



November 8, 2019

Reference No. 11204808

Mr. Barron Meyerhoffer
Director of Planning and Engineering
Ottawa Community Housing
39 Auriga Drive
Ottawa, Ontario K2E 7Y8

Dear Mr. Meyerhoffer:

**Re: Limited Environmental Due Diligence and Groundwater Quality Assessment
October 2019 Sampling Event
715 Mikinak Road, Ottawa, Ontario**

1. Introduction

On behalf of Ottawa Community Housing (OCH or Client), GHD completed a groundwater monitoring program at the Waterbridge Development property located at 715 Mikinak Road, in Ottawa, Ontario (Site or Property). A Site Location Map is presented as Figure 1.

The Site is currently vacant land covered with overgrown vegetation and one tree on the west (central) side of the Site. The northern portion of the Site is surfaced with gravel, which appears to have been imported. A Site Plan is presented as Figure 2.

The objective of the limited due diligence and groundwater quality assessment was to complete preliminary assessment of potential environmental liabilities associated with the Site based on historical information, identify data gaps and complete an assessment of the groundwater quality in existing monitoring wells at the Site.

2. Background Environmental Reports Review

As part of the limited due diligence assessment, GHD reviewed the following environmental reports, provided by OCH:

- "2010 Phase III Environmental Site Assessment (ESA), Former CANEX/Shell Site, CFB Rockcliffe, Ottawa, Ontario", prepared for Public Works and Government Services Canada (PWGSC), prepared by DST Consulting Engineers (DST), dated September, 2010.
- "Phase One Environmental Site Assessment, Former CFB Rockcliffe, Ottawa, Ontario", prepared for Canada Lands Company (CLC) Limited, prepared by DST Consulting Engineers (DST), dated March, 2015.



- "Phase Two Environmental Site Assessment Update, Volume 5, Former CFB Rockcliffe, Ottawa, Ontario", prepared for Canada Lands Company (CLC) Limited, prepared by DST Consulting Engineers (DST), dated May, 2015.
- "Additional Groundwater Sampling in Support of RSC Submission – RSC 7, Wateridge Development, Former CFB Rockcliffe, Ottawa, Ontario", prepared for Canada Lands Company (CLC) Limited, prepared by DST Consulting Engineers (DST), dated March 13, 2019.

Phase III Environmental Site Assessment - 2010

The 2010 Phase III ESA was completed in the vicinity of a former retail fuel outlet (CANEX/Shell) at the Canadian Forces Base (CFB) Rockcliffe, Ottawa, Ontario. The purpose of the Phase III ESA was to remove a groundwater treatment collection trench and manhole associated with previous remediation efforts of the former Canex filling station and to conduct environmental sampling to investigate groundwater impacts and the source of PHC impacts near the former intersection of Via Venus and Bishop Private.

As part of the excavation work in the vicinity of the collection trench, approximately 23 tonnes of material were deemed to be contaminated and sent off-Site for disposal. Field sampling consisted of the submittal of five soil samples for excavation sidewalls and floor and one excavation water sample for confirmation of remediation purposes. Confirmation of remediation sample results were in compliance with the federal and provincial remediation criteria, with the exception of the samples collected from the north sidewall, as these samples were collected from below a water main and therefore a clean excavation boundary could not be achieved in this area.

As part of delineation efforts undertaken at the time of the Phase III ESA, DST advanced 12 test pits and four test trenches in the area around the former interceptor trench and former intersection of Via Venus and Bishop Private. This investigation confirmed the presence and estimated the extent of PHC/BTEXs soil contamination at the Site. Three Areas of Environmental Concern (AECs) were identified based on the 2010 field and analytical testing; these areas are identified on the attached Figure 2. DST estimated that a total of 1,420 cubic metres (m³) of soil, impacted with PHCs and/or BTEXs remained at the Site.

Additionally, the presence of petroleum groundwater contamination was identified based on a visual sheen and the presence of free product.

Phase One Environmental Site Assessment - 2015

The 2015 Phase One ESA was completed for the Former CFB Rockcliffe Lands, which consisted of a Property with an approximate area of 125 hectares, and encompasses the Site at the approximate centre of the Property. The Site was vacant and unoccupied at the time of the 2015 Phase One ESA. According to the Phase One, the floor slab for a former building ("Building 79") was crushed and used to backfill for the former private married quarters (PMQs) building footprints. The Phase One ESA stated that a Phase II ESA field program had been completed and has confirmed the presence of Metals and PAHs in these locations.



Historical research included an interview with persons knowledgeable of the Site; this included DST interviewing Ms. Krista Durie, a project coordinator for CLC (the Site owner), who was familiar with the Site from approximately 2003 to 2014. The interview was used to define areas of environmental concern (AECs) at the Site. Ms. Durie indicated that a commercial fueling outlet was present in the north portion of the Site. The fueling outlet was also equipped with a dry cleaning drop off depot, and no active dry-cleaning was reported to have been present at the Site. No automotive repair/maintenance facilities, manufacturing, waste disposal facilities were present at the Property.

A Phase Two ESA was recommended to assess the aforementioned AECs at the Site, in addition to AECs identified across the CFB Property.

Phase Two Environmental Site Assessment - 2015

The 2015 Phase Two ESA was completed to assess soil and groundwater quality at the CFB Rockcliffe Property, and also specifically at the Site, in response to the AECs identified in the aforementioned Phase One ESA. As part of the Phase Two ESA, six boreholes/monitoring wells (BHMW14-1 to BHMW14-6) were drilled at the former CANEX facility (Site). Additionally, the groundwater from eight existing off-Site monitoring wells (BHMW5, BHMW6, BHMW12, BHMW21, BHMW23, BHMW25 and BHMW26) were also sampled.

The analytical results were compared to the MOE Table 3 standards for residential/parkland/institutional use in coarse grained soil conditions. There were no exceedances identified in the soil samples submitted for PHCs and VOCs (including BTEXs). Groundwater samples collected from the existing monitoring wells BHMW12, BHMW21 and BHMW26 (off-Site) were found to exceed the MOE Table 3 standards for PHCs. There were no exceedances reported from the on-Site monitoring wells for PHCs and no exceedances of VOCs, PAHs or metals were reported from any of the monitoring wells sampled from the Site and other portions of the CANEX Property.

Delineation and volume estimates of remaining contaminated soil were provided. It was recommended that remedial activities be undertaken to remediate the contaminants of concern in the areas delineated during the Phase Two ESA. There were no areas requiring additional remediation identified for the Site.

Additional Groundwater Sampling - 2019

The groundwater sampling letter indicated that a remedial field program was completed at the CFB Property in 2014-2015, however, this remedial program did not include remediation activities at the former CANEX Property. A subsequent remedial field program was commissioned by CLC in 2017 and was directed and supervised by DST. DST submitted a record of site condition application with the Ministry of Environment, Conservation and Parks (MECP) in April 2018. The MECP provided comments on the RSC submission, which included:

Vertical delineation of the PHC impacts in various locations was required, including providing floor samples from excavations. It was noted in some instances, that the remedial excavations were terminated



on bedrock; in these cases the MECP requested that groundwater sampling was required to demonstrate remediation had been completed vertically.

Two additional groundwater monitoring wells (BHMW18-1 and BHMW18-2) were drilled at the Site and were sampled for PHCs and BTEXs. The wells were drilled to depths of 8.2 m and 9.9 m below ground surface, respectively. The groundwater samples collected from the on-Site monitoring wells were found to be in compliance with the MOE Table 3 standards for PHCs and BTEXs. DST stated that vertical delineation had been completed and no additional remediation or subsequent monitoring was recommended.

GHD Notes on the DST 2019 Additional Groundwater Sampling Letter

- No documentation or reports have been provided to GHD for review with respect to remedial activities at the Site.
- The additional groundwater monitoring wells (BHMW18-1 and BHMW18-2) used for vertical delineation do not straddle the groundwater table, i.e., the monitoring well screens were installed below the groundwater elevation and therefore, are not installed in a manner to provide an adequate assessment of groundwater quality with respect to PHCs characterization.

3. Scope of Field Work

The following provides an overview of the scope of work completed by GHD as part of the October 2019 monitoring program including:

- Conducting a Site visit to review general Site features and assess potential environmental liabilities based on visual assessment.
- Collection of water level measurements from available on Site monitoring wells.
- Completion of groundwater sampling from select on Site monitoring wells.
- Collection of groundwater samples on Site for laboratory analysis of Petroleum Hydrocarbon (PHC) fractions (F₁ to F₄), benzene, toluene, ethylbenzene and xylenes (BTEXs), Volatile Organic Compounds (VOCs), Polycyclic Aromatic Hydrocarbons (PAHs), Metals and Inorganics.

Details of the above noted activities are provided in the following sections.

4. Field Activities

4.1 Preparation

Prior to initiating on-Site activities, GHD field personnel reviewed the Site-specific Health and Safety Plan (HASP) prepared by GHD for the Site. The HASP identified potential physical and chemical hazards, personal protective equipment to be used, and health and safety monitoring requirements. The HASP also identified local and project-specific contacts, including the local hospital, in case of emergency.



An on-Site drum, provided by DST as part of on-going monitoring work for the current property owner, was used for containerizing of purge water during sampling.

4.2 Site Observations

GHD completed a Site visit to review the existing Site conditions on October 24, 2019. At the time of the Site visit, the property was vacant. The northern portion of the Site was surfaced with gravel, and a localized depression in the gravel, indicative of excavation activities was observed in the north (central) portion of this area of the Site. Ten groundwater monitoring wells were observed surrounding the excavation and in other areas of the Site. At least five 205 Litre (L) steel drums, used to containerize soil cuttings and one plastic 205 L drum used to containerize purge water from a recent drilling program and groundwater investigation by others were also observed on the northern portion of the Site. The southern portion of the Site was overgrown with vegetation, one mature tree was observed on the west (central) portion of the Site.

Neighboring land use consisted of recently constructed rights-of-way at the perimeter of the Site, followed by vacant land to the north, south and west. The property to the east of the Site was undergoing residential redevelopment.

There were no indications of surficial staining, distressed vegetation or evidence of fuel or chemical storage at the Site at the time of the Site visit.

4.3 Groundwater Monitoring

GHD completed a groundwater monitoring event on October 24, 2019 at all of the known existing on-Site wells (BHMW8, BHMW18-1, BHMW17-1, BHMW18-2 and BHMW20). During the October 2019 sampling event, five new monitoring wells had been recently drilled by DST (BHMW 19-3, BHMW19-4, BHMW 19-5, BHMW 19-6 and BHMW19-7). On the morning of October 24, 2019, a technician from DST had arrived on Site to develop and place pad locks on the newly installed monitoring wells. The approximately monitoring well locations are presented on Figure 2.

The following protocol was followed during the sampling events:

- Water/product levels were measured in each well to confirm groundwater elevations and monitoring well volumes using a calibrated oil/water interface probe. Groundwater elevations are presented in Table 1.
- Each monitoring well was purged using a peristaltic pump at a rate of less than 200 millilitres per minute (mL/min) to ensure representative groundwater samples were obtained. Field measurements of pH, electrical conductivity, temperature, and turbidity were taken after each purged well volume to demonstrate chemical equilibrium prior to sample collection.
- Groundwater samples were collected in laboratory-supplied sample containers specific to the analytical parameter, transported in a cooler with ice, and submitted to a Standards Council of Canada accredited laboratory, Paracel Laboratories Ltd. (Paracel), for chemical analysis of PHCs,



VOCs (Including BTEXs), PAHs, Metals and Inorganics. For quality assurance/quality control (QA/QC), one field duplicate sample was collected during the October 2019 event and one trip blank sample was submitted with the October 2019 submission.

4.4 Waste Management

Water generated from the well purging activities was containerized in a 205-litre (L) drum and temporarily stored on the Waterbridge Development property, near the BHMW19-4 location, pending the analytical results. GHD supplied new tubing for sampling on the day of the monitoring event and all tubing was removed off Site by the end of day.

5. Findings

5.1 Groundwater Flow Direction

Static water level measurements were collected on October 24, 2019. The water levels ranged from approximately 3.6 to 5.12 metres (m) at BHMW20, BHMW18-2, BHMW17-1, BHMW18-1 and BHMW8. The groundwater level measurements are presented in Table 1.

Based on the regional topography, locations of significant surface water bodies and previous environmental reports by others for the Site and surrounding area, the groundwater flow direction within the study area is generally north-northwest, towards the Ottawa River.

The groundwater results observed during the October 2019 monitoring event for BHMW18-1 and BHMW18-2 were consistent with those observed during the June 2018 monitoring event by DST for F1-F4 Hydrocarbons and BTEX. GHD was not provided with any historical chemical data for the other three existing monitoring wells and five newly installed monitoring wells at the Site.

5.2 Field Evidence of Impact

During well development/sample collection activities there was no field evidence of impact (i.e., odours, sheen, product, elevated headspace readings, etc.) noted at any of the five monitoring well locations that were accessed and sampled.

5.3 Data Validation

To validate the analytical results, QC samples were analyzed by the laboratory as required by their analytical methods. In addition, following receipt of the analytical data from the laboratory, a GHD engineer completed a data quality assessment and validation. The evaluation of the analytical data is based on the QA/QC information provided by the laboratory including laboratory blank data, laboratory duplicate data, and laboratory surrogate spike and check recovery data as well as sample holding times, field duplicate/blank analysis and reagent blank analysis. Based on the data review and validation, the analytical data is considered acceptable for use.



5.4 Assessment Standards

The groundwater analytical results were assessed and compared to the Ontario Ministry of the Environment¹ (MOE) Table 1 (background) standards and the MOE Table 3 standards for coarse textured soils, non-potable groundwater usage. The standards are presented in the MOE document entitled, "Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act," dated April 15, 2011. The 2011 standards are referenced in Ontario Regulation (O. Reg.) 153/04 – Records of Site Condition, as amended by O. Reg. 511/09.

5.5 Groundwater Quality

The groundwater analytical results are summarized in Table 2. The laboratory certificates of analysis are provided in Attachment A. Based on a review of the analytical results, all of the analyzed groundwater samples for PHC, VOCs (including BTEXs), PAHs, Metals and inorganics were in compliance with the 2011 MOE Table 3 standards.

6. Discussion

Based on a review of documentation provided by CLC to the City of Ottawa and OCH and reviewed by GHD as part of this limited assessment, remediation of the former CANEX/Shell Site, which is present on the northern portion of the Site, was reported to be complete in 2017, with subsequent monitoring and delineation work on-going.

GHD has not been provided reports documenting the most recent remediation, delineation and monitoring work at the Site. Furthermore, the Phase One and Phase Two ESA reports provided for review encompass a much larger piece of land which includes the Site. These reports were dated 2015 and therefore the MECP would require updated reports, dated within 18 months of submission of the record of site condition (RSC). Review of all documentation should be conducted to ensure that all areas of potential environmental concern and contaminants of concern have been adequately assessed and remediated.

Based on the October 2019 groundwater monitoring program completed on-Site on the northern portion of the Property, all of the groundwater samples analyzed for PHC, VOCs (including BTEXs), PAHs, Metals and inorganics were in compliance with the 2011 MOE Table 3 standards.

As previously noted DST has recently installed additional monitoring wells at the Site. No information to the rational for the additional wells has been provided, however, based on aforementioned correspondence from the MECP pursuant to the filing of a RSC at the Site, it is suspected that these wells may be associated with further documentation requests as part of the RSC filing.

¹ Ministry of the Environment (MOE) was renamed the Ontario Ministry of Environment, Conservation and Parks (MECP) on July 1, 2018 and as a result, all references to the "Ministry of the Environment" and "MOE" refer to the MECP.



We trust this meets your current needs at this time. Should you have any questions regarding the above, please do not hesitate to contact the undersigned.

Sincerely,

GHD

A handwritten signature in blue ink, appearing to read "Luke Lopers", followed by a long horizontal flourish.

Luke Lopers, P. Eng.

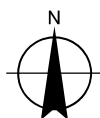
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Paper Size ANSI A
0 140 280 420 560
Meters

Map Projection: Transverse Mercator
Horizontal Datum: North American 1983
Grid: NAD 1983 UTM Zone 18N



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GROUNDWATER QUALITY ASSESSMENT

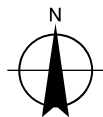
715 MIKINAK ROAD
OTTAWA, ONTARIO
SITE LOCATION MAP

Project No. 11204808-E1
Revision No. -
Date Nov 7, 2019

FIGURE 1



Paper Size ANSI A
 0 10 20 30 40
 Meters
 Map Projection: Mercator Auxiliary Sphere
 Horizontal Datum: WGS 1984
 Grid: WGS 1984 Web Mercator Auxiliary Sphere



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 LIMITED ENVIRONMENTAL DUE DILIGENCE AND
 GROUNDWATER QUALITY ASSESSMENT

715 MIKINAK ROAD
 OTTAWA, ONTARIO
 SITE PLAN

Project No. 11204808-E1
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FIGURE 2

Table 1

Summary of Field Readings and Observations
Limited Environmental Due Diligence and Groundwater Quality Assessment
October 2019 Sampling Event
715 Mikinak Road
Ottawa, Ontario

Well ID	Well Diameter (in)	Well Depth (m)	Static Depth to Water (m)	Water Column Height (m)	Casing Volume (L)	Measuring Reference Point	Temp. (°C)	Conductivity (mS/cm)	pH	Turbidity (NTU)	Colour	Odour	DO (mg/L)	Comments
BHMW8	2	10.29	5.12	5.17	10.44	T.O.R.	11.75	1.63	7.3	50.6	Clear	None	2.8	Well moves easily, integrity questioned, cap missing, well casing lid broken
BHMW18-1	2	8.66	4.35	4.31	8.7	T.O.R.	12.15	1.21	7.15	4.3	Clear	None	2.88	Duplicate taken
BHMW17-1	2	5.31	4.09	1.22	2.46	T.O.R.	12.13	2.04	6.87	24.6	Clear	None	1.38	-
BHMW18-2	2	10.26	4.755	5.505	11.12	T.O.R.	12.82	1.32	7.19	2	Clear	None	2.04	Well moves easily
BHMW20	2	5.76	3.63	2.13	4.3	T.O.R.	10.75	0.845	7.17	>1000	Clear	None	5.99	Peristaltic pump failed, took last Horiba reading and sample with existing waterra. White stick up well near large tree. Actual well ID is unknown.

Table 2

Summary of Groundwater Analysis
Limited Environmental Due Diligence and Groundwater Quality Assessment
October 2019 Sampling Event
715 Mikinak Road
Ottawa, ON

			O.Reg.153/04 Table 1 background	O.Reg.153/04 Table 3 non-potable groundwater, coarse any	BHMW8	BHMW18-1	BHMW17-1	BHMW18-2	BHMW20	DUP	TRIP BLANK
Parameter	Units	MDL	any								
General Inorganics											
Cyanide, free	ug/L	2	5 ug/L	66 ug/L	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	N/A
pH	pH Units	0.1			7.3	7.2	7.0	7.2	7.2	7.2	N/A
Anions											
Chloride	mg/L	1	790000 ug/L (790 mg/L)	2300000 ug/L (2300 mg/L)	37	95	125	106	19	96	N/A
Metals											
Mercury	ug/L	0.1	0.1 ug/L	0.29 ug/L	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	N/A
Antimony	ug/L	0.5	1.5 ug/L	20000 ug/L	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	N/A
Arsenic	ug/L	1	13 ug/L	1900 ug/L	ND (1)	ND (1)	ND (1)	ND (1)	ND (1)	ND (1)	N/A
Barium	ug/L	1	610 ug/L	29000 ug/L	97	59	109	94	ND (1)	22	N/A
Beryllium	ug/L	0.5	0.5 ug/L	67 ug/L	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	N/A
Boron	ug/L	10	1700 ug/L	45000 ug/L	50	99	103	53	ND (10)	ND (10)	N/A
Cadmium	ug/L	0.1	0.5 ug/L	2.7 ug/L	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	N/A
Chromium	ug/L	1	11 ug/L	810 ug/L	ND (1)	ND (1)	ND (1)	ND (1)	ND (1)	ND (1)	N/A
Chromium (VI)	ug/L	10	25 ug/L	140 ug/L	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	N/A
Cobalt	ug/L	0.5	3.8 ug/L	66 ug/L	1.4	ND (0.5)	ND (0.5)	1.3	ND (0.5)	ND (0.5)	N/A
Copper	ug/L	0.5	5 ug/L	87 ug/L	ND (0.5)	1.3	0.7	ND (0.5)	ND (0.5)	0.7	N/A
Lead	ug/L	0.1	1.9 ug/L	25 ug/L	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	N/A
Molybdenum	ug/L	0.5	23 ug/L	9200 ug/L	2.2	0.8	1.5	2.3	ND (0.5)	1.3	N/A
Nickel	ug/L	1	14 ug/L	490 ug/L	3	14	1	3	ND (1)	ND (1)	N/A
Selenium	ug/L	1	5 ug/L	63 ug/L	ND (1)	ND (1)	ND (1)	ND (1)	ND (1)	4	N/A
Silver	ug/L	0.1	0.3 ug/L	1.5 ug/L	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	N/A
Sodium	ug/L	200	490000 ug/L	2300000 ug/L	67800	92100	79600	67500	1160	33700	N/A
Thallium	ug/L	0.1	0.5 ug/L	510 ug/L	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	N/A
Uranium	ug/L	0.1	8.9 ug/L	420 ug/L	1.5	4.1	1.9	1.5	ND (0.1)	3.7	N/A
Vanadium	ug/L	0.5	3.9 ug/L	250 ug/L	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	7.3	N/A
Zinc	ug/L	5	160 ug/L	1100 ug/L	6	ND (5)	ND (5)	6	ND (5)	ND (5)	N/A
Volatiles											
Acetone	ug/L	5.0	2700 ug/L	130000 ug/L	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)
Benzene	ug/L	0.5	0.5 ug/L	44 ug/L	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
Bromodichloromethane	ug/L	0.5	2 ug/L	85000 ug/L	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
Bromoform	ug/L	0.5	5 ug/L	380 ug/L	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
Bromomethane	ug/L	0.5	0.89 ug/L	5.6 ug/L	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
Carbon Tetrachloride	ug/L	0.2	0.2 ug/L	0.79 ug/L	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)
Chlorobenzene	ug/L	0.5	0.5 ug/L	630 ug/L	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
Chloroform	ug/L	0.5	2 ug/L	2.4 ug/L	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
Dibromochloromethane	ug/L	0.5	2 ug/L	82000 ug/L	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
Dichlorodifluoromethane	ug/L	1.0	590 ug/L	4400 ug/L	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
1,2-Dichlorobenzene	ug/L	0.5	0.5 ug/L	4600 ug/L	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
1,3-Dichlorobenzene	ug/L	0.5	0.5 ug/L	9600 ug/L	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
1,4-Dichlorobenzene	ug/L	0.5	0.5 ug/L	8 ug/L	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
1,1-Dichloroethane	ug/L	0.5	0.5 ug/L	320 ug/L	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
1,2-Dichloroethane	ug/L	0.5	0.5 ug/L	1.6 ug/L	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
1,1-Dichloroethylene	ug/L	0.5	0.5 ug/L	1.6 ug/L	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
cis-1,2-Dichloroethylene	ug/L	0.5	1.6 ug/L	1.6 ug/L	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
trans-1,2-Dichloroethylene	ug/L	0.5	1.6 ug/L	1.6 ug/L	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
1,2-Dichloropropane	ug/L	0.5	0.5 ug/L	16 ug/L	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
cis-1,3-Dichloropropylene	ug/L	0.5			ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
trans-1,3-Dichloropropylene	ug/L	0.5			ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
1,3-Dichloropropene, total	ug/L	0.5	0.5 ug/L	5.2 ug/L	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
Ethylbenzene	ug/L	0.5	0.5 ug/L	2300 ug/L	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
Ethylene dibromide (dibromoe	ug/L	0.2	0.2 ug/L	0.25 ug/L	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)
Hexane	ug/L	1.0	5 ug/L	51 ug/L	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Methyl Ethyl Ketone (2-Butanc	ug/L	5.0	400 ug/L	470000 ug/L	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)
Methyl Isobutyl Ketone	ug/L	5.0	640 ug/L	140000 ug/L	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)
Methyl tert-butyl ether	ug/L	2.0	15 ug/L	190 ug/L	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)
Methylene Chloride	ug/L	5.0	5 ug/L	610 ug/L	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)
Styrene	ug/L	0.5	0.5 ug/L	1300 ug/L	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
1,1,1,2-Tetrachloroethane	ug/L	0.5	1.1 ug/L	3.3 ug/L	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
1,1,2,2-Tetrachloroethane	ug/L	0.5	0.5 ug/L	3.2 ug/L	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
Tetrachloroethylene	ug/L	0.5	0.5 ug/L	1.6 ug/L	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
Toluene	ug/L	0.5	0.8 ug/L	18000 ug/L	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
1,1,1-Trichloroethane	ug/L	0.5	0.5 ug/L	640 ug/L	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
1,1,2-Trichloroethane	ug/L	0.5	0.5 ug/L	4.7 ug/L	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
Trichloroethylene	ug/L	0.5	0.5 ug/L	1.6 ug/L	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
Trichlorofluoromethane	ug/L	1.0	150 ug/L	2500 ug/L	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Vinyl Chloride	ug/L	0.5	0.5 ug/L	0.5 ug/L	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
m/p-Xylene	ug/L	0.5			ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
o-Xylene	ug/L	0.5			ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
Xylenes, total	ug/L	0.5	72 ug/L	4200 ug/L	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
Hydrocarbons											
F1 PHCs (C6-C10)	ug/L	25	420 ug/L	750 ug/L	ND (25)	ND (25)	ND (25)	ND (25)	ND (25)	ND (25)	N/A
F2 PHCs (C10-C16)	ug/L	100	150 ug/L	150 ug/L	ND (100)	ND (100)	ND (100)	ND (100)	ND (100)	ND (100)	N/A
F3 PHCs (C16-C34)	ug/L	100	500 ug/L	500 ug/L	ND (100)	ND (100)	ND (100)	ND (100)	ND (100)	ND (100)	N/A
F4 PHCs (C34-C50)	ug/L	100	500 ug/L	500 ug/L	ND (100)	ND (100)	ND (100)	ND (100)	ND (100)	ND (100)	N/A
Semi-Volatiles											
Acenaphthene	ug/L	0.05	4.1 ug/L	600 ug/L	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	N/A
Acenaphthylene	ug/L	0.05	1 ug/L	1.8 ug/L	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	N/A
Anthracene	ug/L	0.01	0.1 ug/L	2.4 ug/L	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	0.01	ND (0.01)	N/A
Benzo[a]anthracene	ug/L	0.01	0.2 ug/L	4.7 ug/L	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	0.04	ND (0.01)	N/A
Benzo[a]pyrene	ug/L	0.01	0.01 ug/L	0.81 ug/L	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	0.03	ND (0.01)	N/A
Benzo[b]fluoranthene	ug/L	0.05	0.1 ug/L	0.75 ug/L	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.06	ND (0.05)	N/A
Benzo[g,h,i]perylene	ug/L	0.05	0.2 ug/L	0.2 ug/L	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	N/A
Benzo[k]fluoranthene	ug/L	0.05	0.1 ug/L	0.4 ug/L	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	N/A
Chrysene	ug/L	0.05	0.1 ug/L	1 ug/L	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.07	ND (0.05)	N/A
Dibenzo[a,h]anthracene	ug/L	0.05	0.2 ug/L	0.52 ug/L	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	N/A
Fluoranthene	ug/L	0.01	0.4 ug/L	130 ug/L	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	0.08	ND (0.01)	N/A
Fluorene	ug/L	0.05	120 ug/L	400 ug/L	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	N/A
Indeno[1,2,3-cd]pyrene	ug/L	0.05	0.2 ug/L	0.2 ug/L	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	N/A
1-Methylnaphthalene	ug/L	0.05	2 ug/L	1800 ug/L	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	N/A
2-Methylnaphthalene	ug/L	0.05	2 ug/L	1800 ug/L	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	N/A
Methylnaphthalene (1&2)	ug/L	0.10	2 ug/L	1800 ug/L	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	N/A
Naphthalene	ug/L	0.05	7 ug/L	1400 ug/L	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	N/A
Phenanthrene	ug/L	0.05	0.1 ug/L	580 ug/L	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.05	ND (0.05)	N/A
Pyrene	ug/L	0.01	0.2 ug/L	68 ug/L	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	0.07	ND (0.01)	N/A
Lab ID					1943611-01	1943611-02	1943611-03	1943611-04	1943611-06	1943611-05	1943611-07
Sample Date					24-Oct-19	24-Oct-19	24-Oct-19	24-Oct-19	24-Oct-19	24-Oct-19	23-Oct-19

Notes:
BOLD - concentration meets or exceeds O.Reg. 153/04 Table 1 (non-agricultural) criteria
BOLD - concentration meets or exceeds O.Reg. 153/04 Table 3 (non-potable, shallow soil, any land use, coarse grained soil) criteria
ND - concentration not detected above Method Detection Limit
N/A - Parameter not Analysed by laboratory

Attachment A

Laboratory Certificates of Analysis

Certificate of Analysis

GHD Limited (Ottawa)

179 Colonnade Road Suite 400
Ottawa, ON K2E7S4
Attn: Luke Lopers

Client PO:

Project: 11204808-E1/715 Mikinak

Custody: 124400

Report Date: 29-Oct-2019

Order Date: 24-Oct-2019

Order #: 1943611

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

Paracel ID	Client ID
1943611-01	GW-11204808-102419-JC-MW8
1943611-02	GW-11204808-102419-JC-MW18-1
1943611-03	GW-11204808-102419-JC-MW17-1
1943611-04	GW-11204808-102419-JC-MW18-2
1943611-05	GW-11204808-102419-JC-MW18-9
1943611-06	GW-11204808-102419-JC-MW20
1943611-07	Trip Blank

Approved By:



Mark Foto, M.Sc.
Lab Supervisor

Certificate of Analysis
Client: **GHD Limited (Ottawa)**
Client PO:

Report Date: 29-Oct-2019

Order Date: 24-Oct-2019

Project Description: 11204808-E1/715 Mikinak

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
Anions	EPA 300.1 - IC	28-Oct-19	28-Oct-19
Chromium, hexavalent - water	MOE E3056 - colourimetric	25-Oct-19	25-Oct-19
Cyanide, free	MOE E3015 - Auto Colour	28-Oct-19	28-Oct-19
Mercury by CVAA	EPA 245.2 - Cold Vapour AA	28-Oct-19	29-Oct-19
Metals, ICP-MS	EPA 200.8 - ICP-MS	25-Oct-19	25-Oct-19
pH	EPA 150.1 - pH probe @25 °C	25-Oct-19	25-Oct-19
PHC F1	CWS Tier 1 - P&T GC-FID	25-Oct-19	27-Oct-19
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	28-Oct-19	29-Oct-19
REG 153: PAHs by GC-MS	EPA 625 - GC-MS, extraction	25-Oct-19	26-Oct-19
REG 153: VOCs by P&T GC/MS	EPA 624 - P&T GC-MS	25-Oct-19	27-Oct-19

Certificate of Analysis
Client: **GHD Limited (Ottawa)**
Client PO:

Report Date: 29-Oct-2019

Order Date: 24-Oct-2019

Project Description: **11204808-E1/715 Mikinak**

Client ID:	GW-11204808-10241	GW-11204808-1024	GW-11204808-1024	GW-11204808-1024
Sample Date:	9-JC-MW8	19-JC-MW18-1	19-JC-MW17-1	19-JC-MW18-2
Sample ID:	24-Oct-19 11:50	24-Oct-19 13:48	24-Oct-19 14:50	24-Oct-19 15:50
	1943611-01	1943611-02	1943611-03	1943611-04
MDL/Units	Water	Water	Water	Water

General Inorganics

Cyanide, free	2 ug/L	<2	<2	<2	<2
pH	0.1 pH Units	7.3	7.2	7.0	7.2

Anions

Chloride	1 mg/L	37	95	125	106
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Metals

Mercury	0.1 ug/L	<0.1	<0.1	<0.1	<0.1
Antimony	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Arsenic	1 ug/L	<1	<1	<1	<1
Barium	1 ug/L	97	59	109	94
Beryllium	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Boron	10 ug/L	50	99	103	53
Cadmium	0.1 ug/L	<0.1	<0.1	<0.1	<0.1
Chromium	1 ug/L	<1	<1	<1	<1
Chromium (VI)	10 ug/L	<10	<10	<10	<10
Cobalt	0.5 ug/L	1.4	<0.5	<0.5	1.3
Copper	0.5 ug/L	<0.5	1.3	0.7	<0.5
Lead	0.1 ug/L	<0.1	<0.1	<0.1	<0.1
Molybdenum	0.5 ug/L	2.2	0.8	1.5	2.3
Nickel	1 ug/L	3	14	1	3
Selenium	1 ug/L	<1	<1	<1	<1
Silver	0.1 ug/L	<0.1	<0.1	<0.1	<0.1
Sodium	200 ug/L	67800	92100	79600	67500
Thallium	0.1 ug/L	<0.1	<0.1	<0.1	<0.1
Uranium	0.1 ug/L	1.5	4.1	1.9	1.5
Vanadium	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Zinc	5 ug/L	6	<5	<5	6

Volatiles

Acetone	5.0 ug/L	<5.0	<5.0	<5.0	<5.0
Benzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Bromodichloromethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Bromoform	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Bromomethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Carbon Tetrachloride	0.2 ug/L	<0.2	<0.2	<0.2	<0.2
Chlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5

Certificate of Analysis
Client: **GHD Limited (Ottawa)**
Client PO:

Report Date: 29-Oct-2019

Order Date: 24-Oct-2019

Project Description: **11204808-E1/715 Mikinak**

		Client ID:	GW-11204808-10241	GW-11204808-1024	GW-11204808-1024	GW-11204808-1024
		Sample Date:	9-JC-MW8 24-Oct-19 11:50 1943611-01 Water	19-JC-MW18-1 24-Oct-19 13:48 1943611-02 Water	19-JC-MW17-1 24-Oct-19 14:50 1943611-03 Water	19-JC-MW18-2 24-Oct-19 15:50 1943611-04 Water
		Sample ID:				
		MDL/Units				
Chloroform	0.5 ug/L	<0.5	<0.5	<0.5	<0.5	<0.5
Dibromochloromethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5	<0.5
Dichlorodifluoromethane	1.0 ug/L	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5	<0.5
1,3-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5	<0.5
1,4-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5	<0.5
1,1-Dichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5	<0.5
1,2-Dichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5	<0.5
1,1-Dichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5	<0.5
cis-1,2-Dichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5	<0.5
trans-1,2-Dichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5	<0.5
1,2-Dichloropropane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5	<0.5
cis-1,3-Dichloropropylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5	<0.5
trans-1,3-Dichloropropylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5	<0.5
1,3-Dichloropropene, total	0.5 ug/L	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylene dibromide (dibromoethane)	0.2 ug/L	<0.2	<0.2	<0.2	<0.2	<0.2
Hexane	1.0 ug/L	<1.0	<1.0	<1.0	<1.0	<1.0
Methyl Ethyl Ketone (2-Butanone)	5.0 ug/L	<5.0	<5.0	<5.0	<5.0	<5.0
Methyl Isobutyl Ketone	5.0 ug/L	<5.0	<5.0	<5.0	<5.0	<5.0
Methyl tert-butyl ether	2.0 ug/L	<2.0	<2.0	<2.0	<2.0	<2.0
Methylene Chloride	5.0 ug/L	<5.0	<5.0	<5.0	<5.0	<5.0
Styrene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5	<0.5
1,1,1,2-Tetrachloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5	<0.5
1,1,2,2-Tetrachloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5	<0.5
Tetrachloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5	<0.5
Toluene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5	<0.5
1,1,1-Trichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5	<0.5
1,1,2-Trichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5	<0.5
Trichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5	<0.5
Trichlorofluoromethane	1.0 ug/L	<1.0	<1.0	<1.0	<1.0	<1.0
Vinyl chloride	0.5 ug/L	<0.5	<0.5	<0.5	<0.5	<0.5
m,p-Xylenes	0.5 ug/L	<0.5	<0.5	<0.5	<0.5	<0.5
o-Xylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5	<0.5
Xylenes, total	0.5 ug/L	<0.5	<0.5	<0.5	<0.5	<0.5

Certificate of Analysis
Client: GHD Limited (Ottawa)
Client PO:

Report Date: 29-Oct-2019

Order Date: 24-Oct-2019

Project Description: 11204808-E1/715 Mikinak

		Client ID:	GW-11204808-10241	GW-11204808-1024	GW-11204808-1024	GW-11204808-1024
		Sample Date:	9-JC-MW8 24-Oct-19 11:50 1943611-01	19-JC-MW18-1 24-Oct-19 13:48 1943611-02	19-JC-MW17-1 24-Oct-19 14:50 1943611-03	19-JC-MW18-2 24-Oct-19 15:50 1943611-04
		Sample ID:				
		MDL/Units	Water	Water	Water	Water
4-Bromofluorobenzene	Surrogate		113%	112%	115%	116%
Dibromofluoromethane	Surrogate		95.2%	98.2%	87.4%	89.6%
Toluene-d8	Surrogate		99.6%	101%	99.2%	99.6%

Hydrocarbons

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

Semi-Volatiles

Acenaphthene	0.05 ug/L	<0.05	<0.05	<0.05	<0.05
Acenaphthylene	0.05 ug/L	<0.05	<0.05	<0.05	<0.05
Anthracene	0.01 ug/L	<0.01	<0.01	<0.01	<0.01
Benzo [a] anthracene	0.01 ug/L	<0.01	<0.01	<0.01	<0.01
Benzo [a] pyrene	0.01 ug/L	<0.01	<0.01	<0.01	<0.01
Benzo [b] fluoranthene	0.05 ug/L	<0.05	<0.05	<0.05	<0.05
Benzo [g,h,i] perylene	0.05 ug/L	<0.05	<0.05	<0.05	<0.05
Benzo [k] fluoranthene	0.05 ug/L	<0.05	<0.05	<0.05	<0.05
Chrysene	0.05 ug/L	<0.05	<0.05	<0.05	<0.05
Dibenzo [a,h] anthracene	0.05 ug/L	<0.05	<0.05	<0.05	<0.05
Fluoranthene	0.01 ug/L	<0.01	<0.01	<0.01	<0.01
Fluorene	0.05 ug/L	<0.05	<0.05	<0.05	<0.05
Indeno [1,2,3-cd] pyrene	0.05 ug/L	<0.05	<0.05	<0.05	<0.05
1-Methylnaphthalene	0.05 ug/L	<0.05	<0.05	<0.05	<0.05
2-Methylnaphthalene	0.05 ug/L	<0.05	<0.05	<0.05	<0.05
Methylnaphthalene (1&2)	0.10 ug/L	<0.10	<0.10	<0.10	<0.10
Naphthalene	0.05 ug/L	<0.05	<0.05	<0.05	<0.05
Phenanthrene	0.05 ug/L	<0.05	<0.05	<0.05	<0.05
Pyrene	0.01 ug/L	<0.01	<0.01	<0.01	<0.01
2-Fluorobiphenyl	Surrogate	92.2%	89.9%	91.0%	93.5%
Terphenyl-d14	Surrogate	111%	110%	117%	122%

Certificate of Analysis
Client: **GHD Limited (Ottawa)**
Client PO:

Report Date: 29-Oct-2019

Order Date: 24-Oct-2019

Project Description: **11204808-E1/715 Mikinak**

Client ID:	GW-11204808-10241	GW-11204808-1024	Trip Blank	-
Sample Date:	9-JC-MW18-9	19-JC-MW20	23-Oct-19 09:50	-
Sample ID:	24-Oct-19 16:20	24-Oct-19 16:50	1943611-07	-
MDL/Units	1943611-05	1943611-06	Water	-
	Water	Water	Water	-

General Inorganics

Cyanide, free	2 ug/L	<2	<2	-	-
pH	0.1 pH Units	7.2	7.2	-	-

Anions

Chloride	1 mg/L	96	19	-	-
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Metals

Mercury	0.1 ug/L	<0.1	<0.1	-	-
Antimony	0.5 ug/L	<0.5	<0.5	-	-
Arsenic	1 ug/L	<1	<1	-	-
Barium	1 ug/L	22	<1	-	-
Beryllium	0.5 ug/L	<0.5	<0.5	-	-
Boron	10 ug/L	<10	<10	-	-
Cadmium	0.1 ug/L	<0.1	<0.1	-	-
Chromium	1 ug/L	<1	<1	-	-
Chromium (VI)	10 ug/L	<10	<10	-	-
Cobalt	0.5 ug/L	<0.5	<0.5	-	-
Copper	0.5 ug/L	0.7	<0.5	-	-
Lead	0.1 ug/L	<0.1	<0.1	-	-
Molybdenum	0.5 ug/L	1.3	<0.5	-	-
Nickel	1 ug/L	<1	<1	-	-
Selenium	1 ug/L	4	<1	-	-
Silver	0.1 ug/L	<0.1	<0.1	-	-
Sodium	200 ug/L	33700	1160	-	-
Thallium	0.1 ug/L	<0.1	<0.1	-	-
Uranium	0.1 ug/L	3.7	<0.1	-	-
Vanadium	0.5 ug/L	7.3	<0.5	-	-
Zinc	5 ug/L	<5	<5	-	-

Volatiles

Acetone	5.0 ug/L	<5.0	<5.0	<5.0	-
Benzene	0.5 ug/L	<0.5	<0.5	<0.5	-
Bromodichloromethane	0.5 ug/L	<0.5	<0.5	<0.5	-
Bromoform	0.5 ug/L	<0.5	<0.5	<0.5	-
Bromomethane	0.5 ug/L	<0.5	<0.5	<0.5	-
Carbon Tetrachloride	0.2 ug/L	<0.2	<0.2	<0.2	-
Chlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	-

Certificate of Analysis
Client: **GHD Limited (Ottawa)**
Client PO:

Report Date: 29-Oct-2019

Order Date: 24-Oct-2019

Project Description: **11204808-E1/715 Mikinak**

	MDL/Units	Client ID:	GW-11204808-10241	GW-11204808-1024	Trip Blank	
		Sample Date:	9-JC-MW18-9	19-JC-MW20	23-Oct-19 09:50	-
		Sample ID:	24-Oct-19 16:20	24-Oct-19 16:50	1943611-07	-
			1943611-05	1943611-06	1943611-07	-
			Water	Water	Water	-
Chloroform	0.5 ug/L		<0.5	<0.5	<0.5	-
Dibromochloromethane	0.5 ug/L		<0.5	<0.5	<0.5	-
Dichlorodifluoromethane	1.0 ug/L		<1.0	<1.0	<1.0	-
1,2-Dichlorobenzene	0.5 ug/L		<0.5	<0.5	<0.5	-
1,3-Dichlorobenzene	0.5 ug/L		<0.5	<0.5	<0.5	-
1,4-Dichlorobenzene	0.5 ug/L		<0.5	<0.5	<0.5	-
1,1-Dichloroethane	0.5 ug/L		<0.5	<0.5	<0.5	-
1,2-Dichloroethane	0.5 ug/L		<0.5	<0.5	<0.5	-
1,1-Dichloroethylene	0.5 ug/L		<0.5	<0.5	<0.5	-
cis-1,2-Dichloroethylene	0.5 ug/L		<0.5	<0.5	<0.5	-
trans-1,2-Dichloroethylene	0.5 ug/L		<0.5	<0.5	<0.5	-
1,2-Dichloropropane	0.5 ug/L		<0.5	<0.5	<0.5	-
cis-1,3-Dichloropropylene	0.5 ug/L		<0.5	<0.5	<0.5	-
trans-1,3-Dichloropropylene	0.5 ug/L		<0.5	<0.5	<0.5	-
1,3-Dichloropropene, total	0.5 ug/L		<0.5	<0.5	<0.5	-
Ethylbenzene	0.5 ug/L		<0.5	<0.5	<0.5	-
Ethylene dibromide (dibromoethane)	0.2 ug/L		<0.2	<0.2	<0.2	-
Hexane	1.0 ug/L		<1.0	<1.0	<1.0	-
Methyl Ethyl Ketone (2-Butanone)	5.0 ug/L		<5.0	<5.0	<5.0	-
Methyl Isobutyl Ketone	5.0 ug/L		<5.0	<5.0	<5.0	-
Methyl tert-butyl ether	2.0 ug/L		<2.0	<2.0	<2.0	-
Methylene Chloride	5.0 ug/L		<5.0	<5.0	<5.0	-
Styrene	0.5 ug/L		<0.5	<0.5	<0.5	-
1,1,1,2-Tetrachloroethane	0.5 ug/L		<0.5	<0.5	<0.5	-
1,1,2,2-Tetrachloroethane	0.5 ug/L		<0.5	<0.5	<0.5	-
Tetrachloroethylene	0.5 ug/L		<0.5	<0.5	<0.5	-
Toluene	0.5 ug/L		<0.5	<0.5	<0.5	-
1,1,1-Trichloroethane	0.5 ug/L		<0.5	<0.5	<0.5	-
1,1,2-Trichloroethane	0.5 ug/L		<0.5	<0.5	<0.5	-
Trichloroethylene	0.5 ug/L		<0.5	<0.5	<0.5	-
Trichlorofluoromethane	1.0 ug/L		<1.0	<1.0	<1.0	-
Vinyl chloride	0.5 ug/L		<0.5	<0.5	<0.5	-
m,p-Xylenes	0.5 ug/L		<0.5	<0.5	<0.5	-
o-Xylene	0.5 ug/L		<0.5	<0.5	<0.5	-

Certificate of Analysis
Client: **GHD Limited (Ottawa)**
Client PO:

Report Date: 29-Oct-2019

Order Date: 24-Oct-2019

Project Description: **11204808-E1/715 Mikinak**

	MDL/Units	Client ID: GW-11204808-10241 9-JC-MW18-9 Sample Date: 24-Oct-19 16:20 Sample ID: 1943611-05 Water	GW-11204808-1024 19-JC-MW20 Sample Date: 24-Oct-19 16:50 Sample ID: 1943611-06 Water	Trip Blank 23-Oct-19 09:50 Sample ID: 1943611-07 Water	
Xylenes, total	0.5 ug/L	<0.5	<0.5	<0.5	-
4-Bromofluorobenzene	Surrogate	110%	115%	120%	-
Dibromofluoromethane	Surrogate	92.0%	89.2%	89.6%	-
Toluene-d8	Surrogate	102%	100%	107%	-

Hydrocarbons

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

Semi-Volatiles

Acenaphthene	0.05 ug/L	<0.05	<0.05	-	-
Acenaphthylene	0.05 ug/L	<0.05	<0.05	-	-
Anthracene	0.01 ug/L	<0.01	0.01	-	-
Benzo [a] anthracene	0.01 ug/L	<0.01	0.04	-	-
Benzo [a] pyrene	0.01 ug/L	<0.01	0.03	-	-
Benzo [b] fluoranthene	0.05 ug/L	<0.05	0.06	-	-
Benzo [g,h,i] perylene	0.05 ug/L	<0.05	<0.05	-	-
Benzo [k] fluoranthene	0.05 ug/L	<0.05	<0.05	-	-
Chrysene	0.05 ug/L	<0.05	0.07	-	-
Dibenzo [a,h] anthracene	0.05 ug/L	<0.05	<0.05	-	-
Fluoranthene	0.01 ug/L	<0.01	0.08	-	-
Fluorene	0.05 ug/L	<0.05	<0.05	-	-
Indeno [1,2,3-cd] pyrene	0.05 ug/L	<0.05	<0.05	-	-
1-Methylnaphthalene	0.05 ug/L	<0.05	<0.05	-	-
2-Methylnaphthalene	0.05 ug/L	<0.05	<0.05	-	-
Methylnaphthalene (1&2)	0.10 ug/L	<0.10	<0.10	-	-
Naphthalene	0.05 ug/L	<0.05	<0.05	-	-
Phenanthrene	0.05 ug/L	<0.05	0.05	-	-
Pyrene	0.01 ug/L	<0.01	0.07	-	-
2-Fluorobiphenyl	Surrogate	105%	88.7%	-	-
Terphenyl-d14	Surrogate	118%	111%	-	-

Certificate of Analysis
Client: GHD Limited (Ottawa)
Client PO:

Report Date: 29-Oct-2019

Order Date: 24-Oct-2019

Project Description: 11204808-E1/715 Mikinak

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Anions									
Chloride	ND	1	mg/L						
General Inorganics									
Cyanide, free	ND	2	ug/L						
Hydrocarbons									
F1 PHCs (C6-C10)	ND	25	ug/L						
F2 PHCs (C10-C16)	ND	100	ug/L						
F3 PHCs (C16-C34)	ND	100	ug/L						
F4 PHCs (C34-C50)	ND	100	ug/L						
Metals									
Mercury	ND	0.1	ug/L						
Antimony	ND	0.5	ug/L						
Arsenic	ND	1	ug/L						
Barium	ND	1	ug/L						
Beryllium	ND	0.5	ug/L						
Boron	ND	10	ug/L						
Cadmium	ND	0.1	ug/L						
Chromium (VI)	ND	10	ug/L						
Chromium	ND	1	ug/L						
Cobalt	ND	0.5	ug/L						
Copper	ND	0.5	ug/L						
Lead	ND	0.1	ug/L						
Molybdenum	ND	0.5	ug/L						
Nickel	ND	1	ug/L						
Selenium	ND	1	ug/L						
Silver	ND	0.1	ug/L						
Sodium	ND	200	ug/L						
Thallium	ND	0.1	ug/L						
Uranium	ND	0.1	ug/L						
Vanadium	ND	0.5	ug/L						
Zinc	ND	5	ug/L						
Semi-Volatiles									
Acenaphthene	ND	0.05	ug/L						
Acenaphthylene	ND	0.05	ug/L						
Anthracene	ND	0.01	ug/L						
Benzo [a] anthracene	ND	0.01	ug/L						
Benzo [a] pyrene	ND	0.01	ug/L						
Benzo [b] fluoranthene	ND	0.05	ug/L						
Benzo [g,h,i] perylene	ND	0.05	ug/L						
Benzo [k] fluoranthene	ND	0.05	ug/L						
Chrysene	ND	0.05	ug/L						
Dibenzo [a,h] anthracene	ND	0.05	ug/L						
Fluoranthene	ND	0.01	ug/L						
Fluorene	ND	0.05	ug/L						
Indeno [1,2,3-cd] pyrene	ND	0.05	ug/L						
1-Methylnaphthalene	ND	0.05	ug/L						
2-Methylnaphthalene	ND	0.05	ug/L						
Methylnaphthalene (1&2)	ND	0.10	ug/L						
Naphthalene	ND	0.05	ug/L						
Phenanthrene	ND	0.05	ug/L						
Pyrene	ND	0.01	ug/L						
Surrogate: 2-Fluorobiphenyl	18.0		ug/L		89.8	50-140			
Surrogate: Terphenyl-d14	22.6		ug/L		113	50-140			
Volatiles									
Acetone	ND	5.0	ug/L						
Benzene	ND	0.5	ug/L						
Bromodichloromethane	ND	0.5	ug/L						
Bromoform	ND	0.5	ug/L						

Certificate of Analysis
Client: GHD Limited (Ottawa)
Client PO:

Report Date: 29-Oct-2019

Order Date: 24-Oct-2019

Project Description: 11204808-E1/715 Mikinak

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Bromomethane	ND	0.5	ug/L						
Carbon Tetrachloride	ND	0.2	ug/L						
Chlorobenzene	ND	0.5	ug/L						
Chloroform	ND	0.5	ug/L						
Dibromochloromethane	ND	0.5	ug/L						
Dichlorodifluoromethane	ND	1.0	ug/L						
1,2-Dichlorobenzene	ND	0.5	ug/L						
1,3-Dichlorobenzene	ND	0.5	ug/L						
1,4-Dichlorobenzene	ND	0.5	ug/L						
1,1-Dichloroethane	ND	0.5	ug/L						
1,2-Dichloroethane	ND	0.5	ug/L						
1,1-Dichloroethylene	ND	0.5	ug/L						
cis-1,2-Dichloroethylene	ND	0.5	ug/L						
trans-1,2-Dichloroethylene	ND	0.5	ug/L						
1,2-Dichloropropane	ND	0.5	ug/L						
cis-1,3-Dichloropropylene	ND	0.5	ug/L						
trans-1,3-Dichloropropylene	ND	0.5	ug/L						
1,3-Dichloropropene, total	ND	0.5	ug/L						
Ethylbenzene	ND	0.5	ug/L						
Ethylene dibromide (dibromoethane)	ND	0.2	ug/L						
Hexane	ND	1.0	ug/L						
Methyl Ethyl Ketone (2-Butanone)	ND	5.0	ug/L						
Methyl Isobutyl Ketone	ND	5.0	ug/L						
Methyl tert-butyl ether	ND	2.0	ug/L						
Methylene Chloride	ND	5.0	ug/L						
Styrene	ND	0.5	ug/L						
1,1,1,2-Tetrachloroethane	ND	0.5	ug/L						
1,1,2,2-Tetrachloroethane	ND	0.5	ug/L						
Tetrachloroethylene	ND	0.5	ug/L						
Toluene	ND	0.5	ug/L						
1,1,1-Trichloroethane	ND	0.5	ug/L						
1,1,2-Trichloroethane	ND	0.5	ug/L						
Trichloroethylene	ND	0.5	ug/L						
Trichlorofluoromethane	ND	1.0	ug/L						
Vinyl chloride	ND	0.5	ug/L						
m,p-Xylenes	ND	0.5	ug/L						
o-Xylene	ND	0.5	ug/L						
Xylenes, total	ND	0.5	ug/L						
Surrogate: 4-Bromofluorobenzene	86.0		ug/L		108	50-140			
Surrogate: Dibromofluoromethane	69.1		ug/L		86.4	50-140			
Surrogate: Toluene-d8	73.6		ug/L		92.1	50-140			

Certificate of Analysis
Client: **GHD Limited (Ottawa)**
Client PO:

Report Date: 29-Oct-2019

Order Date: 24-Oct-2019

Project Description: **11204808-E1/715 Mikinak**

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
General Inorganics									
Cyanide, free	ND	2	ug/L	ND				20	
pH	7.8	0.1	pH Units	7.8			0.3	3.3	
Hydrocarbons									
F1 PHCs (C6-C10)	58	25	ug/L	45			25.2	30	
Metals									
Mercury	ND	0.1	ug/L	ND			0.0	20	
Antimony	ND	0.5	ug/L	ND			0.0	20	
Arsenic	ND	1	ug/L	ND			0.0	20	
Barium	24.9	1	ug/L	25.2			0.9	20	
Beryllium	ND	0.5	ug/L	ND			0.0	20	
Boron	23	10	ug/L	23			0.2	20	
Cadmium	ND	0.1	ug/L	ND			0.0	20	
Chromium (VI)	ND	10	ug/L	ND			0.0	20	
Chromium	ND	1	ug/L	ND			0.0	20	
Cobalt	ND	0.5	ug/L	ND			0.0	20	
Copper	1.10	0.5	ug/L	1.07			2.4	20	
Lead	ND	0.1	ug/L	ND			0.0	20	
Molybdenum	1.20	0.5	ug/L	1.22			0.9	20	
Nickel	ND	1	ug/L	ND			0.0	20	
Selenium	ND	1	ug/L	ND			0.0	20	
Silver	ND	0.1	ug/L	ND			0.0	20	
Sodium	16700	200	ug/L	16500			0.9	20	
Thallium	ND	0.1	ug/L	ND			0.0	20	
Uranium	ND	0.1	ug/L	ND			0.0	20	
Vanadium	ND	0.5	ug/L	ND			0.0	20	
Zinc	11	5	ug/L	9			15.8	20	
Volatiles									
Acetone	ND	5.0	ug/L	ND				30	
Benzene	5.36	0.5	ug/L	6.03			11.8	30	
Bromodichloromethane	ND	0.5	ug/L	ND				30	
Bromoform	ND	0.5	ug/L	ND				30	
Bromomethane	ND	0.5	ug/L	ND				30	
Carbon Tetrachloride	ND	0.2	ug/L	ND				30	
Chlorobenzene	ND	0.5	ug/L	ND				30	
Chloroform	ND	0.5	ug/L	ND				30	
Dibromochloromethane	ND	0.5	ug/L	ND				30	
Dichlorodifluoromethane	ND	1.0	ug/L	ND				30	
1,2-Dichlorobenzene	ND	0.5	ug/L	ND				30	
1,3-Dichlorobenzene	ND	0.5	ug/L	ND				30	
1,4-Dichlorobenzene	ND	0.5	ug/L	ND				30	
1,1-Dichloroethane	ND	0.5	ug/L	ND				30	
1,2-Dichloroethane	ND	0.5	ug/L	1.94			0.0	30	
1,1-Dichloroethylene	ND	0.5	ug/L	ND				30	
cis-1,2-Dichloroethylene	ND	0.5	ug/L	ND				30	
trans-1,2-Dichloroethylene	ND	0.5	ug/L	ND				30	
1,2-Dichloropropane	ND	0.5	ug/L	ND				30	
cis-1,3-Dichloropropylene	ND	0.5	ug/L	ND				30	
trans-1,3-Dichloropropylene	ND	0.5	ug/L	ND				30	
Ethylbenzene	22.5	0.5	ug/L	25.0			10.7	30	
Ethylene dibromide (dibromoethane)	ND	0.2	ug/L	ND				30	
Hexane	ND	1.0	ug/L	ND				30	
Methyl Ethyl Ketone (2-Butanone)	ND	5.0	ug/L	ND				30	
Methyl Isobutyl Ketone	ND	5.0	ug/L	ND				30	
Methyl tert-butyl ether	ND	2.0	ug/L	ND				30	
Methylene Chloride	ND	5.0	ug/L	ND				30	
Styrene	ND	0.5	ug/L	ND				30	

Certificate of Analysis
 Client: GHD Limited (Ottawa)
 Client PO:

Report Date: 29-Oct-2019

Order Date: 24-Oct-2019

Project Description: 11204808-E1/715 Mikinak

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
1,1,1,2-Tetrachloroethane	ND	0.5	ug/L	ND				30	
1,1,2,2-Tetrachloroethane	ND	0.5	ug/L	ND				30	
Tetrachloroethylene	ND	0.5	ug/L	ND				30	
Toluene	0.69	0.5	ug/L	0.75			8.3	30	
1,1,1-Trichloroethane	ND	0.5	ug/L	ND				30	
1,1,2-Trichloroethane	ND	0.5	ug/L	ND				30	
Trichloroethylene	ND	0.5	ug/L	ND				30	
Trichlorofluoromethane	ND	1.0	ug/L	ND				30	
Vinyl chloride	ND	0.5	ug/L	ND				30	
m,p-Xylenes	15.6	0.5	ug/L	17.1			9.3	30	
o-Xylene	ND	0.5	ug/L	ND				30	
Surrogate: 4-Bromofluorobenzene	93.6		ug/L		117	50-140			
Surrogate: Dibromofluoromethane	71.7		ug/L		89.6	50-140			
Surrogate: Toluene-d8	78.8		ug/L		98.5	50-140			

Certificate of Analysis
 Client: **GHD Limited (Ottawa)**
 Client PO:

Report Date: 29-Oct-2019

Order Date: 24-Oct-2019

 Project Description: **11204808-E1/715 Mikinak**

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Anions									
Chloride	9.34	1	mg/L		93.4	85-115			
General Inorganics									
Cyanide, free	26.6	2	ug/L	ND	88.6	70-130			
Hydrocarbons									
F1 PHCs (C6-C10)	1840	25	ug/L		92.2	68-117			
F2 PHCs (C10-C16)	1340	100	ug/L		83.7	60-140			
F3 PHCs (C16-C34)	3520	100	ug/L		89.8	60-140			
F4 PHCs (C34-C50)	2000	100	ug/L		80.8	60-140			
Metals									
Mercury	3.20	0.1	ug/L	ND	107	70-130			
Antimony	44.8		ug/L	ND	88.6	80-120			
Arsenic	54.5		ug/L	ND	108	80-120			
Barium	76.5		ug/L	25.2	103	80-120			
Beryllium	54.5		ug/L	ND	109	80-120			
Boron	68		ug/L	23	88.4	80-120			
Cadmium	53.0		ug/L	ND	106	80-120			
Chromium (VI)	166	10	ug/L	ND	83.0	70-130			
Chromium	56.6		ug/L	ND	113	80-120			
Cobalt	52.1		ug/L	ND	104	80-120			
Copper	53.2		ug/L	1.07	104	80-120			
Lead	46.9		ug/L	ND	93.6	80-120			
Molybdenum	46.1		ug/L	1.22	89.8	80-120			
Nickel	52.4		ug/L	ND	104	80-120			
Selenium	49.7		ug/L	ND	99.0	80-120			
Silver	43.9		ug/L	ND	87.8	80-120			
Sodium	25300		ug/L	16500	88.0	80-120			
Thallium	46.8		ug/L	ND	93.6	80-120			
Uranium	47.1		ug/L	ND	94.2	80-120			
Vanadium	56.6		ug/L	ND	113	80-120			
Zinc	62		ug/L	9	105	80-120			
Semi-Volatiles									
Acenaphthene	4.06	0.05	ug/L		81.2	50-140			
Acenaphthylene	3.44	0.05	ug/L		68.8	50-140			
Anthracene	3.47	0.01	ug/L		69.4	50-140			
Benzo [a] anthracene	3.35	0.01	ug/L		67.1	50-140			
Benzo [a] pyrene	3.03	0.01	ug/L		60.5	50-140			
Benzo [b] fluoranthene	4.80	0.05	ug/L		96.0	50-140			
Benzo [g,h,i] perylene	3.29	0.05	ug/L		65.8	50-140			
Benzo [k] fluoranthene	4.56	0.05	ug/L		91.1	50-140			
Chrysene	4.26	0.05	ug/L		85.2	50-140			
Dibenzo [a,h] anthracene	3.66	0.05	ug/L		73.1	50-140			
Fluoranthene	3.66	0.01	ug/L		73.2	50-140			
Fluorene	3.66	0.05	ug/L		73.1	50-140			
Indeno [1,2,3-cd] pyrene	3.62	0.05	ug/L		72.5	50-140			
1-Methylnaphthalene	4.19	0.05	ug/L		83.8	50-140			
2-Methylnaphthalene	4.62	0.05	ug/L		92.4	50-140			
Naphthalene	4.22	0.05	ug/L		84.5	50-140			
Phenanthrene	3.54	0.05	ug/L		70.8	50-140			
Pyrene	3.77	0.01	ug/L		75.5	50-140			
Surrogate: 2-Fluorobiphenyl	17.8		ug/L		88.8	50-140			

Certificate of Analysis
Client: **GHD Limited (Ottawa)**
Client PO:

Report Date: 29-Oct-2019

Order Date: 24-Oct-2019

Project Description: **11204808-E1/715 Mikinak**

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Volatiles									
Acetone	117	5.0	ug/L		117	50-140			
Benzene	36.5	0.5	ug/L		91.2	60-130			
Bromodichloromethane	28.3	0.5	ug/L		70.8	60-130			
Bromoform	28.6	0.5	ug/L		71.6	60-130			
Bromomethane	35.0	0.5	ug/L		87.5	50-140			
Carbon Tetrachloride	31.0	0.2	ug/L		77.5	60-130			
Chlorobenzene	34.3	0.5	ug/L		85.6	60-130			
Chloroform	30.5	0.5	ug/L		76.2	60-130			
Dibromochloromethane	28.7	0.5	ug/L		71.6	60-130			
Dichlorodifluoromethane	30.5	1.0	ug/L		76.2	50-140			
1,2-Dichlorobenzene	32.4	0.5	ug/L		81.0	60-130			
1,3-Dichlorobenzene	31.6	0.5	ug/L		79.0	60-130			
1,4-Dichlorobenzene	33.3	0.5	ug/L		83.3	60-130			
1,1-Dichloroethane	32.3	0.5	ug/L		80.7	60-130			
1,2-Dichloroethane	30.2	0.5	ug/L		75.6	60-130			
1,1-Dichloroethylene	34.8	0.5	ug/L		87.1	60-130			
cis-1,2-Dichloroethylene	33.3	0.5	ug/L		83.3	60-130			
trans-1,2-Dichloroethylene	33.7	0.5	ug/L		84.2	60-130			
1,2-Dichloropropane	35.8	0.5	ug/L		89.4	60-130			
cis-1,3-Dichloropropylene	31.0	0.5	ug/L		77.4	60-130			
trans-1,3-Dichloropropylene	31.0	0.5	ug/L		77.5	60-130			
Ethylbenzene	32.4	0.5	ug/L		80.9	60-130			
Ethylene dibromide (dibromoethane)	31.8	0.2	ug/L		79.4	60-130			
Hexane	43.2	1.0	ug/L		108	60-130			
Methyl Ethyl Ketone (2-Butanone)	72.9	5.0	ug/L		72.9	50-140			
Methyl Isobutyl Ketone	75.5	5.0	ug/L		75.5	50-140			
Methyl tert-butyl ether	66.3	2.0	ug/L		66.3	50-140			
Methylene Chloride	33.9	5.0	ug/L		84.8	60-130			
Styrene	32.3	0.5	ug/L		80.8	60-130			
1,1,1,2-Tetrachloroethane	30.7	0.5	ug/L		76.8	60-130			
1,1,2,2-Tetrachloroethane	40.5	0.5	ug/L		101	60-130			
Tetrachloroethylene	33.4	0.5	ug/L		83.6	60-130			
Toluene	34.6	0.5	ug/L		86.4	60-130			
1,1,1-Trichloroethane	27.4	0.5	ug/L		68.6	60-130			
1,1,2-Trichloroethane	34.7	0.5	ug/L		86.8	60-130			
Trichloroethylene	29.8	0.5	ug/L		74.5	60-130			
Trichlorofluoromethane	26.8	1.0	ug/L		67.1	60-130			
Vinyl chloride	30.2	0.5	ug/L		75.6	50-140			
m,p-Xylenes	70.5	0.5	ug/L		88.1	60-130			
o-Xylene	32.4	0.5	ug/L		81.0	60-130			

Certificate of Analysis
Client: GHD Limited (Ottawa)
Client PO:

Report Date: 29-Oct-2019

Order Date: 24-Oct-2019

Project Description: 11204808-E1/715 Mikinak

Qualifier Notes:

None

Sample Data Revisions

None

Work Order Revisions / Comments:

None

Other Report Notes:

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

CCME PHC additional information:

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



1943611

No 124400

Client Name: GHD	Project Ref: 11204808-E1	Page <u> </u> of <u> </u>
Contact Name: LUKE LOPERS	Quote #: CITY OF OTTAWA	Turnaround Time <input type="checkbox"/> 1 day <input checked="" type="checkbox"/> 3 day <input type="checkbox"/> 2 day <input type="checkbox"/> Regular
Address: 179 COLONNADE RD OTTAWA ON	PO #: E-mail: LUKE.LOPERS@GHD.COM	
Telephone: 613-288-1723	Date Required: <u> </u>	

Regulation 153/04		Other Regulation		Matrix Type: S (Soil/Sed.) GW (Ground Water) SW (Surface Water) SS (Storm/Sanitary Sewer) P (Paint) A (Air) O (Other)		Required Analysis																			
<input checked="" type="checkbox"/> Table 1	<input type="checkbox"/> Res/Park <input type="checkbox"/> Med/Fine	<input type="checkbox"/> REG 558	<input type="checkbox"/> PWQO	Matrix	Air Volume	# of Containers	Sample Taken Date	Time	PHCs F1-F4+BTEX	VOCs	PAHs	Metals by ICP	H8	CrVI	B (HWS)	METALS AND INORGANICS									
<input type="checkbox"/> Table 2	<input type="checkbox"/> Ind/Comm <input type="checkbox"/> Coarse	<input type="checkbox"/> CCME	<input type="checkbox"/> MISA																						
<input type="checkbox"/> Table 3	<input type="checkbox"/> Agri/Other	<input type="checkbox"/> SU - Sani	<input type="checkbox"/> SU - Storm																						
For RSC: <input type="checkbox"/> Yes <input type="checkbox"/> No				Mun: <u> </u>		Other: <u> </u>																			
Sample ID/Location Name																									
1	GW-11204808-102419-JC-mwB			GW		9	10/24/2019	11:50	X	X	X					X									86m 714 ✓
2	GW-11204808-102419-JC-mwB-1			GW		9	10/24/2019	13:48	X	X	X					X									715 ✓
3	GW-11204808-102419-JC-mwB-2			GW		9	10/24/2019	14:50	X	X	X					X									716 ✓
4	GW-11204808-102419-JC-mwB-3			GW		9	10/24/2019	15:50	X	X	X					X									717 ✓
5	GW-11204808-102419-JC-mwB-4			GW		9	10/24/2019	16:20	X	X	X					X									718 ✓
6	GW-11204808-102419-JC-mwB-5			GW		9	10/24/2019	16:50	X	X	X					X									719 ✓
7	TRIP BLANK					1	10/24/2019																		720 ✓
8																									
9																									
10																									

Comments: **FIELD FILTERED METALS, MERCURY, CHROMIUM**

Method of Delivery: **Wagon**

Relinquished By (Sign): [Signature]	Received By Driver/Depot: [Signature]	Received at Lab: [Signature]	Verified By: [Signature]
Relinquished By (Print): JACQUELYN CURPHEY	Date/Time: 10/24/2019 17:45	Date/Time: 10/24/2019 15:15	Date/Time: Oct 25/19 10:30
Date/Time: 10/24/2019 17:45	Temperature: <u> </u> °C	Temperature: 68 °C	pH Verified: <input type="checkbox"/> By: SC