently operating as a Petro Canada Gas Bar. This PCA contributes to <b>APEC-2</b> because groundwater flowing through this gas bar may eventually flow beneath the Phase One Property.</p>

A total of four (4) boreholes were advanced to maximum depths of 5.2 metres below ground surface (mbgs) on May 28, 2019 and June 11, 2019 under the supervision of WSP personnel. Three (3) of the four (4) boreholes were completed as groundwater-monitoring wells to facilitate groundwater sampling and to calculate local groundwater flow direction. All three (3) wells were purged and sampled on June 11, 2019. The borehole locations were selected based on the findings of the Phase One ESA (WSP, 2019). Soil and groundwater samples were submitted for analysis of potential contaminants of concern (PCOCs) including metals and other regulated parameters (ORPs), petroleum hydrocarbons (PHCs) and volatile organic compounds (VOCs).

WSP's Phase Two ESA findings are summarized below:

- Three (3) boreholes (BH19-01, BH19-03 and BH19-04) were advanced through a 5-cm thick layer of asphalt and granular fill ranging in thickness from 15 cm to 40 cm. Underlying the granular fill in two of the boreholes (BH19-01 and BH19-03) was an organic layer to a depth of 0.8 to 1.0 mbgs. Beneath the organic layer was clayey silt which extended to depths between 1.8 to 3.1 mbgs. Sand was encountered in BH19-03 from 1.8 to 3.4 mbgs. Sand and silt till was found to depths ranging from 3.6 to 3.8 mbgs and a gravelly sand and silt till/sand to sand and gravel layer was encountered to the final depths of the boreholes. Underlying the granular fill in BH19-04 was a sand and silt till which extended to the final depth of the borehole. BH19-02 was advanced through a 30-cm thick topsoil layer and a 50 cm reworked silty sand and gravel layer. Clayey silt/organics were encountered from 0.8 to 1.8 mbgs while clayey silt with no organics was found from 1.8 to 3.0 mbgs. Sand and silt till was encountered at 3.1 mbgs and extended to the final depth of the borehole. Based on the MECP Water Well Records reviewed as part of the Phase One ESA by WSP, bedrock depth is approximately 6.7 mbgs.
- The depth to groundwater was recorded in three (3) monitoring wells installed during the investigation. The groundwater levels ranged between 0.6 and 0.9 mbgs on June 18, 2019. The June 2019 groundwater elevations ranged from 457.3 to 457.5 m above mean sea level (masl). The inferred shallow groundwater flow direction is to the southeast below the Phase Two study area. Groundwater levels and flow direction can be influenced by seasonal fluctuations, utility services, and other subsurface features and can only be confirmed with long term monitoring.
- The soil and groundwater analytical results were compared to 2011 MECP Table 2 Full Depth Generic Site Condition Standards in a Potable Ground Water Condition for Industrial/Commercial/Community (ICC) land uses.
- On May 28, 2019 and June 11, 2019, a total of five (5) soil samples plus two (2) QA/QC samples (for a total of seven (7) samples), were submitted to the laboratory and analysed for potential contaminants of concern (PCOCs) including: metals and ORPs, PHCs and VOCs. Analytical results indicated that all soil samples submitted to the laboratory met the Table 2 ICC SCS for all parameters analyzed.
- On June 11, 2019, groundwater samples were obtained from each of the three (3) monitoring wells and submitted for analysis of metals and ORPs, PHCs, and VOCs. Analytical results indicated that the groundwater samples submitted to the laboratory all met Table 2 SCS for all parameters analysed except for the parameters shown in Table 1.2 below:

**Table 1.2 Summary of Metals and ORP Table 2 ICC SCS Exceedances in Groundwater**

WELL LOCATION	PARAMETER	TABLE 2 SCS (UG/L)	RESULT (UG/L)
BH19-01	Sodium	490,000	<b>581,000</b>
	Chloride	790,000	<b>853,000</b>
BH19-02	Sodium	490,000	<b>687,000</b>
	Chloride	790,000	<b>1,110,000</b>

Based on the findings of this Phase Two ESA, WSP presents the following conclusions and recommendations:

- All soil samples collected from the Phase Two Property met Table 2 ICC SCS for all tested parameters.

- Groundwater containing elevated sodium and chloride concentrations was found in two (2) of the three monitoring wells (BH19-01 and BH19-02). De-icing road salt (sodium chloride) is often the cause of elevated sodium and chloride concentrations adjacent to roadways and parking lots. The Phase Two Property is located adjacent to Highway 89; a provincial highway that has received decades of road salt applications during the winter months. Elevated sodium and chloride concentrations are of significance where soils must support vegetative root growth and where the water is to be used for potable applications. WSP understands that the Phase Two Property is to be combined with a larger land parcel to the north and that no agricultural uses are expected within this combined land parcel. For this reason, ecological risk exposure due to elevated groundwater sodium and chloride is considered low. Human health exposure risk via dermal contact due to the presence of elevated sodium and chloride in groundwater is considered negligible. Human health exposure risk due to ingestion of water containing elevated sodium and chloride is considered low, and can be effectively managed by (i) installing potable water well screens in deep aquifers beyond the influence of elevated sodium and chloride and/or (ii) installing end-of-pipe water treatment equipment to reduce sodium and chloride levels.
- All other groundwater parameters tested met their respective Table 2 SCS within samples collected from all three (3) wells.
- As development of the Phase Two Property is not expected to result in a more sensitive land use than the existing agricultural use, a Record of Site Condition (RSC) is not required under O.Reg. 153/04. If an RSC is required for any other purpose (i.e. municipal approvals), a formal risk management strategy for sodium and chloride in the form of a Risk Assessment may be needed prior to filing an RSC.

All three (3) monitoring wells installed by WSP for this study should be decommissioned in accordance with O.Reg. 903 when no longer required.

## 2 INTRODUCTION

WSP was retained by Mr. Ray Duhamel of The Jones Consulting Group Ltd. on behalf of Deltini (Mulmur) Inc. to conduct a Phase Two Environmental Site Assessment (ESA) of 506249 Highway 89 in the Town of Primrose, Ontario. It is our understanding that this environmental assessment has been requested to support a pending property transaction.

The Phase Two ESA was conducted in general compliance with O.Reg. 153/04 to support the proposed property transaction and commercial redevelopment of the Site. It is our understanding that the proposed development for the Phase Two Property is not considered a change to a more sensitive property use, and as such an RSC with the MECP will not be required under O.Reg. 153/04.

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### 2.1 SITE DESCRIPTION

The rectangular-shaped Site is located on the north side of Highway 89 in a primarily commercial and agricultural area within the Town of Primrose, Township of Mulmur, Ontario. The Phase Two Property currently contains a business known as “Steven’s BBQ Restaurant” and occupies a total surface area of approximately 0.8 ha (2.0 acres). The location of the Phase Two Property is depicted in **Figure 1**.

Property information for the Site is provided in Table 2.1 below:

**Table 2.1 Property Information**

CRITERION	DESCRIPTION
Municipal Address	506249 Highway 89, Primrose, Township of Mulmur, Ontario
Property Identification Numbers (PINs)	34128-0052 (LT)
Legal Description	Part of the East Half of Lot 1, Concession 2, West of Hurontario Street, Township of Mulmur, County of Dufferin

A legal survey dated April 6, 1984 prepared by Young & Young Surveying Inc., Ontario Land Surveyor, was provided showing the Phase Two Property. The Legal Survey is included as **Appendix A**.

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### 2.2 PROPERTY OWNERSHIP

Property ownership information for the Site is provided in the table below:

**Table 2.2 Property Ownership Information**

CRITERION	DESCRIPTION
Current Site Owner	2517653 Ontario Limited
Phase Two Site Representative	Mr. Ray Duhamel The Jones Consulting Group Ltd. 229 Maplevue Drive East Barrie, Ontario L4N 0W5

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## 2.3 CURRENT AND PROPOSED FUTURE USES

The Phase Two Property currently contains a business known as “Steven’s BBQ Restaurant”. Redevelopment of the property for commercial/industrial purposes has been proposed.

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## 2.4 APPLICABLE SITE CONDITION STANDARD

Analytical results were compared to the 2011 MECP Table 2 Full Depth Generic Site Condition Standards in a Potable Ground Water Condition for Industrial/Commercial/Community (ICC) property uses set out in the MECP publication *Soil, Groundwater and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act* (April 15, 2011). This evaluation standard for the Phase Two Property was selected for comparison purposes based on the following:

- There are no water bodies within 30 m of the Phase Two Property.
- The Phase Two Property has not been confirmed to be an “environmentally sensitive” site, as defined by O.Reg. 153/04.
- Commercial/Industrial land use is proposed for the Phase Two Property;
- It is possible that the future development may use groundwater below the Phase Two Property for potable applications;
- The pH of soil samples analysed during this investigation ranged from 7.61 to 7.80 which falls within the acceptable range pursuant to O.Reg. 153/04; and
- Bedrock was not encountered within 2 m of the ground surface during this investigation.

# 3 BACKGROUND INFORMATION

## 3.1 PHYSICAL SETTING

A summary of the Site’s physical setting as determined through the Phase One ESA (WSP, 2019) is provided in Table 3.1 below:

**Table 3.1 Summary of Physical Setting**

CRITERIA	DESCRIPTION
<ul style="list-style-type: none"> <li>Water Bodies and Areas of Natural Significance</li> </ul>	<p>A branch of the Boyne River is located 540 m northwest of the Phase One Property. The Boyne River flows in a northeasterly direction into the Nottawasaga River which itself flows in a northwesterly direction into Georgian Bay. There are no areas of natural significance within the Phase One Study Area. According to the MNR Natural Heritage Map, two threatened species, the bobolink and eastern meadowlark, have been observed on the Phase One Property and/or the Phase One Study Area and therefore the Phase One Property may be considered an environmentally sensitive area in accordance with O.Reg. 153/04, as amended.</p>
<ul style="list-style-type: none"> <li>Topography, Hydrology, Geology</li> </ul>	<p>The Phase One Property slopes in a north-to-northwesterly direction. The Phase One Property is relatively flat and has an elevation of approximately 455 - 465 masl. The topography in the vicinity of the Phase One Property also slopes to the north-to-northwest. Based on the local topography, the inferred shallow groundwater flow direction of the Phase One Study Area is to the northwest towards Boyne River.</p> <p>The Phase One Property is situated within a spillways physiographic region. The surficial geology of the Phase One Property is described as “glaciofluvial deposits including river deposits and delta facies”. The underlying bedrock within the area generally consists of sandstone, shale, dolostone, and siltstone of the Armabel Formation. According to the MECP Water Well Records, the bedrock depth within the Phase One Study Area is approximately 6.7 mbgs.</p>

## 3.2 PAST ASSESSMENTS AND INVESTIGATIONS

A Phase One ESA (WSP, 2019) was completed concurrently with this investigation and is referenced throughout this report. The Phase One CSM can be found in Section 4.3 below.

The following hydrogeological report was provided to WSP for review as part of this investigation:

*Preliminary Hydrogeological and Servicing Concepts Study – Primrose, Ontario (Township of Mulmur), Prepared for: Township of Mulmur, Prepared by: Azimuth Environmental Consulting, Inc. dated February 2008 (revised March 2009).*

The hydrogeological report provides a preliminary hydrogeological review and servicing concepts assessment for the Phase Two Property along with properties to the east, north and west. Azimuth excavated a total of eight (8) test pits to maximum depths of 1.0 mbgs, to conduct soil percolation tests. None of the test pits were located on the Phase Two Property. The soils consisted of brown clayey silt with trace gravel, brown sandy silt

with trace gravel and brown clay with some silt, trace sand and gravel. No monitoring wells were installed as part of the Azimuth investigation.



# 4 SCOPE OF INVESTIGATION

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## 4.1 OVERVIEW OF SITE INVESTIGATION

The Phase Two ESA involved an intrusive investigation of the APECs identified in the Phase One ESA. The Phase Two ESA was carried out in general accordance with O. Reg. 153/04. The Site investigation activities were limited to visible and accessible locations of the Site. Subsurface investigations, testing, sampling, and laboratory analyses were completed based on the findings of WSP's Phase One ESA, accessibility to each APEC, and site observations.

The site investigation program included the following:

- Clearance of public and private underground utilities and services prior to commencement of intrusive investigation activities;
- Preparation of a Health and Safety Plan and safe execution of all proposed work;
- Advancement of four (4) boreholes on the Phase Two Property to approximate maximum depths of 5.2 mbgs using a truck-mounted and a track-mounted drill rig. Soil samples from all boreholes were submitted for analysis. Soil lithology from each borehole was logged in the field and samples were screened for TOV with a photoionization detector. Borehole locations were chosen based on the APEC locations identified during the Phase One ESA (WSP, 2019).
- Based on field screening and visual/olfactory observations, worst-case/representative soil samples from the boreholes were submitted for laboratory testing of relevant PCOCs.
- Groundwater monitoring wells were installed within three (3) of the four (4) boreholes to assess groundwater quality below the Site;
- The groundwater-monitoring wells were purged to remove stagnant water and sampled for laboratory testing of relevant parameters of concern; and
- Soil and groundwater samples were submitted for chemical analysis to a CALA-certified laboratory in accordance with the MECP standards and requirements of O. Reg. 153/04 (as amended).

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### 4.1.1 SAMPLING AND ANALYSIS PLAN

The sampling and analysis plan (SAP) is provided in **Appendix B**. Per O.Reg. 153/04 Schedule E. Condition 3(5), WSP developed the standard operating procedures (SOPs) used in the field investigation.

Fieldwork for this Phase Two ESA was undertaken following the SOPs. Deviations from the SAP and SOPs, if any, are detailed in Section 4.4. The list of SOPs is presented in the table below.

**Table 4.1 List of Standard Operating Procedures Used in Field Investigation**

CATEGORY	SOP
i. Drilling	Auger/Boring Rigs Monitoring Well Hollow Stem Auger Advancement Soil Sample Material Descriptions
ii. Soil Sampling	Continuous Sampling Field Soil Sampling for VOC and PHC Analysis
iii. Soil Field Testing	Odour Identification Field Screening of Samples for Organic Vapours
iv. Monitoring Well Construction	Monitoring Well Construction Monitoring Well Development
v. Field Measurement of Water Quality Indicators	Temperature Measurement Conductivity Measurement pH Measurement
vi. Groundwater Monitoring/Sampling	Water Level Monitoring Monitoring Well Purging Monitoring Well Sampling Volatile Organic Sampling
vii. QA/QC Program	Quality Assurance Quality Control

## 4.2 MEDIA INVESTIGATED

A summary of the media investigated during the Phase Two ESA is provided in **Table 2** and **Table 3**, attached.

## 4.3 PHASE ONE CONCEPTUAL SITE MODEL

A Phase One CSM was presented in the Phase One ESA report by WSP (2019) and is presented in this report for reference as **Figure 2**. The Phase One CSM identified the PCAs and APECs for the Site, as described in Section 6.4.

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## **4.4 DEVIATIONS FROM THE SAMPLING AND ANALYSIS PLAN**

The Phase Two ESA was completed in accordance with the SAP.

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## **4.5 IMPEDIMENTS**

Impediments were not encountered during this investigation and, therefore, did not limit WSP's ability to carry out this Phase Two ESA in accordance with O.Reg. 153/04.

# 5 INVESTIGATION METHOD

## 5.1 GENERAL

This section provides a brief description of all methods employed by WSP during this Phase Two ESA. Where the method differs from the associated standard operating procedure, a detailed description of the method used and a rationale for the change in method is provided in the appropriate subsection below.

## 5.2 DRILLING

WSP staff inspected the Site and identified the preferred borehole locations based on the APEC locations identified in the Phase One ESA by WSP (2019), as shown on **Figure 2**. Borehole locations are shown on the Borehole Location Plan in **Figure 3**. Underground services below the Site were cleared prior to commencement of the drilling program. WSP arranged for public service locates to be completed through Ontario One Call and private services were cleared by *Allclear Private Locators*. A summary of the drilling details is presented in Table 5.1 below.

**Table 5.1 Summary of Drilling Details**

PARAMETER	DETAILS
Name of Drilling Contractor	Pontil Drilling Services Inc.
Drilling Equipment Used	Truck-mounted CME 45 auger rig and Track-mounted CME 55 auger rig.
Measures taken to minimize the potential for cross-contamination	A 50-mm stainless steel split spoon sampler was used to collect soil samples from the boreholes. The split spoon sampler was brushed clean of soil, washed in water containing phosphate free detergent, and rinsed in water for each sampling interval in order to reduce the potential for cross contamination.
Frequency of sample collection	All boreholes were sampled every 0.6 m per 0.8 m to the termination depths of each borehole.

On May 28 and June 11, 2019, four (4) boreholes (BH19-01 to BH19-04) were drilled on-site using a truck-mounted CME 45 and a track-mounted CME 55 drill rig supplied and operated by *Pontil Drilling Services Inc.* of Mount Albert, Ontario. The boreholes were advanced to maximum depths of 5.2 mbgs. Soil samples were collected from the native sand and silt till with varying amount of clay and gravel using a 50-mm diameter, 0.61-m long stainless-steel split spoon sampler.

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## 5.3 SOIL

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### 5.3.1 SOIL SAMPLING

Disposable nitrile gloves were used during sample collection and changed between each sample to minimize the potential for cross-contamination. Soil samples were described in the field by WSP staff and observations were recorded in a dedicated field book. Soil samples were collected directly into laboratory-supplied 250-ml and 120-mL amber glass jars and 40-mL methanol-preserved vials and were stored in a cooler on ice. Samples selected for laboratory analysis were handled under standard chain of custody procedures until received at the laboratory. The soil samples selected for laboratory analysis were considered representative of “worst-case” conditions in the boreholes based on field screening results and visual and olfactory observations.

All soil samples were submitted to AGAT Laboratories in Mississauga, Ontario. The soil samples submitted for chemical analysis are summarized in **Table 2**, appended.

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### 5.3.2 FIELD SCREENING MEASUREMENTS

Soil samples collected from the boreholes were field screened for TOV using an RKI Eagle 2 PID. In addition to visual and olfactory observations, the results of field screening were used to identify worst-case samples for submission to the laboratory. A summary of field screening measurements is provided in Table 5.2 below:

**Table 5.2 Summary of Field Screening Information**

PARAMETER	DESCRIPTION
i. Make and Model of Field Screening Instrument	RKI Eagle 2
ii. Chemicals that Field Screening Instrument Detects and Respective Detection Limits	VOCs with dynamic range of 0 parts per million (ppm) to 50,000 ppm
iii. Precision of the Measurements	3 significant figures
iv. Accuracy of the Measurements	± 5% display reading ± one digit
v. Calibration Reference Standards	Hexane and Isobutylene
vi. Calibration Procedures	The PID is factory-calibrated on an annual basis and the calibration was checked on a daily basis both prior to and after use in the field using 100 ppm isobutylene according to manufacturer procedures.

Field screening measurements (PID readings) are discussed in Section 6.2.2 and presented on the borehole logs included in **Appendix C**.

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## 5.4 GROUNDWATER

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### 5.4.1 GROUNDWATER WELL INSTALLATION AND MONITORING

Groundwater monitoring wells were installed in three (3) of the four (4) borehole locations (BH19-01, BH19-02, and BH19-03) by *Pontil Drilling Services Inc.* A truck-mounted drill rig was used for the installation of monitoring wells BH19-01 and BH19-3 on May 28, 2019 and a track-mounted drill rig was used to install monitoring well BH19-2 on June 11, 2019. Nitrile gloves were used to handle the well casings and screens during installation to minimize the potential for cross contamination during installation.

Monitoring wells BH19-01, BH19-02 and BH19-03 could not be screened to intersect the suspected local groundwater table based on observed conditions in the soil horizon (i.e. brown to grey colour change and/or observed change in moisture content) during the drilling and soil sampling activities. The groundwater levels were higher than expected and the wells would have not been sealed properly if screened across the water table. The wells were constructed using 50-millimetre (mm) Schedule 40 PVC riser and included a 3.1-m well screen (slot 10). A sand pack was placed in the borehole annulus around the well screen from the bottom of the well to approximately 0.3 m above the well screen. Bentonite holeplug seal was placed above the sand pack to surface. The wells were completed with flush-mount casings. The monitoring well construction details are shown on the attached borehole logs included as *Appendix C*.

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### 5.4.2 GROUNDWATER FIELD MEASUREMENT OF WATER QUALITY PARAMETERS

The monitoring wells were purged using HDPE tubing and a peristaltic pump. The wells were purged by removing three (3) well volumes or by purging the well dry three (3) times. The wells were sampled on June 11, 2019 using the peristaltic pump. Field measurements of water quality parameters were collected using a Hanna multi-meter as part of this assessment including field pH, electrical conductivity (EC), and temperature. Field groundwater quality measurements were obtained after the removal of each well volume and were recorded. This data has been archived and is available upon request.

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### 5.4.3 GROUNDWATER SAMPLING

On June 11, 2019, groundwater samples were collected from the newly-installed wells BH19-01, BH19-02 and BH19-03 following purging. The samples were collected in laboratory-supplied and preserved containers and stored in an ice-filled cooler. The groundwater samples were submitted under proper chain of custody procedures to AGAT Laboratories in Mississauga for analysis of metals and ORPs, PHCs, and VOCs.

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## 5.5 SEDIMENT SAMPLING

Sediment sampling was not conducted as part of this Phase Two ESA.

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## 5.6 ANALYTICAL TESTING

Soil and groundwater samples were submitted to AGAT Laboratories in Mississauga, Ontario for chemical analysis of the above-listed parameters. AGAT Laboratories is certified by CALA.

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## 5.7 RESIDUE MANAGEMENT PROCEDURES

The management of residues such as soil cuttings, purge and development groundwater, and fluids from equipment cleaning was conducted as shown in Table 5.3 below:

**Table 5.3 Summary of Residue Management Procedures**

RESIDUE	MANAGEMENT PROCEDURE
i. Soil cuttings from drilling and excavations	Soil cuttings were left on the Phase Two Property due to the absence of visual and olfactory observations of potential contaminants, and based on the analytical results contained in this report.
ii. Water from well development and purging	Groundwater from the development and purging of the monitoring wells was emptied onto the ground downstream of the wells based on the analytical results contained in this report.
iii. Fluids from equipment cleaning.	Equipment cleaning water was emptied onto the ground downstream of the wells. No equipment contamination was expected in the field due to WSP's field observations, and as confirmed by the analytical results included in this report.

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## 5.8 ELEVATION SURVEY

A ground surface elevation survey of each borehole location was conducted by a third-party surveyor. The ground surface elevations are shown on the borehole logs presented in **Appendix C**.

## 5.9 QUALITY ASSURANCE AND QUALITY CONTROL (QA/QC) MEASURES

The project-specific QA/QC measures are described in Table 5.4 below.

**Table 5.4 Quality Assurance and Quality Control Measures**

QA/QC MEASURE	DESCRIPTION
i. Sample containers, preservation, labelling, handling, and custody for samples submitted for laboratory analysis, including any deviations from the SAP.	<p>Soil samples from the boreholes were collected in 40 mL methanol-preserved vials for PHC F1/VOCs/BTEX analysis, 250ml and 120 mL glass jars without preservative for analysis of all other parameters at the sample locations.</p> <p>Groundwater samples from the monitoring wells were collected using the following laboratory supplied containers (the containers below collectively constitute one sample):</p> <ol style="list-style-type: none"> <li>VOCs – three (3) 40 mL glass vials preserved with a sodium bisulphate tablet</li> <li>PHC F1/BTEX – three (3) 40 mL glass vials preserved with a sodium bisulphate tablet</li> <li>PHC F2-F4 – one (1) 500 mL amber glass bottle, HCl preservative</li> <li>Inorganics – one (1) 500 mL plastic ‘general’ bottle, no preservation</li> <li>Dissolved metals – one (1) 125 mL plastic bottle, HNO<sub>3</sub> preservative</li> <li>Mercury – one (1) 100 mL clear glass bottle, HCl preservative</li> <li>Chromium VI – one (1) 125 mL plastic bottle, preserved with Ammonium Sulfate/Ammonium Hydroxide</li> <li>Cyanide – one (1) 125 mL plastic bottle, preserved with Sodium Hydroxide</li> </ol> <p>Groundwater samples were collected using dedicated sampling equipment for each well. Groundwater samples collected for dissolved metals, mercury, and chromium (VI) analysis were field-filtered using a dedicated 0.45-micron filter. Groundwater containers used for PHC F1/BTEX and VOC analysis were filled to achieve zero headspace. Sample containers were labelled with unique sample identification, the project number, and the sampling date. A laboratory-supplied chain of custody was completed. A copy was sent with the samples to the laboratory, and one (1) copy was retained for the project file.</p>
ii. Equipment cleaning procedures during sampling	<p>Nitrile gloves were replaced after each sample was collected to reduce the potential for cross-contamination of the samples.</p> <p>Field equipment was cleaned with soap and water, and was rinsed with municipal water between samples.</p>
iii. Field QC measures	<p>Blind field duplicate samples of soil and groundwater were collected and submitted for laboratory analysis as part of this investigation. A laboratory-prepared VOC trip blank was brought to the Site during the groundwater sampling and was submitted to the laboratory for analysis.</p>



QA/QC MEASURE

DESCRIPTION

<p>iv. Deviations from the procedures set out in the QA/QC program set out in the SAP.</p>	<p>None</p>
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Field duplicate samples were assessed as part of the QA/QC program through a comparison of the analytical results of the original samples to the field duplicate samples. Field duplicates measure the cumulative effects of both field and laboratory precision and hence provide an indication of overall precision. Therefore, field duplicates may have greater variability than laboratory duplicates which measure only laboratory precision. It is also expected that non-aqueous matrices will have a greater variance than aqueous matrices due to the heterogeneity of most non-aqueous samples (such as soil/sediment samples). Field duplicates were evaluated based on the relative percent difference (RPD) in parameter concentrations.

The RPD was calculated 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). The calculated RPD was assessed against the recommended performance criteria outlined in the 2011 Protocol where the measured concentration was greater than 5 times the MDL.

AGAT Laboratories also performed QA/QC procedures as outlined in their CALA procedures. These procedures included analysis of lab duplicates and blanks as well as analysis of surrogate recovery as outlined in the Certificates of Analysis provided in **Appendix D**.

# 6 RESULTS REVIEW AND EVALUATION

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## 6.1 GEOLOGY/SOIL STRATIGRAPHY

A brief summary of the subsurface conditions encountered within the Site is presented below. Detailed borehole logs are provided in *Appendix C*.

Three (3) boreholes (BH19-01, BH19-03 and BH19-04) were advanced through a 5-cm thick layer of asphalt and granular fill ranging in thickness of 15 to 40 cm. Underlying the granular fill in two (2) of the boreholes (BH19-01 and BH19-03) was an organic layer to a depth of 0.8 to 1.0 mbgs. Beneath the organic layer was clayey silt which extended to depths between 1.8 to 3.1 mbgs. Sand was encountered in BH19-03 from 1.8 to 3.4 mbgs. Sand and silt till was found to depths ranging from 3.6 to 3.8 mbgs and a gravelly sand and silt till/sand to sand and gravel layer was encountered to the final depths of the boreholes. Underlying the granular fill in BH19-04 was a sand and silt till which extended to the final depth of the borehole. BH19-02 was advanced through a 30-cm thick topsoil layer and a 50-cm reworked silty sand and gravel layer. Clayey silt/organics was encountered from 0.8 to 1.8 mbgs while clayey silt with no organics was found from 1.8 to 3.0 mbgs. Sand and silt till was encountered at 3.1 mbgs and extended to the final depth of the borehole.

Bedrock was not encountered during the Phase Two ESA investigation. Based on the MECP Water Well Records reviewed as part of the Phase One ESA by WSP, bedrock depth is approximately 6.7 mbgs.

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## 6.2 HYDROGEOLOGY

### 6.2.1 ELEVATIONS AND FLOW DIRECTION

Groundwater levels in the monitoring wells ranged from 0.6 to 0.9 mbgs on June 18, 2019. The well screens were 3.05 m in length and were installed in the native sand and silt till, clayey silt, and sands at all borehole locations. The starting (pre-purge) water levels were reported to be above the screen length in all monitoring wells.

Groundwater elevations were measured on June 18, 2019 and are presented in *Table 1*. The June 18, 2019 groundwater elevations ranged from 457.25 to 457.52 masl within the monitoring wells. The shallow inferred groundwater flow direction is to the southeast across the Site. Groundwater levels are presented in *Figure 4*.

Neither LNAPL nor DNAPL were found to be present in any of the monitoring wells on-site.

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### 6.2.2 HYDRAULIC GRADIENTS

The hydraulic gradient was calculated based on the June 18, 2019 groundwater elevations. The average horizontal hydraulic gradient was calculated to be 0.0043 based upon these measurements.

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## 6.3 RESULTS OF ANALYSIS

Analytical results are discussed in the following sub-sections.

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### 6.3.1 SOIL TEXTURE ANALYSIS

Results of the soil texture analysis are presented below.

**Table 6.1 Soil Texture Analysis**

CRITERIA	DESCRIPTION
i. rationale for the use of soil texture category,	Four (4) soil samples from the native material underwent grain size analysis, the results of which indicated that all four (4) samples were coarse textured, as defined by O.Reg. 153/04.
ii. a description of the results of the required grain size analysis	The results of the four (4) grain size analysis showed that all samples contained more than 50% by mass of particles that are 75 µm or larger in mean diameter (sand and gravel). BH19-01 SS3: 0% Gravel, 1% Sand, 70% Silt, 29% Clay BH19-01 SS6: 22% Gravel, 35% Sand, 32% Silt, 11% Clay BH19-04 SS2: 7% Gravel, 41% Sand, 37% Silt, 15% Clay BH19-04 SS5: 0% Gravel, 47% Sand, 43% Silt, 10% Clay
iii. a description and rationale for the number of samples collected and analysed	The grain size analyses were conducted as part of the Phase Two ESA. A total of four (4) samples were analyzed in order to characterize the soils across the Phase Two Property.

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### 6.3.2 FIELD SCREENING

Twenty-eight (28) soil samples were screened for TOV using a PID. TOV concentrations ranged from 0 ppm to 195 ppm. The TOV readings are included on the borehole logs included in **Appendix C**. The samples that were submitted for laboratory analysis of organic parameters (VOCs, PHCs) are indicated in **Table 2**.

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### 6.3.3 SOIL CHEMICAL QUALITY

The soil analytical results from the present investigation are presented in **Tables 4** through **6** and summarized on **Figure 5**.

The Laboratory Certificates of Analysis for the soil analysis completed during the present investigation are provided in **Appendix D**.

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### 6.3.4 SOIL - METALS AND OTHER REGULATED PARAMETERS

Four (4) soil samples were collected and submitted for analysis of metals and ORPs. The soil analytical results for metals and ORPs are provided in **Table 4** and the results of the laboratory analyses indicated that all samples analysed met Table 2 ICC SCS.

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### 6.3.5 SOIL - ALIPHATIC PETROLEUM HYDROCARBONS (PHC)

Four (4) soil samples were collected and submitted for analysis of PHCs. The soil analytical results for PHCs are provided in **Table 5** and the results of the laboratory analyses indicated that all samples analysed met Table 2 ICC SCS.

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### 6.3.6 SOIL - VOLATILE ORGANIC COMPOUNDS

Four (4) soil samples and two (2) blind field duplicate QA/QC samples were collected and submitted for analysis of VOCs. The soil analytical results for VOCs are provided in **Table 6** and the results of the laboratory analyses indicated that all samples analysed met Table 2 ICC SCS.

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### 6.3.7 GROUNDWATER CHEMICAL QUALITY

The groundwater analytical results from the June 2019 sampling event are presented in **Tables 7** through **9** and are summarized on **Figure 6**.

The Laboratory Certificates of Analysis for the groundwater analysis completed during the Phase Two ESA are provided in **Appendix D**.

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### 6.3.8 GROUNDWATER - METALS AND OTHER REGULATED PARAMETERS (ORP)

Three (3) groundwater samples were collected and submitted for analysis of metals and ORPs. The groundwater analytical results for metals and ORPs are provided in **Table 7**. Laboratory analytical results indicated that all samples analysed met the Table 2 SCS with the exceptions listed in Table 6.2 below:

**Table 6.2 Summary of Metals and ORP Exceedances in Groundwater**

LOCATION	PARAMETER	TABLE 2 SCS	RESULT
BH19-01	Sodium	490000	<b>581000</b>
	Chloride	790000	<b>853000</b>
BH19-02	Sodium	490000	<b>687000</b>
	Chloride	790000	<b>1110000</b>

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### 6.3.9 GROUNDWATER - PETROLEUM HYDROCARBONS

Three (3) groundwater samples were collected and submitted for analysis of PHCs. The groundwater analytical results for PHCs are provided in **Table 8** and the results of the laboratory analyses indicated that all samples analysed met Table 2 SCS.

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### 6.3.10 GROUNDWATER- VOLATILE ORGANIC COMPOUNDS

Three (3) groundwater samples and one (1) blind field QA/QC duplicate were collected and submitted for analysis of VOCs. The groundwater analytical results for VOCs are provided in **Table 9** and the laboratory analyses indicated that all samples analysed met Table 2 SCS.

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### 6.3.11 SEDIMENT QUALITY

Sediment testing was not a part of this scope of work.

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## 6.4 QUALITY ASSURANCE AND QUALITY CONTROL RESULTS

Proper field protocols for sample collection and handling were followed by all WSP personnel in accordance with the MECP *Guidance on Sampling and Analytical Methods for Use at Contaminated Sites in Ontario*. All field equipment was decontaminated before and between sample collection and clean nitrile gloves were used for each sample to eliminate the potential for cross contamination of samples. All soil and groundwater samples were collected directly into laboratory-supplied containers, preserved as required, and stored and shipped in ice-filled coolers. Proper chain of custody procedures were followed by WSP and the laboratory during sample transfer.

The RPDs for the analyzed parameters in duplicate samples (where the RPD could be calculated) were within the 2011 Protocol performance criteria. As such, it is WSP's opinion that the laboratory analytical data is reliable and reproducible.

A summary of the field duplicate soil and groundwater samples, and the results of the QA/QC comparisons of the duplicate samples indicating that the results can be interpreted with confidence is provided in Table 6.3.

**Table 6.3 Summary of QA/QC Results**

DATE	MEDIA	SAMPLE ID	FIELD DUPLICATE ID	PARAMETERS	QA/QC RESULTS
2019-05-28	Soil	BH19-01 SS5	DUP-1	VOCs	All results were within the 2011 Protocol criteria for RPD
2019-06-11		BH18-02 SS6	DUP-2	VOCs	All results were within the 2011 Protocol criteria for RPD
2019-06-11	Groundwater	BH19-03	GWDUP-1	VOCs	All results were within the 2011 Protocol criteria for RPD

A laboratory-prepared trip blank was included with the June 2019 groundwater samples and was analysed by the laboratory for VOCs. All concentrations were below the RDL indicating no contamination from the sample containers, preservatives, transportation, and storage conditions. The results also indicate that the laboratory instrument was not detecting analytical interference.

AGAT Laboratories carried out internal QA/QC measures including process recoveries, blanks, and replicate samples. The laboratory QA/QC results are provided on the Certificates of Analysis in **Appendix D**. The results were acceptable and therefore suitable for interpretation.

With respect to subsection 47 (3) of O.Reg. 153/04, all certificates of analysis of analytical reports received pursuant to clause 47 (2) (b) of the regulation comply with subsection 47(3), a certificate of analysis of analytical report has been received for each sample submitted for analysis, and all certificates of analysis or analytical reports received have been included in full in **Appendix D** to this Phase Two ESA report.

## 6.5 PHASE TWO CONCEPTUAL SITE MODEL

Through analysis and interpretation of the Phase One ESA, Phase One CSM, and field data gathered during this Phase Two ESA, a Phase Two CSM was developed.

Based on information obtained as part of the Phase One ESA (WSP, 2019), it was concluded that APECs associated with past activities/operations existed at the Site. The table of APECs, prepared in accordance with clause 16 (2) (a), Schedule D, O.Reg. 153/04, is presented in Table 6.4 below.

**Table 6.4 Summary of APECs Identified in Phase One ESA**

AREA OF POTENTIAL ENVIRONMENTAL CONCERN	LOCATION OF POTENTIAL ENVIRONMENTAL CONCERN ON PHASE ONE PROPERTY	POTENTIALLY CONTAMINATING ACTIVITY	LOCATION OF PCA (ON-SITE OR OFF-SITE)	POTENTIAL CONTAMINANTS OF CONCERN	MEDIA POTENTIALLY IMPACTED (GROUND WATER, SOIL AND/OR SEDIMENT)
APEC-1 Historical Gasoline Service Station in southwest adjoining property	Central and Southern portions of the Phase One Property	PCA No. 28 Gasoline and Associated Products in Fixed Tanks	Off-site	Metals & ORPs PHCs VOCs	Soil & Groundwater
APEC-2 Gasoline Service Station on property in western portion of Phase One Study Area	Central and Southern portions of the Phase One Property	PCA No. 28 Gasoline and Associated Products in Fixed Tanks	Off-site	Metals & ORPs PHCs VOCs	Soil & Groundwater

Table 6.5 below provides a summary discussion of the interpreted field data that is incorporated into the Phase Two CSM:

**Table 6.5 Summary of Phase Two Conceptual Site Model (CSM)**

CRITERIA	DISCUSSION
<p>i. a description and assessment of,</p> <ul style="list-style-type: none"> <li>a. areas where a PCA have occurred,</li> <li>b. APECs, and</li> <li>a. any subsurface structures and utilities on, in or under the phase two property that may affect contaminant distribution and transport</li> </ul>	<p>The Phase One ESA completed by WSP concurrently with this Phase Two ESA identified PCAs that contributed to the identification of APECs, as identified in <b>Figure 2</b>.</p> <p>The Phase One CSM (<b>Figure 2</b>) for the Site incorporates the information and data collected as part of this Phase Two ESA and Phase One ESA.</p> <p>A. In summary, off-site PCAs that were identified as contributing to on-site APECs included:</p> <p>PCA No. 28. Gasoline and Associated Products Storage in Fixed Tanks off-site (southeast neighboring property and another property to the east)</p> <p>B. The on-site APECs that were interpreted from the occurrence of the PCAs were:</p> <p>APEC #1 – Central and Southern portion of Phase Two Property – Gasoline and Associated Products in Fixed Tanks No exceedances relating to this APEC were identified on-site during this investigation.</p> <p>APEC #2 – Central and Southern portion of Phase Two Property – Gasoline and Associated Products in Fixed Tanks No exceedances relating to this APEC were identified on-site during this investigation.</p> <p>C. Underground utilities can affect contaminant distribution and transport. Trenches excavated to install utility services, and the associated granular backfill may provide preferential pathways for horizontal contaminant migration in the shallow subsurface.</p>
<p>ii. a description of and, as appropriate, figures illustrating, the physical setting of the phase two property and any areas under it including,</p> <ul style="list-style-type: none"> <li>a. stratigraphy from ground surface to the deepest aquifer or aquitard investigated,</li> <li>b. hydrogeological characteristics, including aquifers, aquitards and, in each hydrostratigraphic unit where one or more contaminants is present at concentrations above the</li> </ul>	<p>A. The Site is located within a spillways physiographic region. Three (3) boreholes (BH19-01, BH19-03 and BH19-04) were advanced through a 5-cm thick layer of asphalt and granular fill ranging in thickness of 15 to 40 cm. Underlying the granular fill in two of the boreholes (BH19-01 and BH19-03) was an organic layer to a depth of 0.8 to 1.0 mbgs. Beneath the organic layer was clayey silt which extended to depths between 1.8 to 3.1 mbgs. Sand was encountered in BH19-03 from 1.8 to 3.4 mbgs. Sand and silt till was found in both boreholes to depths ranging from 3.6 to 3.8 mbgs and a gravelly sand and silt till/sand to sand and gravel layer was encountered to the final depths of the boreholes. Underlying the granular fill in BH19-04 was a sand and silt till which extended to the final depth of the borehole. BH19-02 was advanced through a 30-cm thick topsoil layer and a 50 cm reworked silty sand and gravel layer. Clayey silt/organics was encountered from 0.8 to 1.8 mbgs while clayey silt with no organics was found from 1.8 to 3.0 mbgs.</p>

<p>applicable site condition standards, lateral and vertical gradients,</p> <p>c. approximate depth to bedrock,</p> <p>d. approximate depth to water table,</p> <p>e. any respect in which section 41 or 43.1 of the regulation applies to the property,</p> <p>f. areas where soil has been brought from another property and placed on, in or under the phase two property, and</p> <p>a. approximate locations, if known, of any proposed buildings and other structures</p>	<p>Sand and silt till was encountered at 3.1 mbgs and extended to the final depth of the borehole.</p> <p>B. The borehole sampling generally identified the on-site soils as predominantly silt and sand with no discernible aquitards identified in the explored depths of the boreholes suggesting that the sampled soils represent one hydrostratigraphic unit.</p> <p>C. Bedrock was not encountered during the Phase Two ESA. Based on the MECP Water Well Records reviewed as part of the Phase One ESA by WSP, the bedrock depth is approximately 6.7 mbgs.</p> <p>D. The depth to shallow groundwater in the overburden was approximately 0.6 to 0.9 mbgs, based on the June 2019 groundwater sampling event.</p> <p>E. A branch of the Boyne River is located 540 m northeast of the Phase One Property. The Boyne River flows in a northeasterly direction into the Nottawasaga River which flows in a northwesterly direction into Georgian Bay. According to the MNRF Natural Heritage Map, two threatened species, the bobolink and eastern meadowlark, have been observed on the Phase One Property or within the Phase One Study Area and therefore the Phase One Property may be considered an environmentally sensitive area in accordance with O.Reg. 153/04, as amended. The soil at the property has a pH value between 5 and 9.</p> <p>F. Soil was not brought from another property and placed on, in, or under the Site, as part of this Phase Two ESA.</p> <p>G. The Site is proposed for redevelopment as a commercial/industrial development. Building plans were not provided to WSP as part of this investigation.</p>
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<p>iii. where a contaminant is present on, in or under the phase two property at a concentration greater than the applicable site condition standard, identification of,</p> <p>A. each area where a contaminant is present on, in or under the phase two property at a concentration greater than the applicable site condition standard,</p> <p>B. the contaminants associated with each of the areas referred to in subparagraph A,</p> <p>C. each medium in which a contaminant associated with an area referred to in subparagraph is present,</p>	A.	B.	C.
	Central and Southwest portions of Phase Two Property	Sodium	Groundwater
	Central and Southwest portions of Phase Two Property	Chloride	Groundwater
	D. What is known about the areas of environmental impact:		
	<p>Groundwater</p> <p>Elevated Sodium and Chloride were identified during this investigation in the groundwater. It is likely that the application of de-icing road salt to the parking lot and adjacent roadways may have contributed to the elevated levels observed.</p>		



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| <ul style="list-style-type: none"> <li>D. a description and assessment of what is known about each of the areas referred to in subparagraph A,</li> <li>E. the distribution, in each of the areas referred to in subparagraph A, of each contaminant present in the area at a concentration greater than the applicable site condition standard, for each medium in which the contaminant is present, together with figures showing the distribution,</li> <li>F. anything known about the reason for the discharge of the contaminants present on, in or under the phase two property at a concentration greater than the applicable site condition standard into the natural environment,</li> <li>G. anything known about migration of the contaminants present on, in or under the phase two property at a concentration greater than the applicable site condition standard away from any APEC, including the identification of any preferential pathways,</li> <li>H. climatic or meteorological conditions that may have influenced distribution and migration of the contaminants, such as temporal fluctuations in groundwater levels, and</li> <li>I. if applicable, information concerning soil vapour intrusion of the contaminants into buildings including, <ul style="list-style-type: none"> <li>1. relevant construction features of a building, such as a basement or crawl space,</li> <li>2. building heating, ventilating and air conditioning</li> </ul> </li> </ul> | <ul style="list-style-type: none"> <li>E. The horizontal distribution of contaminants in groundwater on-site is presented in <b>Figure 6</b>. The vertical and lateral extent of the impacts are currently unknown.</li> <li>F. The presence of Sodium and Chloride impacts in groundwater is likely associated with the application of de-icing road salt.</li> <li>G. Migration of these contaminants will be affected by water infiltration and groundwater flow.</li> <li>H. Climatic or meteorological conditions are not considered to have greatly influenced the distribution or migration of the contaminants.</li> <li>I. Given the nature of the contaminants identified in this investigation, vapour intrusion is not considered a concern.</li> </ul> |
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<p>design and operation, and</p> <p>3. subsurface utilities,</p>	
<p>iv. where contaminants on, in or under the phase two property are present at concentrations greater than the applicable site condition standard, one or more cross-sections showing,</p> <p>A. the lateral and vertical distribution of a contaminant in each area where the contaminants is present at concentrations greater than the applicable site condition standard in soil, groundwater and sediment,</p> <p>B. approximate depth to water table in each area referred to in subparagraph A,</p> <p>C. stratigraphy from ground surface to the deepest aquifer or aquitard investigated, and</p> <p>D. any subsurface structures and utilities that may affect contaminant distribution and transport in each area referred to in subparagraph A</p>	<p>A. Plan view figures that indicate the horizontal distribution of contaminants are provided as:</p> <p>Figure 6 Summary of Chemical Analysis and Exceedances in Groundwater</p> <p>B. Groundwater levels are provided in <b>Table 1</b> and <b>Figure 4</b>.</p> <p>C. Stratigraphy from ground surface to the deepest strata investigated is provided in the borehole logs presented in <b>Appendix C</b>.</p> <p>D. Underground utilities have the potential to affect contaminant distribution and transport. Utilities were primarily located on the west side of the building. Underground utilities on the Phase Two Property and on adjacent properties may affect local migration of contaminants in the subsurface.</p>
<p>v. for each areas where a contaminant is present on, in or under the property at a concentration greater than the applicable site condition standard for the contaminant, a diagram identifying, with narrative explanatory notes,</p> <p>A. the release mechanisms,</p> <p>B. contaminant transport pathway,</p> <p>C. the human and ecological receptors located on, in or under the phase two property,</p> <p>D. receptor exposure points, and routes of exposure.</p>	<p>Elevated Sodium and Chloride in groundwater is likely due to the application of de-icing road salt on the parking lot of the Phase Two Property and adjacent roadways. An exposure diagram is available in <b>Appendix E</b>.</p>

# 7 SUMMARY AND CONCLUSIONS

Based on the Phase Two ESA, WSP presents the following findings:

- Three (3) boreholes (BH19-01, BH19-03 and BH19-04) were advanced through a 5-cm thick layer of asphalt and granular fill ranging in thickness between 15 to 40 cm. Underlying the granular fill in two (2) of the boreholes (BH19-01 and BH19-03) was an organic layer to a depth of 0.8 to 1.0 mbgs. Beneath the organic layer was clayey silt which extended to depths between 1.8 to 3.1 mbgs. Sand was encountered in BH19-03 from 1.8 to 3.4 mbgs. Sand and silt till was found in both boreholes to depths ranging from 3.6 to 3.8 mbgs and a gravelly sand and silt till/sand to sand and gravel layer was encountered to the final depths of the boreholes. Underlying the granular fill in BH19-04 was a sand and silt till which extended to the final depth of the borehole. BH19-02 was advanced through a 30-cm thick topsoil layer and a 50-cm reworked silty sand and gravel layer. Clayey silt/organics was encountered from 0.8 to 1.8 mbgs while clayey silt with no organics was found from 1.8 to 3.0 mbgs. Sand and silt till was encountered at 3.1 mbgs and extended to the final depth of the borehole. Based on the MECP Water Well Records reviewed as part of the Phase One ESA by WSP, bedrock depth is approximately 6.7 mbgs.
- The depth to groundwater was recorded in three (3) monitoring wells installed during the investigation. The groundwater levels were found to range between 0.6 and 0.9 mbgs on June 18, 2019. The June 2019 groundwater elevations ranged from 457.3 to 457.5 masl. The inferred shallow groundwater flow direction is the southeast below the Phase Two study area. Groundwater levels and flow direction can be influenced by seasonal fluctuation, utility services, and other subsurface features and can only be confirmed with long term monitoring.
- The soil and groundwater analytical results were compared to 2011 MECP Table 2 Full Depth Generic Site Condition Standards in a Potable Ground Water Condition for Industrial/Commercial/Community (ICC) land uses.
- On May 28 and June 11, 2019, a total of five (5) soil samples plus two (2) QA/QC samples were submitted to the laboratory and analysed for potential contaminants of concern (PCOCs) including metals and ORPs, PHCs and VOCs. The results of the analyses indicated that the soil samples tested all met Table 2 SCS for all parameters analyzed.
- On June 11, 2019, groundwater samples were obtained from the three (3) monitoring wells installed by WSP and submitted for analysis of metals and ORPs, PHCs, and VOCs. Analytical results indicated that the groundwater sampled from the monitoring wells met Table 2 SCS for all parameters analysed with the exception of the following parameters listed in Table 7.1:

**Table 7.1 Summary of Metals and ORP Exceedances in Groundwater**

LOCATION	PARAMETER	TABLE 2 SCS	RESULT
BH19-01	Sodium	490,000	<b>581,000</b>
	Chloride	790,000	<b>853,000</b>
BH19-02	Sodium	490,000	<b>687,000</b>
	Chloride	790,000	<b>1,110,000</b>

Based on the findings of this Phase Two ESA, WSP presents the following conclusions and recommendations:

- All soil samples collected from the Phase Two Property met Table 2 ICC SCS for all tested parameters.
- Groundwater containing elevated sodium and chloride concentrations was found in two (2) of the three (3) monitoring wells (BH19-01 and BH19-02). De-icing road salt (sodium chloride) is often the cause of elevated sodium and chloride concentrations adjacent to roadways and parking lots. The Phase Two Property is located adjacent to Highway 89; a provincial highway that has received decades of road salt applications during the winter months. Elevated sodium and chloride concentrations are of significance where soils must support vegetative root growth and where the water is to be used for potable applications. WSP understands that the Phase Two Property is to be combined with a larger land parcel to the north and that no agricultural uses are expected within this combined land parcel. For this reason, ecological risk exposure due to elevated groundwater sodium and chloride is considered low. Human health exposure risk via dermal contact due to the presence of elevated sodium and chloride in groundwater is considered negligible. Human health exposure risk due to ingestion of water containing elevated sodium and chloride is considered low, and can be effectively managed by (i) installing potable water well screens in deep aquifers beyond the influence of elevated sodium and chloride and/or (ii) installing end-of-pipe water treatment equipment to reduce sodium and chloride levels.
- All other groundwater parameters tested met their respective Table 2 SCS within samples collected from all three (3) wells.
- As development of the Phase Two Property is not expected to result in a more sensitive land use than the existing agricultural use, a Record of Site Condition (RSC) is not required under O.Reg. 153/04. If an RSC is required for any other purpose (i.e. municipal approvals), a formal risk management strategy for sodium and chloride in the form of a Risk Assessment may be needed prior to filing an RSC.

All three (3) monitoring wells installed by WSP for this study should be decommissioned in accordance with O.Reg. 903 when no longer required.

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## 7.1 QUALIFIER

This assignment was limited to the completion of a Phase Two ESA and analysis of potential Contaminants of Concern at the selected borehole locations. This report was prepared for the exclusive use of Deltini (Mulmur) Inc. and may not be relied upon by any other party without WSP's written consent.

The Phase Two ESA, sampling, and laboratory analyses were completed as documented in the report. Extrapolation of data beyond the borehole locations assumes that homogenous conditions exist beyond the sampling locations, which may not be the case. Therefore, it is not possible to state conclusively that the subsurface conditions encountered during this investigation exist beyond the sampled locations.

The conclusions provided in this report reflect our best judgment in light of the information available at the time of report preparation. Any use which a third party makes of this report, or any reliance on or any decisions to be made based on it, is the responsibility of such third parties. WSP accepts no responsibility for damages, if any, suffered by any third party because of decisions or actions taken, based on this report. Conclusions documented in this report do not apply to other land uses. It is understood that Site conditions, environmental or otherwise, are not static and that this report documents Site conditions at the time of the investigation.

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## 7.2 QUALIFICATIONS OF THE ASSESSORS

Nicole Corbett has an Environmental Technician Diploma and an Ecosystem Management Technology Diploma from Sir Sandford Fleming College. Her experience in environmental monitoring programs, includes long term leachate, ground and surface water monitoring. Observing and recording installation of piezometers, and groundwater sampling programs at landfills, and environmental drilling programs for Phase One & Two ESA's.

This report was reviewed by Jay Dolan, who is a licensed Professional Engineer (Ontario) with over twenty-five (25) years of full and part-time experience in environmental consulting and contracting. Jay has successfully applied in-situ remedial techniques to remediate contaminated soil and groundwater including chemical oxidation, bioremediation, soil vapour extraction and multi-phase extraction, and has successfully applied ex-situ techniques including bio-piling and "dig and dump". He has completed hundreds of Phase I, II and III Environmental Site Assessments and has prepared hundreds of assessment reports and remedial action plans for contaminated properties.

## 8 REFERENCES

- Ontario Ministry of the Environment and Climate Change (MECP). 1996. Guidance on Sampling and Analytical Methods for Use at Contaminated Sites in Ontario. December 1996.
- Ontario Ministry of the Environment and Climate Change (MECP). 2011a. Ontario Regulation 153/04, as amended, made under the Environmental Protection Act. July 1, 2011.
- Ontario Ministry of the Environment and Climate Change (MECP). 2011b. Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act. July 1, 2011.
- Ontario Ministry of the Environment and Climate Change (MECP). 2011c. Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act. July 1, 2011.
- Ontario Ministry of the Environment and Climate Change (MECP). 2013. Ontario Regulation 903: “Wells.” R.R.O. 1990, under the Ontario Water Resources Act, as amended by O.Reg. 331/13.
- Preliminary Hydrogeological and Servicing Concepts Study – Primrose, Ontario (Township of Mulmur), Prepared for: Township of Mulmur, Prepared by: Azimuth Environmental Consulting, Inc. dated February 2008 (revised March 2009).
- WSP Canada Inc. (WSP). Phase Two Environmental Site Assessment 506249 Highway 89, Primrose, Ontario. May 2019.

# TABLES



## Notes for Soil & Groundwater Summary Tables

1. mbgs = metres below ground surface
2. ORPs = other regulated parameters
3. PHCs = petroleum hydrocarbons
4. VOCs = volatile organic compounds
5. - = parameter not analyzed
6. Units for all soil analyses are in  $\mu\text{g/g}$  (ppm) unless otherwise indicated
7. Units for all groundwater analyses are in  $\mu\text{g/L}$  (ppb) unless otherwise indicated
8. Table 2 = Full Depth Generic Site Condition Standards in a Potable Ground Water Condition with Coarse Textured Soils as contained in Table 2 of the "Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act", published by the MOECC on April 15, 2011
9. For soil and groundwater analytical results: **bold** = Concentration exceeds the 2011 MOECC Table 2 SCS



**Table 1 Monitoring Well Installation and Groundwater Levels**

Monitoring Well ID		BH19-01	BH19-02	BH19-03	
Installed By		WSP	WSP	WSP	
Installation Date		28-May-19	11-Jun-19	11-Jun-19	
Well Status		Active	Active	Active	
Well Inner Diameter	(mm)	50	50	50	
Top of Pipe Length	(m)	-0.08	-0.14	-0.12	
Ground Surface Elevation	(masl)	457.990	458.440	457.940	
Bottom of Concrete Seal/Top of Bentonite Seal	(mbgs)	0.30	0.30	0.30	
	(masl)	457.69	458.14	457.64	
Bottom of Bentonite Seal/Top of Sand Pack	(mbgs)	0.8	1.3	1.1	
	(masl)	457.19	457.14	456.84	
Top of Well Screen	(mbgs)	1.1	1.6	1.4	
	(masl)	456.89	456.84	456.54	
Screen Length	(m)	3.00	3.00	3.00	
Bottom of Screen	(mbgs)	4.1	4.6	4.4	
	(masl)	453.89	453.84	453.54	
18-Jun-19	Depth of GW	(mbgs)	0.61	0.92	0.69
	GW Elevation	(masl)	457.38	457.52	457.25

See "Notes for Soil and Groundwater Summary Tables" included at the beginning of this Section

**Table 2 Summary of Soil Samples Submitted for Chemical Analysis**

Borehole ID	Sample ID	Depth (mbgs)	Date	Soil Type	Laboratory Analyses
BH19-01	SS5	3.1 - 3.7	28-May-19	Sandy Silt Till	Metals and ORPs, PHCs, VOCs
	DUP-1				VOCs
BH19-02	SS6	3.8 - 4.4	28-May-19	Sandy Silt Till	Metals and ORPs, PHCs, VOCs
	DUP-2				VOCs
BH19-03	SS4	2.3 - 2.8	11-Jun-19	Sand	Metals and ORPs, PHCs, VOCs
BH19-04	SS3	1.5 - 2.1	11-Jun-19	Clayey Silty Sand	Metals and ORPs, PHCs, VOCs

See "Notes for Soil and Groundwater Summary Tables" included at the beginning of this Section

**Table 3: Summary of Groundwater Samples Submitted for Chemical Analysis**

Monitoring Well ID	Screened Interval (mbgs)	Date	Parameters		
			M&ORP	PHCs	VOCs
BH19-01	1.1 - 4.1	11-Jun-19	✓	✓	✓
BH19-02	1.4 - 4.4	11-Jun-19	✓	✓	✓
BH19-03	1.6 - 4.6	11-Jun-19	✓	✓	✓
GWDUP-1			-	-	✓

See "Notes for Soil and Groundwater Summary Tables" included at the beginning of this Section

**Table 4 Soil Analytical Results - Metals&ORPs**

Parameter		BH19-01 SS5	BH19-02 SS6	BH19-03 SS4	BH19-04 SS3
Date of Collection	Table 2 ICC CT	May 28, 2019	Jun 11, 2019	May 28, 2019	May 28, 2019
Date Reported		Jun 05, 2019	Jun 18, 2019	Jun 05, 2019	Jun 05, 2019
Sampling Depth (mbgs)		3.1 - 3.7	3.8 - 4.4	2.3 - 2.8	1.5 - 2.1
Analytical Report Reference No.		234638	270866	234639	234640
Antimony	40	<0.8	<0.8	<0.8	<0.8
Arsenic	18	3	2	2	2
Barium	670	33	40	12	18
Beryllium	8	<0.5	<0.5	<0.5	<0.5
Boron	120	7	6	<5	<5
Boron (Hot Water Soluble)	2	<0.10	<0.10	<0.10	<0.10
Cadmium	1.9	<0.5	<0.5	<0.5	<0.5
Chromium	160	11	10	8	8
Chromium VI	8	<0.2	<0.2	<0.2	<0.2
Cobalt	80	5.0	4.5	2.7	2.9
Copper	230	11	11	9	11
Cyanide	0.051	<0.040	<0.040	<0.040	<0.040
Lead	120	4	4	3	3
Mercury	3.9	<0.10	<0.10	<0.10	<0.10
Molybdenum	40	<0.5	<0.5	<0.5	<0.5
Nickel	270	11	11	5	6
Selenium	5.5	<0.4	<0.4	<0.4	<0.4
Silver	40	<0.2	<0.2	<0.2	<0.2
Thallium	3.3	<0.4	<0.4	<0.4	<0.4
Uranium	33	<0.5	<0.5	<0.5	<0.5
Vanadium	86	17	16	22	15
Zinc	340	23	20	13	14
Electrical Conductivity (mS/cm)	1.4	0.437	0.471	0.244	0.558
Sodium Adsorption Ratio	12	2.710	2.890	3.120	8.460
pH, 2:1 CaCl2 Extraction	5 to 9	7.66	7.61	7.80	7.65

See "Notes for Soil and Groundwater Summary Tables" included at the beginning of this Section

**Table 5 Soil Analytical Results - PHCs & BTEX**

Parameter		BH19-01 SS5	BH19-02 SS6	BH19-03 SS4	BH19-04 SS3
Date of Collection	Table 2 ICC CT	May 28, 2019	Jun 11, 2019	May 28, 2019	May 28, 2019
Date Reported		Jun 05, 2019	Jun 18, 2019	Jun 05, 2019	Jun 05, 2019
Sampling Depth (mbgs)		3.1 - 3.7	3.8 - 4.4	2.3 - 2.8	1.5 - 2.1
Analytical Report Reference No.		234638	270866	234639	234640
F1 (C6 to C10) minus BTEX	55	<5	<5	<5	<5
F2 (C10 to C16)	230	<10	<10	<10	<10
F3 (C16 to C34)	1700	<50	<50	<50	<50
F4 (C34 to C50)	3300	<50	<50	<50	<50

See "Notes for Soil and Groundwater Summary Tables" included at the beginning of this Section

**Table 6 Soil Analytical Results - VOCs**

Parameter		BH19-01 SS5	BH19-02 SS6	BH19-03 SS4	BH19-04 SS3	DUP-1
Date of Collection	Table 2 ICC CT	May 28, 2019	Jun 11, 2019	May 28, 2019	May 28, 2019	May 28, 2019
Date Reported		Jun 05, 2019	Jun 18, 2019	Jun 05, 2019	Jun 05, 2019	Jun 05, 2019
Sampling Depth (mbgs)		3.1 - 3.7	3.8 - 4.4	2.3 - 2.8	1.5 - 2.1	3.1 - 3.7
Analytical Report Reference No.		234638	270866	234639	234640	234641
Acetone	16	<0.50	<0.50	<0.50	<0.50	<0.50
Benzene	0.32	<0.02	<0.02	<0.02	<0.02	<0.02
Bromodichloromethane	1.5	<0.05	<0.05	<0.05	<0.05	<0.05
Bromoform	0.61	<0.05	<0.05	<0.05	<0.05	<0.05
Bromomethane	0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Carbon Tetrachloride	0.21	<0.05	<0.05	<0.05	<0.05	<0.05
Chlorobenzene	2.4	<0.05	<0.05	<0.05	<0.05	<0.05
Chloroform	0.47	<0.04	<0.04	<0.04	<0.04	<0.04
Dibromochloromethane	2.3	<0.05	<0.05	<0.05	<0.05	<0.05
Dichlorobenzene, 1,2-	1.2	<0.05	<0.05	<0.05	<0.05	<0.05
Dichlorobenzene, 1,3-	9.6	<0.05	<0.05	<0.05	<0.05	<0.05
Dichlorobenzene, 1,4-	0.2	<0.05	<0.05	<0.05	<0.05	<0.05
Dichlorodifluoromethane	16	<0.05	<0.05	<0.05	<0.05	<0.05
Dichloroethane, 1,1-	0.47	<0.02	<0.02	<0.02	<0.02	<0.02
Dichloroethane, 1,2-	0.05	<0.03	<0.03	<0.03	<0.03	<0.03
Dichloroethylene, 1,1-	0.064	<0.05	<0.05	<0.05	<0.05	<0.05
Dichloroethylene, Cis- 1,2-	1.9	<0.02	<0.02	<0.02	<0.02	<0.02
Dichloroethylene, Trans- 1,2-	1.3	<0.05	<0.05	<0.05	<0.05	<0.05
Dichloropropane, 1,2-	0.16	<0.03	<0.03	<0.03	<0.03	<0.03
Dichloropropene, 1,3-	0.059	<0.04	<0.04	<0.04	<0.04	<0.04
Ethylbenzene	1.1	<0.05	<0.05	<0.05	<0.05	<0.05
Ethylene Dibromide	0.05	<0.04	<0.04	<0.04	<0.04	<0.04
Hexane, n-	46	<0.05	<0.05	<0.05	<0.05	<0.05
Methyl Ethyl Ketone	70	<0.50	<0.50	<0.50	<0.50	<0.50
Methyl Isobutyl Ketone	31	<0.50	<0.50	<0.50	<0.50	<0.50
Methyl tert-butyl Ether	1.6	<0.05	<0.05	<0.05	<0.05	<0.05
Methylene Chloride	1.6	<0.05	<0.05	<0.05	<0.05	<0.05
Styrene	34	<0.05	<0.05	<0.05	<0.05	<0.05
Tetrachloroethane, 1,1,1,2-	0.087	<0.04	<0.04	<0.04	<0.04	<0.04
Tetrachloroethane, 1,1,2,2-	0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Tetrachloroethylene	1.9	<0.05	<0.05	<0.05	<0.05	<0.05
Toluene	6.4	<0.05	<0.05	<0.05	<0.05	<0.05
Trichloroethane, 1,1,1-	6.1	<0.05	<0.05	<0.05	<0.05	<0.05
Trichloroethane, 1,1,2-	0.05	<0.04	<0.04	<0.04	<0.04	<0.04
Trichloroethylene	0.55	<0.03	<0.03	<0.03	<0.03	<0.03
Trichlorofluoromethane	4	<0.05	<0.05	<0.05	<0.05	<0.05
Vinyl Chloride	0.032	<0.02	<0.02	<0.02	<0.02	<0.02
Xylene Mixture	26	<0.05	<0.05	<0.05	<0.05	<0.05

See "Notes for Soil and Groundwater Summary Tables" included at the beginning of this Section

**Table 6 Soil Analytical Results - VOCs**

Parameter	DUP-2	
Date of Collection	Table 2 ICC CT	Jun 11, 2019
Date Reported		Jun 18, 2019
Sampling Depth (mbgs)		3.8 - 4.4
Analytical Report Reference No.		270902
Acetone	16	<0.50
Benzene	0.32	<0.02
Bromodichloromethane	1.5	<0.05
Bromoform	0.61	<0.05
Bromomethane	0.05	<0.05
Carbon Tetrachloride	0.21	<0.05
Chlorobenzene	2.4	<0.05
Chloroform	0.47	<0.04
Dibromochloromethane	2.3	<0.05
Dichlorobenzene, 1,2-	1.2	<0.05
Dichlorobenzene, 1,3-	9.6	<0.05
Dichlorobenzene, 1,4-	0.2	<0.05
Dichlorodifluoromethane	16	<0.05
Dichloroethane, 1,1-	0.47	<0.02
Dichloroethane, 1,2-	0.05	<0.03
Dichloroethylene, 1,1-	0.064	<0.05
Dichloroethylene, Cis- 1,2-	1.9	<0.02
Dichloroethylene, Trans- 1,2-	1.3	<0.05
Dichloropropane, 1,2-	0.16	<0.03
Dichloropropene, 1,3-	0.059	<0.04
Ethylbenzene	1.1	<0.05
Ethylene Dibromide	0.05	<0.04
Hexane, n-	46	<0.05
Methyl Ethyl Ketone	70	<0.50
Methyl Isobutyl Ketone	31	<0.50
Methyl tert-butyl Ether	1.6	<0.05
Methylene Chloride	1.6	<0.05
Styrene	34	<0.05
Tetrachloroethane, 1,1,1,2-	0.087	<0.04
Tetrachloroethane, 1,1,2,2-	0.05	<0.05
Tetrachloroethylene	1.9	<0.05
Toluene	6.4	<0.05
Trichloroethane, 1,1,1-	6.1	<0.05
Trichloroethane, 1,1,2-	0.05	<0.04
Trichloroethylene	0.55	<0.03
Trichlorofluoromethane	4	<0.05
Vinyl Chloride	0.032	<0.02
Xylene Mixture	26	<0.05

See "Notes for Soil and Groundwater Summary Tables" included at the beginning of this Section

**Table 7 Groundwater Analytical Results - Metals&ORPs**

Parameter		BH19-01	BH19-02	BH19-03
Date of Collection	Table 2 Potable Groundwater CT	Jun 11, 2019	Jun 11, 2019	Jun 11, 2019
Date Reported		Jun 18, 2019	Jun 18, 2019	Jun 18, 2019
Screened Depth (mbgs)		1.1 - 4.1	1.6 - 4.6	1.4 - 4.4
Analytical Report Reference No.		270938	270989	270990
Antimony	6	<1.0	<1.0	<1.0
Arsenic	25	<1.0	8.1	<1.0
Barium	1000	87.6	273.0	259.0
Beryllium	4	<0.5	<0.5	<0.5
Boron	5000	45	25.8	25.8
Cadmium	2.7	<0.2	<0.2	<0.2
Chromium	50	5.5	6.8	3.4
Chromium VI	25	<5	<5	<5
Cobalt	3.8	1.3	1.5	0.7
Copper	87	<1.0	<1.0	1.4
Cyanide	66	<2	<2	<2
Lead	10	0.8	0.7	0.6
Mercury	0.29	<0.02	<0.02	<0.02
Molybdenum	70	2.6	1.9	4.8
Nickel	100	2.9	<1.0	<1.0
Selenium	10	<1.0	<1.0	<1.0
Silver	1.5	<0.2	<0.2	<0.2
Thallium	2	<0.3	<0.3	<0.3
Uranium	20	3.4	1.1	1.2
Vanadium	6.2	<0.4	<0.4	<0.4
Zinc	1100	<5.0	<5.0	<5.0
Sodium	490000	<b>581000</b>	<b>687000</b>	378000
Chloride	790000	<b>853000</b>	<b>1110000</b>	736000

See "Notes for Soil and Groundwater Summary Tables"  
included at the beginning of this Section



**Table 8 Groundwater Analytical Results - PHCs&BTEX**

Parameter		BH19-01	BH19-02	BH19-03
Date of Collection	Table 2 Potable Groundwater CT	Jun 11, 2019	Jun 11, 2019	Jun 11, 2019
Date Reported		Jun 18, 2019	Jun 18, 2019	Jun 18, 2019
Screened Depth (mbgs)		1.1 - 4.1	1.6 - 4.6	1.4 - 4.4
Analytical Report Reference No.		270938	270989	270990
F1 (C6 to C10) minus BTEX	750	<25	<25	<25
F2 (C10 to C16)	150	<100	<100	<100
F3 (C16 to C34)	500	<100	<100	<100
F4 (C34 to C50)	500	<100	<100	<100

See "Notes for Soil and Groundwater Summary Tables"  
included at the beginning of this Section

**Table 9 Groundwater Analytical Results - VOCs**

Parameter		BH19-01	BH19-02	BH19-03	GWDUP-1	Trip Blank
Date of Collection		Jun 11, 2019	Jun 11, 2019	Jun 11, 2019	Jun 11, 2019	N/A
Date Reported	Table 2 Potable Groundwater CT	Jun 18, 2019	Jun 18, 2019	Jun 18, 2019	Jun 18, 2019	Jun 18, 2019
Screened Depth (mbgs)		1.1 - 4.1	1.6 - 4.6	1.4 - 4.4	1.4 - 4.4	N/A
Analytical Report Reference No.		270938	270989	270990	270991	270992
Acetone	2700	<1.0	<4.0	<1.0	<1.0	<1.0
Benzene	5	<0.20	<0.80	<0.20	<0.20	<0.20
Bromodichloromethane	16	<0.20	<0.80	<0.20	<0.20	<0.20
Bromoform	25	<0.10	<0.40	<0.10	<0.10	<0.10
Bromomethane	0.89	<0.20	<0.80	<0.20	<0.20	<0.20
Carbon Tetrachloride	0.79	<0.20	<0.79	<0.20	<0.20	<0.20
Chlorobenzene	30	<0.10	<0.40	<0.10	<0.10	<0.10
Chloroform	2.4	<0.20	<0.80	<0.20	<0.20	<0.20
Dibromochloromethane	25	<0.10	<0.40	<0.10	<0.10	<0.10
Dichlorobenzene, 1,2-	3	<0.10	<0.40	<0.10	<0.10	<0.10
Dichlorobenzene, 1,3-	59	<0.10	<0.40	<0.10	<0.10	<0.10
Dichlorobenzene, 1,4-	1	<0.10	<0.40	<0.10	<0.10	<0.10
Dichlorodifluoromethane	590	<0.20	<0.80	<0.20	<0.20	<0.20
Dichloroethane, 1,1-	5	<0.30	<1.20	<0.30	<0.30	<0.30
Dichloroethane, 1,2-	1.6	<0.20	<0.80	<0.20	<0.20	<0.20
Dichloroethylene, 1,1-	1.6	<0.30	<1.20	<0.30	<0.30	<0.30
Dichloroethylene, cis- 1,2-	1.6	<0.20	<0.80	<0.20	<0.20	<0.20
Dichloroethylene, trans- 1,2-	1.6	<0.20	<0.80	<0.20	<0.20	<0.20
Dichloropropane, 1,2-	5	<0.20	<0.80	<0.20	<0.20	<0.20
Dichloropropene, 1,3-	0.5	<0.30	<0.50	<0.30	<0.30	<0.30
Ethylbenzene	2.4	<0.10	<0.40	<0.10	<0.10	<0.10
Ethylene Dibromide	0.2	<0.10	<0.20	<0.10	<0.10	<0.10
Hexane, n-	51	<0.20	<0.80	<0.20	<0.20	<0.20
Methyl Ethyl Ketone	1800	<1.0	<4.0	<1.0	<1.0	<1.0
Methyl Isobutyl Ketone	640	<1.0	<4.0	<1.0	<1.0	<1.0
Methyl tert-butyl ether	15	<0.20	<0.80	<0.20	<0.20	<0.20
Methylene Chloride	50	<0.30	<1.20	<0.30	<0.30	<0.30
Styrene	5.4	<0.10	<0.40	<0.10	<0.10	<0.10
Tetrachloroethane, 1,1,1,2-	1.1	<0.10	<0.40	<0.10	<0.10	<0.10
Tetrachloroethane, 1,1,2,2-	1	<0.10	<0.40	<0.10	<0.10	<0.10
Tetrachloroethylene	1.6	<0.20	<0.80	<0.20	<0.20	<0.20
Toluene	24	0.28	1.40	0.5	0.63	<0.20
Trichloroethane, 1,1,1-	200	<0.30	<1.20	<0.30	<0.30	<0.30
Trichloroethane, 1,1,2-	4.7	<0.20	<0.80	<0.20	<0.20	<0.20
Trichloroethylene	1.6	<0.20	<0.80	<0.20	<0.20	<0.20
Trichlorofluoromethane	150	<0.40	<1.60	<0.40	<0.40	<0.40
Vinyl Chloride	0.5	<0.17	<0.17	<0.17	<0.17	<0.17
Xylene Mixture	300	<0.20	<0.80	<0.20	<0.20	<0.20

See "Notes for Soil and Groundwater Summary Tables" included at the beginning of this Section

**Table 10 Summary of Maximum Concentrations in Soil**

Group	Parameter	Table 2 ICC CT	Maximum Concentration	Location
Metals & ORPs	Antimony	40	<0.8	all samples
	Arsenic	18	3	BH19-01 SS5
	Barium	670	40	BH19-02 SS6
	Beryllium	8	<0.5	all samples
	Boron	120	7	BH19-01 SS5
	Boron (Hot Water Soluble)	2	<0.10	all samples
	Cadmium	1.9	<0.5	all samples
	Chromium	160	11	BH19-01 SS5
	Chromium VI	8	<0.2	all samples
	Cobalt	80	5	BH19-01 SS5
	Copper	230	11	BH19-01 SS5
	Cyanide	0.051	<0.040	all samples
	Lead	120	4	BH19-01 SS5
	Mercury	3.9	<0.10	all samples
	Molybdenum	40	<0.5	all samples
	Nickel	270	11	BH19-01 SS5
	Selenium	5.5	<0.4	all samples
	Silver	40	<0.2	all samples
	Thallium	3.3	<0.4	all samples
	Uranium	33	<0.5	all samples
	Vanadium	86	22	BH19-03 SS4
Zinc	340	23	BH19-01 SS5	
Electrical Conductivity (mS/cm)	1.4	0.558	BH19-04 SS3	
Sodium Adsorption Ratio	12	8.46	BH19-04 SS3	
PHCs	F1 (C6 to C10) minus BTEX	55	<5	all samples
	F2 (C10 to C16)	230	<10	all samples
	F3 (C16 to C34)	1700	<50	all samples
	F4 (C34 to C50)	3300	<50	all samples
VOCs	Acetone	16	<0.50	all samples
	Benzene	0.32	<0.02	all samples
	Bromodichloromethane	1.5	<0.05	all samples
	Bromoform	0.61	<0.05	all samples
	Bromomethane	0.05	<0.05	all samples
	Carbon Tetrachloride	0.21	<0.05	all samples
	Chlorobenzene	2.4	<0.05	all samples
	Chloroform	0.47	<0.04	all samples
	Dibromochloromethane	2.3	<0.05	all samples
	Dichlorobenzene, 1,2-	1.2	<0.05	all samples
	Dichlorobenzene, 1,3-	9.6	<0.05	all samples
	Dichlorobenzene, 1,4-	0.2	<0.05	all samples
	Dichlorodifluoromethane	16	<0.05	all samples
	Dichloroethane, 1,1-	0.47	<0.02	all samples
	Dichloroethane, 1,2-	0.05	<0.03	all samples
	Dichloroethylene, 1,1-	0.064	<0.05	all samples
	Dichloroethylene, Cis- 1,2-	1.9	<0.02	all samples

**Table 10 Summary of Maximum Concentrations in Soil**

Group	Parameter	Table 2 ICC CT	Maximum Concentration	Location
VOCs	Dichloroethylene, Trans- 1,2-	1.3	<0.05	all samples
	Dichloropropane, 1,2-	0.16	<0.03	all samples
	Dichloropropene, 1,3-	0.059	<0.04	all samples
	Ethylbenzene	1.1	<0.05	all samples
	Ethylene Dibromide	0.05	<0.04	all samples
	Hexane, n-	46	<0.05	all samples
	Methyl Ethyl Ketone	70	<0.50	all samples
	Methyl Isobutyl Ketone	31	<0.50	all samples
	Methyl tert-butyl Ether	1.6	<0.05	all samples
	Methylene Chloride	1.6	<0.05	all samples
	Styrene	34	<0.05	all samples
	Tetrachloroethane, 1,1,1,2-	0.087	<0.04	all samples
	Tetrachloroethane, 1,1,2,2-	0.05	<0.05	all samples
	Tetrachloroethylene	1.9	<0.05	all samples
	Toluene	6.4	<0.05	all samples
	Trichloroethane, 1,1,1-	6.1	<0.05	all samples
	Trichloroethane, 1,1,2-	0.05	<0.04	all samples
	Trichloroethylene	0.55	<0.03	all samples
	Trichlorofluoromethane	4	<0.05	all samples
	Vinyl Chloride	0.032	<0.02	all samples
Xylene Mixture	26	<0.05	all samples	

See "Notes for Soil and Groundwater Summary Tables" included at the beginning of this Section

**Table 11 Summary of Maximum Concentrations in Groundwater**

Group	Parameter	Table 2 Potable Groundwater CT	Maximum Concentration	Location
Metals & ORPs	Antimony	6	<1.0	all samples
	Arsenic	25	8.1	BH19-02
	Barium	1000	273	BH19-02
	Beryllium	4	<0.5	all samples
	Boron	5000	45	BH19-01
	Cadmium	2.7	<0.2	all samples
	Chromium	50	6.8	BH19-02
	Chromium VI	25	<5	all samples
	Cobalt	3.8	1.5	BH19-02
	Copper	87	1.4	BH19-03
	Cyanide	66	<2	all samples
	Lead	10	0.8	BH19-01
	Mercury	0.29	<0.02	all samples
	Molybdenum	70	4.8	BH19-03
	Nickel	100	2.9	BH19-01
	Selenium	10	<1.0	all samples
	Silver	1.5	<0.2	all samples
	Thallium	2	<0.3	all samples
	Uranium	20	3.4	BH19-01
	Vanadium	6.2	<0.4	all samples
Zinc	1100	<5.0	all samples	
Sodium	490000	687000	BH19-02	
Chloride	790000	1110000	BH19-02	
PHCs	F1 (C6 to C10) minus BTEX	750	<25	all samples
	F2 (C10 to C16)	150	<100	all samples
	F3 (C16 to C34)	500	<100	all samples
	F4 (C34 to C50)	500	<100	all samples
VOCs	Acetone	2700	<1.0	all samples
	Benzene	5	<0.20	all samples
	Bromodichloromethane	16	<0.20	all samples
	Bromoform	25	<0.10	all samples
	Bromomethane	0.89	<0.20	all samples
	Carbon Tetrachloride	0.79	<0.20	all samples
	Chlorobenzene	30	<0.10	all samples
	Chloroform	2.4	<0.20	all samples
	Dibromochloromethane	25	<0.10	all samples
	Dichlorobenzene, 1,2-	3	<0.10	all samples
	Dichlorobenzene, 1,3-	59	<0.10	all samples
	Dichlorobenzene, 1,4-	1	<0.10	all samples
	Dichlorodifluoromethane	590	<0.20	all samples
	Dichloroethane, 1,1-	5	<0.30	all samples
	Dichloroethane, 1,2-	1.6	<0.20	all samples
	Dichloroethylene, 1,1-	1.6	<0.30	all samples
	Dichloroethylene, cis- 1,2-	1.6	<0.20	all samples

**Table 11 Summary of Maximum Concentrations in Groundwater**

Group	Parameter	Table 2 Potable Groundwater CT	Maximum Concentration	Location
VOCs	Dichloroethylene, trans- 1,2-	1.6	<0.20	all samples
	Dichloropropane, 1,2-	5	<0.20	all samples
	Dichloropropene, 1,3-	0.5	<0.30	all samples
	Ethylbenzene	2.4	<0.10	all samples
	Ethylene Dibromide	0.2	<0.10	all samples
	Hexane, n-	51	<0.20	all samples
	Methyl Ethyl Ketone	1800	<1.0	all samples
	Methyl Isobutyl Ketone	640	<1.0	all samples
	Methyl tert-butyl ether	15	<0.20	all samples
	Methylene Chloride	50	<0.30	all samples
	Styrene	5.4	<0.10	all samples
	Tetrachloroethane, 1,1,1,2-	1.1	<0.10	all samples
	Tetrachloroethane, 1,1,2,2-	1	<0.10	all samples
	Tetrachloroethylene	1.6	<0.20	all samples
	Toluene	24	1.4	BH19-02
	Trichloroethane, 1,1,1-	200	<0.30	all samples
	Trichloroethane, 1,1,2-	4.7	<0.20	all samples
	Trichloroethylene	1.6	<0.20	all samples
	Trichlorofluoromethane	150	<0.40	all samples
	Vinyl Chloride	0.5	<0.17	all samples
Xylene Mixture	300	<0.20	all samples	


See "Notes for Soil and Groundwater Summary Tables" included at the beginning of this Section

# FIGURES





©Google Maps

 <p>561 Bryne Drive, Units C&amp;D Barrie, Ontario L4N 9Y3</p>	<b>SITE LOCATION PLAN</b>		
	<p>Scale: 1:55,000</p>	<p><b>PHASE TWO ENVIRONMENTAL SITE ASSESSMENT</b> <b>506249 HIGHWAY 89, PRIMOSE,</b> <b>TOWNSHIP OF MULMUR, ONTARIO</b></p>	<p>Prepared By: NC</p>
	<p>Date: June 2019</p>		<p>Reviewed By: JD</p>
<p>Project: 191-06184-00</p>	<p>Prepared For: Deltini (Mulmur) Inc.</p>	<p>Drawing No. <b>1</b></p>	





**POTENTIALLY CONTAMINATING ACTIVITIES (PCAs)**  
 (28) GASOLINE AND ASSOCIATED PRODUCTS STORAGE IN FIXED TANKS

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



126 DON HILLOCK DRIVE, UNIT 2  
 AURORA, ONTARIO CANADA L4G 0G9  
 TEL.: 905-750-3080 | FAX: 905-727-0463 | WWW.WSP.COM

LEGEND		AREAS OF POTENTIAL ENVIRONMENTAL CONCERN	
	APPROXIMATE PHASE ONE PROPERTY		APEC 1 & 2
	PHASE ONE STUDY AREA		
	5 m INTERVAL TOPOGRAPHIC CONTOURS		
	WATERCOURSE		
	WETLANDS		
	INFERRED GROUNDWATER FLOW DIRECTION		
	MECP WATER WELL RECORD		




Data Source: Ministry of Natural Resources, Ontario Base Mapping, October 2016

CLIENT:	DELTINI (MULMUR) INC.		PROJECT NO:	191-06184-00 100	DATE:	MAY 2019	TITLE:	CONCEPTUAL SITE MODEL			
DESIGNED BY:	-		DRAWN BY:	TP		CHECKED BY:	JD		DISCIPLINE:	ENVIRONMENT	
PROJECT:	PHASE ONE ENVIRONMENTAL SITE ASSESSMENT 506249 HIGHWAY 89 PRIMROSE, TOWNSHIP OF MULMUR, ONTARIO		FIGURE NO:	2	SCALE:	AS SHOWN		ISSUE:	-	REV.:	-



NOTE: AERIAL IMAGE OBTAINED FROM GOOGLE EARTH, 2015.

 <p>561 BRYNE DRIVE, UNITS C &amp; D BARRIE, ONTARIO CANADA L4N 9Y3 TEL.: 705-735-8771   FAX: 705-735-6450   WWW.WSP.COM</p>	PROJECT:	SCALE:	
	<p><b>PHASE TWO ENVIRONMENTAL SITE ASSESSMENT</b> <b>506249 HIGHWAY 89, PRIMROSE, ONTARIO</b></p>		1:700
	TITLE:	DRAWN BY:	KMT
	<p><b>BOREHOLE LOCATION PLAN</b></p>		PROJECT NO: 191-06184-00
		DATE: JUNE / 2019	
		FIGURE NO: 3	REV. #. -



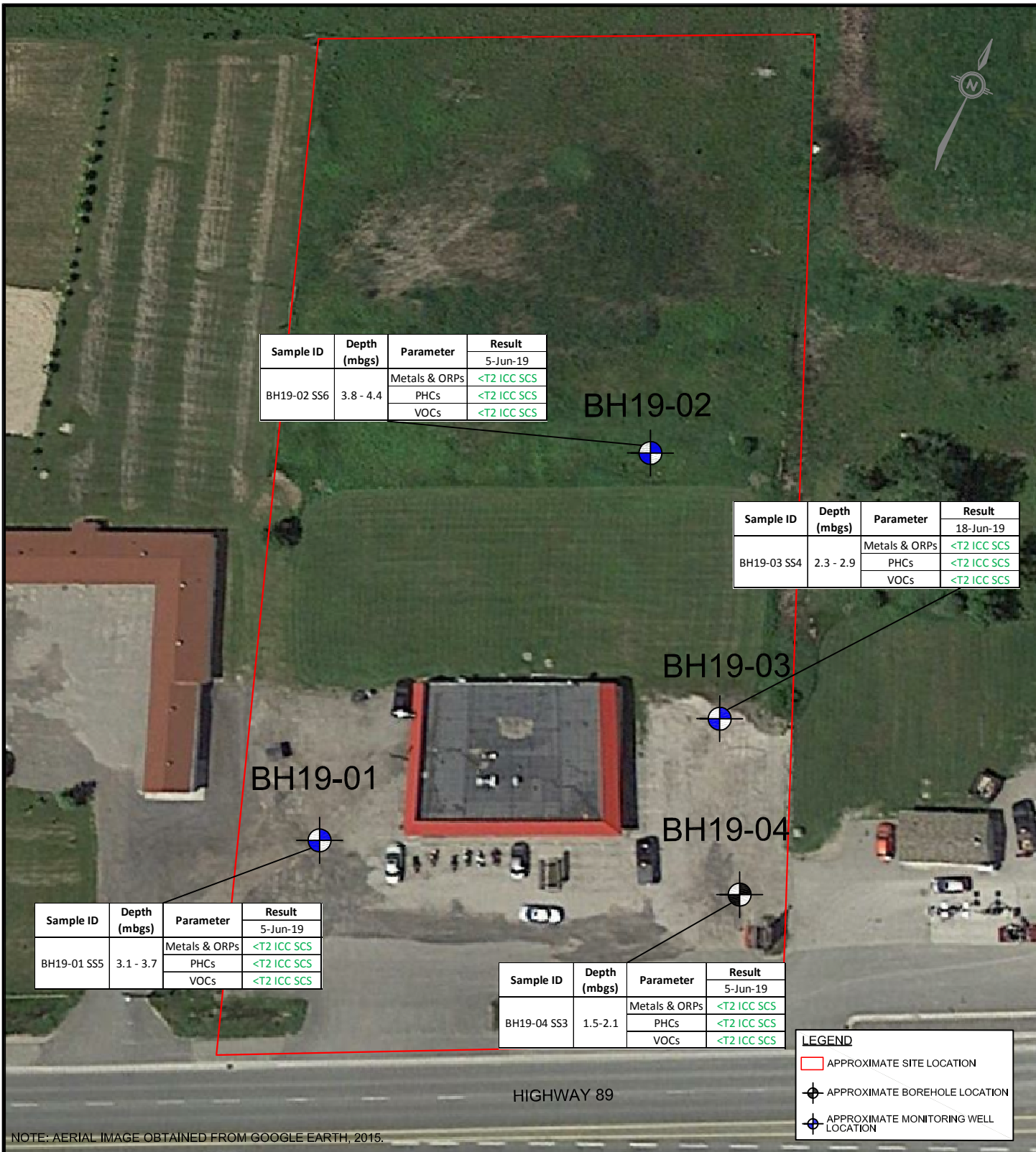
**LEGEND**


- APPROXIMATE SITE LOCATION
- APPROXIMATE BOREHOLE LOCATION
- APPROXIMATE MONITORING WELL LOCATION
- 457.25 GROUNDWATER ELEVATION (MASL)
- GROUNDWATER CONTOURS
- INFERRED GROUNDWATER FLOW DIRECTION

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus  
 SDG, USDA, USDA/NRCS, AeroGRID, IGN, and the GIS User Community

Document Path: T:\19-06-184-00\MXD\2191-06-184-00 210 Figure 3 Groundwater Elevations.mxd

<p>126 DON HILLOCK DRIVE, UNIT 2        AURORA, ONTARIO CANADA L4G 0G9        TEL.: 905-750-3080   FAX: 905-727-0463   WWW.WSP.COM</p>	PROJECT: <b>PHASE TWO ENVIRONMENTAL SITE ASSESSMENT</b> <b>506249 HIGHWAY 89</b> <b>PRIMROSE, TOWNSHIP OF MULMUR, ONTARIO</b>	SCALE: <b>1:800</b>		
	TITLE: <b>GROUNDWATER CONTOUR MAP</b>	DRAWN BY: <b>TP</b>	CHECKED BY: <b>JD</b>	
	CLIENT: <b>DELTINI (MULMUR) INC.</b>	PROJECT NO: <b>191-06184-00 200</b>		DATE: <b>JUNE 2019</b>
		FIGURE NO: <b>4</b>	REV.: <b>-</b>	



 <p>561 BRYNE DRIVE, UNITS C &amp; D BARRIE, ONTARIO CANADA L4N 9Y3 TEL.: 705-735-8771   FAX: 705-735-8450   WWW.WSP.COM</p>	PROJECT: <b>PHASE TWO ENVIRONMENTAL SITE ASSESSMENT 506249 HIGHWAY 89, PRIMROSE, ONTARIO</b>	SCALE: 1:700 DRAWN BY: KMT
	TITLE: <b>SUMMARY OF CHEMICAL ANALYSIS IN SOIL</b>	PROJECT NO: 191-06184-00 DATE: JUNE / 2019 FIGURE NO: 5



Sample ID	Screened Depth (mbgs)	Parameter	Result
BH19-02	1.6 - 4.6	Sodium	>T2 SCS
		Chloride	>T2 SCS
		All other Metals&ORPs	<T2 SCS
		PHCs	<T2 SCS
		VOCs	<T2 SCS

BH19-02

BH19-03

BH19-04

Sample ID	Screened Depth (mbgs)	Parameter	Result
BH19-01	1.1 - 4.1	Sodium	>T2 SCS
		Chloride	>T2 SCS
		All other Metals&ORPs	<T2 SCS
		PHCs	<T2 SCS
		VOCs	<T2 SCS

BH19-01

Sample ID	Screened Depth (mbgs)	Parameter	Result
BH19-03	1.4 - 4.4	Metals&ORPs	<T2 SCS
		PHCs	<T2 SCS
		VOCs	<T2 SCS

**LEGEND**

- APPROXIMATE SITE LOCATION
- APPROXIMATE BOREHOLE LOCATION
- APPROXIMATE MONITORING WELL LOCATION

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus  
 Data SIO, USDA, USDA/NRCS, AeroGRID, IGN, and the GIS User Community



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 TEL.: 905-750-3080 | FAX: 905-727-0463 | WWW.WSP.COM

PROJECT: PHASE TWO ENVIRONMENTAL SITE ASSESSMENT  
 506249 HIGHWAY 89  
 PRIMROSE, TOWNSHIP OF MULMUR, ONTARIO

TITLE: SUMMARY OF CHEMICAL ANALYSIS IN GROUNDWATER

CLIENT: DELTINI (MULMUR) INC.

SCALE: 1:800

DRAWN BY: TP CHECKED BY: JD

PROJECT NO: 191-06184-00 200

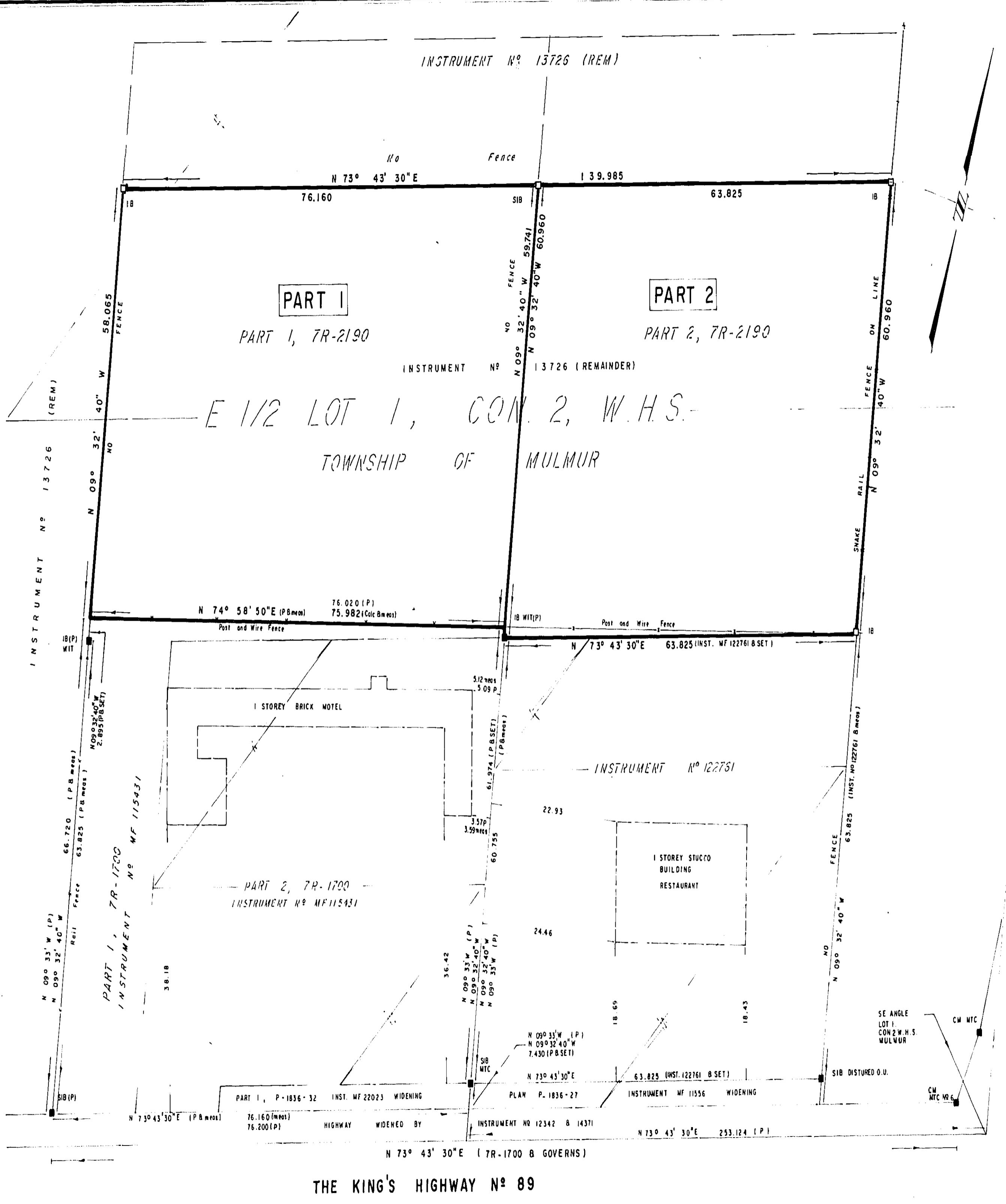
DATE: JUNE 2019

FIGURE NO: 6 REV.: -

# APPENDIX

# A LEGAL SURVEY





I REQUIRE THIS PLAN TO BE DEPOSITED UNDER THE REGISTRY ACT.  
 DATE April 6, 1984

PLAN TR-2194  
 RECEIVED AND DEPOSITED  
April 10, 1984

*John F. Young*  
 JOHN F. G. YOUNG B.Sc., O.L.S.  
 ONTARIO LAND SURVEYOR

*Joan Crawford*  
 LAND REGISTRAR FOR THE  
 REGISTRY DIVISION OF DUFFERIN  
 (N° 7)

**CAUTION: THIS PLAN IS NOT A PLAN OF SUBDIVISION WITHIN THE MEANING OF THE PLANNING ACT.**

PLAN OF SURVEY OF  
 PART OF THE EAST HALF OF LOT 1  
 CONCESSION 2, WEST OF HURONTARIO STREET  
 TOWNSHIP OF MULMUR, COUNTY OF DUFFERIN

SCALE 1:500  
 0m 5 10 15 20 30 40 50m  
 JOHN F. G. YOUNG B.Sc., O.L.S. 1984

SCHEDULE				
PART N°	LOT N°	CONCESSION	INST. N°	AREA
1	1	2 W.H.S.	13726 (REM)	0.446 Ha
2	1	2 W.H.S.	13726 (REM)	0.387 Ha

**NOTES:**  
 BEARINGS SHOWN HEREON ARE ASTRONOMIC AND ARE REFERRED TO THE N 73° 43' 30" E OF THE NORTH LIMIT OF HIGHWAY N° 89 AS WIDENED AND SHOWN ON DEPOSITED PLAN N° 7R-1700

- DENOTES SURVEY MONUMENT SET
- " SURVEY MONUMENT FOUND
- IB " IRON BAR (0.016 x 0.016 x 0.61 m)
- SIB " STANDARD IRON BAR (.025 x .025 x 1.219 m)
- MTC " MINISTRY OF TRANSPORTATION AND COMMUNICATIONS
- CM " CONCRETE MONUMENT
- (P) " PLAN 7R-1700
- WIT " WITNESS
- meas " MEASURED
- O.U. " ORIGIN UNKNOWN
- INST " INSTRUMENT

**METRIC:**  
 DISTANCES ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048

**SURVEYOR'S CERTIFICATE**  
 I CERTIFY THAT,  
 1) THIS SURVEY AND PLAN ARE CORRECT AND IN ACCORDANCE WITH THE SURVEYS ACT AND THE REGISTRY ACT AND THE REGULATIONS MADE THEREUNDER,  
 2) THE SURVEY WAS COMPLETED ON THE 6<sup>th</sup> DAY OF April, 1984

April 6, 1984  
 DATE

*John F. Young*  
 JOHN F. G. YOUNG B.Sc., O. L. S.  
 ONTARIO LAND SURVEYOR

**Young & Young Surveying Inc.**  
 TORONTO — 281 HUMBERCREST BLVD. M6S 4L5 769-8081  
 BOLTON — R R I BOLTON LOP 1A0 857-2484

DRAWN BY JFGY	LOT 1	PROJECT N° 84-B428-1
------------------	----------	-------------------------

# APPENDIX

## **B** SAMPLING AND ANALYSIS PLAN





## SAMPLING AND ANALYSIS PLAN

WSP was retained by Mr. Ray Duhamel of The Jones Consulting Group Ltd. on behalf of Deltini (Mulmur) Inc. to conduct a Phase Two Environmental Site Assessment (ESA) of 506249 Highway 89, in the Town of Primrose, Ontario. The purpose of the proposed Phase Two ESA is to assess the current subsurface environmental conditions in support of a property transaction.

The Phase Two ESA will involve intrusive investigation in the areas determined in the Site visit to be APECs, and will be completed in general accordance with O.Reg 153/04. Based on the findings of the field and laboratory analyses, a Phase Two ESA report will be prepared.

The Site Investigation Program will be completed as follows:

- Public and private underground utilities and services will be cleared prior to commencement of intrusive investigation activities
- A Health and Safety Plan will be prepared and all work will be executed safely
- Four (4) boreholes will be advanced on the Phase Two Property, to an approximate maximum depth of 5.0 m bgs using a track-mounted drill rig. The soil profile from each borehole will be logged in the field and samples will be screened for TOV with a PID. The location of the boreholes will be selected to investigate any APECs identified during the Site visit, as well as to delineate the horizontal and vertical extents of relevant parameters of concern.
- Based on field screening and visual/olfactory observations, worst-case/representative soil samples from the boreholes will be submitted for laboratory testing of relevant parameters of concern.
- Three (3) groundwater monitoring wells will be installed within three (3) of the four (4) boreholes to assess groundwater quality below the Site;
- The groundwater levels in the wells will be measured at least 24 hours after well development has been completed.
- The groundwater wells will be purged to remove stagnant water and sampled for laboratory testing of relevant parameters of concern.
- Both soil and groundwater samples will be submitted for chemical analysis by a CALA laboratory in accordance with the Ontario MECP standards and requirements of O.Reg. 153/04 under the Environmental Protection Act.

The proposed analytical program is outlined below (proposed program subject to change as a result of site observations/findings). All soil and groundwater sampling will be carried out in accordance with WSP's Standard Operating Procedures (SOPs).

### Soils:

- Four (4) soil samples for Metals and ORPs
- Four (4) soil samples for PHCs
- Four (4) soil samples for VOCs

- Two (2) soil sample for QA/QC purposes (duplicates)

Groundwater:

- Three (3) groundwater samples for Metals and ORPs
- Three (3) groundwater samples for VOCs
- Three (3) groundwater samples for PHCs
- Two (2) groundwater samples for QA/QC purposes (one duplicate and one trip blank)

Following receipt of all of the results, a report in accordance with O.Reg. 153/04 will be prepared.

It is noted that if the Phase Two ESA reveals parameter concentrations greater than the applicable standards set out in *Ontario Regulation 153/04*, then additional work (i.e., supplemental delineation, additional drilling, sampling, analysis, and/or site remediation activities) will be deemed necessary prior to RSC filing, should an RSC be required. The costs for any additional work, if necessary, are beyond the current scope of work.

**Finalized Sampling & Analysis Plan**

The finalized SAP was created based on the request to complete a Phase Two ESA for due diligence purposes. The SAP was compiled to collect data to provide information on soil and/or groundwater quality in each APEC.

Figure 3 outlines the borehole/monitoring well investigation locations. Table 4.1 provides the proposed and implemented SAP, which includes the specific requirements for sampling and analysis for the areas to be investigated.

Additional delineation may be required following the implementation of this SAP to meet the requirements of O.Reg. 153/04 which requires delineation of all areas where concentrations are above the applicable SCS such as in the following conditions:

Unexpected contamination not previously discovered, or not related to identified APECs, will need to be further delineated to identify source(s); and

Requirement for a minimum of three monitoring wells per stratigraphic unit would have to extend to underlying units if there is evidence of contamination extending into it; the SAP assumes contamination is limited to the upper stratigraphic unit (confirmed with clean sample) then the underlying units do not necessarily have to be characterized. The SAP has been developed using the available data, and may require additional delineation if sampling results come out suggesting impacts are deeper than initially expected.

# APPENDIX

## C BOREHOLE LOGS





LOG OF BOREHOLE BH19-01

PROJECT: Phase Two ESA  
 CLIENT: Deltini (Mulumur) Inc.  
 PROJECT LOCATION: 506249 Highway 89, Primrose, Ontario  
 DATUM: Geodetic  
 BH LOCATION: See Figure 1

Method: Hollow Stem Auger  
 Diameter: 150mm  
 Date: May/28/2019

REF. NO.: 191-06184-00  
 ENCL NO.: 1

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m <sup>3</sup> )	REMARKS AND GRAIN SIZE DISTRIBUTION (%)
(m) ELEV DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" BLOWS 0.3 m			20	40						
458.0	Ground Surface														GR SA SI CL
458.0	ASPHALT: 5cm														HEX: 10ppm, ISO: 1ppm
457.5	GRANULAR FILL: 40cm, sand and gravel, brown, moist, compact		1	SS	12										
457.0	ORGANICS: topsoil, dark brown, moist, very soft														HEX: 10ppm, ISO: 1ppm
457.0	CLAYEY SILT: trace sand, brown, moist, soft		2	SS	3										HEX: 5ppm, ISO: 0ppm
			3	SS	3										0 1 70 29
			4	SS	7										HEX: 0ppm, ISO: 0ppm
454.9	SAND AND SILT TILL: some clay, trace gravel, grey, very moist, compact		5	SS	11										HEX: 25ppm, ISO: 0ppm
454.2	GRAVELLY SAND AND SILT TILL: some clay, grey, wet/very moist, compact to dense		6	SS	16										HEX: 35ppm, ISO: 0ppm
			7	SS	33										HEX: 0ppm, ISO: 0ppm
452.8	END OF BOREHOLE: Notes: 1) Installed groundwater monitoring well upon completion.														

W. L. 457.4 m  
Upon Completion

WSP-SOIL-ROCK-MAY-28-2017-CLB  
WSP-SOIL-LOG-191-06184-00-BH1905-GPH-02949

GROUNDWATER ELEVATIONS  
 Measurement 1st 2nd 3rd 4th

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



LOG OF BOREHOLE BH19-02

PROJECT: Phase Two ESA  
 CLIENT: Deltini (Mulmur) Inc.  
 PROJECT LOCATION: 506249 Highway 89, Primrose, Ontario  
 DATUM: Geodetic  
 BH LOCATION: See Figure 1

Method: Hollow Stem Auger  
 Diameter: 200mm  
 Date: Jun/11/2019

REF. NO.: 191-06184-00  
 ENCL NO.: 2

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m <sup>3</sup> )	REMARKS AND GRAIN SIZE DISTRIBUTION (%)
(m) ELEV DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" BLOWS 0.3 m			20	40						
458.4	Ground Surface														GR SA SI CL
0.0	<b>TOPSOIL:</b> 30cm														HEX: 15ppm, ISO: 1ppm
458.1	<b>SILTY SAND AND GRAVEL (reworked):</b> greyish brown, moist, loose		1	SS	4										
457.7	<b>CLAYEY SILT/ORGANICS:</b> trace sand, trace rootlets, grey/dark brown, moist to very moist, firm		2	SS	7										HEX: 25ppm, ISO: 1ppm
456.6	<b>CLAYEY SILT:</b> trace sand, grey, very moist, firm		3	SS	6										HEX: 15ppm, ISO: 0ppm
456.2	brown		4	SS	13										HEX: 20ppm, ISO: 1ppm
455.6	grey		5	SS	7										HEX: 25ppm, ISO: 0ppm
455.4	<b>SAND AND SILT TILL:</b> some clay to clayey, grey, very moist, loose to compact		6	SS	7										HEX: 125ppm, ISO: 0ppm
			7	SS	12										HEX: 40ppm, ISO: 0ppm
453.3	<b>END OF BOREHOLE:</b> Notes: 1) Installed groundwater monitoring well upon completion.														

WSP-SOIL-ROCK-MAY-20-2017-CLB  
WSP-SOIL-LOG-191-06184-00-BH19-02-GPH-02910

**GROUNDWATER ELEVATIONS**  
 Measurement 1st 2nd 3rd 4th

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



LOG OF BOREHOLE BH19-03

PROJECT: Phase Two ESA  
 CLIENT: Deltini (Mulumur) Inc.  
 PROJECT LOCATION: 506249 Highway 89, Primrose, Ontario  
 DATUM: Geodetic  
 BH LOCATION: See Figure 1

Method: Hollow Stem Auger  
 Diameter: 200mm  
 Date: May/28/2019

REF. NO.: 191-06184-00  
 ENCL NO.: 3

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m <sup>3</sup> )	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
(m) ELEV DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" BLOWS 0.3 m			20 40 60 80 100	20 40 60 80 100						
457.9	Ground Surface														
457.9	ASPHALT: 5cm														HEX: 0ppm, ISO: 0ppm
457.7	GRANULAR FILL: 15cm, silty sand and gravel, brown, moist, loose ORGANICS: dark brown, moist, soft		1	SS	7										
457.2	CLAYEY SILT: trace sand, trace gravel, brown, moist, firm		2	SS	7										HEX: 40ppm, ISO: 0ppm
456.1	SAND: trace silt, reddish brown, wet, compact		3	SS	7										HEX: 145ppm, ISO: 0ppm
454.6	SAND AND SILT TILL: brown, moist, compact		5	SS	30										HEX: 195ppm, ISO: 0ppm
454.3	SAND TO SAND AND GRAVEL: brown, wet, compact to dense		6	SS	28										HEX: 15ppm, ISO: 1ppm
452.8	END OF BOREHOLE: Notes: 1) Installed groundwater monitoring well upon completion.		7	SS	43										HEX: 55ppm, ISO: 0ppm
															HEX: 90ppm, ISO: 0ppm

W. L. 457.3 m  
 Upon Completion  
 Jun 18, 2019

WSP-SOIL-ROCK-MAY-28-2017-CLB  
 WSP-SOIL-LOG-191-06184-00-BH1903-GPH-029410

GROUNDWATER ELEVATIONS  
 Measurement 1st 2nd 3rd 4th

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

PROJECT: Phase Two ESA	REF. NO.: 191-06184-00
CLIENT: Deltini (Mulumur) Inc.	Method: Hollow Stem Auger
PROJECT LOCATION: 506249 Highway 89, Primrose, Ontario	Diameter: 150mm
DATUM: Geodetic	Date: May/28/2019
BH LOCATION: See Figure 1	

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT				POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (g/cm <sup>3</sup> )	REMARKS AND GRAIN SIZE DISTRIBUTION (%)		
(m) ELEV DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" BLOWS 0.3 m			SHEAR STRENGTH (kPa)							NATURAL MOISTURE CONTENT	
															PLASTIC LIMIT	LIQUID LIMIT
458.1	Ground Surface													GR SA SI CL		
458.0	<b>ASPHALT: 5cm</b>						458							HEX: 15ppm, ISO: 2ppm		
457.8	<b>GRANULAR FILL: 25cm, silty sand and gravel, brown, moist, loose</b>		1	SS	15									HEX: 15ppm, ISO: 2ppm		
456.5	<b>SAND AND SILT TILL: some clay, trace gravel, brown, very moist, loose</b>						457							7 41 37 15		
456.5	trace organics for 30 cm, trace to some clay, dark grey													HEX: 55ppm, ISO: 1ppm		
456.5			3	SS	9									HEX: 15ppm, ISO: 1ppm		
456.5							456							HEX: 15ppm, ISO: 1ppm		
456.5			4	SS	10									HEX: 20ppm, ISO: 1ppm		
456.5							455							0 47 43 10		
456.5			5	SS	12									HEX: 15ppm, ISO: 1ppm		
456.5							454							HEX: 45ppm, ISO: 2ppm		
456.5			6	SS	5									HEX: 15ppm, ISO: 1ppm		
453.8	10 cm sandy clayey silt layer													HEX: 15ppm, ISO: 1ppm		
453.8			7	SS	12									HEX: 45ppm, ISO: 2ppm		
452.9	<b>END OF BOREHOLE:</b> Notes: 1) Borehole caved to 2.3 mbgs and water level was 1.8 mbgs upon completion.						453									

WSP- SOIL-ROCK-MAY-28-2017-CLB  
WSP- SOIL-LOG- 191-06184-00 BH1905-GRU 029410

GROUNDWATER ELEVATIONS      GRAPH NOTES      + 3 , × 3 : Numbers refer to Sensitivity      ○ e=3% Strain at Failure

Measurement      1st      2nd      3rd      4th

# APPENDIX

## D CERTIFICATES OF ANALYSIS





# APPENDIX

## *D-1 SOIL*





**CLIENT NAME: WSP CANADA INC.  
180 SHEARSON CRESCENT, UNIT 5  
CAMBRIDGE, ON N1T1P4  
(519) 740-0065**

**ATTENTION TO: Nicole Collins**

**PROJECT: 191-06184-00**

**AGAT WORK ORDER: 19T473632**

**SOIL ANALYSIS REVIEWED BY: Nivine Basily, Inorganics Report Writer**

**TRACE ORGANICS REVIEWED BY: Oksana Gushyla, Trace Organics Lab Supervisor**

**DATE REPORTED: Jun 05, 2019**

**PAGES (INCLUDING COVER): 14**

**VERSION\*: 1**

Should you require any information regarding this analysis please contact your client services representative at (905) 712-5100

**\*NOTES**

Empty box for notes.

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



## Certificate of Analysis

AGAT WORK ORDER: 19T473632

PROJECT: 191-06184-00

5835 COOPERS AVENUE  
MISSISSAUGA, ONTARIO  
CANADA L4Z 1Y2  
TEL (905)712-5100  
FAX (905)712-5122  
<http://www.agatlabs.com>

CLIENT NAME: WSP CANADA INC.

SAMPLING SITE: 506249 Highway 89, Primrose

ATTENTION TO: Nicole Collins

SAMPLED BY: Nicole Collins

### O. Reg. 153(511) - Metals & Inorganics (Soil)

DATE RECEIVED: 2019-05-31

DATE REPORTED: 2019-06-05

Parameter	Unit	SAMPLE DESCRIPTION:				
		BH19-01 SS5		BH19-03 SS4		BH19-04 SS3
		Soil		Soil		Soil
		DATE SAMPLED: 2019-05-28		2019-05-28		2019-05-28
	G / S	RDL	234638	234639	234640	
Antimony	µg/g	40	0.8	<0.8	<0.8	<0.8
Arsenic	µg/g	18	1	3	2	2
Barium	µg/g	670	2	33	12	18
Beryllium	µg/g	8	0.5	<0.5	<0.5	<0.5
Boron	µg/g	120	5	7	<5	<5
Boron (Hot Water Soluble)	µg/g	2	0.10	<0.10	<0.10	<0.10
Cadmium	µg/g	1.9	0.5	<0.5	<0.5	<0.5
Chromium	µg/g	160	2	11	8	8
Cobalt	µg/g	80	0.5	5.0	2.7	2.9
Copper	µg/g	230	1	11	9	11
Lead	µg/g	120	1	4	3	3
Molybdenum	µg/g	40	0.5	<0.5	<0.5	<0.5
Nickel	µg/g	270	1	11	5	6
Selenium	µg/g	5.5	0.4	<0.4	<0.4	<0.4
Silver	µg/g	40	0.2	<0.2	<0.2	<0.2
Thallium	µg/g	3.3	0.4	<0.4	<0.4	<0.4
Uranium	µg/g	33	0.5	<0.5	<0.5	<0.5
Vanadium	µg/g	86	1	17	22	15
Zinc	µg/g	340	5	23	13	14
Chromium VI	µg/g	8	0.2	<0.2	<0.2	<0.2
Cyanide	µg/g	0.051	0.040	<0.040	<0.040	<0.040
Mercury	µg/g	3.9	0.10	<0.10	<0.10	<0.10
Electrical Conductivity	mS/cm	1.4	0.005	0.437	0.244	0.558
Sodium Adsorption Ratio	NA	12	NA	2.71	3.12	8.46
pH, 2:1 CaCl2 Extraction	pH Units		NA	7.66	7.80	7.65

Certified By:

*Divine Basily*



**AGAT** Laboratories

# Certificate of Analysis

AGAT WORK ORDER: 19T473632

PROJECT: 191-06184-00

5835 COOPERS AVENUE  
MISSISSAUGA, ONTARIO  
CANADA L4Z 1Y2  
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FAX (905)712-5122  
<http://www.agatlabs.com>

CLIENT NAME: WSP CANADA INC.

SAMPLING SITE: 506249 Highway 89, Primrose

ATTENTION TO: Nicole Collins

SAMPLED BY: Nicole Collins

## O. Reg. 153(511) - Metals & Inorganics (Soil)

DATE RECEIVED: 2019-05-31

DATE REPORTED: 2019-06-05

**Comments:** RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to Table 2: Full Depth Generic Site Condition Standards in a Potable Ground Water Condition - Soil - Industrial/Commercial/Community Property Use - Coarse Textured Soils  
Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.

**234638-234640** EC was determined on the DI water extract obtained from the 2:1 leaching procedure (2 parts DI water:1 part soil). pH was determined on the 0.01M CaCl<sub>2</sub> extract prepared at 2:1 ratio. SAR is a calculated parameter.

Analysis performed at AGAT Toronto (unless marked by \*)

Certified By:

*Divine Basily*

# Certificate of Analysis

AGAT WORK ORDER: 19T473632

PROJECT: 191-06184-00

 5835 COOPERS AVENUE  
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 FAX (905)712-5122  
<http://www.agatlabs.com>

CLIENT NAME: WSP CANADA INC.

SAMPLING SITE: 506249 Highway 89, Primrose

ATTENTION TO: Nicole Collins

SAMPLED BY: Nicole Collins

## O. Reg. 153(511) - PHCs F1 - F4 (-BTEX) (Soil)

DATE RECEIVED: 2019-05-31

DATE REPORTED: 2019-06-05

Parameter	Unit	SAMPLE DESCRIPTION:		BH19-01 SS5	BH19-03 SS4	BH19-04 SS3
		G / S	RDL	234638	234639	234640
F1 (C6 to C10)	µg/g	55	5	<5	<5	<5
F1 (C6 to C10) minus BTEX	µg/g	55	5	<5	<5	<5
F2 (C10 to C16)	µg/g	230	10	<10	<10	<10
F3 (C16 to C34)	µg/g	1700	50	<50	<50	<50
F4 (C34 to C50)	µg/g	3300	50	<50	<50	<50
Gravimetric Heavy Hydrocarbons	µg/g	3300	50	NA	NA	NA
Moisture Content	%		0.1	11.7	16.9	10.4
Surrogate	Unit	Acceptable Limits				
Terphenyl	%	60-140		95	111	103

**Comments:** RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to Table 2: Full Depth Generic Site Condition Standards in a Potable Ground Water Condition - Soil - Industrial/Commercial/Community Property Use - Coarse Textured Soils  
 Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.

**234638-234640** Results are based on sample dry weight.  
 The C6-C10 fraction is calculated using toluene response factor.  
 C6-C10 (F1 minus BTEX) is a calculated parameter. The calculated value is F1 minus BTEX.  
 The C10 - C16, C16 - C34, and C34 - C50 fractions are calculated using the average response factor for n-C10, n-C16, and n-C34.  
 Gravimetric Heavy Hydrocarbons are not included in the Total C16-C50 and are only determined if the chromatogram of the C34 - C50 hydrocarbons indicates that hydrocarbons >C50 are present.  
 The chromatogram has returned to baseline by the retention time of nC50.  
 Total C6 - C50 results are corrected for BTEX contribution.  
 This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.  
 nC6 and nC10 response factors are within 30% of Toluene response factor.  
 nC10, nC16 and nC34 response factors are within 10% of their average.  
 C50 response factor is within 70% of nC10 + nC16 + nC34 average.  
 Linearity is within 15%.  
 Extraction and holding times were met for this sample.  
 Fractions 1-4 are quantified without the contribution of PAHs. Under Ontario Regulation 153, results are considered valid without determining the PAH contribution if not requested by the client.

Analysis performed at AGAT Toronto (unless marked by \*)

Certified By:





## Certificate of Analysis

AGAT WORK ORDER: 19T473632

PROJECT: 191-06184-00

5835 COOPERS AVENUE  
 MISSISSAUGA, ONTARIO  
 CANADA L4Z 1Y2  
 TEL (905)712-5100  
 FAX (905)712-5122  
<http://www.agatlabs.com>

CLIENT NAME: WSP CANADA INC.

SAMPLING SITE: 506249 Highway 89, Primrose

ATTENTION TO: Nicole Collins

SAMPLED BY: Nicole Collins

### O. Reg. 153(511) - VOCs (Soil)

DATE RECEIVED: 2019-05-31

DATE REPORTED: 2019-06-05

Parameter	Unit	SAMPLE DESCRIPTION:		DUP-1
		G / S	RDL	234641
Dichlorodifluoromethane	µg/g	16	0.05	<0.05
Vinyl Chloride	ug/g	0.032	0.02	<0.02
Bromomethane	ug/g	0.05	0.05	<0.05
Trichlorofluoromethane	ug/g	4	0.05	<0.05
Acetone	ug/g	16	0.50	<0.50
Dichloroethylene, 1,1-	ug/g	0.064	0.05	<0.05
Methylene Chloride	ug/g	1.6	0.05	<0.05
Dichloroethylene, Trans- 1,2-	ug/g	1.3	0.05	<0.05
Methyl tert-butyl Ether	ug/g	1.6	0.05	<0.05
Dichloroethane, 1,1-	ug/g	0.47	0.02	<0.02
Methyl Ethyl Ketone	ug/g	70	0.50	<0.50
Dichloroethylene, Cis- 1,2-	ug/g	1.9	0.02	<0.02
Chloroform	ug/g	0.47	0.04	<0.04
Dichloroethane, 1,2-	ug/g	0.05	0.03	<0.03
Trichloroethane, 1,1,1-	ug/g	6.1	0.05	<0.05
Carbon Tetrachloride	ug/g	0.21	0.05	<0.05
Benzene	ug/g	0.32	0.02	<0.02
Dichloropropane, 1,2-	ug/g	0.16	0.03	<0.03
Trichloroethylene	ug/g	0.55	0.03	<0.03
Bromodichloromethane	ug/g	1.5	0.05	<0.05
Methyl Isobutyl Ketone	ug/g	31	0.50	<0.50
Trichloroethane, 1,1,2-	ug/g	0.05	0.04	<0.04
Toluene	ug/g	6.4	0.05	<0.05
Dibromochloromethane	ug/g	2.3	0.05	<0.05
Ethylene Dibromide	ug/g	0.05	0.04	<0.04
Tetrachloroethylene	ug/g	1.9	0.05	<0.05
Tetrachloroethane, 1,1,1,2-	ug/g	0.087	0.04	<0.04
Chlorobenzene	ug/g	2.4	0.05	<0.05
Ethylbenzene	ug/g	1.1	0.05	<0.05
Bromoform	ug/g	0.61	0.05	<0.05

Certified By:



## Certificate of Analysis

AGAT WORK ORDER: 19T473632

PROJECT: 191-06184-00

5835 COOPERS AVENUE  
 MISSISSAUGA, ONTARIO  
 CANADA L4Z 1Y2  
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 FAX (905)712-5122  
<http://www.agatlabs.com>

CLIENT NAME: WSP CANADA INC.

SAMPLING SITE: 506249 Highway 89, Primrose

ATTENTION TO: Nicole Collins

SAMPLED BY: Nicole Collins

### O. Reg. 153(511) - VOCs (Soil)

DATE RECEIVED: 2019-05-31

DATE REPORTED: 2019-06-05

SAMPLE DESCRIPTION:		DUP-1		
SAMPLE TYPE:		Soil		
DATE SAMPLED:		2019-05-28		
Parameter	Unit	G / S	RDL	234641
Styrene	ug/g	34	0.05	<0.05
Tetrachloroethane, 1,1,2,2-	ug/g	0.05	0.05	<0.05
Dichlorobenzene, 1,3-	ug/g	9.6	0.05	<0.05
Dichlorobenzene, 1,4-	ug/g	0.2	0.05	<0.05
Dichlorobenzene, 1,2-	ug/g	1.2	0.05	<0.05
Xylene Mixture	ug/g	26	0.05	<0.05
Dichloropropene, 1,3-	µg/g	0.059	0.04	<0.04
Hexane, n-	µg/g	46	0.05	<0.05
Surrogate	Unit	Acceptable Limits		
Toluene-d8	% Recovery	50-140	108	
4-Bromofluorobenzene	% Recovery	50-140	76	

**Comments:** RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to Table 2: Full Depth Generic Site Condition Standards in a Potable Ground Water Condition - Soil - Industrial/Commercial/Community Property Use - Coarse Textured Soils  
 Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.

**234641** The sample was analyzed using the high level technique. The sample was extracted using methanol, a small amount of the methanol extract was diluted in water and the purge & trap GC/MS analysis was performed. Results are based on the dry weight of the soil.  
 Xylenes total is a calculated parameter. The calculated value is the sum of m&p-Xylene + o-Xylene.  
 1,3-Dichloropropene total is a calculated parameter. The calculated value is the sum of Cis-1,3-Dichloropropene and Trans-1,3-Dichloropropene.

Analysis performed at AGAT Toronto (unless marked by \*)

Certified By:



## Certificate of Analysis

AGAT WORK ORDER: 19T473632

PROJECT: 191-06184-00

5835 COOPERS AVENUE  
MISSISSAUGA, ONTARIO  
CANADA L4Z 1Y2  
TEL (905)712-5100  
FAX (905)712-5122  
<http://www.agatlabs.com>

CLIENT NAME: WSP CANADA INC.

SAMPLING SITE: 506249 Highway 89, Primrose

ATTENTION TO: Nicole Collins

SAMPLED BY: Nicole Collins

### O. Reg. 153(511) - VOCs (Soil)

DATE RECEIVED: 2019-05-31

DATE REPORTED: 2019-06-05

Parameter	Unit	SAMPLE DESCRIPTION:		BH19-01 SS5	BH19-03 SS4	BH19-04 SS3
		SAMPLE TYPE:		Soil	Soil	Soil
		DATE SAMPLED:		2019-05-28	2019-05-28	2019-05-28
		G / S	RDL	234638	234639	234640
Dichlorodifluoromethane	µg/g	16	0.05	<0.05	<0.05	<0.05
Vinyl Chloride	ug/g	0.032	0.02	<0.02	<0.02	<0.02
Bromomethane	ug/g	0.05	0.05	<0.05	<0.05	<0.05
Trichlorofluoromethane	ug/g	4	0.05	<0.05	<0.05	<0.05
Acetone	ug/g	16	0.50	<0.50	<0.50	<0.50
Dichloroethylene, 1,1-	ug/g	0.064	0.05	<0.05	<0.05	<0.05
Methylene Chloride	ug/g	1.6	0.05	<0.05	<0.05	<0.05
Dichloroethylene, Trans- 1,2-	ug/g	1.3	0.05	<0.05	<0.05	<0.05
Methyl tert-butyl Ether	ug/g	1.6	0.05	<0.05	<0.05	<0.05
Dichloroethane, 1,1-	ug/g	0.47	0.02	<0.02	<0.02	<0.02
Methyl Ethyl Ketone	ug/g	70	0.50	<0.50	<0.50	<0.50
Dichloroethylene, Cis- 1,2-	ug/g	1.9	0.02	<0.02	<0.02	<0.02
Chloroform	ug/g	0.47	0.04	<0.04	<0.04	<0.04
Dichloroethane, 1,2-	ug/g	0.05	0.03	<0.03	<0.03	<0.03
Trichloroethane, 1,1,1-	ug/g	6.1	0.05	<0.05	<0.05	<0.05
Carbon Tetrachloride	ug/g	0.21	0.05	<0.05	<0.05	<0.05
Benzene	ug/g	0.32	0.02	<0.02	<0.02	<0.02
Dichloropropane, 1,2-	ug/g	0.16	0.03	<0.03	<0.03	<0.03
Trichloroethylene	ug/g	0.55	0.03	<0.03	<0.03	<0.03
Bromodichloromethane	ug/g	1.5	0.05	<0.05	<0.05	<0.05
Methyl Isobutyl Ketone	ug/g	31	0.50	<0.50	<0.50	<0.50
Trichloroethane, 1,1,2-	ug/g	0.05	0.04	<0.04	<0.04	<0.04
Toluene	ug/g	6.4	0.05	<0.05	<0.05	<0.05
Dibromochloromethane	ug/g	2.3	0.05	<0.05	<0.05	<0.05
Ethylene Dibromide	ug/g	0.05	0.04	<0.04	<0.04	<0.04
Tetrachloroethylene	ug/g	1.9	0.05	<0.05	<0.05	<0.05
Tetrachloroethane, 1,1,1,2-	ug/g	0.087	0.04	<0.04	<0.04	<0.04
Chlorobenzene	ug/g	2.4	0.05	<0.05	<0.05	<0.05
Ethylbenzene	ug/g	1.1	0.05	<0.05	<0.05	<0.05
Bromoform	ug/g	0.61	0.05	<0.05	<0.05	<0.05

Certified By:





## Certificate of Analysis

AGAT WORK ORDER: 19T473632

PROJECT: 191-06184-00

5835 COOPERS AVENUE  
MISSISSAUGA, ONTARIO  
CANADA L4Z 1Y2  
TEL (905)712-5100  
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<http://www.agatlabs.com>

CLIENT NAME: WSP CANADA INC.

SAMPLING SITE: 506249 Highway 89, Primrose

ATTENTION TO: Nicole Collins

SAMPLED BY: Nicole Collins

### O. Reg. 153(511) - VOCs (Soil)

DATE RECEIVED: 2019-05-31

DATE REPORTED: 2019-06-05

Parameter	Unit	SAMPLE DESCRIPTION:				
		BH19-01 SS5		BH19-03 SS4		BH19-04 SS3
		SAMPLE TYPE: Soil		Soil		Soil
		DATE SAMPLED: 2019-05-28		2019-05-28		2019-05-28
	G / S	RDL	234638	234639	234640	
Styrene	ug/g	34	0.05	<0.05	<0.05	<0.05
Tetrachloroethane, 1,1,2,2-	ug/g	0.05	0.05	<0.05	<0.05	<0.05
Dichlorobenzene, 1,3-	ug/g	9.6	0.05	<0.05	<0.05	<0.05
Dichlorobenzene, 1,4-	ug/g	0.2	0.05	<0.05	<0.05	<0.05
Dichlorobenzene, 1,2-	ug/g	1.2	0.05	<0.05	<0.05	<0.05
Xylene Mixture	ug/g	26	0.05	<0.05	<0.05	<0.05
Dichloropropene, 1,3-	µg/g	0.059	0.04	<0.04	<0.04	<0.04
Hexane, n-	µg/g	46	0.05	<0.05	<0.05	<0.05
Surrogate	Unit	Acceptable Limits				
Toluene-d8	% Recovery	50-140	107	108	108	
4-Bromofluorobenzene	% Recovery	50-140	73	75	74	

**Comments:** RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to Table 2: Full Depth Generic Site Condition Standards in a Potable Ground Water Condition - Soil - Industrial/Commercial/Community Property Use - Coarse Textured Soils  
Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.

**234638-234640** The sample was analyzed using the high level technique. The sample was extracted using methanol, a small amount of the methanol extract was diluted in water and the purge & trap GC/MS analysis was performed. Results are based on the dry weight of the soil.  
Xylenes total is a calculated parameter. The calculated value is the sum of m&p-Xylene + o-Xylene.  
1,3-Dichloropropene total is a calculated parameter. The calculated value is the sum of Cis-1,3-Dichloropropene and Trans-1,3-Dichloropropene.

Analysis performed at AGAT Toronto (unless marked by \*)

Certified By:

## Quality Assurance

CLIENT NAME: WSP CANADA INC.

AGAT WORK ORDER: 19T473632

PROJECT: 191-06184-00

ATTENTION TO: Nicole Collins

SAMPLING SITE: 506249 Highway 89, Primrose

SAMPLED BY: Nicole Collins

Soil Analysis															
RPT Date: Jun 05, 2019			DUPLICATE				Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE		MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Measured Value		Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
<b>O. Reg. 153(511) - Metals &amp; Inorganics (Soil)</b>															
Antimony	236280		<0.8	<0.8	NA	< 0.8	124%	70%	130%	101%	80%	120%	96%	70%	130%
Arsenic	236280		1	1	NA	< 1	110%	70%	130%	106%	80%	120%	108%	70%	130%
Barium	236280		30	29	3.4%	< 2	103%	70%	130%	101%	80%	120%	96%	70%	130%
Beryllium	236280		<0.5	<0.5	NA	< 0.5	83%	70%	130%	104%	80%	120%	95%	70%	130%
Boron	236280		<5	<5	NA	< 5	89%	70%	130%	106%	80%	120%	95%	70%	130%
Boron (Hot Water Soluble)	234703		1.74	1.59	9.0%	< 0.10	102%	60%	140%	107%	70%	130%	103%	60%	140%
Cadmium	236280		<0.5	<0.5	NA	< 0.5	108%	70%	130%	102%	80%	120%	103%	70%	130%
Chromium	236280		7	7	NA	< 2	93%	70%	130%	102%	80%	120%	98%	70%	130%
Cobalt	236280		3.0	3.0	0.0%	< 0.5	92%	70%	130%	101%	80%	120%	91%	70%	130%
Copper	236280		6	7	15.4%	< 1	91%	70%	130%	103%	80%	120%	92%	70%	130%
Lead	236280		3	3	NA	< 1	103%	70%	130%	95%	80%	120%	88%	70%	130%
Molybdenum	236280		<0.5	<0.5	NA	< 0.5	112%	70%	130%	107%	80%	120%	107%	70%	130%
Nickel	236280		7	7	0.0%	< 1	96%	70%	130%	106%	80%	120%	95%	70%	130%
Selenium	236280		<0.4	<0.4	NA	< 0.4	121%	70%	130%	102%	80%	120%	105%	70%	130%
Silver	236280		<0.2	<0.2	NA	< 0.2	97%	70%	130%	100%	80%	120%	95%	70%	130%
Thallium	236280		<0.4	<0.4	NA	< 0.4	102%	70%	130%	105%	80%	120%	99%	70%	130%
Uranium	236280		<0.5	<0.5	NA	< 0.5	98%	70%	130%	106%	80%	120%	89%	70%	130%
Vanadium	236280		14	14	0.0%	< 1	93%	70%	130%	104%	80%	120%	101%	70%	130%
Zinc	236280		14	15	NA	< 5	99%	70%	130%	98%	80%	120%	87%	70%	130%
Chromium VI	234638	234638	<0.2	<0.2	NA	< 0.2	105%	70%	130%	97%	80%	120%	99%	70%	130%
Cyanide	234638	234638	<0.040	<0.040	NA	< 0.040	99%	70%	130%	103%	80%	120%	93%	70%	130%
Mercury	236280		<0.10	<0.10	NA	< 0.10	104%	70%	130%	100%	80%	120%	97%	70%	130%
Electrical Conductivity	233465		0.174	0.176	1.1%	< 0.005	101%	90%	110%						
Sodium Adsorption Ratio	228828		0.937	0.891	5.0%	NA									
pH, 2:1 CaCl2 Extraction	228821		7.48	7.50	0.3%	NA	98%	80%	120%						

Comments: NA signifies Not Applicable.

Duplicate Qualifier: As the measured result approaches the RL, the uncertainty associated with the value increases dramatically, thus duplicate acceptance limits apply only where the average of the two duplicates is greater than five times the RL

pH duplicates QA acceptance criteria was met relative as stated in Table 5-15 of Analytical Protocol document.

Certified By: \_\_\_\_\_

*Divine Basily*  
/

## Quality Assurance

**CLIENT NAME: WSP CANADA INC.**
**AGAT WORK ORDER: 19T473632**
**PROJECT: 191-06184-00**
**ATTENTION TO: Nicole Collins**
**SAMPLING SITE: 506249 Highway 89, Primrose**
**SAMPLED BY: Nicole Collins**

### Trace Organics Analysis

RPT Date: Jun 05, 2019			DUPLICATE			Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD		Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper

**O. Reg. 153(511) - VOCs (Soil)**

Dichlorodifluoromethane	236554		< 0.05	< 0.05	NA	< 0.05	102%	50%	140%	118%	50%	140%	97%	50%	140%
Vinyl Chloride	236554		< 0.02	< 0.02	NA	< 0.02	95%	50%	140%	109%	50%	140%	95%	50%	140%
Bromomethane	236554		< 0.05	< 0.05	NA	< 0.05	102%	50%	140%	102%	50%	140%	85%	50%	140%
Trichlorofluoromethane	236554		< 0.05	< 0.05	NA	< 0.05	106%	50%	140%	112%	50%	140%	94%	50%	140%
Acetone	236554		< 0.50	< 0.50	NA	< 0.50	101%	50%	140%	97%	50%	140%	97%	50%	140%
Dichloroethylene, 1,1-	236554		< 0.05	< 0.05	NA	< 0.05	91%	50%	140%	104%	60%	130%	110%	50%	140%
Methylene Chloride	236554		< 0.05	< 0.05	NA	< 0.05	93%	50%	140%	113%	60%	130%	90%	50%	140%
Dichloroethylene, Trans- 1,2-	236554		< 0.05	< 0.05	NA	< 0.05	103%	50%	140%	106%	60%	130%	105%	50%	140%
Methyl tert-butyl Ether	236554		< 0.05	< 0.05	NA	< 0.05	104%	50%	140%	104%	60%	130%	92%	50%	140%
Dichloroethane, 1,1-	236554		< 0.02	< 0.02	NA	< 0.02	87%	50%	140%	90%	60%	130%	93%	50%	140%
Methyl Ethyl Ketone	236554		< 0.50	< 0.50	NA	< 0.50	86%	50%	140%	106%	50%	140%	103%	50%	140%
Dichloroethylene, Cis- 1,2-	236554		< 0.02	< 0.02	NA	< 0.02	105%	50%	140%	100%	60%	130%	104%	50%	140%
Chloroform	236554		< 0.04	< 0.04	NA	< 0.04	108%	50%	140%	109%	60%	130%	91%	50%	140%
Dichloroethane, 1,2-	236554		< 0.03	< 0.03	NA	< 0.03	101%	50%	140%	97%	60%	130%	88%	50%	140%
Trichloroethane, 1,1,1-	236554		< 0.05	< 0.05	NA	< 0.05	119%	50%	140%	104%	60%	130%	102%	50%	140%
Carbon Tetrachloride	236554		< 0.05	< 0.05	NA	< 0.05	100%	50%	140%	112%	60%	130%	102%	50%	140%
Benzene	236554		< 0.02	< 0.02	NA	< 0.02	101%	50%	140%	99%	60%	130%	106%	50%	140%
Dichloropropane, 1,2-	236554		< 0.03	< 0.03	NA	< 0.03	99%	50%	140%	100%	60%	130%	93%	50%	140%
Trichloroethylene	236554		< 0.03	< 0.03	NA	< 0.03	94%	50%	140%	96%	60%	130%	112%	50%	140%
Bromodichloromethane	236554		< 0.05	< 0.05	NA	< 0.05	103%	50%	140%	108%	60%	130%	106%	50%	140%
Methyl Isobutyl Ketone	236554		< 0.50	< 0.50	NA	< 0.50	108%	50%	140%	99%	50%	140%	92%	50%	140%
Trichloroethane, 1,1,2-	236554		< 0.04	< 0.04	NA	< 0.04	111%	50%	140%	110%	60%	130%	97%	50%	140%
Toluene	236554		< 0.05	< 0.05	NA	< 0.05	119%	50%	140%	119%	60%	130%	110%	50%	140%
Dibromochloromethane	236554		< 0.05	< 0.05	NA	< 0.05	108%	50%	140%	104%	60%	130%	102%	50%	140%
Ethylene Dibromide	236554		< 0.04	< 0.04	NA	< 0.04	102%	50%	140%	106%	60%	130%	83%	50%	140%
Tetrachloroethylene	236554		< 0.05	< 0.05	NA	< 0.05	113%	50%	140%	113%	60%	130%	90%	50%	140%
Tetrachloroethane, 1,1,1,2-	236554		< 0.04	< 0.04	NA	< 0.04	106%	50%	140%	112%	60%	130%	112%	50%	140%
Chlorobenzene	236554		< 0.05	< 0.05	NA	< 0.05	114%	50%	140%	114%	60%	130%	93%	50%	140%
Ethylbenzene	236554		< 0.05	< 0.05	NA	< 0.05	112%	50%	140%	114%	60%	130%	111%	50%	140%
Bromoform	236554		< 0.05	< 0.05	NA	< 0.05	114%	50%	140%	105%	60%	130%	111%	50%	140%
Styrene	236554		< 0.05	< 0.05	NA	< 0.05	102%	50%	140%	99%	60%	130%	92%	50%	140%
Tetrachloroethane, 1,1,2,2-	236554		< 0.05	< 0.05	NA	< 0.05	115%	50%	140%	105%	60%	130%	98%	50%	140%
Dichlorobenzene, 1,3-	236554		< 0.05	< 0.05	NA	< 0.05	98%	50%	140%	103%	60%	130%	72%	50%	140%
Dichlorobenzene, 1,4-	236554		< 0.05	< 0.05	NA	< 0.05	97%	50%	140%	96%	60%	130%	71%	50%	140%
Dichlorobenzene, 1,2-	236554		< 0.05	< 0.05	NA	< 0.05	95%	50%	140%	94%	60%	130%	74%	50%	140%
Dichloropropene, 1,3-	236554		< 0.04	< 0.04	NA	< 0.04	99%	50%	140%	108%	60%	130%	93%	50%	140%
Hexane, n-	236554		< 0.05	< 0.05	NA	< 0.05	93%	50%	140%	104%	60%	130%	91%	50%	140%

**O. Reg. 153(511) - PHCs F1 - F4 (-BTEX) (Soil)**
**AGAT QUALITY ASSURANCE REPORT (V1)**

Page 10 of 14

AGAT Laboratories is accredited to ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA) and/or Standards Council of Canada (SCC) for specific tests listed on the scope of accreditation. AGAT Laboratories (Mississauga) is also accredited by the Canadian Association for Laboratory Accreditation Inc. (CALA) for specific drinking water tests. Accreditations are location and parameter specific. A complete listing of parameters for each location is available from www.cala.ca and/or www.scc.ca. The tests in this report may not necessarily be included in the scope of accreditation. RPDs calculated using raw data. The RPD may not be reflective of duplicate values shown, due to rounding of final results.

*Results relate only to the items tested. Results apply to samples as received.*

## Quality Assurance

CLIENT NAME: WSP CANADA INC.

AGAT WORK ORDER: 19T473632

PROJECT: 191-06184-00

ATTENTION TO: Nicole Collins

SAMPLING SITE: 506249 Highway 89, Primrose

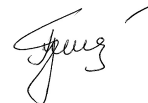
SAMPLED BY: Nicole Collins

### Trace Organics Analysis (Continued)

RPT Date: Jun 05, 2019			DUPLICATE				Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Measured Value		Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits		
								Lower	Upper		Lower	Upper		Lower	Upper	
F1 (C6 to C10)	228362		< 5	< 5	NA	< 5	96%	60%	130%	95%	85%	115%	80%	70%	130%	
F2 (C10 to C16)	231171		< 10	< 10	NA	< 10	108%	60%	130%	98%	80%	120%	70%	70%	130%	
F3 (C16 to C34)	231171		< 50	< 50	NA	< 50	109%	60%	130%	99%	80%	120%	70%	70%	130%	
F4 (C34 to C50)	231171		< 50	< 50	NA	< 50	105%	60%	130%	80%	80%	120%	108%	70%	130%	

Comments: When the average of the sample and duplicate results is less than 5x the RDL, the Relative Percent Difference (RPD) will be indicated as Not Applicable (NA).

Certified By: \_\_\_\_\_





## Method Summary

CLIENT NAME: WSP CANADA INC.

AGAT WORK ORDER: 19T473632

PROJECT: 191-06184-00

ATTENTION TO: Nicole Collins

SAMPLING SITE:506249 Highway 89, Primrose

SAMPLED BY:Nicole Collins

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
<b>Soil Analysis</b>			
Antimony	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Arsenic	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Barium	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Beryllium	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Boron	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Boron (Hot Water Soluble)	MET-93-6104	EPA SW 846 6010C; MSA, Part 3, Ch.21	ICP/OES
Cadmium	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Chromium	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Cobalt	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Copper	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Lead	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Molybdenum	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Nickel	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Selenium	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Silver	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Thallium	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Uranium	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Vanadium	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Zinc	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Chromium VI	INOR-93-6029	SM 3500 B; MSA Part 3, Ch. 25	SPECTROPHOTOMETER
Cyanide	INOR-93-6052	MOE CN-3015 & E 3009 A;SM 4500 CN	TECHNICON AUTO ANALYZER
Mercury	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Electrical Conductivity	INOR-93-6036	McKeague 4.12, SM 2510 B	EC METER
Sodium Adsorption Ratio	INOR-93-6007	McKeague 4.12 & 3.26 & EPA SW-846 6010C	ICP/OES
pH, 2:1 CaCl2 Extraction	INOR-93-6031	MSA part 3 & SM 4500-H+ B	PH METER

## Method Summary

**CLIENT NAME: WSP CANADA INC.**
**AGAT WORK ORDER: 19T473632**
**PROJECT: 191-06184-00**
**ATTENTION TO: Nicole Collins**
**SAMPLING SITE:506249 Highway 89, Primrose**
**SAMPLED BY:Nicole Collins**

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
<b>Trace Organics Analysis</b>			
F1 (C6 to C10)	VOL-91-5009	CCME Tier 1 Method, SW846 5035	P&T GC/FID
F1 (C6 to C10) minus BTEX	VOL-91-5009	CCME Tier 1 Method, SW846 5035	P&T GC/FID
F2 (C10 to C16)	VOL-91-5009	CCME Tier 1 Method	GC/FID
F3 (C16 to C34)	VOL-91-5009	CCME Tier 1 Method	GC/FID
F4 (C34 to C50)	VOL-91-5009	CCME Tier 1 Method	GC/FID
Gravimetric Heavy Hydrocarbons	VOL-91-5009	CCME Tier 1 Method	BALANCE
Moisture Content	VOL-91-5009	CCME Tier 1 Method	BALANCE
Terphenyl	VOL-91-5009	CCME Tier 1 Method	GC/FID
Dichlorodifluoromethane	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
Vinyl Chloride	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
Bromomethane	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
Trichlorofluoromethane	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
Acetone	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
Dichloroethylene, 1,1-	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
Methylene Chloride	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
Dichloroethylene, Trans- 1,2-	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
Methyl tert-butyl Ether	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
Dichloroethane, 1,1-	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
Methyl Ethyl Ketone	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
Dichloroethylene, Cis- 1,2-	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
Chloroform	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
Dichloroethane, 1,2-	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
Trichloroethane, 1,1,1-	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
Carbon Tetrachloride	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
Benzene	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
Dichloropropane, 1,2-	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
Trichloroethylene	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
Bromodichloromethane	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
Methyl Isobutyl Ketone	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
Trichloroethane, 1,1,2-	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
Toluene	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
Dibromochloromethane	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
Ethylene Dibromide	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
Tetrachloroethylene	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
Tetrachloroethane, 1,1,1,2-	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
Chlorobenzene	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
Ethylbenzene	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
Bromoform	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
Styrene	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
Tetrachloroethane, 1,1,2,2-	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
Dichlorobenzene, 1,3-	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
Dichlorobenzene, 1,4-	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
Dichlorobenzene, 1,2-	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
Xylene Mixture	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
Dichloropropene, 1,3-	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
Hexane, n-	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
Toluene-d8	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
4-Bromofluorobenzene	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS



# AGAT Laboratories

1 MED BLUE

5835 Coopers Avenue  
Mississauga, Ontario L4Z 1Y2  
Ph: 905.712.5100 Fax: 905.712.5122  
webearth.agatlabs.com

### Laboratory Use Only

Work Order #: 19T473632

Cooler Quantity: \_\_\_\_\_  
Arrival Temperatures: 5.8 | 4.9 | 5.1

Custody Seal Intact:  Yes  No  N/A  
Notes: \_\_\_\_\_

### Turnaround Time (TAT) Required:

**Regular TAT**  5 to 7 Business Days

**Rush TAT** (Rush Surcharges Apply)

3 Business Days  2 Business Days  Next Business Day

OR Date Required (Rush Surcharges May Apply): \_\_\_\_\_

Please provide prior notification for rush TAT  
\*TAT is exclusive of weekends and statutory holidays

For 'Same Day' analysis, please contact your AGAT CPM

## Chain of Custody Record If this is a Drinking Water sample, please use Drinking Water Chain of Custody Form (potable water consumed by humans)

### Report Information:

Company: WSP Canada Inc.  
Contact: Nicole Collins / Jay Dolan  
Address: 561 Bryne Dr. Units C+D  
Barrie, ON  
Phone: (705) 888-5629 Fax: \_\_\_\_\_  
Reports to be sent to:  
1. Email: nicole.corbett@wsp.com  
2. Email: jay.dolan@wsp.com

### Regulatory Requirements: No Regulatory Requirement

(Please check all applicable boxes)

Regulation 153/04  Sewer Use  Regulation 558  
 Table 2  Sanitary  CCME  
Indicate One  
 Ind/Com  Storm  Prov. Water Quality Objectives (PWQO)  
 Res/Park  Agriculture  Other  
 Agriculture  
 Soil Texture (Check One) Region \_\_\_\_\_ Indicate One  
 Coarse  MISA  
 Fine  MISA Indicate One

### Project Information:

Project: 191-06184-00  
Site Location: 506249 Highway 89, Primrose NC  
Sampled By: \_\_\_\_\_  
AGAT Quote #: \_\_\_\_\_ PO: \_\_\_\_\_  
Please note: If quotation number is not provided, client will be billed full price for analysis.

### Is this submission for a Record of Site Condition?

Yes  No

### Report Guideline on Certificate of Analysis

Yes  No

### Invoice Information:

Company: WSP Bill To Same: Yes  No   
Contact: \_\_\_\_\_  
Address: \_\_\_\_\_  
Email: Payables.Ontario@wsp.com

### Sample Matrix Legend

- B** Biota
- GW** Ground Water
- O** Oil
- P** Paint
- S** Soil
- SD** Sediment
- SW** Surface Water

Field Filtered - Metals, Hg, CrVI

Field Filtered - Metals, Hg, CrVI	O. Reg 153	Metals and Inorganics	Nutrients/Custom Metals	Volatiles	PHCs F1 - F4	ABNS	PAHS	PCBs: Total Aroclors	Organochlorine Pesticides	TCLP: M&I ABNS PCBs	Sewer Use
	<input type="checkbox"/> All Metals <input type="checkbox"/> 153 Metals (excl. Hydrides) <input type="checkbox"/> Hydride Metals <input type="checkbox"/> 153 Metals (incl. Hydrides)	ORPs: <input type="checkbox"/> B-HWS <input type="checkbox"/> Cl <input type="checkbox"/> CN <input type="checkbox"/> Cr <sup>6+</sup> <input type="checkbox"/> EC <input type="checkbox"/> FOC <input type="checkbox"/> Hg <input type="checkbox"/> pH <input type="checkbox"/> SAR	Nutrients: <input type="checkbox"/> TP <input type="checkbox"/> NH <sub>3</sub> <input type="checkbox"/> TKN <input type="checkbox"/> NO <sub>3</sub> <input type="checkbox"/> NO <sub>2</sub> <input type="checkbox"/> NO <sub>3</sub> +NO <sub>2</sub>	Volatiles: <input checked="" type="checkbox"/> VOC <input type="checkbox"/> BTEX <input type="checkbox"/> THM							
		<input checked="" type="checkbox"/>									<input checked="" type="checkbox"/>
		<input checked="" type="checkbox"/>									<input checked="" type="checkbox"/>
		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>							<input checked="" type="checkbox"/>
					<input checked="" type="checkbox"/>						<input checked="" type="checkbox"/>

Sample Identification	Date Sampled	Time Sampled	# of Containers	Sample Matrix	Comments/Special Instructions	Y / N
BH19-01 SS5	05/28/19	AM	3	S		N
BH19-03 SS4	↓	AM	↓	↓		↓
BH19-04 SS3	↓	PM	↓	↓		↓
DUP-1	↓	AM	2	↓		↓

Samples Relinquished By (Print Name and Sign): <u>Nicole Collins Nicole Cello</u>	Date: <u>05/29/19</u>	Time: <u>3:00pm</u>	Samples Received By (Print Name and Sign): <u>MANOJ JOHN</u>	Date: <u>MAY 31, 19</u>	Time: <u>9:20</u>
Samples Relinquished By (Print Name and Sign):	Date:	Time:	Samples Received By (Print Name and Sign):	Date:	Time:
Samples Relinquished By (Print Name and Sign):	Date:	Time:	Samples Received By (Print Name and Sign):	Date:	Time:

Page 1 of 1  
N#: **T 088168**



CLIENT NAME: WSP CANADA INC.  
561 BRYNE DRIVE, UNITS C&D  
BARRIE , ON L4N9Y3  
(705) 735-9771

ATTENTION TO: Nicole Corbett

PROJECT: 191-06184-00

AGAT WORK ORDER: 19T479276

SOIL ANALYSIS REVIEWED BY: Amanjot Bhela, Inorganic Supervisor

TRACE ORGANICS REVIEWED BY: Pinkal Patel, Report Reviewer

DATE REPORTED: Jun 18, 2019

PAGES (INCLUDING COVER): 13

VERSION\*: 1

Should you require any information regarding this analysis please contact your client services representative at (905) 712-5100

\*NOTES

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





## Certificate of Analysis

AGAT WORK ORDER: 19T479276

PROJECT: 191-06184-00

5835 COOPERS AVENUE  
MISSISSAUGA, ONTARIO  
CANADA L4Z 1Y2  
TEL (905)712-5100  
FAX (905)712-5122  
<http://www.agatlabs.com>

CLIENT NAME: WSP CANADA INC.

ATTENTION TO: Nicole Corbett

SAMPLING SITE:

SAMPLED BY:

### O. Reg. 153(511) - Metals & Inorganics (Soil)

DATE RECEIVED: 2019-06-13

DATE REPORTED: 2019-06-18

SAMPLE DESCRIPTION: BH19-02 SS6

SAMPLE TYPE: Soil

DATE SAMPLED: 2019-06-11

Parameter	Unit	G / S	RDL	270866
Antimony	µg/g	40	0.8	<0.8
Arsenic	µg/g	18	1	2
Barium	µg/g	670	2	40
Beryllium	µg/g	8	0.5	<0.5
Boron	µg/g	120	5	6
Boron (Hot Water Soluble)	µg/g	2	0.10	<0.10
Cadmium	µg/g	1.9	0.5	<0.5
Chromium	µg/g	160	2	10
Cobalt	µg/g	80	0.5	4.5
Copper	µg/g	230	1	11
Lead	µg/g	120	1	4
Molybdenum	µg/g	40	0.5	<0.5
Nickel	µg/g	270	1	11
Selenium	µg/g	5.5	0.4	<0.4
Silver	µg/g	40	0.2	<0.2
Thallium	µg/g	3.3	0.4	<0.4
Uranium	µg/g	33	0.5	<0.5
Vanadium	µg/g	86	1	16
Zinc	µg/g	340	5	20
Chromium VI	µg/g	8	0.2	<0.2
Cyanide	µg/g	0.051	0.040	<0.040
Mercury	µg/g	3.9	0.10	<0.10
Electrical Conductivity	mS/cm	1.4	0.005	0.471
Sodium Adsorption Ratio	NA	12	NA	2.89
pH, 2:1 CaCl2 Extraction	pH Units		NA	7.61

Certified By:





**AGAT** Laboratories

# Certificate of Analysis

AGAT WORK ORDER: 19T479276

PROJECT: 191-06184-00

5835 COOPERS AVENUE  
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<http://www.agatlabs.com>

CLIENT NAME: WSP CANADA INC.

ATTENTION TO: Nicole Corbett

SAMPLING SITE:

SAMPLED BY:

O. Reg. 153(511) - Metals & Inorganics (Soil)

DATE RECEIVED: 2019-06-13

DATE REPORTED: 2019-06-18

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to Table 2: Full Depth Generic Site Condition Standards in a Potable Ground Water Condition - Soil - Industrial/Commercial/Community Property Use - Coarse Textured Soils  
 Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.

270866 EC was determined on the DI water extract obtained from the 2:1 leaching procedure (2 parts DI water:1 part soil). pH was determined on the 0.01M CaCl<sub>2</sub> extract prepared at 2:1 ratio. SAR is a calculated parameter.

Analysis performed at AGAT Toronto (unless marked by \*)

Certified By:

*Anamjot Bhela*



## Certificate of Analysis

AGAT WORK ORDER: 19T479276

PROJECT: 191-06184-00

5835 COOPERS AVENUE  
MISSISSAUGA, ONTARIO  
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<http://www.agatlabs.com>

CLIENT NAME: WSP CANADA INC.

ATTENTION TO: Nicole Corbett

SAMPLING SITE:

SAMPLED BY:

### O. Reg. 153(511) - PHCs F1 - F4 (-BTEX) (Soil)

DATE RECEIVED: 2019-06-13

DATE REPORTED: 2019-06-18

SAMPLE DESCRIPTION: BH19-02 SS6

SAMPLE TYPE: Soil

DATE SAMPLED: 2019-06-11

Parameter	Unit	G / S	RDL	270866
F1 (C6 to C10)	µg/g	55	5	<5
F1 (C6 to C10) minus BTEX	µg/g	55	5	<5
F2 (C10 to C16)	µg/g	230	10	<10
F3 (C16 to C34)	µg/g	1700	50	<50
F4 (C34 to C50)	µg/g	3300	50	<50
Gravimetric Heavy Hydrocarbons	µg/g	3300	50	NA
Moisture Content	%		0.1	9.3
Surrogate	Unit	Acceptable Limits		
Terphenyl	%	60-140		110

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to Table 2: Full Depth Generic Site Condition Standards in a Potable Ground Water Condition - Soil - Industrial/Commercial/Community Property Use - Coarse Textured Soils  
Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.

270866 Results are based on sample dry weight.  
The C6-C10 fraction is calculated using toluene response factor.  
C6-C10 (F1 minus BTEX) is a calculated parameter. The calculated value is F1 minus BTEX.  
The C10 - C16, C16 - C34, and C34 - C50 fractions are calculated using the average response factor for n-C10, n-C16, and n-C34.  
Gravimetric Heavy Hydrocarbons are not included in the Total C16-C50 and are only determined if the chromatogram of the C34 - C50 hydrocarbons indicates that hydrocarbons >C50 are present.  
The chromatogram has returned to baseline by the retention time of nC50.  
Total C6 - C50 results are corrected for BTEX contribution.  
This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.  
nC6 and nC10 response factors are within 30% of Toluene response factor.  
nC10, nC16 and nC34 response factors are within 10% of their average.  
C50 response factor is within 70% of nC10 + nC16 + nC34 average.  
Linearity is within 15%.  
Extraction and holding times were met for this sample.  
Fractions 1-4 are quantified without the contribution of PAHs. Under Ontario Regulation 153, results are considered valid without determining the PAH contribution if not requested by the client.

Analysis performed at AGAT Toronto (unless marked by \*)

Certified By:



## Certificate of Analysis

AGAT WORK ORDER: 19T479276

PROJECT: 191-06184-00

5835 COOPERS AVENUE  
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FAX (905)712-5122  
<http://www.agatlabs.com>

CLIENT NAME: WSP CANADA INC.

ATTENTION TO: Nicole Corbett

SAMPLING SITE:

SAMPLED BY:

### O. Reg. 153(511) - VOCs (Soil)

DATE RECEIVED: 2019-06-13

DATE REPORTED: 2019-06-18

Parameter	Unit	SAMPLE DESCRIPTION: BH19-02 SS6		DUP-2	
		SAMPLE TYPE: Soil		Soil	
		DATE SAMPLED: 2019-06-11		2019-06-11	
		G / S	RDL	270866	270902
Dichlorodifluoromethane	µg/g	16	0.05	<0.05	<0.05
Vinyl Chloride	ug/g	0.032	0.02	<0.02	<0.02
Bromomethane	ug/g	0.05	0.05	<0.05	<0.05
Trichlorofluoromethane	ug/g	4	0.05	<0.05	<0.05
Acetone	ug/g	16	0.50	<0.50	<0.50
1,1-Dichloroethylene	ug/g	0.064	0.05	<0.05	<0.05
Methylene Chloride	ug/g	1.6	0.05	<0.05	<0.05
Trans- 1,2-Dichloroethylene	ug/g	1.3	0.05	<0.05	<0.05
Methyl tert-butyl Ether	ug/g	1.6	0.05	<0.05	<0.05
1,1-Dichloroethane	ug/g	0.47	0.02	<0.02	<0.02
Methyl Ethyl Ketone	ug/g	70	0.50	<0.50	<0.50
Cis- 1,2-Dichloroethylene	ug/g	1.9	0.02	<0.02	<0.02
Chloroform	ug/g	0.47	0.04	<0.04	<0.04
1,2-Dichloroethane	ug/g	0.05	0.03	<0.03	<0.03
1,1,1-Trichloroethane	ug/g	6.1	0.05	<0.05	<0.05
Carbon Tetrachloride	ug/g	0.21	0.05	<0.05	<0.05
Benzene	ug/g	0.32	0.02	<0.02	<0.02
1,2-Dichloropropane	ug/g	0.16	0.03	<0.03	<0.03
Trichloroethylene	ug/g	0.55	0.03	<0.03	<0.03
Bromodichloromethane	ug/g	1.5	0.05	<0.05	<0.05
Methyl Isobutyl Ketone	ug/g	31	0.50	<0.50	<0.50
1,1,2-Trichloroethane	ug/g	0.05	0.04	<0.04	<0.04
Toluene	ug/g	6.4	0.05	<0.05	<0.05
Dibromochloromethane	ug/g	2.3	0.05	<0.05	<0.05
Ethylene Dibromide	ug/g	0.05	0.04	<0.04	<0.04
Tetrachloroethylene	ug/g	1.9	0.05	<0.05	<0.05
1,1,1,2-Tetrachloroethane	ug/g	0.087	0.04	<0.04	<0.04
Chlorobenzene	ug/g	2.4	0.05	<0.05	<0.05
Ethylbenzene	ug/g	1.1	0.05	<0.05	<0.05
m & p-Xylene	ug/g		0.05	<0.05	<0.05

Certified By:



## Certificate of Analysis

AGAT WORK ORDER: 19T479276

PROJECT: 191-06184-00

5835 COOPERS AVENUE  
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CLIENT NAME: WSP CANADA INC.

ATTENTION TO: Nicole Corbett

SAMPLING SITE:

SAMPLED BY:

### O. Reg. 153(511) - VOCs (Soil)

DATE RECEIVED: 2019-06-13

DATE REPORTED: 2019-06-18

Parameter	Unit	SAMPLE DESCRIPTION: BH19-02 SS6		DUP-2	
		G / S	RDL	270866	270902
Bromoform	ug/g	0.61	0.05	<0.05	<0.05
Styrene	ug/g	34	0.05	<0.05	<0.05
1,1,2,2-Tetrachloroethane	ug/g	0.05	0.05	<0.05	<0.05
o-Xylene	ug/g		0.05	<0.05	<0.05
1,3-Dichlorobenzene	ug/g	9.6	0.05	<0.05	<0.05
1,4-Dichlorobenzene	ug/g	0.2	0.05	<0.05	<0.05
1,2-Dichlorobenzene	ug/g	1.2	0.05	<0.05	<0.05
Xylene Mixture	ug/g	26	0.05	<0.05	<0.05
1,3-Dichloropropene	µg/g	0.059	0.04	<0.04	<0.04
n-Hexane	µg/g	46	0.05	<0.05	<0.05
Moisture Content	%		0.1		9.6
Surrogate	Unit	Acceptable Limits			
Toluene-d8	% Recovery	50-140		109	109
4-Bromofluorobenzene	% Recovery	50-140		76	76

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to Table 2: Full Depth Generic Site Condition Standards in a Potable Ground Water Condition - Soil - Industrial/Commercial/Community Property Use - Coarse Textured Soils

Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.

270866-270902 The sample was analyzed using the high level technique. The sample was extracted using methanol, a small amount of the methanol extract was diluted in water and the purge & trap GC/MS analysis was performed. Results are based on the dry weight of the soil.

Xylenes total is a calculated parameter. The calculated value is the sum of m&p-Xylene + o-Xylene.

1,3-Dichloropropene total is a calculated parameter. The calculated value is the sum of Cis-1,3-Dichloropropene and Trans-1,3-Dichloropropene.

Analysis performed at AGAT Toronto (unless marked by \*)

Certified By:

## Quality Assurance

CLIENT NAME: WSP CANADA INC.  
 PROJECT: 191-06184-00  
 SAMPLING SITE:

AGAT WORK ORDER: 19T479276  
 ATTENTION TO: Nicole Corbett  
 SAMPLED BY:

Soil Analysis															
RPT Date: Jun 18, 2019			DUPLICATE				Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE		MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Measured Value		Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper

O. Reg. 153(511) - Metals & Inorganics (Soil)

Antimony	270866	270866	< 0.8	<0.8	NA	< 0.8	130%	70%	130%	99%	80%	120%	93%	70%	130%
Arsenic	270866	270866	2	2	NA	< 1	107%	70%	130%	100%	80%	120%	103%	70%	130%
Barium	270866	270866	40	41	2.5%	< 2	109%	70%	130%	104%	80%	120%	105%	70%	130%
Beryllium	270866	270866	< 0.5	<0.5	NA	< 0.5	72%	70%	130%	94%	80%	120%	82%	70%	130%
Boron	270866	270866	6	6	NA	< 5	80%	70%	130%	102%	80%	120%	84%	70%	130%
Boron (Hot Water Soluble)	270866	270866	< 0.10	<0.10	NA	< 0.10	114%	60%	140%	109%	70%	130%	102%	60%	140%
Cadmium	270866	270866	< 0.5	<0.5	NA	< 0.5	114%	70%	130%	100%	80%	120%	104%	70%	130%
Chromium	270866	270866	10	10	0.0%	< 2	99%	70%	130%	112%	80%	120%	108%	70%	130%
Cobalt	270866	270866	4.5	4.7	4.3%	< 0.5	105%	70%	130%	108%	80%	120%	104%	70%	130%
Copper	270866	270866	11	11	0.0%	< 1	96%	70%	130%	105%	80%	120%	107%	70%	130%
Lead	270866	270866	4	4	NA	< 1	108%	70%	130%	90%	80%	120%	86%	70%	130%
Molybdenum	270866	270866	< 0.5	<0.5	NA	< 0.5	118%	70%	130%	111%	80%	120%	114%	70%	130%
Nickel	270866	270866	11	12	8.7%	< 1	105%	70%	130%	111%	80%	120%	105%	70%	130%
Selenium	270866	270866	< 0.4	<0.4	NA	< 0.4	112%	70%	130%	95%	80%	120%	96%	70%	130%
Silver	270866	270866	< 0.2	<0.2	NA	< 0.2	112%	70%	130%	102%	80%	120%	97%	70%	130%
Thallium	270866	270866	< 0.4	<0.4	NA	< 0.4	102%	70%	130%	100%	80%	120%	98%	70%	130%
Uranium	270866	270866	< 0.5	<0.5	NA	< 0.5	97%	70%	130%	100%	80%	120%	103%	70%	130%
Vanadium	270866	270866	16	16	0.0%	< 1	101%	70%	130%	109%	80%	120%	108%	70%	130%
Zinc	270866	270866	20	21	NA	< 5	104%	70%	130%	105%	80%	120%	108%	70%	130%
Chromium VI	273094		<0.2	<0.2	NA	< 0.2	110%	70%	130%	100%	80%	120%	100%	70%	130%
Cyanide	273046		<0.040	<0.040	NA	< 0.040	98%	70%	130%	106%	80%	120%	105%	70%	130%
Mercury	270866	270866	< 0.10	<0.10	NA	< 0.10	104%	70%	130%	96%	80%	120%	98%	70%	130%
Electrical Conductivity	270866	270866	0.471	0.475	0.8%	< 0.005	101%	90%	110%	NA			NA		
Sodium Adsorption Ratio	270866	270866	2.89	2.78	3.9%	NA	NA			NA			NA		
pH, 2:1 CaCl2 Extraction	267763		7.19	7.21	0.3%	NA	100%	80%	120%	NA			NA		

Comments: NA signifies Not Applicable.

Duplicate Qualifier: As the measured result approaches the RL, the uncertainty associated with the value increases dramatically, thus duplicate acceptance limits apply only where the average of the two duplicates is greater than five times the RL

pH duplicates QA acceptance criteria was met relative as stated in Table 5-15 of Analytical Protocol document.

Certified By:

*Amanjot Bhella*  


## Quality Assurance

CLIENT NAME: WSP CANADA INC.

AGAT WORK ORDER: 19T479276

PROJECT: 191-06184-00

ATTENTION TO: Nicole Corbett

SAMPLING SITE:

SAMPLED BY:

Trace Organics Analysis															
RPT Date: Jun 18, 2019			DUPLICATE			Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD		Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
O. Reg. 153(511) - VOCs (Soil)															
Dichlorodifluoromethane	188096		< 0.05	< 0.05	NA	< 0.05	108%	50%	140%	92%	50%	140%	83%	50%	140%
Vinyl Chloride	188096		< 0.02	< 0.02	NA	< 0.02	90%	50%	140%	91%	50%	140%	106%	50%	140%
Bromomethane	188096		< 0.05	< 0.05	NA	< 0.05	96%	50%	140%	104%	50%	140%	116%	50%	140%
Trichlorofluoromethane	188096		< 0.05	< 0.05	NA	< 0.05	94%	50%	140%	97%	50%	140%	97%	50%	140%
Acetone	188096		< 0.50	< 0.50	NA	< 0.50	87%	50%	140%	96%	50%	140%	91%	50%	140%
1,1-Dichloroethylene	188096		< 0.05	< 0.05	NA	< 0.05	102%	50%	140%	97%	60%	130%	83%	50%	140%
Methylene Chloride	188096		< 0.05	< 0.05	NA	< 0.05	99%	50%	140%	97%	60%	130%	89%	50%	140%
Trans- 1,2-Dichloroethylene	188096		< 0.05	< 0.05	NA	< 0.05	98%	50%	140%	102%	60%	130%	88%	50%	140%
Methyl tert-butyl Ether	188096		< 0.05	< 0.05	NA	< 0.05	78%	50%	140%	82%	60%	130%	112%	50%	140%
1,1-Dichloroethane	188096		< 0.02	< 0.02	NA	< 0.02	97%	50%	140%	95%	60%	130%	83%	50%	140%
Methyl Ethyl Ketone	188096		< 0.50	< 0.50	NA	< 0.50	89%	50%	140%	105%	50%	140%	95%	50%	140%
Cis- 1,2-Dichloroethylene	188096		< 0.02	< 0.02	NA	< 0.02	98%	50%	140%	97%	60%	130%	105%	50%	140%
Chloroform	188096		< 0.04	< 0.04	NA	< 0.04	99%	50%	140%	99%	60%	130%	89%	50%	140%
1,2-Dichloroethane	188096		< 0.03	< 0.03	NA	< 0.03	95%	50%	140%	101%	60%	130%	88%	50%	140%
1,1,1-Trichloroethane	188096		< 0.05	< 0.05	NA	< 0.05	105%	50%	140%	81%	60%	130%	100%	50%	140%
Carbon Tetrachloride	188096		< 0.05	< 0.05	NA	< 0.05	84%	50%	140%	91%	60%	130%	93%	50%	140%
Benzene	188096		< 0.02	< 0.02	NA	< 0.02	100%	50%	140%	105%	60%	130%	93%	50%	140%
1,2-Dichloropropane	188096		< 0.03	< 0.03	NA	< 0.03	89%	50%	140%	97%	60%	130%	80%	50%	140%
Trichloroethylene	188096		< 0.03	< 0.03	NA	< 0.03	92%	50%	140%	98%	60%	130%	86%	50%	140%
Bromodichloromethane	188096		< 0.05	< 0.05	NA	< 0.05	76%	50%	140%	83%	60%	130%	93%	50%	140%
Methyl Isobutyl Ketone	188096		< 0.50	< 0.50	NA	< 0.50	79%	50%	140%	102%	50%	140%	91%	50%	140%
1,1,2-Trichloroethane	188096		< 0.04	< 0.04	NA	< 0.04	108%	50%	140%	98%	60%	130%	96%	50%	140%
Toluene	188096		< 0.05	< 0.05	NA	< 0.05	114%	50%	140%	96%	60%	130%	102%	50%	140%
Dibromochloromethane	188096		< 0.05	< 0.05	NA	< 0.05	112%	50%	140%	84%	60%	130%	92%	50%	140%
Ethylene Dibromide	188096		< 0.04	< 0.04	NA	< 0.04	93%	50%	140%	96%	60%	130%	82%	50%	140%
Tetrachloroethylene	188096		< 0.05	< 0.05	NA	< 0.05	105%	50%	140%	106%	60%	130%	95%	50%	140%
1,1,1,2-Tetrachloroethane	188096		< 0.04	< 0.04	NA	< 0.04	75%	50%	140%	82%	60%	130%	93%	50%	140%
Chlorobenzene	188096		< 0.05	< 0.05	NA	< 0.05	112%	50%	140%	100%	60%	130%	105%	50%	140%
Ethylbenzene	188096		< 0.05	< 0.05	NA	< 0.05	112%	50%	140%	97%	60%	130%	105%	50%	140%
m & p-Xylene	188096		< 0.05	< 0.05	NA	< 0.05	115%	50%	140%	73%	60%	130%	109%	50%	140%
Bromoform	188096		< 0.05	< 0.05	NA	< 0.05	86%	50%	140%	112%	60%	130%	112%	50%	140%
Styrene	188096		< 0.05	< 0.05	NA	< 0.05	82%	50%	140%	102%	60%	130%	106%	50%	140%
1,1,2,2-Tetrachloroethane	188096		< 0.05	< 0.05	NA	< 0.05	112%	50%	140%	102%	60%	130%	96%	50%	140%
o-Xylene	188096		< 0.05	< 0.05	NA	< 0.05	119%	50%	140%	113%	60%	130%	114%	50%	140%
1,3-Dichlorobenzene	188096		< 0.05	< 0.05	NA	< 0.05	100%	50%	140%	108%	60%	130%	98%	50%	140%
1,4-Dichlorobenzene	188096		< 0.05	< 0.05	NA	< 0.05	91%	50%	140%	109%	60%	130%	95%	50%	140%
1,2-Dichlorobenzene	188096		< 0.05	< 0.05	NA	< 0.05	95%	50%	140%	102%	60%	130%	93%	50%	140%
1,3-Dichloropropene	188096		< 0.04	< 0.04	NA	< 0.04	101%	50%	140%	83%	60%	130%	103%	50%	140%
n-Hexane	188096		< 0.05	< 0.05	NA	< 0.05	102%	50%	140%	86%	60%	130%	102%	50%	140%

## Quality Assurance

 CLIENT NAME: WSP CANADA INC.  
 PROJECT: 191-06184-00  
 SAMPLING SITE:

 AGAT WORK ORDER: 19T479276  
 ATTENTION TO: Nicole Corbett  
 SAMPLED BY:

### Trace Organics Analysis (Continued)

RPT Date: Jun 18, 2019			DUPLICATE			Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD		Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper

O. Reg. 153(511) - PHCs F1 - F4 (-BTEX) (Soil)

F1 (C6 to C10)	272324	< 5	< 5	NA	< 5	111%	60%	130%	105%	85%	115%	91%	70%	130%
F2 (C10 to C16)	247073	< 10	< 10	NA	< 10	92%	60%	130%	83%	80%	120%	74%	70%	130%
F3 (C16 to C34)	247073	< 50	< 50	NA	< 50	91%	60%	130%	92%	80%	120%	88%	70%	130%
F4 (C34 to C50)	247073	< 50	< 50	NA	< 50	94%	60%	130%	110%	80%	120%	110%	70%	130%

Comments: When the average of the sample and duplicate results is less than 5x the RDL, the Relative Percent Difference (RPD) will be indicated as Not Applicable (NA).

Certified By: \_\_\_\_\_







## Method Summary

CLIENT NAME: WSP CANADA INC.

AGAT WORK ORDER: 19T479276

PROJECT: 191-06184-00

ATTENTION TO: Nicole Corbett

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Soil Analysis			
Antimony	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Arsenic	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Barium	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Beryllium	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Boron	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Boron (Hot Water Soluble)	MET-93-6104	EPA SW 846 6010C; MSA, Part 3, Ch.21	ICP/OES
Cadmium	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Chromium	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Cobalt	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Copper	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Lead	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Molybdenum	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Nickel	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Selenium	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Silver	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Thallium	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Uranium	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Vanadium	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Zinc	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Chromium VI	INOR-93-6029	SM 3500 B; MSA Part 3, Ch. 25	SPECTROPHOTOMETER
Cyanide	INOR-93-6052	MOE CN-3015 & E 3009 A; SM 4500 CN	TECHNICON AUTO ANALYZER
Mercury	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Electrical Conductivity	INOR-93-6036	McKeague 4.12, SM 2510 B	EC METER
Sodium Adsorption Ratio	INOR-93-6007	McKeague 4.12 & 3.26 & EPA SW-846 6010C	ICP/OES
pH, 2:1 CaCl <sub>2</sub> Extraction	INOR-93-6031	MSA part 3 & SM 4500-H+ B	PH METER

## Method Summary

CLIENT NAME: WSP CANADA INC.

AGAT WORK ORDER: 19T479276

PROJECT: 191-06184-00

ATTENTION TO: Nicole Corbett

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Trace Organics Analysis			
F1 (C6 to C10)	VOL-91-5009	CCME Tier 1 Method, SW846 5035	P&T GC/FID
F1 (C6 to C10) minus BTEX	VOL-91-5009	CCME Tier 1 Method, SW846 5035	P&T GC/FID
F2 (C10 to C16)	VOL-91-5009	CCME Tier 1 Method	GC/FID
F3 (C16 to C34)	VOL-91-5009	CCME Tier 1 Method	GC/FID
F4 (C34 to C50)	VOL-91-5009	CCME Tier 1 Method	GC/FID
Gravimetric Heavy Hydrocarbons	VOL-91-5009	CCME Tier 1 Method	BALANCE
Moisture Content	VOL-91-5009	CCME Tier 1 Method	BALANCE
Terphenyl	VOL-91-5009	CCME Tier 1 Method	GC/FID
Dichlorodifluoromethane	VOL-91-5002	EPA SW-846 5035 & 8260D	(P&T)GC/MS
Vinyl Chloride	VOL-91-5002	EPA SW-846 5035 & 8260D	(P&T)GC/MS
Bromomethane	VOL-91-5002	EPA SW-846 5035 & 8260D	(P&T)GC/MS
Trichlorofluoromethane	VOL-91-5002	EPA SW-846 5035 & 8260D	(P&T)GC/MS
Acetone	VOL-91-5002	EPA SW-846 5035 & 8260D	(P&T)GC/MS
1,1-Dichloroethylene	VOL-91-5002	EPA SW-846 5035 & 8260D	(P&T)GC/MS
Methylene Chloride	VOL-91-5002	EPA SW-846 5035 & 8260D	(P&T)GC/MS
Trans- 1,2-Dichloroethylene	VOL-91-5002	EPA SW-846 5035 & 8260D	(P&T)GC/MS
Methyl tert-butyl Ether	VOL-91-5002	EPA SW-846 5035 & 8260D	(P&T)GC/MS
1,1-Dichloroethane	VOL-91-5002	EPA SW-846 5035 & 8260D	(P&T)GC/MS
Methyl Ethyl Ketone	VOL-91-5002	EPA SW-846 5035 & 8260D	(P&T)GC/MS
Cis- 1,2-Dichloroethylene	VOL-91-5002	EPA SW-846 5035 & 8260D	(P&T)GC/MS
Chloroform	VOL-91-5002	EPA SW-846 5035 & 8260D	(P&T)GC/MS
1,2-Dichloroethane	VOL-91-5002	EPA SW-846 5035 & 8260D	(P&T)GC/MS
1,1,1-Trichloroethane	VOL-91-5002	EPA SW-846 5035 & 8260D	(P&T)GC/MS
Carbon Tetrachloride	VOL-91-5002	EPA SW-846 5035 & 8260D	(P&T)GC/MS
Benzene	VOL-91-5002	EPA SW-846 5035 & 8260D	(P&T)GC/MS
1,2-Dichloropropane	VOL-91-5002	EPA SW-846 5035 & 8260D	(P&T)GC/MS
Trichloroethylene	VOL-91-5002	EPA SW-846 5035 & 8260D	(P&T)GC/MS
Bromodichloromethane	VOL-91-5002	EPA SW-846 5035 & 8260D	(P&T)GC/MS
Methyl Isobutyl Ketone	VOL-91-5002	EPA SW-846 5035 & 8260D	(P&T)GC/MS
1,1,2-Trichloroethane	VOL-91-5002	EPA SW-846 5035 & 8260D	(P&T)GC/MS
Toluene	VOL-91-5002	EPA SW-846 5035 & 8260D	(P&T)GC/MS
Dibromochloromethane	VOL-91-5002	EPA SW-846 5035 & 8260D	(P&T)GC/MS
Ethylene Dibromide	VOL-91-5002	EPA SW-846 5035 & 8260D	(P&T)GC/MS
Tetrachloroethylene	VOL-91-5002	EPA SW-846 5035 & 8260D	(P&T)GC/MS
1,1,1,2-Tetrachloroethane	VOL-91-5002	EPA SW-846 5035 & 8260D	(P&T)GC/MS
Chlorobenzene	VOL-91-5002	EPA SW-846 5035 & 8260D	(P&T)GC/MS
Ethylbenzene	VOL-91-5002	EPA SW-846 5035 & 8260D	(P&T)GC/MS
m & p-Xylene	VOL-91-5002	EPA SW-846 5035 & 8260D	(P&T)GC/MS
Bromoform	VOL-91-5002	EPA SW-846 5035 & 8260D	(P&T)GC/MS
Styrene	VOL-91-5002	EPA SW-846 5035 & 8260D	(P&T)GC/MS
1,1,2,2-Tetrachloroethane	VOL-91-5002	EPA SW-846 5035 & 8260D	(P&T)GC/MS
o-Xylene	VOL-91-5002	EPA SW-846 5035 & 8260D	(P&T)GC/MS
1,3-Dichlorobenzene	VOL-91-5002	EPA SW-846 5035 & 8260D	(P&T)GC/MS
1,4-Dichlorobenzene	VOL-91-5002	EPA SW-846 5035 & 8260D	(P&T)GC/MS
1,2-Dichlorobenzene	VOL-91-5002	EPA SW-846 5035 & 8260D	(P&T)GC/MS
Xylene Mixture	VOL-91-5002	EPA SW-846 5035 & 8260D	(P&T)GC/MS
1,3-Dichloropropene	VOL-91-5002	EPA SW-846 5035 & 8260D	(P&T)GC/MS
n-Hexane	VOL-91-5002	EPA SW-846 5035 & 8260D	(P&T)GC/MS
Toluene-d8	VOL-91-5002	EPA SW-846 5035 & 8260D	(P&T)GC/MS

## Method Summary

CLIENT NAME: WSP CANADA INC.

AGAT WORK ORDER: 19T479276

PROJECT: 191-06184-00

ATTENTION TO: Nicole Corbett

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
4-Bromofluorobenzene	VOL-91-5002	EPA SW-846 5035 & 8260D	(P&T)GC/MS
Moisture Content		MOE E3139	BALANCE

15 BLK

## Chain of Custody Record

If this is a Drinking Water sample, please use Drinking Water Chain of Custody Form (potable water consumed by humans)

### Report Information:

Company: WSP Canada Inc.  
 Contact: Nicole Corbett  
 Address: 561 Bryne Dr. Units C+D  
Barrie, ON L4N 9Y3  
(705)888-5629 Fax: \_\_\_\_\_  
 Phone: nicole.corbett@wsp.com  
 Reports to be sent to:  
 1. Email: jay.dalen@wsp.com  
 2. Email: \_\_\_\_\_

### Project Information:

Project: 191-06184-06  
 Site Location: 56249 Highway 89  
 Sampled By: NC  
 AGAT Quote #: SO PO: \_\_\_\_\_  
Please note: If quotation number is not provided, client will be billed full price for analysis.

### Invoice Information:

Company: WSP Bill To Same: Yes  No   
 Contact: \_\_\_\_\_  
 Address: \_\_\_\_\_  
 Email: Payables.Ontario@wsp.com

### Regulatory Requirements:

(Please check all applicable boxes)  
 Regulation 153/04  
 Sewer Use  
 Table 2 (Indicate One)  
 Res/Com  
 Res/Park  
 Agriculture  
 Storm  
 Sanitary  
 CCWE  
 Prow. Water Quality Objectives (PWQO)  
 Other  
 Fine  
 Coarse  
 MISA  
 Regulation 558  
 Regulation 153/04  
 Other  
 Other  
 Other  
 Other

Is this submission for a Record of Site Condition?  
 Yes  No

Report Guideline on Certificate of Analysis  
 Yes  No

### Sample Matrix Legend

- B Biota
- GW Ground Water
- O Oil
- P Paint
- S Soil
- SD Sediment
- SW Surface Water

Field Filtered - Metals, Hg, CrVI

### Metals and Inorganics

- All Metals  153 Metals (excl. Hydrides)  
 Hydride Metals  153 Metals (Incl. Hydrides)  
 ORPs:  B-HWS  Cl  CN  
 Cr<sup>6+</sup>  EC  FOC  Hg  
 pH  SAR  
 Full Metals Scan

### Regulation/Custom Metals

- Nutrients:  TP  NH<sub>3</sub>  TKN  
 NO<sub>2</sub>  NO<sub>3</sub>  NO<sub>3</sub>+NO<sub>2</sub>

### Volatiles:

- VOC  BTEX  THM  
 PHCs F1 - F4  
 ABNs  
 PAHs  
 PCBs:  Total  Aroclors  
 Organochlorine Pesticides  
 TCLP:  M&I  VOCs  ABNs  B(a)P  PCBs  
 Sewer Use

Potentially Hazardous or High Concentration (Y/N)

Sample Identification	Date Sampled	Time Sampled	# of Containers	Sample Matrix	Comments/Special Instructions	Y/N	Field Filtered - Metals, Hg, CrVI	Metals and Inorganics	Regulation/Custom Metals	Nutrients	Volatiles	PHCs F1 - F4	ABNs	PAHs	PCBs	Organochlorine Pesticides	TCLP	Sewer Use	Potentially Hazardous or High Concentration (Y/N)
BH19-03	SS	06/11/19	3	S		+	X												
DUP-2			2	S															

**Laboratory Use Only**  
 Work Order #: 19TY79276  
 Cooler Quantity: \_\_\_\_\_  
 Arrival Temperatures: 7.9 7.3 6.9  
 Custody Seal Intact:  Yes  No  N/A  
 Notes: \_\_\_\_\_

### Turnaround Time (TAT) Required:

Regular TAT  5 to 7 Business Days  
 Rush TAT (Rush Surcharges Apply)  
 3 Business Days  
 2 Business Days  
 Next Business Day  
 OR Date Required (Rush Surcharges May Apply): \_\_\_\_\_

Please provide prior notification for rush TAT  
 \*TAT is exclusive of weekends and statutory holidays  
 For 'Same Day' analysis, please contact your AGAT CPM

Samples Relinquished By: (Print Name and Sign) Nicole Corbett W.D. Corbett Date: 06/11/19 Time: 5:00pm  
 Samples Relinquished By: (Print Name and Sign) \_\_\_\_\_ Date: \_\_\_\_\_ Time: \_\_\_\_\_  
 Samples Relinquished By: (Print Name and Sign) \_\_\_\_\_ Date: \_\_\_\_\_ Time: \_\_\_\_\_  
 Samples Received By: (Print Name and Sign) \_\_\_\_\_ Date: 06/13 Time: 9:05  
 Samples Received By: (Print Name and Sign) \_\_\_\_\_ Date: \_\_\_\_\_ Time: \_\_\_\_\_  
 Samples Received By: (Print Name and Sign) \_\_\_\_\_ Date: \_\_\_\_\_ Time: \_\_\_\_\_

# APPENDIX

## *D-2 GROUNDWATER*





CLIENT NAME: WSP CANADA INC.  
561 BRYNE DRIVE, UNITS C&D  
BARRIE , ON L4N9Y3  
(705) 735-9771

ATTENTION TO: Nicole Corbett

PROJECT: 191-06184-00

AGAT WORK ORDER: 19T479270

TRACE ORGANICS REVIEWED BY: Pinkal Patel, Report Reviewer

WATER ANALYSIS REVIEWED BY: Jacky Zhu, Spectroscopy Technician

DATE REPORTED: Jun 18, 2019

PAGES (INCLUDING COVER): 13

VERSION\*: 1

Should you require any information regarding this analysis please contact your client services representative at (905) 712-5100

\*NOTES

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



## Certificate of Analysis

AGAT WORK ORDER: 19T479270

PROJECT: 191-06184-00

5835 COOPERS AVENUE  
 MISSISSAUGA, ONTARIO  
 CANADA L4Z 1Y2  
 TEL (905)712-5100  
 FAX (905)712-5122  
<http://www.agatlabs.com>

CLIENT NAME: WSP CANADA INC.

ATTENTION TO: Nicole Corbett

SAMPLING SITE:

SAMPLED BY:

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

DATE RECEIVED: 2019-06-13

DATE REPORTED: 2019-06-17

Parameter	Unit	SAMPLE DESCRIPTION:				
		SAMPLE TYPE:		BH19-01	BH19-02	BH19-03
		DATE SAMPLED:		2019-06-11	2019-06-11	2019-06-11
		G / S	RDL	270938	270989	270990
F1 (C6 - C10)	µg/L	750	25	<25	<25	<25
F1 (C6 to C10) minus BTEX	µg/L	750	25	<25	<25	<25
F2 (C10 to C16)	µg/L	150	100	<100	<100	<100
F3 (C16 to C34)	µg/L	500	100	<100	<100	<100
F4 (C34 to C50)	µg/L	500	100	<100	<100	<100
Gravimetric Heavy Hydrocarbons	µg/L	500	500	NA	NA	NA
Surrogate	Unit	Acceptable Limits				
Terphenyl	%	60-140	116	84	112	

Certified By:



## Certificate of Analysis

AGAT WORK ORDER: 19T479270

PROJECT: 191-06184-00

5835 COOPERS AVENUE  
MISSISSAUGA, ONTARIO  
CANADA L4Z 1Y2  
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<http://www.agatlabs.com>

CLIENT NAME: WSP CANADA INC.

ATTENTION TO: Nicole Corbett

SAMPLING SITE:

SAMPLED BY:

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

DATE RECEIVED: 2019-06-13

DATE REPORTED: 2019-06-17

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to Table 2: Full Depth Generic Site Condition Standards in a Potable Ground Water Condition - Potable Ground Water - All Types of Property Uses - Coarse Textured Soils

Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.

270938 Small amount of sediment was observed in the sample. Entire sample was extracted and bottle rinsed with solvent.

The C6-C10 fraction is calculated using Toluene response factor.

C6-C10 (F1 minus BTEX) is a calculated parameter. The calculated value is F1 minus BTEX.

The C10 - C16, C16 - C34, and C34 - C50 fractions are calculated using the average response factor for n-C10, n-C16, and nC34.

Gravimetric Heavy Hydrocarbons are not included in the Total C16 - C50 and are only determined if the chromatogram of the C34 - C50 Hydrocarbons indicated that hydrocarbons >C50 are present.

The chromatogram has returned to baseline by the retention time of nC50.

Total C6-C50 results are corrected for BTEX contribution.

This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.

nC6 and nC10 response factors are within 30% of Toluene response factor.

nC10, nC16 and nC34 response factors are within 10% of their average.

C50 response factor is within 70% of nC10 + nC16 nC34 average.

Linearity is within 15%.

Extraction and holding times were met for this sample.

Fractions 1-4 are quantified with the contribution of PAHs. Under Ontario Regulation 153, results are considered valid without determining the PAH contribution if not requested by the client.

270989-270990 The C6-C10 fraction is calculated using Toluene response factor.

C6-C10 (F1 minus BTEX) is a calculated parameter. The calculated value is F1 minus BTEX.

The C10 - C16, C16 - C34, and C34 - C50 fractions are calculated using the average response factor for n-C10, n-C16, and nC34.

Gravimetric Heavy Hydrocarbons are not included in the Total C16 - C50 and are only determined if the chromatogram of the C34 - C50 Hydrocarbons indicated that hydrocarbons >C50 are present.

The chromatogram has returned to baseline by the retention time of nC50.

Total C6-C50 results are corrected for BTEX contribution.

This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.

nC6 and nC10 response factors are within 30% of Toluene response factor.

nC10, nC16 and nC34 response factors are within 10% of their average.

C50 response factor is within 70% of nC10 + nC16 nC34 average.

Linearity is within 15%.

Extraction and holding times were met for this sample.

Fractions 1-4 are quantified with the contribution of PAHs. Under Ontario Regulation 153, results are considered valid without determining the PAH contribution if not requested by the client.

Analysis performed at AGAT Toronto (unless marked by \*)

Certified By:





## Certificate of Analysis

AGAT WORK ORDER: 19T479270

PROJECT: 191-06184-00

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CLIENT NAME: WSP CANADA INC.

ATTENTION TO: Nicole Corbett

SAMPLING SITE:

SAMPLED BY:

### O. Reg. 153(511) - VOCs (Water)

DATE RECEIVED: 2019-06-13

DATE REPORTED: 2019-06-17

Parameter	Unit	SAMPLE DESCRIPTION:		BH19-01		BH19-02		BH19-03		GWDUP-1		Trip Blank
		SAMPLE TYPE:		Water		Water		Water		Water		Water
		DATE SAMPLED:		2019-06-11		2019-06-11		2019-06-11		2019-06-11		2019-06-11
		G / S	RDL	270938	RDL	270989	RDL	270990	270991	270992		
Dichlorodifluoromethane	µg/L	590	0.20	<0.20	0.80	<0.80	0.20	<0.20	<0.20	<0.20	<0.20	
Vinyl Chloride	µg/L	0.5	0.17	<0.17	0.17	<0.17	0.17	<0.17	<0.17	<0.17	<0.17	
Bromomethane	µg/L	0.89	0.20	<0.20	0.80	<0.80	0.20	<0.20	<0.20	<0.20	<0.20	
Trichlorofluoromethane	µg/L	150	0.40	<0.40	1.60	<1.60	0.40	<0.40	<0.40	<0.40	<0.40	
Acetone	µg/L	2700	1.0	<1.0	4.0	<4.0	1.0	<1.0	<1.0	<1.0	<1.0	
1,1-Dichloroethylene	µg/L	1.6	0.30	<0.30	1.20	<1.20	0.30	<0.30	<0.30	<0.30	<0.30	
Methylene Chloride	µg/L	50	0.30	<0.30	1.20	<1.20	0.30	<0.30	<0.30	<0.30	<0.30	
trans- 1,2-Dichloroethylene	µg/L	1.6	0.20	<0.20	0.80	<0.80	0.20	<0.20	<0.20	<0.20	<0.20	
Methyl tert-butyl ether	µg/L	15	0.20	<0.20	0.80	<0.80	0.20	<0.20	<0.20	<0.20	<0.20	
1,1-Dichloroethane	µg/L	5	0.30	<0.30	1.20	<1.20	0.30	<0.30	<0.30	<0.30	<0.30	
Methyl Ethyl Ketone	µg/L	1800	1.0	<1.0	4.0	<4.0	1.0	<1.0	<1.0	<1.0	<1.0	
cis- 1,2-Dichloroethylene	µg/L	1.6	0.20	<0.20	0.80	<0.80	0.20	<0.20	<0.20	<0.20	<0.20	
Chloroform	µg/L	2.4	0.20	<0.20	0.80	<0.80	0.20	<0.20	<0.20	<0.20	<0.20	
1,2-Dichloroethane	µg/L	1.6	0.20	<0.20	0.80	<0.80	0.20	<0.20	<0.20	<0.20	<0.20	
1,1,1-Trichloroethane	µg/L	200	0.30	<0.30	1.20	<1.20	0.30	<0.30	<0.30	<0.30	<0.30	
Carbon Tetrachloride	µg/L	0.79	0.20	<0.20	0.79	<0.79	0.20	<0.20	<0.20	<0.20	<0.20	
Benzene	µg/L	5.0	0.20	<0.20	0.80	<0.80	0.20	<0.20	<0.20	<0.20	<0.20	
1,2-Dichloropropane	µg/L	5	0.20	<0.20	0.80	<0.80	0.20	<0.20	<0.20	<0.20	<0.20	
Trichloroethylene	µg/L	1.6	0.20	<0.20	0.80	<0.80	0.20	<0.20	<0.20	<0.20	<0.20	
Bromodichloromethane	µg/L	16	0.20	<0.20	0.80	<0.80	0.20	<0.20	<0.20	<0.20	<0.20	
Methyl Isobutyl Ketone	µg/L	640	1.0	<1.0	4.0	<4.0	1.0	<1.0	<1.0	<1.0	<1.0	
1,1,2-Trichloroethane	µg/L	4.7	0.20	<0.20	0.80	<0.80	0.20	<0.20	<0.20	<0.20	<0.20	
Toluene	µg/L	24	0.20	0.28	0.80	1.4	0.20	0.50	0.63	<0.20	<0.20	
Dibromochloromethane	µg/L	25	0.10	<0.10	0.40	<0.40	0.10	<0.10	<0.10	<0.10	<0.10	
Ethylene Dibromide	µg/L	0.2	0.10	<0.10	0.20	<0.20	0.10	<0.10	<0.10	<0.10	<0.10	
Tetrachloroethylene	µg/L	1.6	0.20	<0.20	0.80	<0.80	0.20	<0.20	<0.20	<0.20	<0.20	
1,1,1,2-Tetrachloroethane	µg/L	1.1	0.10	<0.10	0.40	<0.40	0.10	<0.10	<0.10	<0.10	<0.10	
Chlorobenzene	µg/L	30	0.10	<0.10	0.40	<0.40	0.10	<0.10	<0.10	<0.10	<0.10	
Ethylbenzene	µg/L	2.4	0.10	<0.10	0.40	<0.40	0.10	<0.10	<0.10	<0.10	<0.10	
m & p-Xylene	µg/L		0.20	<0.20	0.80	<0.80	0.20	<0.20	<0.20	<0.20	<0.20	

Certified By:

*Pinkal Jata*



## Certificate of Analysis

AGAT WORK ORDER: 19T479270

PROJECT: 191-06184-00

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CLIENT NAME: WSP CANADA INC.

ATTENTION TO: Nicole Corbett

SAMPLING SITE:

SAMPLED BY:

### O. Reg. 153(511) - VOCs (Water)

DATE RECEIVED: 2019-06-13

DATE REPORTED: 2019-06-17

Parameter	Unit	SAMPLE DESCRIPTION:		BH19-01		BH19-02		BH19-03		GWDUP-1		Trip Blank	
		SAMPLE TYPE:		Water		Water		Water		Water		Water	
		DATE SAMPLED:		2019-06-11		2019-06-11		2019-06-11		2019-06-11		2019-06-11	
		G / S	RDL	270938	RDL	270989	RDL	270990	270991	270992			
Bromoform	µg/L	25	0.10	<0.10	0.40	<0.40	0.10	<0.10	<0.10	<0.10			<0.10
Styrene	µg/L	5.4	0.10	<0.10	0.40	<0.40	0.10	<0.10	<0.10	<0.10			<0.10
1,1,2,2-Tetrachloroethane	µg/L	1	0.10	<0.10	0.40	<0.40	0.10	<0.10	<0.10	<0.10			<0.10
o-Xylene	µg/L		0.10	<0.10	0.40	<0.40	0.10	<0.10	<0.10	<0.10			<0.10
1,3-Dichlorobenzene	µg/L	59	0.10	<0.10	0.40	<0.40	0.10	<0.10	<0.10	<0.10			<0.10
1,4-Dichlorobenzene	µg/L	1	0.10	<0.10	0.40	<0.40	0.10	<0.10	<0.10	<0.10			<0.10
1,2-Dichlorobenzene	µg/L	3	0.10	<0.10	0.40	<0.40	0.10	<0.10	<0.10	<0.10			<0.10
1,3-Dichloropropene	µg/L	0.5	0.30	<0.30	0.50	<0.50	0.30	<0.30	<0.30	<0.30			<0.30
Xylene Mixture	µg/L	300	0.20	<0.20	0.80	<0.80	0.20	<0.20	<0.20	<0.20			<0.20
n-Hexane	µg/L	51	0.20	<0.20	0.80	<0.80	0.20	<0.20	<0.20	<0.20			<0.20
Surrogate	Unit	Acceptable Limits											
Toluene-d8	% Recovery	50-140		93		101		98	105	103			
4-Bromofluorobenzene	% Recovery	50-140		84		90		95	83	89			

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to Table 2: Full Depth Generic Site Condition Standards in a Potable Ground Water Condition - Potable Ground Water - All Types of Property Uses - Coarse Textured Soils  
Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.

270938 Xylenes total is a calculated parameter. The calculated value is the sum of m&p-Xylene and o-Xylene.  
1,3-Dichloropropene total is a calculated parameter. The calculated value is the sum of Cis-1,3-Dichloropropene and Trans-1,3-Dichloropropene.

270989 Dilution factor=4  
The sample was diluted because it was foamy. The reporting detection limit has been corrected for the dilution factor used.  
Xylenes total is a calculated parameter. The calculated value is the sum of m&p-Xylene and o-Xylene.  
1,3-Dichloropropene total is a calculated parameter. The calculated value is the sum of Cis-1,3-Dichloropropene and Trans-1,3-Dichloropropene.

270990-270992 Xylenes total is a calculated parameter. The calculated value is the sum of m&p-Xylene and o-Xylene.  
1,3-Dichloropropene total is a calculated parameter. The calculated value is the sum of Cis-1,3-Dichloropropene and Trans-1,3-Dichloropropene.

Analysis performed at AGAT Toronto (unless marked by \*)

Certified By:



## Certificate of Analysis

AGAT WORK ORDER: 19T479270

PROJECT: 191-06184-00

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CLIENT NAME: WSP CANADA INC.

ATTENTION TO: Nicole Corbett

SAMPLING SITE:

SAMPLED BY:

### O. Reg. 153(511) - Metals & Inorganics (Water)

DATE RECEIVED: 2019-06-13

DATE REPORTED: 2019-06-18

Parameter	Unit	SAMPLE DESCRIPTION:		BH19-01		BH19-02		BH19-03	
		G / S	RDL	270938	RDL	270989	RDL	270990	
Antimony	µg/L	6	1.0	<1.0	1.0	<1.0	1.0	<1.0	
Arsenic	µg/L	25	1.0	<1.0	1.0	8.1	1.0	<1.0	
Barium	µg/L	1000	2.0	87.6	2.0	273	2.0	259	
Beryllium	µg/L	4.0	0.5	<0.5	0.5	<0.5	0.5	<0.5	
Boron	µg/L	5000	10.0	45.0	10.0	25.8	10.0	25.8	
Cadmium	µg/L	2.7	0.2	<0.2	0.2	<0.2	0.2	<0.2	
Chromium	µg/L	50	2.0	5.5	2.0	6.8	2.0	3.4	
Cobalt	µg/L	3.8	0.5	1.3	0.5	1.5	0.5	0.7	
Copper	µg/L	87	1.0	<1.0	1.0	<1.0	1.0	1.4	
Lead	µg/L	10	0.5	0.8	0.5	0.7	0.5	0.6	
Molybdenum	µg/L	70	0.5	2.6	0.5	1.9	0.5	4.8	
Nickel	µg/L	100	1.0	2.9	1.0	<1.0	1.0	<1.0	
Selenium	µg/L	10	1.0	<1.0	1.0	<1.0	1.0	<1.0	
Silver	µg/L	1.5	0.2	<0.2	0.2	<0.2	0.2	<0.2	
Thallium	µg/L	2	0.3	<0.3	0.3	<0.3	0.3	<0.3	
Uranium	µg/L	20	0.5	3.4	0.5	1.1	0.5	1.2	
Vanadium	µg/L	6.2	0.4	<0.4	0.4	<0.4	0.4	<0.4	
Zinc	µg/L	1100	5.0	<5.0	5.0	<5.0	5.0	<5.0	
Mercury	µg/L		0.02	<0.02	0.02	<0.02	0.02	<0.02	
Chromium VI	µg/L	25	5	<5	5	<5	5	<5	
Cyanide	µg/L	66	2	<2	2	<2	2	<2	
Sodium	µg/L	490000	5000	581000	5000	687000	5000	378000	
Chloride	µg/L	790000	2000	853000	5000	1110000	2000	736000	
Electrical Conductivity	uS/cm		2	3440	2	4310	2	2870	
pH	pH Units		NA	7.82	NA	7.69	NA	7.66	

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to Table 2: Full Depth Generic Site Condition Standards in a Potable Ground Water Condition - Potable Ground Water - All Types of Property Uses - Coarse Textured Soils  
Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.

270938-270990 Elevated RDL indicates the degree of sample dilution prior to the analysis in order to keep analytes within the calibration range of the instrument and to reduce matrix interference.

Analysis performed at AGAT Toronto (unless marked by \*)

Certified By:



# Guideline Violation

AGAT WORK ORDER: 19T479270

PROJECT: 191-06184-00

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CLIENT NAME: WSP CANADA INC.

ATTENTION TO: Nicole Corbett

SAMPLEID	SAMPLE TITLE	GUIDELINE	ANALYSIS PACKAGE	PARAMETER	UNIT	GUIDEVALUE	RESULT
270938	BH19-01	ON T2 PGW CT	O. Reg. 153(511) - Metals & Inorganics (Water)	Chloride	µg/L	790000	853000
270938	BH19-01	ON T2 PGW CT	O. Reg. 153(511) - Metals & Inorganics (Water)	Sodium	µg/L	490000	581000
270989	BH19-02	ON T2 PGW CT	O. Reg. 153(511) - Metals & Inorganics (Water)	Chloride	µg/L	790000	1110000
270989	BH19-02	ON T2 PGW CT	O. Reg. 153(511) - Metals & Inorganics (Water)	Sodium	µg/L	490000	687000

## Quality Assurance

CLIENT NAME: WSP CANADA INC.

AGAT WORK ORDER: 19T479270

PROJECT: 191-06184-00

ATTENTION TO: Nicole Corbett

SAMPLING SITE:

SAMPLED BY:

### Trace Organics Analysis

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

**O. Reg. 153(511) - VOCs (Water)**

Dichlorodifluoromethane	258358		< 0.20	< 0.20	NA	< 0.20	97%	50%	140%	86%	50%	140%	82%	50%	140%
Vinyl Chloride	258358		< 0.17	< 0.17	NA	< 0.17	80%	50%	140%	95%	50%	140%	90%	50%	140%
Bromomethane	258358		< 0.20	< 0.20	NA	< 0.20	114%	50%	140%	116%	50%	140%	112%	50%	140%
Trichlorofluoromethane	258358		< 0.40	< 0.40	NA	< 0.40	90%	50%	140%	82%	50%	140%	80%	50%	140%
Acetone	258358		< 1.0	< 1.0	NA	< 1.0	116%	50%	140%	103%	50%	140%	103%	50%	140%
1,1-Dichloroethylene	258358		< 0.30	< 0.30	NA	< 0.30	104%	50%	140%	101%	60%	130%	95%	50%	140%
Methylene Chloride	258358		< 0.30	< 0.30	NA	< 0.30	115%	50%	140%	117%	60%	130%	113%	50%	140%
trans- 1,2-Dichloroethylene	258358		< 0.20	< 0.20	NA	< 0.20	101%	50%	140%	98%	60%	130%	96%	50%	140%
Methyl tert-butyl ether	258358		< 0.20	< 0.20	NA	< 0.20	94%	50%	140%	90%	60%	130%	96%	50%	140%
1,1-Dichloroethane	258358		< 0.30	< 0.30	NA	< 0.30	104%	50%	140%	115%	60%	130%	102%	50%	140%
Methyl Ethyl Ketone	258358		< 1.0	< 1.0	NA	< 1.0	90%	50%	140%	88%	50%	140%	87%	50%	140%
cis- 1,2-Dichloroethylene	258358		< 0.20	< 0.20	NA	< 0.20	96%	50%	140%	85%	60%	130%	94%	50%	140%
Chloroform	258358		< 0.20	< 0.20	NA	< 0.20	103%	50%	140%	90%	60%	130%	96%	50%	140%
1,2-Dichloroethane	258358		< 0.20	< 0.20	NA	< 0.20	90%	50%	140%	85%	60%	130%	92%	50%	140%
1,1,1-Trichloroethane	258358		< 0.30	< 0.30	NA	< 0.30	101%	50%	140%	99%	60%	130%	82%	50%	140%
Carbon Tetrachloride	258358		< 0.20	< 0.20	NA	< 0.20	91%	50%	140%	82%	60%	130%	80%	50%	140%
Benzene	258358		< 0.20	< 0.20	NA	< 0.20	90%	50%	140%	90%	60%	130%	95%	50%	140%
1,2-Dichloropropane	258358		< 0.20	< 0.20	NA	< 0.20	91%	50%	140%	91%	60%	130%	91%	50%	140%
Trichloroethylene	258358		< 0.20	< 0.20	NA	< 0.20	98%	50%	140%	87%	60%	130%	88%	50%	140%
Bromodichloromethane	258358		< 0.20	< 0.20	NA	< 0.20	94%	50%	140%	100%	60%	130%	89%	50%	140%
Methyl Isobutyl Ketone	258358		< 1.0	< 1.0	NA	< 1.0	88%	50%	140%	81%	50%	140%	81%	50%	140%
1,1,2-Trichloroethane	258358		< 0.20	< 0.20	NA	< 0.20	105%	50%	140%	103%	60%	130%	111%	50%	140%
Toluene	258358		< 0.20	< 0.20	NA	< 0.20	116%	50%	140%	108%	60%	130%	111%	50%	140%
Dibromochloromethane	258358		< 0.10	< 0.10	NA	< 0.10	100%	50%	140%	111%	60%	130%	92%	50%	140%
Ethylene Dibromide	258358		< 0.10	< 0.10	NA	< 0.10	97%	50%	140%	99%	60%	130%	102%	50%	140%
Tetrachloroethylene	258358		< 0.20	< 0.20	NA	< 0.20	99%	50%	140%	90%	60%	130%	94%	50%	140%
1,1,1,2-Tetrachloroethane	258358		< 0.10	< 0.10	NA	< 0.10	102%	50%	140%	102%	60%	130%	94%	50%	140%
Chlorobenzene	258358		< 0.10	< 0.10	NA	< 0.10	110%	50%	140%	102%	60%	130%	110%	50%	140%
Ethylbenzene	258358		< 0.10	< 0.10	NA	< 0.10	104%	50%	140%	96%	60%	130%	102%	50%	140%
m & p-Xylene	258358		< 0.20	< 0.20	NA	< 0.20	112%	50%	140%	101%	60%	130%	109%	50%	140%
Bromoform	258358		< 0.10	< 0.10	NA	< 0.10	105%	50%	140%	113%	60%	130%	92%	50%	140%
Styrene	258358		< 0.10	< 0.10	NA	< 0.10	76%	50%	140%	98%	60%	130%	108%	50%	140%
1,1,2,2-Tetrachloroethane	258358		< 0.10	< 0.10	NA	< 0.10	97%	50%	140%	95%	60%	130%	107%	50%	140%
o-Xylene	258358		< 0.10	< 0.10	NA	< 0.10	110%	50%	140%	102%	60%	130%	109%	50%	140%
1,3-Dichlorobenzene	258358		< 0.10	< 0.10	NA	< 0.10	93%	50%	140%	93%	60%	130%	104%	50%	140%
1,4-Dichlorobenzene	258358		< 0.10	< 0.10	NA	< 0.10	92%	50%	140%	87%	60%	130%	99%	50%	140%
1,2-Dichlorobenzene	258358		< 0.10	< 0.10	NA	< 0.10	94%	50%	140%	87%	60%	130%	96%	50%	140%
1,3-Dichloropropene	258358		< 0.30	< 0.30	NA	< 0.30	86%	50%	140%	81%	60%	130%	107%	50%	140%
n-Hexane	258358		< 0.20	< 0.20	NA	< 0.20	98%	50%	140%	92%	60%	130%	91%	50%	140%

## Quality Assurance

 CLIENT NAME: WSP CANADA INC.  
 PROJECT: 191-06184-00  
 SAMPLING SITE:

 AGAT WORK ORDER: 19T479270  
 ATTENTION TO: Nicole Corbett  
 SAMPLED BY:

### Trace Organics Analysis (Continued)

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

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

F1 (C6 - C10)	275745	< 25	< 25	NA	< 25	94%	60%	140%	101%	60%	140%	100%	60%	140%
F2 (C10 to C16)	264606	< 100	< 100	NA	< 100	97%	60%	140%	94%	60%	140%	91%	60%	140%
F3 (C16 to C34)	264606	< 100	< 100	NA	< 100	100%	60%	140%	110%	60%	140%	108%	60%	140%
F4 (C34 to C50)	264606	< 100	< 100	NA	< 100	96%	60%	140%	106%	60%	140%	101%	60%	140%

Comments: When the average of the sample and duplicate results is less than 5x the RDL, the Relative Percent Difference (RPD) will be indicated as Not Applicable (NA).

Certified By: \_\_\_\_\_



## Quality Assurance

CLIENT NAME: WSP CANADA INC.  
 PROJECT: 191-06184-00  
 SAMPLING SITE:

AGAT WORK ORDER: 19T479270  
 ATTENTION TO: Nicole Corbett  
 SAMPLED BY:

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

O. Reg. 153(511) - Metals & Inorganics (Water)

Antimony	268428		<1.0	<1.0	NA	< 1.0	101%	70%	130%	97%	80%	120%	93%	70%	130%
Arsenic	268428		<1.0	<1.0	NA	< 1.0	104%	70%	130%	102%	80%	120%	103%	70%	130%
Barium	268428		13.7	13.6	0.7%	< 2.0	99%	70%	130%	97%	80%	120%	92%	70%	130%
Beryllium	268428		<0.5	<0.5	NA	< 0.5	97%	70%	130%	95%	80%	120%	98%	70%	130%
Boron	268428		<10.0	<10.0	NA	< 10.0	99%	70%	130%	95%	80%	120%	95%	70%	130%
Cadmium	268428		<0.2	<0.2	NA	< 0.2	105%	70%	130%	108%	80%	120%	106%	70%	130%
Chromium	268428		<2.0	<2.0	NA	< 2.0	107%	70%	130%	106%	80%	120%	104%	70%	130%
Cobalt	268428		<0.5	<0.5	NA	< 0.5	106%	70%	130%	107%	80%	120%	104%	70%	130%
Copper	268428		1.8	1.9	NA	< 1.0	106%	70%	130%	108%	80%	120%	106%	70%	130%
Lead	268428		<0.5	<0.5	NA	< 0.5	102%	70%	130%	104%	80%	120%	100%	70%	130%
Molybdenum	268428		<0.5	<0.5	NA	< 0.5	103%	70%	130%	100%	80%	120%	101%	70%	130%
Nickel	268428		<1.0	<1.0	NA	< 1.0	103%	70%	130%	103%	80%	120%	100%	70%	130%
Selenium	268428		<1.0	<1.0	NA	< 1.0	104%	70%	130%	102%	80%	120%	110%	70%	130%
Silver	268428		<0.2	<0.2	NA	< 0.2	104%	70%	130%	107%	80%	120%	106%	70%	130%
Thallium	268428		<0.3	<0.3	NA	< 0.3	107%	70%	130%	105%	80%	120%	101%	70%	130%
Uranium	268428		<0.5	<0.5	NA	< 0.5	101%	70%	130%	100%	80%	120%	99%	70%	130%
Vanadium	268428		2.6	2.6	0.0%	< 0.4	104%	70%	130%	100%	80%	120%	99%	70%	130%
Zinc	268428		<5.0	<5.0	NA	< 5.0	99%	70%	130%	97%	80%	120%	101%	70%	130%
Mercury	271998		<0.02	<0.02	NA	< 0.02	105%	70%	130%	102%	80%	120%	105%	70%	130%
Chromium VI	270938	270938	<5	<5	NA	< 5	101%	70%	130%	101%	80%	120%	104%	70%	130%
Cyanide	271998		<2	<2	NA	< 2	98%	70%	130%	100%	80%	120%	103%	70%	130%
Sodium	264611		11500	11300	1.8%	< 500	96%	70%	130%	95%	80%	120%	97%	70%	130%
Chloride	272147		79400	80000	0.8%	< 100	91%	70%	130%	99%	70%	130%	109%	70%	130%
Electrical Conductivity	268467		828	831	0.4%	< 2	98%	90%	110%						
pH	268467		7.39	7.38	0.1%	NA	100%	90%	110%						

Comments: NA signifies Not Applicable.

Duplicate Qualifier: As the measured result approaches the RL, the uncertainty associated with the value increases dramatically, thus duplicate acceptance limits apply only where the average of the two duplicates is greater than five times the RL.

Certified By: \_\_\_\_\_



## Method Summary

CLIENT NAME: WSP CANADA INC.

AGAT WORK ORDER: 19T479270

PROJECT: 191-06184-00

ATTENTION TO: Nicole Corbett

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Trace Organics Analysis			
F1 (C6 - C10)	VOL-91- 5010	MOE PHC E3421	(P&T)GC/FID
F1 (C6 to C10) minus BTEX	VOL-91-5010	MOE PHC E3421	(P&T)GC/FID
F2 (C10 to C16)	VOL-91-5010	MOE PHC E3421	GC / FID
F3 (C16 to C34)	VOL-91-5010	MOE PHC E3421	GC / FID
F4 (C34 to C50)	VOL-91-5010	MOE PHC E3421	GC / FID
Gravimetric Heavy Hydrocarbons	VOL-91-5010	MOE PHC E3421	BALANCE
Terphenyl	VOL-91-5010		GC/FID
Dichlorodifluoromethane	VOL-91-5001	EPA SW-846 5030C & 8260D	(P&T)GC/MS
Vinyl Chloride	VOL-91-5001	EPA SW-846 5030C & 8260D	(P&T)GC/MS
Bromomethane	VOL-91-5001	EPA SW-846 5030C & 8260D	(P&T)GC/MS
Trichlorofluoromethane	VOL-91-5001	EPA SW-846 5030C & 8260D	(P&T)GC/MS
Acetone	VOL-91-5001	EPA SW-846 5030C & 8260D	(P&T)GC/MS
1,1-Dichloroethylene	VOL-91-5001	EPA SW-846 5030C & 8260D	(P&T)GC/MS
Methylene Chloride	VOL-91-5001	EPA SW-846 5030C & 8260D	(P&T)GC/MS
trans- 1,2-Dichloroethylene	VOL-91-5001	EPA SW-846 5030C & 8260D	(P&T)GC/MS
Methyl tert-butyl ether	VOL-91-5001	EPA SW-846 5030C & 8260D	(P&T)GC/MS
1,1-Dichloroethane	VOL-91-5001	EPA SW-846 5030C & 8260D	(P&T)GC/MS
Methyl Ethyl Ketone	VOL-91-5001	EPA SW-846 5030C & 8260D	(P&T)GC/MS
cis- 1,2-Dichloroethylene	VOL-91-5001	EPA SW-846 5030C & 8260D	(P&T)GC/MS
Chloroform	VOL-91-5001	EPA SW-846 5030C & 8260D	(P&T)GC/MS
1,2-Dichloroethane	VOL-91-5001	EPA SW-846 5030C & 8260D	(P&T)GC/MS
1,1,1-Trichloroethane	VOL-91-5001	EPA SW-846 5030C & 8260D	(P&T)GC/MS
Carbon Tetrachloride	VOL-91-5001	EPA SW-846 5030C & 8260D	(P&T)GC/MS
Benzene	VOL-91-5001	EPA SW-846 5030C & 8260D	(P&T)GC/MS
1,2-Dichloropropane	VOL-91-5001	EPA SW-846 5030C & 8260D	(P&T)GC/MS
Trichloroethylene	VOL-91-5001	EPA SW-846 5030C & 8260D	(P&T)GC/MS
Bromodichloromethane	VOL-91-5001	EPA SW-846 5030C & 8260D	(P&T)GC/MS
Methyl Isobutyl Ketone	VOL-91-5001	EPA SW-846 5030C & 8260D	(P&T)GC/MS
1,1,2-Trichloroethane	VOL-91-5001	EPA SW-846 5030C & 8260D	(P&T)GC/MS
Toluene	VOL-91-5001	EPA SW-846 5030C & 8260D	(P&T)GC/MS
Dibromochloromethane	VOL-91-5001	EPA SW-846 5030C & 8260D	(P&T)GC/MS
Ethylene Dibromide	VOL-91-5001	EPA SW-846 5030C & 8260D	(P&T)GC/MS
Tetrachloroethylene	VOL-91-5001	EPA SW-846 5030C & 8260D	(P&T)GC/MS
1,1,1,2-Tetrachloroethane	VOL-91-5001	EPA SW-846 5030C & 8260D	(P&T)GC/MS
Chlorobenzene	VOL-91-5001	EPA SW-846 5030C & 8260D	(P&T)GC/MS
Ethylbenzene	VOL-91-5001	EPA SW-846 5030C & 8260D	(P&T)GC/MS
m & p-Xylene	VOL-91-5001	EPA SW-846 5030C & 8260D	(P&T)GC/MS
Bromoform	VOL-91-5001	EPA SW-846 5030C & 8260D	(P&T)GC/MS
Styrene	VOL-91-5001	EPA SW-846 5030C & 8260D	(P&T)GC/MS
1,1,2,2-Tetrachloroethane	VOL-91-5001	EPA SW-846 5030C & 8260D	(P&T)GC/MS
o-Xylene	VOL-91-5001	EPA SW-846 5030C & 8260D	(P&T)GC/MS
1,3-Dichlorobenzene	VOL-91-5001	EPA SW-846 5030C & 8260D	(P&T)GC/MS
1,4-Dichlorobenzene	VOL-91-5001	EPA SW-846 5030C & 8260D	(P&T)GC/MS
1,2-Dichlorobenzene	VOL-91-5001	EPA SW-846 5030C & 8260D	(P&T)GC/MS
1,3-Dichloropropene	VOL-91-5001	EPA SW-846 5030C & 8260D	(P&T)GC/MS
Xylene Mixture	VOL-91-5001	EPA SW-846 5030C & 8260D	(P&T)GC/MS
n-Hexane	VOL-91-5001	EPA SW-846 5030C & 8260D	(P&T)GC/MS
Toluene-d8	VOL-91-5001	EPA SW-846 5030C & 8260D	(P&T)GC/MS
4-Bromofluorobenzene	VOL-91-5001	EPA SW-846 5030C & 8260D	(P&T)GC/MS





## Method Summary

CLIENT NAME: WSP CANADA INC.

AGAT WORK ORDER: 19T479270

PROJECT: 191-06184-00

ATTENTION TO: Nicole Corbett

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Water Analysis			
Antimony	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Arsenic	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Barium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Beryllium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Boron	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Cadmium	MET 1002	EPA SW-846 6020A & 200.8	ICP-MS
Chromium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Cobalt	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Copper	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Lead	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Molybdenum	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Nickel	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Selenium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Silver	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Thallium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Uranium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Vanadium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Zinc	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Mercury	MET-93-6100	EPA SW 846 7470 & 245.1	CVAAS
Chromium VI	INOR-93-6034	SM 3500-Cr B	SPECTROPHOTOMETER
Cyanide	INOR-93-6052	MOE METHOD CN- 3015 & SM 4500 CN- I	TECHNICON AUTO ANALYZER
Sodium	MET-93-6105	EPA SW-846 6010C & 200.7	ICP/OES
Chloride	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Electrical Conductivity	INOR-93-6000	SM 2510 B	PC TITRATE
pH	INOR-93-6000	SM 4500-H+ B	PC TITRATE



# AGAT

## Laboratories

1561K

5835 Coopers Avenue  
Mississauga, Ontario L4Z 1Y2  
Ph: 905.712.5100 Fax: 905.712.5122  
web@earth.agatlabs.com

### Chain of Custody Record

If this is a Drinking Water sample, please use Drinking Water Chain of Custody Form (potable water consumed by humans)

#### Report Information:

Company: WSP Canada Inc.  
Contact: Nicole Corbett  
Address: 561 Bcyne Dr. Units C/D  
Barrie, ON L4N 9V3  
(705) 888-5629 Fax: \_\_\_\_\_  
Phone: \_\_\_\_\_  
Reports to be sent to: nicole.corbett@wsp.com  
1. Email: \_\_\_\_\_  
2. Email: \_\_\_\_\_

#### Project Information:

Project: 191-06184-00  
Site Location: 506249 Highway 89  
Sampled By: NC  
AGAT Quote #: SD  
PO: \_\_\_\_\_  
Please note: If quotation number is not provided, client will be billed full price for analysis.

#### Invoice Information:

Company: WSP  
Contact: \_\_\_\_\_  
Address: \_\_\_\_\_  
Email: Payables.Ontario@wsp.com  
Bill To Same: Yes  No

#### Regulatory Requirements:

Please check all applicable boxes  
 Regulation 153/04  
 Sewer Use  
 Table 2 Indicate One  
 Ind/Comm  
 Sanitary  
 Res/Park  
 Storm  
 Agriculture  
 Soils (Check One)  
 Fine  
 MISA  
 Region Indicate One  
 Regulation 558  
 CCME  
 Prov. Water Quality Objectives (PWQO)  
 Other Indicate One

Is this submission for a Record of Site Condition?  
 Yes  No

Report Guideline on Certificate of Analysis  
 Yes  No

#### Sample Matrix Legend

- B Biota
- GW Ground Water
- O Oil
- P Paint
- S Soil
- SD Sediment
- SW Surface Water

Field Filtered - Metals, Hg, CrVI

#### Sample Identification

Sample Identification	Date Sampled	Time Sampled	# of Containers	Sample Matrix
BH19-01	06/11/19	PM	9	GW
BH19-02			1	
BH19-03			1	
GWDUP-1			3	
Trip Blank			3	

#### Comments/Special Instructions

PHC caps broken please be careful

#### Metals and Inorganics

- All Metals  153 Metals (excl. Hydrides)
- Hydride Metals  153 Metals (Incl. Hydrides)
- ORPs:  B-HWS  Cl  CN
- Cr<sup>6+</sup>  EC  FOC  Hg
- pH  SAR
- Full Metals Scan
- Regulation/Custom Metals
- Nutrients:  TP  NH<sub>3</sub>  TKN
- NO<sub>3</sub>  NO<sub>2</sub>  NO<sub>3</sub>+NO<sub>2</sub>
- Volatiles:  VOC  BTEX  THM

#### Regulation/Custom Metals

- PHCs F1 - F4
- ABNs
- PAHs
- PCBs:  Total  Aroclors
- Organochlorine Pesticides
- TCLP:  M&I  VOCs  ABNs  B(a)P  PCBs
- Sewer Use

Potentially Hazardous or High Concentration (Y/N)

#### Laboratory Use Only

Work Order #: 19T479270  
Cooler Quantity: \_\_\_\_\_  
Arrival Temperatures: 7.9 7.3 6.9  
Custody Seal Intact:  Yes  No  N/A  
Notes: \_\_\_\_\_

#### Turnaround Time (TAT) Required:

Regular TAT  5 to 7 Business Days

#### Rush TAT (Rush Surcharges Apply)

3 Business Days  2 Business Days  Next Business Day  
OR Date Required (Rush Surcharges May Apply): \_\_\_\_\_

Please provide prior notification for rush TAT  
\*TAT is exclusive of weekends and statutory holidays  
For 'Same Day' analysis, please contact your AGAT CPM

Samples Relinquished By (Print Name and Sign): Nicole Corbett WSP CCB Date: 06/11/19 Time: 5:00pm

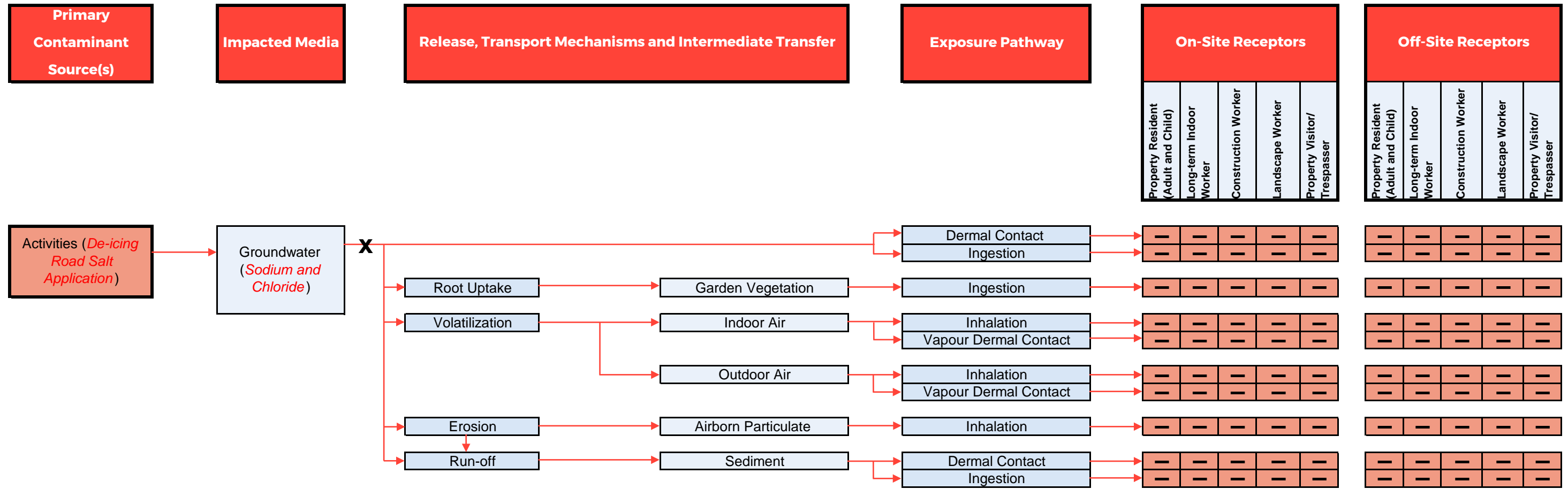
Samples Received By (Print Name and Sign): WSP WSP Date: \_\_\_\_\_ Time: \_\_\_\_\_

Samples Relinquished By (Print Name and Sign): \_\_\_\_\_ Date: \_\_\_\_\_ Time: \_\_\_\_\_

# APPENDIX

## **E** CSM TRANSPORT DIAGRAMS

## PHASE TWO ESA CONCEPTUAL SITE MODEL - HUMAN HEALTH EXPOSURE



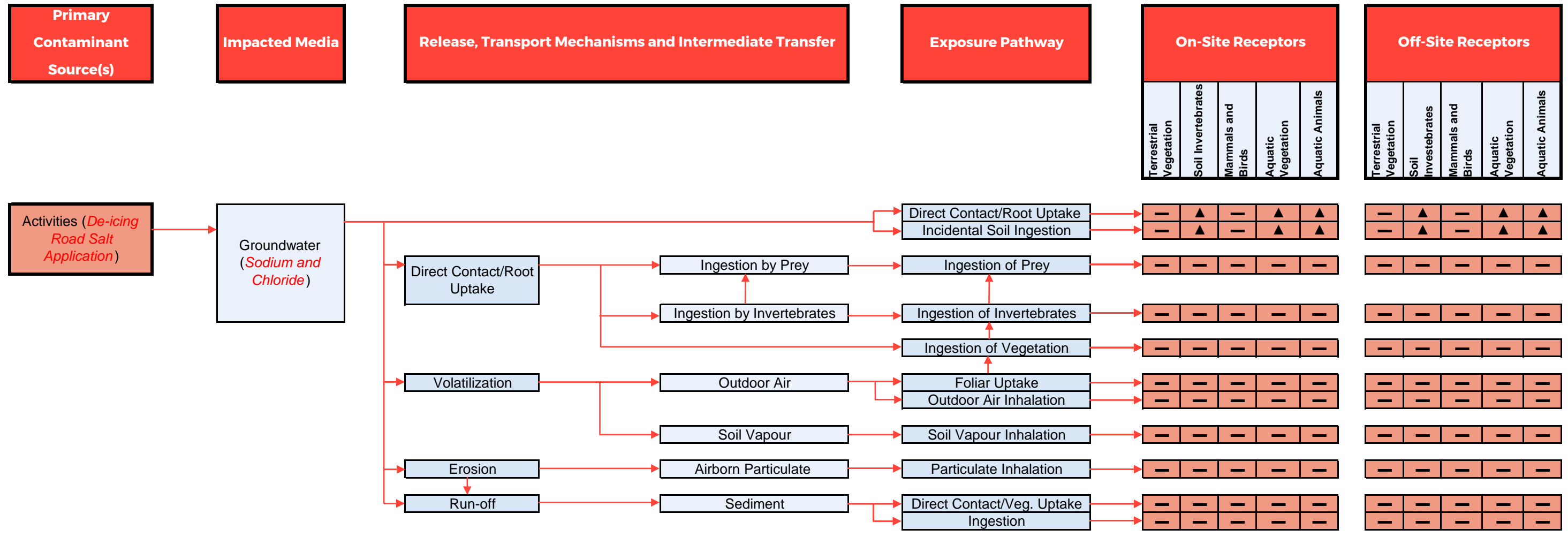
**LEGEND:**

- [—] - NO Receptor considered to be present and/or Pathway Incomplete
- [▲] - Receptor is considered to be present and Pathway Complete
- X - Exposure Pathway considered blocked (*indicate* Risk Management *and/or* Remediation) (*To be Shown after completion of Remediation/Risk Assessment*)



<b>Project No.: 191-06184-00</b>		<b>Appendix: E</b>	
<b>Project: 506249 Highway 89, Primrose, Ontario</b>			
<b>Date: June, 2019</b>	<b>Drawn: NC</b>	<b>Approved: JD</b>	

## PHASE TWO ESA CONCEPTUAL SITE MODEL - ECOLOGICAL EXPOSURE



**LEGEND:**

[—] - NO Receptor considered to be present and/or Pathway Incomplete  
 [▲] - Receptor is considered to be present and Pathway Complete



Project No.: <b>191-06184-00</b>	Appendix: <b>E</b>	
Project: <b>506249 Highway 89, Primrose, Ontario</b>		
Date: <b>June, 2019</b>	Drawn: <b>NC</b>	Approved: <b>JD</b>