2021 Operations and Monitoring Report

For the Upland Original and New Landfills

Northwin Environmental

March 31, 2022

→ The Power of Commitment

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1. Introduction

GHD has been retained by Northwin Environment Ltd. (Northwin) to prepare this 2021 Annual Operations and Monitoring Report (Annual Report) for the Upland Original Landfill and New Landfill located at 7295 Gold River Highway (Site) approximately 7 kilometres (km) west of Campbell River, British Columbia (BC) city centre. A Site location map is provided as Figure 1. The landfill is operating under the Operational Certificate 107689 (OC 107689), which was issued to Upland Excavating Ltd. (Upland) on August 1, 2019. A copy of the OC is provided as Appendix A. The Site is owned by Upland. The landfill is operated by Northwin.

This Annual Report provides a summary of the landfill operations carried out on Site and the results of the environmental monitoring plan (EMP) implemented from January 1 to December 31 of 2021 (Reporting Period). An evaluation of the operational and environmental performance of the landfills are provided with recommendations made for the ongoing development of the landfills and the EMP.

This Annual Report has been written in accordance with the Landfill Criteria for Municipal Solid Waste (MOE, June 2016) and Section 5.4 of the OC.

1.1 Limitations

This report has been prepared by GHD for Northwin Environmental and may only be used and relied on by Northwin Environmental for the purpose agreed between GHD and Northwin Environmental as set out in section 1 of this report.

GHD otherwise disclaims responsibility to any person other than Northwin Environmental arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited by the information provided by Northwin Environmental.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

1.2 Background

The Site is approximately 48 hectares in size and is accessed from the north via an entrance from Gold River Highway. In 2021, the Site encompasses a large sand and gravel pit (Pit), the Original Landfill, and Cell 1 East of the New Landfill. A Site Plan is provided on Figure 2.

Prior to the issuance of the OC, the Original Landfill operated under Permit PR-10807 (Permit). This Permit was issued for the Original Landfill on June 1, 1992. In accordance with the approved Comox Valley Regional District Solid Waste Management Plan (SWMP), Upland, being the owner of the Site, submitted an application in June 2015 to replace the Permit with a new Operational Certificate.

Prior to the issuance of the OC, annual water quality monitoring results were provided to the Ministry of Environment and Climate Change Strategy (ENV) in 2017 and 2018 in response to an e-mail request from ENV to Upland and GHD dated November 10, 2017.

The OC was issued on August 1, 2019 authorizing the Original Landfill and the New Landfill.

1.3 Site Location

The Site is bound to the north by Gold River Highway (Highway 28), to the east by forested and industrial land parcels and to the west by Rico Lake, a construction storage yard, and an undeveloped industrial lot. The southern boundary of the Site is located on the Campbell River city limit. The area to the south is part of the Strathcona Regional District and includes land parcels used by the forestry industry. The legal description of the Site is Lot A, District Lot 85, Plan 30709, Sayward District.

1.4 Site Security

Signage is erected at the main entrance of the Site. The signage includes all information specified in Section 6.10 of the Landfill Criteria. In 2021, surveillance cameras were installed and are monitored 24 hours a day by a security company. An outdoor lighting system was also installed to illuminate the Site at night.

2. Original Landfill Operations and Development

2.1 Original Landfill

The Original Landfill includes the 85 metres (m) by 85 m Original Lined Cell, the Original Un-Lined Cell, approximately 7,000 square metres (m^2) in size, and leachate management works located near the southeast corner of the Site.

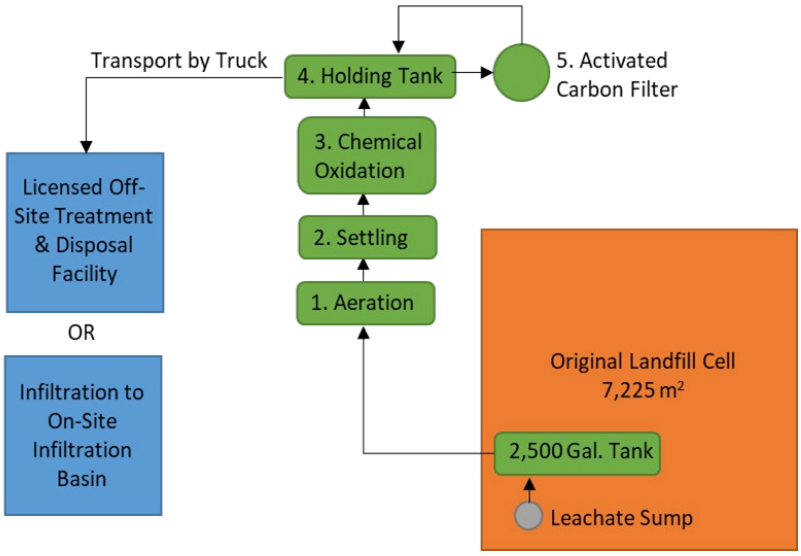
The OC authorizes waste discharge to the Original Lined Cell. Waste discharge to the Original Un-Lined Cell is not authorized.

The Original Lined Cell was constructed with two 20 mil Coated Woven Polyethylene (CWPE) liners and is equipped with a leachate collection system and a leak detection drainage layer composed of medium sand between the upper and lower liner. The leak detection drainage layer is equipped with a perforated pipe with a riser pipe that extends to ground surface, which may be used for water level monitoring and extraction of the contained water, if required.

The Original Lined Cell intermittently accepts construction and demolition (C&D) waste, land clearing debris and soil meeting applicable Contaminated Sites Regulation (CSR) industrial land use standards, by appointment only. All accepted wastes were discharged to the Original Lined Cell until November 24, 2021, and no waste was discharged to the Original Un-Lined Cell. The Original Lined Cell was covered by a tarp except during active filling to reduce the generation of leachate.

2.2 Original Leachate Management Works

The original leachate management works include leachate collection, extraction, storage, and treatment and either on- or off-Site discharge, as appropriate based on treated effluent quality. A process schematic of the original leachate management works is provided in Figure 2.1 below.



Leachate is collected within the Original Lined Cell and drains to the leachate sumps. The location of the sumps is shown on Figure 3. Sump S03-19 collected leachate from the northern portion of the cell. Sump S05-19 collects leachate from the southern portion of the cell.

A 2,500 US gallon (9.46 m^3) leachate collection tank is located within the northwest side of the Original Lined Cell near S03-19. Leachate from S03-19 is set to automatically drain to the 2,500-gallon collection tank. Leachate from the collection tank, as well as from S05-19 is transferred to one of the three partially buried 25 cubic metre (m^3) (6,600 US gallon) fibreglass leachate tanks located adjacent to the Original Lined Cell. The three 25 m^3 tanks provide for aeration, settling, filtration, oxidation, and storage of the treated leachate. A 63.6 m^3 (400 fluid barrel (bbl)) steel frac tank, which is located adjacent to the three existing tanks, provides additional leachate storage capacity. Leachate treatment chemicals are stored on Site in a seacan.

The Original Lined Cell was covered by a tarp except during active filling to reduce the generation of leachate.

Effluent is sampled to determine the discharge quality. Dependent on the quality, the treated leachate is either transported off-Site to a licensed treatment and disposal facility or discharged to the on-Site infiltration basin. Effluent that meets CSR Schedule 3.2 standards for drinking water protection (DW) may be infiltrated on-Site at a maximum rate of 7,139 m^3 per year. Effluent that does not meet CSR DW standards will be accepted by Tervita Corporation (Newalta) located in Nanaimo, BC, or another provincially licensed facility. In 2021, treated leachate effluent met the CSR DW standards and was discharged to the on-Site infiltration basin (see Section 2.10) according to Northwin.

2.3 Summary of OCP Implementation

A summary of the OCP components outlined in Section 2.3(b) of the OC that were implemented from January 1 to December 31, 2021 include:

– Filling: waste was accepted according to the waste acceptance policy (Sections 8.2 through 8.4 of the OCP) and discharged in the Original Lined Cell in accordance with the fill plan.
– Cover Placement: intermediate soil cover was placed on non-soil waste following landfilling. In addition, a polyethylene tarp was placed over all areas that received waste to minimize leachate generation.
– Original Leachate Management Plan: the works included leachate collection, extraction, storage, and treatment, as described in Section 2.2.
– Stormwater Management Plan: operational berms continue to ensure that contact water remains within the lined cell and separate from the clean stormwater runoff. Clean stormwater continues to be directed away from the landfill for infiltration into the groundwater aquifer below the Site.
– Operation Plan: the Original Landfill operated in accordance with the operations section presented in the OCP.

2.4 2022 Significant Works

The significant works planned for 2022 at the Original Landfill include:

– Waste from the Original Landfill will be exhumed and discharged to the New Landfill following the completion of Cell 1 West, which is scheduled for 2022 or 2023. The plan to remove all waste from the Original Landfill, as presented in the DOCP, will be practiced.

2.5 Waste Tonnage and Volume

In 2021, the Original Landfill accepted a total of 7,034 metric tonnes (tonnes) or 4,464 m^3 of waste for discharge to the Original Lined Cell:

– 471 tonnes or 362 m^3 of C&D waste.
– 6,563 tonnes or 4,102 m^3 of industrial quality soil.

In 2021, the Site accepted a total of 3,139 tonnes or 2,415 m^3 of recyclables which included concrete and asphalt waste:

– 1,744 tonnes or 1,342 m^3 of clean concrete.
– 449 tonnes or 345 m^3 of concrete containing rebar.
– 946 tonnes or 728 m^3 of asphalt.

No creosote timbers, hazardous waste, controlled waste, or attractants were received in 2021.

Note that the conversion between waste tonnage and volume of C&D waste and soil was completed based on the apparent densities provided in the OCP – 1.3 tonnes per m^3 for C&D waste and 1.6 tonnes per m^3 for soil.

2.6 Airspace Consumption, Remaining Volume, and Remaining Life

As shown in Table 2.1, the airspace consumption from January 1 through to December 31, 2021 is 4,464 m^3 with a cumulative total airspace consumption of 74,746 m^3.

The airspace consumption analysis through to October 4, 2019, was completed as part of the OCP. The airspace consumption analysis from October 5, 2019 through to December 31, 2021, was completed based on accepted total volume received for discharge to the Original Lined Cell.

Using the 2019 to 2021 average airspace consumption of 5,907 m^3, the remaining life for the Original Lined Cell is 3.0 years. Although the Original Lined Cell has capacity, waste will no longer be accepted for discharge at the Original Lined Cell. Instead, waste will be discharged to the New Landfill.

Table 2.1 Original Landfill Airspace Consumption, Remaining Volume, and Remaining Life

	Un-lined Cell (m^3)	Lined Cell (m^3)	Total Original Landfill (m^3)
Historical to Oct 4, 2019	35,000	4,446	39,446
Oct 5 thru Dec 31, 2019	0	5,445	5,445
Jan 1 thru Dec 31, 2020	0	7,812	7,812
Jan 1 thru Dec 31, 2021	0	4,464	4,464
Total Airspace Consumed	**35,000**	**22,167**	**57,167**
Total Capacity	**35,000**	**39,746**	**74,746**
Total Airspace Available	**0**	**17,579**	**17,579**
Remaining Life			**3.0 years**

2.7 Treated Leachate Effluent Quantity and Quality

In 2021, the Original Landfill generated leachate only during times of active filling, as outside of these times Northwin deployed a polyethylene tarp over the landfill area to minimize leachate generation. Water shed off the tarp was not in contact with the waste and, therefore, was not treated as leachate.

Treated leachate effluent was sampled on May 14, 2021 by Northwin. As shown in the lab reports, concentrations were below CSR DW standards except for manganese (Appendix C). Treated leachate effluent underwent additional treatment to reduce manganese concentrations and supplementary samples were collected by Northwin. Analytical results were reported at concentrations below the CSR Schedule 3.2 drinking water quality standards (CSR DW standard) in 2021 prior to discharge, according to Northwin.

In 2021, Northwin collected, treated, and discharged approximately 325 m^3 of leachate.

2.8 Non-Compliance

According to Northwin, the Original Landfill was compliant with the conditions of the OC during the Reporting Period.

2.9 Public Complaints

According to Northwin, no public complaints were received during the Reporting Period.

3. New Landfill Operations and Development

3.1 New Landfill

Presently, the New Landfill includes one cell (Cell 1 East). Cell 1 East includes a double liner system, leak detection layer, and leachate management works (see Section 3.2). Cell 1 East is shown on Figure 4.

Cell 1 East is comprised of a primary and secondary base liner. The primary base liner refers to the composite liner system that consists of an HDPR geomembrane liner and geosynthetic clay liner (GCL) which underlies the leachate collection system. The secondary base liner refers to the composite liner system which is comprised from an HDPE geomembrane liner and GCL which underlies the leak detection system.

The Cell 1 East and Ponds Construction Report was submitted to the ENV on October 19, 2021. The New Landfill was authorized to accept waste 30 days following submission on November 19, 2021. The New Landfill started accepting waste on November 24, 2021. The New Landfill is authorized to accept C&D waste, landfill clearing waste, soil meeting the applicable BC CSR industrial land use standards, and sludge from the leachate management works or water management works.

3.2 New Leachate Management Works

The new leachate management works include leachate collection, extraction, storage, treatment, and infiltration. A process schematic of the new leachate management works is provided in Figure 3.1 below.

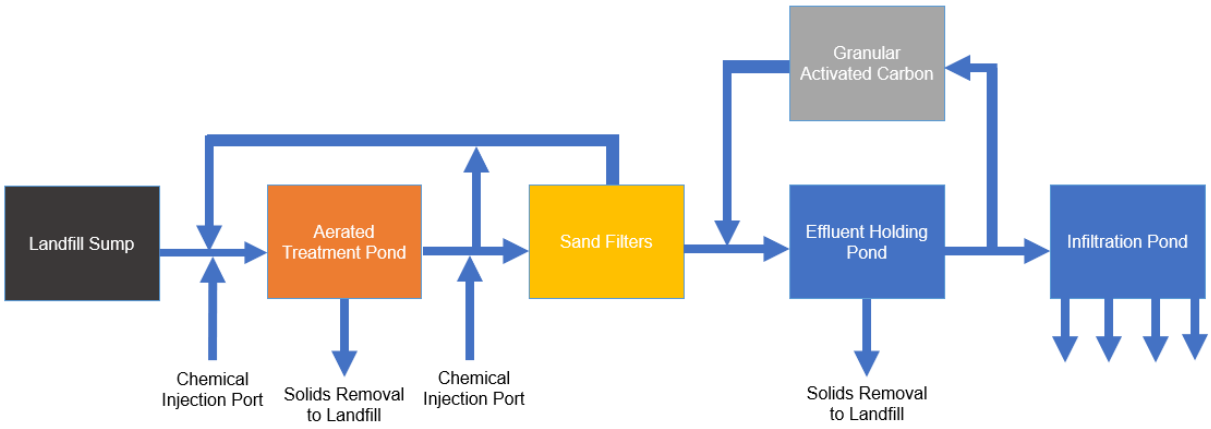


Figure 3.1 New Leachate Management Works Schematic

Leachate is collected within Cell 1 East in a series of perforated pipes installed at the base of the cell and discharges to a sump. Leachate is stored temporarily in the landfill and pumped from the sump to the leachate treatment pond for batch treatment as shown in Figure 3.1, on an as-needed basis. The location of the sump is shown on Figure 4. The leachate treatment pond includes a primary and secondary liner, leak detection layer, and leak collection pipes.

To target operation of a weekly batch at the peak daily leachate generation rate, an average batch size is 625 m^3, with the maximum batch size to be 1,400 m^3. A batch size may vary, requiring operational adjustments to the treatment system.

The process begins with aerated equalization, where the aerated equalization pond is filled, and the aeration system on during the filling process. Following aeration, the leachate is pumped through pipes that enter the leachate

treatment container, where chemicals can be added inline through injection ports. After chemical addition, leachate can be recirculated to the equalization pond or sent through a series of sand filters before entering the effluent holding pond. The effluent batch will be held in the effluent holding pond and sampled with a 3-day turnaround on the laboratory analysis. Following receipt of sample results, the batch will then be pumped to the infiltration pond or recirculated through the Granular Activated Carbon (GAC), if polycyclic aromatic hydrocarbons (PAHs) did not meet discharge criteria. During operations the batches will be tested periodically to confirm discharge criteria are being met. The treatment process will continue until treated effluent concentrations meet the BC CSR Schedule 3.2 DW standards.

3.3 Summary of DOCP Implementation

A summary of the DOCP components outlined in Section 2.5(b) of the OC that were implemented from November 24 to December 31, 2021, include:

– Soil Acceptance Plan: soil was received in accordance with the soil acceptance plan presented in the DOCP.
– Filling: waste was accepted according to the waste acceptance policy and discharged in Cell 1 East in accordance with the fill plan.
– Cover Placement: daily cover was placed over waste as a means of landfill nuisance control on an as-needed basis determined by landfill staff. Intermediate soil cover was placed on areas of the landfill that were no scheduled to receive the placement of additional waste for 30 days or more.
– New Leachate Management Plan: leachate management includes leachate collection, extraction, storage, and treatment. Leachate is extracted from the landfill by active pumping from the Cell 1 East for treatment as described in Section 3.2.
– New Surface Water Management Plan: perimeter berms around the cell prevent run-on of stormwater to the landfill footprint. Existing site ditches promote stormwater infiltration into the ground at the base of the Pit. Contact water is managed as leachate.
– Operations Plan: the New Landfill operated in accordance with the Site Operations section presented in the DOCP.
– Tigger Level Assessment Plan: potential primary liner leakage is assessed as outlined in the DOCP.

3.4 2022 Significant Works

The significant works planned for 2022 at the New Landfill include:

– As per the Environmental Monitoring Plan (EMP) presented in the DOCP, two probes will be installed to monitor the concentration of landfill gas in soil (SVP-1 and SVP-2) and one monitoring well will be installed downgradient (MW12). The proposed monitoring well MW13 will be installed on a later date when gravel extraction in the area is complete.
– The Leachate Treatment System Commissioning Report will be submitted to the Ministry following the commissioning of the Leachate Treatment System in 2022 as the leachate concentration from Cell 1East stabilizes.
– The construction of Cell 1 West is tentatively scheduled for 2022 or 2023.
– The construction of ditches on the east and west sides of the New Landfill, which will convey clean surface water to the north of the landfill into the infiltration areas located in the base of the Upland pit.

3.5 Waste Tonnage and Volume

In 2021, the New Landfill accepted a total 2,940 tonnes or 2,262 m^3 of waste for discharge to Cell 1 East:

– 1,309 tonnes or 1,007 m^3 of C&D waste
– 1,127 tonnes or 867 m^3 of industrial quality soil
– 504 tonnes or 388 m^3 of creosote timbers

No hazardous waste, controlled waste, attractants, and/or recyclable material (excluding the recyclable material reported under Section 2.5) were received in 2021.

Note that the conversion between waste tonnage and volume of C&D waste and soil was completed based on the average apparent density of 1.3 tonnes per m^3 as outlined in the DOCP.

3.6 Airspace Consumption, Remaining Volume, and Remaining Life

As shown in Table 3.1, the maximum design capacity of Cell 1 East is 138,238 tonnes or 106,406 m^3 using the average apparent density of 1.3 tonnes per m^3. The total airspace consumption from November 24 to December 31, 2021 was approximatley 2,262 m^3. The remaining volume of Cell 1 East is 104,144 m^3. The remaining volume for the New Landfill is 507,936 m^3.

Using the maximum allowable discharge rate of 45,000 tonnes per year or 34,615 m^3 per year, the remaining life for Cell 1 East is 2.3 years and the remaining life for the New Landfill 14.7 years.

Table 3.1 New Landfill Airspace Consumption, Remaining Volume, and Remaining Life

	Cell 1 East (m^3)	Total New Landfill (m^3)
Nov 24 thru Dec 31, 2021	2,262	2,262
Waste from Original Lined Cell	0	22,167
Total Capacity	**106,406**	**532,365**
Total Airspace Available	**104,144**	**507,936**
Remaining Life	**2.3**	**14.7**

3.7 Treated Leachate Effluent Quantity and Quality

Treated leachate effluent was sampled on December 15, 2021, by Northwin. Concentrations were at or below the CSR DW standards.

In 2021, Northwin collected, treated, and discharged approximately 2,780 m^3 of leachate.

3.8 Non-Compliance

According to Northwin, the New Landfill was compliant with the conditions of the OC during the Reporting Period.

3.9 Public Complaints

According to Northwin, no public complaints were received during the Reporting Period.

4. Site Physical Setting

The following section summarizes the Site setting with respect to climate, topography, stormwater drainage, geology, and hydrogeology.

4.1 Climate

Climate data was measured at Environment Canada's Campbell River Airport Climate Station (ID 1021261) located approximately 8 km southeast of the Site. Based on the available climate data, the area received 1,406 millimetres (mm) of precipitation in 2021 with much of the rainfall occurring between November and January.

4.2 Topography and Drainage

The Site is located on a terrace that is partially surrounded by mountainous terrain to the south and southwest. The terrace gradually slopes towards the Quinsam River located approximately 3.8 km to the southeast of the east Site boundary. The Quinsam River channel is at an elevation that is greater than 100 m below the Site. There are no defined surface water drainage courses on Site.

Drainage within the Original Landfill area is managed according to the stormwater management plan provided in the OCP. Perimeter berms have been constructed around the lined cell footprint to ensure that precipitation that falls on the lined cell footprint remains within the lined cell. Precipitation that falls outside of the lined cell is considered clean water and infiltrates into the groundwater aquifer below the Site.

4.3 Geologic Setting

Overburden

Based on regional geologic mapping, the area in the vicinity of the landfill underwent several periods of glaciation during the Pleistocene Epoch. Vancouver Island was glaciated with ice thicknesses to 2 km. During the recession of the last glaciation approximately 14,000 years ago, glacial and glacio-fluvial sediments were deposited, and in some cases reworked and redeposited, to make up many of the present surficial deposits of Vancouver Island. These deposits consist of till that was deposited directly by glacial activity[1] and of glacial outwash composed primarily of poorly sorted, coarse-grained sand and gravel sediments deposited by glacial melt water (Greene, Scoates, and Weis, 2005; McCammon, 1977)[2].

Based on investigations completed by GHD and Site operations, the surficial geology underlying the landfill is native interbedded sand and gravel with occasional seams of sand and silty sand. Directly underlying the landfill, this unit is greater than 40 m in thickness.

Bedrock

The Site is underlain by the Karmutsen Formation, which is part of the Wrangellia Terrane. The Karmutsen Formation consists mostly of submarine flood basalts up to 6 km in thickness.

Based on Site investigations completed by GHD, the bedrock underlying the landfill is competent igneous basalt. The surface of the bedrock is greater than 50 m below the ground surface in the Original Landfill area.

A bedrock ridge is present between Rico Lake and the Pit along the western limit of the Site. The presence of the ridge creates a surface water and groundwater flow divide. The approximate location of the watershed and groundwater flow divide is illustrated on Figures 4 and 5.

4.4 Hydrogeologic Setting

In general, the geologic units identified in the previous section may be grouped into the following two hydrogeologic units:

1. A sand and gravel overburden aquifer
2. Bedrock aquifer

[1] This till consists of larger clasts supported in a matrix of fine-grained sediment.
[2] Greene, A.R., J.S. Scoates and D. Weis, 2005. Wrangellia Terrane on Vancouver Island, British Columbia: Distribution of Flood Basalts with Implications for Potential Ni Cu PGE Mineralization in Southwestern British Columbia.

An unconfined aquifer exists within sand and gravel overlying bedrock at the Site. In 2021, the water table was present approximately 42-45 m bgs in the vicinity of the Original Landfill. Groundwater flow is interpreted to be from northwest to southeast towards the Quinsam River. The head waters of the aquifer are from McIvor Lake in the vicinity of the Site.

This sand and gravel aquifer is a major aquifer in the region and is identified in the BC Water Resource Atlas (2017) as aquifer 975 IIA (10). This aquifer is interpreted to be the principal groundwater flow zone at the Site. In the context of the landfill, this aquifer represents the only receptor to landfill-related groundwater quality impairments.

GHD completed single well response tests at nine wells screened within the sand and gravel aquifer. The results of the SWRTs show that hydraulic conductivity of the sand and gravel aquifer is approximately 1.8×10^{-2} cm/sec.

5. 2021 Environmental Monitoring Plan

This section presents the 2021 environmental monitoring plan (EMP), sampling methodology, laboratory program, quality assurance/quality control (QA/QC) program, and specification developed for the Original Landfill. Monitoring locations are presented on Figures 3 and 4.

The quarterly EMP for the New Landfill will begin in 2022. The EMP results for the New Landfill will be presented in the 2022 Annual Monitoring Report.

5.1 Environmental Monitoring Plan

The EMP was developed for the Site to assess and identify potential landfill derived impacts to the underlying aquifers, to monitor groundwater and surface water levels, and to evaluate Site regulatory compliance (Section 3.5 of the OC). The EMP consists of semi-annual monitoring at groundwater, surface water, leachate, and the leak detection layer locations. The objective of each component of the EMP is provided below.

Groundwater

The objective of the groundwater monitoring plan is to detect the extent and magnitude of potential landfill-derived impacts to the underlying overburden aquifer and to monitor the groundwater flow direction across the Site. Groundwater quality is monitored at three up-gradient (MW2-14, MW2A-16, MW3-14), one cross-gradient (MW10-17) and one downgradient well (MW11-19). Groundwater levels are monitored at 12 additional wells located across the Site.

Surface Water

Water levels in Rico Lake and McIvor Lake are monitored to assess the hydraulic relationship between these surface water bodies and the underlying aquifers. The water level surface elevation at Rico Lake is measured from a surface water gauge installed in the lake. The hydrometric surface of McIvor Lake is monitored by BC Hydro. GHD records the water level surface elevation from the publicly available BC Hydro Data Records.

Leachate

The objective of the leachate monitoring program is to characterize leachate quality generated within the lined cell of the Original Landfill. Leachate is sampled at leachate sumps S03-19 and S05-19.

Leak Detection Layer Monitoring

The objective of the leak detection layer monitoring is to assess the water quality in the leak detection system and the potential for leachate-derived alterations to occur below the upper liner (i.e., polyethylene extension) of the lined cell. Water within the leak detection layer is monitored at S01-17. The leak detection layer is illustrated in Figure 5.1, below.

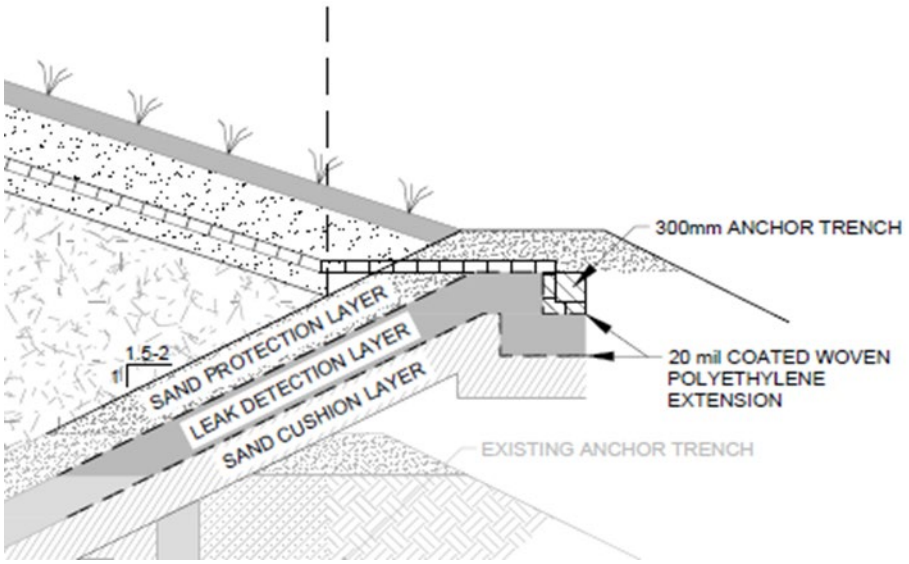


Figure 5.1 The Leak Detection Layer in the Original Landfill

EMP Specification

The EMP Specification is presented in Appendix B. The specification includes monitoring locations, frequency, and analytical parameters for each sample type. The EMP is updated based on the semi-annual monitoring results and each year's review of Site operations and environmental data as part of the Annual Report.

5.2 2021 Environmental Monitoring Plan Summary

The 2021 EMP consisted of bi-annual water level, water quality and leachate monitoring occurring in June and November. The EMP activities included:

- Water level monitoring, field parameter measurement, sample collection and analytical testing of groundwater at the four up-gradient and cross-gradient monitoring wells MW2-14, MW2A-16, MW3-14 and MW10-17.
- Water level monitoring, field parameter measurement, sample collection and analytical testing of groundwater at the downgradient well MW11-19.
- Water level monitoring at an additional 11 wells and one piezometer, MW1-14, MW4A-15, MW4B-15, MW5A-15, MW5B-15, MW6-17, MW7-17, MW8-17, MW9-17, MW15A-18, MW15B-18, and PZ1-19. Water level monitoring at MW6-17 could not be completed in the June monitoring event as the flushmount became filled with gravel.
- Surface water level monitoring at Rico Lake and McIvor Lake.
- Field parameter measurement, sample collection and analytical testing at the leak detection system access pipe S01-17.
- Water level monitoring, field parameter measurement, sample collection and analytical testing of leachate from leachate sumps S03-19 and S04-20.
- Collection of two duplicates and two field blanks as part of the quality assurance/quality control program. A trip blank was not completed in November. The trip blank did not arrive with the bottle shipment from the laboratory. A field blank was prepared instead.
- Field sample key (FSK) preparation and environmental database updates.

5.3 Sampling Methodology

Sampling was conducted in accordance with the BC Field Sampling Manual for Continuous Monitoring and the Collection of Air, Air Emission, Water, Wastewater, Soil, Sediment and Biological Samples (British Columbia, Ministry of Environment, 2013) (BC Field Sampling Manual) and GHD's standard operating procedures. The sampling methodology consisted of the following:

- Well identification and inspection.
- Water level monitoring followed by well volume calculation.
- Well purging and stabilization monitoring. Purging was completed using dedicated Waterra™ tubing or dedicated bailer. A minimum three well volumes were purged at wells with good recovery. Wells with insufficient yield were purged dry and allowed to recover followed by sample collection. Field measurements included pH, conductivity, temperature, turbidity, and oxidation-reduction potential.
- Leachate samples were collected from leachate sumps S03-19 and S05-19 using a dedicated bailer. Field measurements included pH, conductivity, temperature, turbidity, and oxidation-reduction potential.
- Sampling equipment was decontaminated between each water quality monitoring location.
- Groundwater and leachate samples designated for dissolved metals analysis were collected, filtered, and preserved in the field.
- Leachate and surface water samples designated for total metals analysis were collected and preserved in the field.
- Samples were collected in the appropriate laboratory-supplied sample containers, preserved as required, packaged in an ice-chilled cooler, and delivered to the laboratory under chain-of-custody protocol to meet holding time requirements.

5.4 Laboratory Program

Analytical services were provided by Bureau Veritas Laboratories (BV) of Burnaby, BC. BV is an accredited by the Canadian Association for Laboratory Accreditation (CALA) to perform the analytical tests required as part of the EMP. Laboratory reports and respective field sample keys (FSK) for each monitoring event are provided in Appendix C.

5.5 Data Quality Assessment and Validation

A qualified GHD chemist completed data validation to assess laboratory and field QA/QC measures. The QA/QC results presented in the annual memorandum (Appendix D) indicate that data exhibited acceptable levels of accuracy and precision with the qualifications noted. All data collected for the 2021 EMP has been determined to be acceptable for use in this Annual Report.

6. EMP Results and Water Quality Assessment

This section presents the EMP results and an assessment of groundwater and leak detection layer water for evidence of landfill-derived alterations. Water quality was assessed through an evaluation of the spatial distribution and temporal trends of typical leachate indicator parameters in downgradient groundwater as compared to leachate and background quality as well as baseline results). Baseline results were established prior to landfilling as part of the HHCR. Concentration versus time plots for leachate indicator parameters are presented in Appendix E.

6.1 Water Level Monitoring Results

Water levels were measured from the monitoring wells on-Site in June and November. Water level monitoring data is presented in the attached Table 1.

Groundwater contours for June and November are presented on Figures 5 and 6. These figures illustrate the inferred groundwater flow direction within the sand and gravel aquifer, which is directed from the northwest towards the southeast (i.e., from McIvor Lake towards the southeast corner of the Site) during both monitoring events. McIvor Lake is the headwaters for the sand and gravel aquifer underlying the Site.

In general, groundwater levels observed at the Site were marginally higher in November than in June. Historically, groundwater levels have been observed to peak in March (coinciding with the spring freshet) and reach their lowest levels in September (following periods of relatively lower precipitation).

6.2 Leachate Quality

Characterization of leachate generated within the Original Lined Cell was completed via sample collection from leachate sumps S03-19 and S05-19. Leachate samples were analyzed for general chemistry, nutrients, sulphides, metals (total and dissolved), Polycyclic Aromatic Hydrocarbons (PAHs), Volatile Organic Compounds (VOCs), and Extractable Petroleum Hydrocarbons (EPHs). The analytical leachate results are provided in Table 2.

Based on the leachate analytical results, leachate can be characterized as:

- Weak leachate containing low concentrations of Chemical Oxygen Demand (COD), Biochemical Oxygen Demand (BOD), Total Organic Carbon (TOC), ammonia, and nitrogen as well as high concentrations of calcium and magnesium due to the nature of the C&D waste.
- Containing metals in concentrations higher than the surrounding groundwater likely derived from the acceptance of soil that meets the applicable soil discharge standards for the Site (IL).
- Containing metal concentrations that are less than the applicable water quality standards except for total arsenic at S03-19 in November (Section 7).
- Containing VOC concentrations less than applicable standards (Section 7) likely derived from the acceptance of soil that meets the applicable soil discharge standards for the Site (IL).
- Containing PAH concentrations greater than standards, likely derived from the presence of the creosote treated wood waste within the lined cell.

6.3 Leachate Indicator Parameters

The leachate indicator parameters selected for the Site were based on parameters that are typically elevated in construction and demolition landfill leachate as well as industrial quality (IL) soils:

- Alkalinity (total)
- Ammonia
- Boron
- Chloride
- Conductivity (lab)
- Hardness
- Hydrogen Sulphide
- Iron
- Manganese
- Oxidation Reduction Potential (ORP)
- Sulphate
- Total Dissolved Solids (TDS) (lab)

Parameter	Description
Hardness	Caused by the increased concentrations of calcium and magnesium ions due to the waste materials and more acidic pH breaking down the native lime-rich soils.
TDS	A measure of the quantity of dissolved ions in solution. TDS increases with the dissolution of waste materials and salts.
Conductivity	Electrical or specific conductivity increases in leachate-affected groundwater due to the increased conductive capacity of water as a result of increased dissolved ions.
Chloride	Chloride is generally abundant in municipal solid waste, however, is often found at lower concentrations in construction and demolition waste (Townsend, 2000). Chloride is formed in part by the degradation of various wastes and can be a very useful leachate indicator parameter because it is not subject to retardation processes and is therefore a conservative tracer.
Alkalinity	Alkalinity typically increases down-gradient of landfills primarily due to elevated levels of dissolved carbon dioxide in affected water (produced by the biological breakdown of organic material) causing the dissolution of carbonate from natural geologic materials within the aquifer.

Parameter	Description
Hydrogen Sulphide	Under anaerobic conditions, sulphide (as H_2S) is observed through the reduction of sulphur species. The reducing conditions resulting from the presence of buried waste favor the development of sulphide in leachate.
Sulphate	Construction and demolition waste landfills often generate elevated concentrations of sulphate in leachate due to the abundance of sulphate available from gypsum in drywall and other building materials in the waste stream.
Ammonia	High concentrations of ammonia are observed when the landfill enters its anaerobic stage. In the anaerobic stage, anaerobic decomposition dominates, resulting in more ammonia than nitrate or nitrite.
Boron	Boron is a useful leachate indicator parameter as it is not subject to retardation processes and is therefore a conservative tracer.
Iron and Manganese	Concentrations typically increase in landfill-affected groundwater due to the alteration of redox conditions within the groundwater. The breakdown of dissolved organic matter within leachate consumes dissolved oxygen and related oxygen sources in groundwater and creates reducing conditions. Where conditions are reducing, naturally-occurring iron and manganese oxides within the geologic material are reduced to more soluble forms.

6.4 Leak Detection System Water Quality

The leak detection system was sampled via the leak detection pipe (S01-17) to assess water quality in the leak detection system and the potential for leachate leakage through the upper liner of the lined cell. It is important to note that a secondary liner is present beneath the leak detection layer.

Leak detection water samples were analyzed for general chemistry, nutrients, total or dissolved metals, PAHs and VOCs. The 2021 analytical results are presented in the attached Table 3.

A summary of the indicator parameter concentrations reported in the water sampled from the leak detection system are presented in Table 5.1 below.

Table 6.1 Leachate Water Quality Summary of Indicator Parameters (June – November)

Leachate Indicator Parameter	Upgradient Concentration Range	Cross-Gradient Concentration Range	Downgradient Concentration Range	Leak Detection System	Leachate Concentration Range
ORP (millivolts)	190 - 259	190 - 201	133 - 216	-17 - 2	-51 - 53
TDS (lab)	58 - 120	88 - 110	130 - 300	660 - 2000	250 - 1200
Dissolved Hardness	29.0 - 63.2	59.2 - 66.5	75.3 - 257	479 - 1280	201 - 622
Conductivity (lab) (uS/cm)	68 - 150	150 - 160	180 - 520	1000 - 2400	430 - 2000
Bicarbonate	35 - 69	69 - 85	78 - 320	510 - 530	200 - 700
Alkalinity (total)	29 - 56	57 - 70	64 - 260	420 - 430	170 - 570
Chloride	ND (1.0) - 9.3	3.8 - 4.5	2.8 - 11	39 - 89	16 - 250
Dissolved Sulphur	ND (3.0)	ND (3.0)	ND (3.0)	32.1 - 321	8.7 - 43.5
Sulphate	ND (3.6) - 6.1	Nd (8.0) - 5.2	ND (9.5) - 7.2	110 - 930	32 - 120
Hydrogen Sulphide	ND (0.005)	ND (0.005)	ND (0.005)	ND (0.005) - 0.018	ND (0.005) - 0.085
Dissolved Boron	ND (0.05)	ND (0.05)	ND (0.05)	0.132 - 2.06	0.056 - 0.898
Dissolved Iron	ND (0.005)	ND (0.005) -	ND (0.005) -	1.25 - 16.8	0.776 - 13.8

Leachate Indicator Parameter	Upgradient Concentration Range	Cross-Gradient Concentration Range	Downgradient Concentration Range	Leak Detection System	Leachate Concentration Range
		0.0066	0.0714		
Dissolved Manganese	ND (0.001) - 0.0011	ND (0.001)	ND (0.001) - 0.001	6.05 - 9.73	3.12 - 7.08
Total Boron	--	--	--	0.129 - 1.63	0.063 - 1.03
Total Iron	--	--	--	6.47 - 38.5	2.74 – 30.0
Total Manganese	--	--	--	6.25 - 9.89	2.41 – 8.0
Total PAHs	--	--	--	0.0049 - 0.0081	0.0013 - 1.9
Notes: Units are in mg/L unless otherwise noted; Red - greater than CSR DW standards; -- data not available.					

General Chemistry Parameters, Nutrients and Metals

The general chemistry, nutrients, and metals leachate indicator parameters are present in the leak detection system (S01-19) at higher concentrations than the surrounding groundwater. These parameters are comparable in concentration to leachate concentrations. Sulphur and sulphate concentrations were significantly higher than leachate in November.

Water sampled from the leak detection system showed considerable variation in concentration between the June and November monitoring events. All the leachate indicator parameters for general chemistry parameters, nutrients, and metals showed higher concentrations in November than in June. In June and November, reducing conditions were apparent as indicated by a negative or low oxidation reduction potential (ORP) value. In previous monitoring years, reducing conditions were only apparent in November.

As shown in Table 5.1, sulphate, iron, and manganese were present in the leak detection water at concentrations greater than the BC CSR DW standards in June and/or November.

PAHs and VPH

PAH and VPH compounds in the leak detection system water samples were either not detected or reported at concentrations below the BC CSR DW standards.

The total PAH concentration in the leak detection system has been increasing since 2019. Total PAH increased from not detected in 2019 and June 2020 to 8.1 ug/L in June 2021 and 2.0 ug/L in November 2020 to 4.9 ug/L in November 2021.

VOCs

VOCs were either not detected in the leak detection system water samples or reported at concentrations below the BC CSR DW standards.

6.5 Groundwater Quality

Water quality results have been assessed for evidence of leachate derived alterations. Up-gradient and cross-gradient groundwater samples were analyzed for general chemistry parameters, nutrients, and dissolved metals. Downgradient groundwater samples were analyzed for general chemistry, nutrients, dissolved metals, PAHs and VOCs. The 2021 analytical results are presented in Table 4.

A summary of the leachate indicator parameter concentrations reported in the upgradient wells (MW2-14, MW2A-16, MW3-14), and cross-gradient well (MW10-17) are presented in Table 6.1.

Up-gradient Groundwater Monitoring Wells

Water quality at the up-gradient monitoring wells (MW2-14, MW2A-16 and MW3-14) is characterized by low concentrations of alkalinity, hardness (soft to moderately hard), chloride and TDS.

The 2021 dataset was compared to historical concentrations. Little variation was observed between the 2017 to 2021 monitoring events at the up-gradient groundwater monitoring wells, and concentrations of leachate indicator parameters do not appear to be increasing over time.

With the exception of the spike in concentrations observed at MW2-14 in 2019-2020, groundwater quality at the up-gradient monitoring wells has been stable since monitoring began in 2014. No exceedances of the CSR DW standards occurred in the 2021 monitoring events.

Cross-gradient Groundwater Monitoring Well

Water quality at the cross-gradient well (MW10-17) is similar in quality to the up-gradient wells and is also characterized by low concentrations of alkalinity, hardness (moderately hard), chloride, and TDS. Little variation has been observed at the cross-gradient groundwater monitoring well since monitoring began in 2017, and concentrations of leachate indicator parameters do not appear to be increasing over time. No exceedances of the CSR DW standards occurred in the 2021 monitoring events.

Downgradient Groundwater Monitoring Well

The water quality at the downgradient well (MW11-19) is similar in quality to the up-gradient and cross-gradient wells and is also characterized as relatively fresh water with low, but variable concentrations of alkalinity, hardness (moderately hard), chloride, and TDS. Seasonal variation is apparent. No exceedances of the CSR DW standards occurred in the 2021 monitoring events.

7. Compliance Assessment

A compliance assessment of groundwater quality was completed by comparing analytical concentrations against the applicable water quality standards. The applicability of standards depend on current and future groundwater and surface water uses, and the potential for groundwater on-Site to discharge to surface water bodies that support aquatic life.

7.1 Applicable Water Quality Standards

The downgradient groundwater analytical results have been assessed to the BC CSR DW standards as specified in Section 3.5 of the OC.

The CSR DW standards are appropriate for evaluating water quality at permitted landfills as stated in the BC MOE Landfill Criteria for Municipal Solid Waste (Second Edition, June 2016) and based on the following rationale.

Rationale

Protocol 21 states that both current and future drinking water use must be considered when determining whether CSR DW standards apply to a site. Future land use in the vicinity of the Site may include potable water supply, therefore the drinking water exposure pathway is applicable for the Site and DW standards apply.

Protocol 21 also states that CSR freshwater aquatic life (FWAL) standards apply to sites located within 500 m of an aquatic receiving environment (i.e., a surface water body containing aquatic life) unless it can be demonstrated that the groundwater discharges into a different surface water body (located greater than 500 m from the site) or that groundwater does not migrate to within 500 m of a surface water body that contains aquatic life. The results of the aquatic life assessment completed down-gradient of the Site as part of the HHCR revealed that no surface water bodies are present within 500 m east of the Site. The assessment identified two watercourses within 500 m of the southeast Site boundary; however, the watercourses are located cross-gradient of the Original Landfill and at an elevation well above groundwater leaving the Site. In addition, Rico Lake and McIvor Lake are located up-gradient

based on Site flow patterns (Figures 5 and 6) and are therefore also not considered aquatic receiving environments. Based on these results, the CSR AW standards do not apply to groundwater quality at the Site.

7.2 Results

As presented in Table 4, concentrations of leachate indicator parameters were significantly less than the applicable CSR DW standards (i.e., well below 20% of the standard) and background monitoring locations, these results indicate Site compliance with respect to water quality.

8. Conclusions

Based on the results of this Annual Report, the operational and water quality conclusions presented below can be made. The annual status form is provided in Appendix F.

Operational Conclusions

Original Landfill

- The Original Landfill was compliant with the operational conditions of the OC during the Reporting Period, and no complaints were received. The annual status form is provided as Appendix F.
- The Original Landfill stopped receiving waste on November 24, 2021. The Original Landfill will continue to be tarped until waste is exhumed and discharged to the New Landfill. Leachate management will also continue until the waste from the Original Landfill is exhumed and discharged to the New Landfill.
- No significant works occurred at the Original Landfill in 2021.
- An estimated total of 362 m^3 of C&D waste and 4,102 m^3 of industrial quality soil was discharged to the Original Lined Cell.
- An estimated total of 2,415 m^3 of recyclables, which included concrete and asphalt, were diverted from the landfill.
- The 2021 airspace consumption was estimated at 4,464 m^3.
- The total remaining airspace for the Original Landfill is estimated at 17,746 m^3 using the 2019 to 2021 average airspace consumption rate of 5,907 m^3 per year.
- The remaining life for the Original Lined Cell is 3.0 years. Although the Original Lined Cell has capacity, waste will no longer be accepted for discharge at the Original Lined Cell. Instead, waste will be discharged to the New Landfill.
- Using the maximum allowable discharge rate of 45,000 tonnes per year or 34,615 m^3 per year, the remaining life for Cell 1 East is 2.3 years and the remaining life for the New Landfill is 14.27 years.
- In 2021, Northwin collected, treated, and discharged approximately 325 m^3 of leachate from the Original Landfill.

New Landfill

- The New Landfill was compliant with the operational conditions of the OC from November 24 to December 31, 2021, and no complaints were received. The annual status form is provided as Appendix F.
- The Cell 1 East and Ponds Construction Report was submitted to the ENV on October 19, 2021. The New Landfill was authorized to accept waste 30 days following submission of the report on November 19, 2021.
- The New Landfill began accepting waste on November 24, 2021.
- No significant works occurred at the New Landfill from November 24 to December 31, 2021.
- An estimated total of 1,007 m^3 of C&D waste, 867 m^3 of industrial quality soil, and 388 m^3 of creosote timbers were discharged to the New Landfill.
- The total airspace consumption from November 24 to December 31, 2021 was approximately 2,262 m^3. The remaining volume of Cell 1 East is 104,144 m^3. The remaining volume for the New Landfill is 507,936 m^3.

– In 2021, Northwin collected, treated, and discharged approximately 2,780 m^3 of leachate from the New Landfill.

Water Quality Conclusions

– Downgradient groundwater concentrations were significantly less than the applicable CSR DW standards (i.e., well below 20% of the standard). The Site is in compliance with respect to water quality.
– Water level monitoring results show that groundwater flow direction was in a general southeasterly direction.
– Groundwater quality at the up-gradient and cross-gradient monitoring wells is consistent with previous water quality monitoring results.
– Untreated leachate from the Original Landfill is characterized as a weak leachate. VOCs and PAHs are present in the Original Landfill leachate likely derived from the acceptance of IL soil and historical acceptance of creosote treated wood waste. Calcium and magnesium concentrations are elevated due to the acceptance of C&D waste.
– Within the leak detection system, several general chemistry, nutrients, and metal analytes are present at concentrations similar to those observed in leachate. Leachate indicator parameter concentrations are higher in November compared to June, and reducing conditions were apparent (low or negative ORP levels) during both monitoring events. PAH compounds continue to be detected in the Original Landfill leak detection water with total PAHs increasing over time.
– Iron and manganese are present in the Original Landfill leak detection water at concentrations greater than the CSR DW standards.

9. Recommendations

Based on the conclusions presented in this Annual Report, the following operational and water quality recommendations can be made:

Original Landfill Operational Recommendations

– Continue to tarp the Original Lined Cell to reduce leachate generation. Leachate should continue to be transferred to the on-Site leachate tanks for storage and treatment or an off-Site licensed treatment and disposal facility. The periodic removal of leachate from the lined cell will reduce the potential for leachate seepage into the leak detection system.
– Maintain the leak detection system in a dewatered state. Water removed from the leak detection system should be transferred to the on-Site leachate tanks for storage and treatment or an off-Site licensed treatment and disposal facility.
– Monitor the inflow of water into the leak detection system and inspect the bermed perimeter of the Original Lined Cell for surface water infiltration.
– Northwin should monitor the leachate and leak detection system water levels monthly.
– Complete the significant works scheduled for 2022 as presented in Section 2.4
– Maintain treated leachate effluent lab reports for inclusion in the annual reports.

New Landfill Operational Recommendations

– Complete the significant works scheduled for 2022 as presented in Section 3.4.

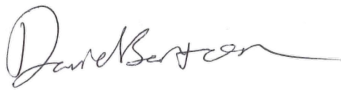
Water Quality Monitoring Recommendations

– Continue to complete the Original Landfill environmental monitoring plan as outlined in Appendix B until refuse is exhumed and discharged to the New Landfill.
– Begin the New Landfill environmental monitoring plan in 2022 as outlined in Appendix G.
– Repair the flushmount of monitoring well MW6-17.

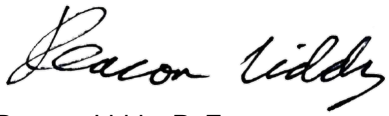
All of Which is Respectfully Submitted,

GHD

Rose Marie Rocca, P. Geo.



David R. Barton, GIT



Deacon Liddy, P. Eng.

Table 1

Water Level Monitoring Data
2021 Operations and Monitoring Report
Campbell River, British Columbia

Monitoring ID	Borehole Depth (m BGS)	Reference Elevation TOR (m AMSL)	Depth to Water (m BTOR)		Water Elevation (m AMSL)		Screened Unit (Aquifer)
Date:			**3-Jun-21**	**15-Nov-21**	**3-Jun-21**	**15-Nov-21**	**Primary Constituent**
MW1-14	11.0	172.9	10.9	6.1	162.1	166.9	Sand/gravel (S&G Aquifer)
MW2-14	21.6	173.8	19.0	15.9	154.8	157.9	Sand/gravel (S&G Aquifer)
MW2A-16	45.4	173.9	19.0	15.9	154.9	158.0	Sand (S&G Aquifer)
MW3-14	18.6	168.6	15.7	15.0	152.9	153.6	Sand/gravel (S&G Aquifer)
MW4A-15	21.3	169.3	8.8	4.7	160.5	164.6	Bedrock (S&G Aquifer)
MW4B-15	18.3	169.3	9.0	4.8	160.3	164.5	Sand (S&G Aquifer)
MW5A-15	10.7	191.9	8.3	7.9	183.5	184.0	Bedrock (Shallow Aquifer)
MW5B-15	8.2	192.0	8.3	5.5	183.8	186.5	Sand/Silt with clay (Shallow Aquifer)
MW6-17	11.3	*185.4*	-	7.3	-	178.1	Sand (S&G Aquifer)
MW7-17	4.3	*187.5*	3.8	2.7	183.7	184.8	Gravel (Shallow Aquifer)
MW8-17	18.8	*192.5*	19.7	19.7	172.8	172.8	Gravel (S&G Aquifer)
MW9-17	33.5	*191.7*	26.7	23.1	165.0	168.5	Sand/gravel (S&G Aquifer)
MW10-17	46.3	*189.1*	41.8	42.2	147.3	146.8	Sand (S&G Aquifer)
MW15A-18	15.2	183.1	6.4	5.6	176.7	177.4	Bedrock (S&G Aquifer)
MW15B-18	9.0	183.2	6.7	6.1	176.5	177.1	Silty/Clayey Sand (S&G Aquifer)
MW11-19	54.9	194.8	47.5	48.6	147.3	146.2	Sand (S&G Aquifer)
PZ1-19	20.4	192.1	20.2	19.5	171.9	172.6	Sand/Silty Gravel (Shallow Aquifer)
McIvor Lake**	-	-	-	-	176.6		-
SW15-02 Rico Lake*	-	180.3	2.1	2.0	178.2	178.3	-

Notes:

191.88 - Surveys completed by McElhanney on April 6, 2016 and March 16 and 31, 2017

185.4 - Survey completed by Upland Excavating Ltd. on January 29th, 2015, March 8, 2016 and April 6th, 2016. Elevations measured with respect to AMSL.

** McIvor Lake elevations are based on BC Hydro record of water elevations at Ladore Dam recorded every three hours.

* Surface water gauge reference elevation refers to the bottom of the gauge. (0 m on gauge = 180.33 m amsl)

m BGS - metres below ground surface

m AMSL - metres above mean sea level (WGS1984)

TOR - top of riser

S&G - Sand and gravel

- Well was dry during monitoring event.

Table 2
Leachate Analytical Results
2021 Operations and Monitoring Report
Campbell River, British Columbia

Sample Location:			S03-19	S03-19	S05-19	S05-19
Sample ID:			WL-11222680-030621-NT-02	WL-11222680-161121-KH-01	WL-11222680-030621-NT-01	WL-11222680-161121-KH-02
Sample Date:		BC CSR[1] DW	06/03/2021	11/16/2021	06/03/2021	11/16/2021
Parameters	**Units**	**a**				
Field Parameters						
Conductivity, field	uS/cm	--	1380	1830	1110	381
Oxidation reduction potential (ORP), field	millivolts	--	48	-51	53	-34
pH, field	s.u.	--	7.2	6.90	6.75	7.71
Temperature, field	Deg C	--	23.4	15.37	22.41	12.32
Total dissolved solids, field (TDS)	mg/L	--	1280	1.17	2200	248
Turbidity, field	NTU	--	5.7	20.1	43.6	8.0
General Chemistry						
Alkalinity, bicarbonate (as CaCO3)	mg/L	--	690	700	500	200
Alkalinity, carbonate (as CaCO3)	mg/L	--	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Alkalinity (as CaCO3 pH=8.3)	mg/L	--	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Alkalinity, total (as CaCO3)	mg/L	--	570	570	410	170
Biochemical oxygen demand (BOD)	mg/L	--	ND (2.0)	15	10	2.5
Chemical oxygen demand (COD)	mg/L	--	152	282	136	34
Chloride (dissolved)	mg/L	250	72	250	93	16
Conductivity	uS/cm	--	1300	2000	1100	430
Hardness (total)	mg/L	--	682	574	432	173
Hardness (dissolved)	mg/L	--	622	453	450	201
Sulfide	mg/L	--	0.23 J-	0.047 J-	0.068 J-	ND (0.0018)
Sulphate (Dissolved)	mg/L	500	110	120	32	34
Hydrogen sulfide	mg/L	--	0.080	0.028	0.042	ND (0.0050)
Hydrogen sulfide (unionized)	mg/L	0.05	**0.085[a]**	0.030	0.045	ND (0.0050)
Sulfide as H2S	mg/L	--	0.24	0.050	0.072	ND (0.0020)
Hydroxide (as CaCO3)	mg/L	--	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Total dissolved solids (TDS)	mg/L	--	900	1200	730	250
Total suspended solids (TSS)	mg/L	--	46	46	310	26
Nutrients						
Ammonia-N	mg/L	--	7.5	41	6.3	0.34
Nitrate (as N)	mg/L	10	0.036	0.45	6.46	0.287
Nitrite (as N)	mg/L	1	0.0107	0.060	0.0695	0.0070
Nitrite/Nitrate	mg/L	10	0.047	0.51	6.53	0.294
Orthophosphate	mg/L	--	0.0037	0.079	ND (0.0030)	ND (0.0030)
Dissolved Metals						
Aluminum (dissolved)	ug/L	9500	34.6	27.9	57.6	ND (3.0)
Antimony (dissolved)	ug/L	6	1.04	ND (0.50)	ND (0.50)	ND (0.50)
Arsenic (dissolved)	ug/L	10	2.39	3.76	6.65	0.24
Barium (dissolved)	ug/L	1000	38.9	28.6	43.6	14.8
Beryllium (dissolved)	ug/L	8	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)
Bismuth (dissolved)	ug/L	--	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Boron (dissolved)	ug/L	5000	898	464	214	56
Cadmium (dissolved)	ug/L	5	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)
Calcium (dissolved)	ug/L	--	194000	138000	134000	62300
Chromium (dissolved)	ug/L	50	1.5	5.5	2.1	ND (1.0)
Cobalt (dissolved)	ug/L	20 (i)	1.70	3.62	2.08	2.08
Copper (dissolved)	ug/L	1500	1.13	3.91	3.79	3.22
Iron (dissolved)	ug/L	6500	**13800[a]**	971	**12500[a]**	776
Lead (dissolved)	ug/L	10	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)

Table 2
Leachate Analytical Results
2021 Operations and Monitoring Report
Campbell River, British Columbia

Sample Location:			S03-19	S03-19	S05-19	S05-19
Sample ID:			WL-11222680-030621-NT-02	WL-11222680-161121-KH-01	WL-11222680-030621-NT-01	WL-11222680-161121-KH-02
Sample Date:		BC CSR[(1)] DW	06/03/2021	11/16/2021	06/03/2021	11/16/2021
Parameters	**Units**	**a**				
Dissolved Metals (continued)						
Lithium (dissolved)	ug/L	8	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)
Magnesium (dissolved)	ug/L	--	33400	26500	27800	11000
Manganese (dissolved)	ug/L	1500	7080[a]	5620[a]	5380[a]	3120[a]
Mercury (dissolved)	ug/L	1	0.0023	ND (0.0019)	ND (0.0019)	ND (0.0019)
Molybdenum (dissolved)	ug/L	250	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Nickel (dissolved)	ug/L	80	1.7	5.2	3.5	ND (1.0)
Phosphorus (dissolved)	ug/L	--	491	45	121	ND (10)
Potassium (dissolved)	ug/L	--	9540	17600	9170	2190
Selenium (dissolved)	ug/L	10	0.30	0.53	0.23	ND (0.10)
Silicon (dissolved)	ug/L	--	12000	12600	14400	1550
Silver (dissolved)	ug/L	20	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)
Sodium (dissolved)	ug/L	200000	63400	75800	54400	13100
Strontium (dissolved)	ug/L	2500	654	809	552	212
Sulphur (Dissolved)	ug/L	--	43500	11400	8700	11000
Thallium (dissolved)	ug/L	--	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)
Tin (dissolved)	ug/L	2500	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)
Titanium (dissolved)	ug/L	--	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)
Uranium (dissolved)	ug/L	20	1.24	ND (0.10)	0.24	ND (0.10)
Vanadium (dissolved)	ug/L	20	8.1	ND (5.0)	ND (5.0)	ND (5.0)
Zinc (dissolved)	ug/L	3000	ND (5.0)	12.8	80.8	6.8
Zirconium (dissolved)	ug/L	--	1.09 J	0.74	0.67	ND (0.10)
Total Metals						
Aluminum	ug/L	9500	133	338	3920	155
Antimony	ug/L	6	1.1	ND (0.50)	ND (0.50)	ND (0.50)
Arsenic	ug/L	10	3.44	10.6[a]	8.65	0.27
Barium	ug/L	1000	53.8	89.6	53.9	14.4
Beryllium	ug/L	8	ND (0.20)	ND (0.10)	ND (0.10)	ND (0.10)
Bismuth	ug/L	--	ND (2.0)	ND (1.0)	ND (1.0)	ND (1.0)
Boron	ug/L	5000	1030	607	201	63
Cadmium	ug/L	5	0.197	0.076	0.077	0.011
Calcium	ug/L	--	213000	158000	127000	54600
Chromium	ug/L	50	ND (2.0)	8.7	4.9	ND (1.0)
Cobalt	ug/L	20 (i)	2.67	3.95	3.82	1.72
Copper	ug/L	1500	14.7	31.9	42.9	2.25
Iron	ug/L	6500	20500[a]	30000[a]	17800[a]	2740
Lead	ug/L	10	1.85	0.68	2.66	0.40
Lithium	ug/L	8	ND (4.0)	ND (2.0)	ND (2.0)	ND (2.0)
Magnesium	ug/L	--	36600	43500	28000	8870
Manganese	ug/L	1500	8000[a]	6230[a]	5210[a]	2410[a]
Mercury	ug/L	1	0.0085	ND (0.038) J	0.0020	ND (0.0019)
Molybdenum	ug/L	250	ND (2.0)	ND (1.0)	ND (1.0)	ND (1.0)
Nickel	ug/L	80	2.5	5.6	7.7	ND (1.0)
Phosphorus	ug/L	--	529	2470	598	20
Potassium	ug/L	--	10600	20300	9240	1840
Selenium	ug/L	10	0.39	0.81	0.24	0.10
Silicon	ug/L	--	12100	19900	15800	1730
Silver	ug/L	20	ND (0.040)	ND (0.020)	ND (0.020)	ND (0.020)
Sodium	ug/L	200000	75400	126000	52500	11800
Strontium	ug/L	2500	787	949	559	172

Table 2
Leachate Analytical Results
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Sample Location:			S03-19	S03-19	S05-19	S05-19
Sample ID:			WL-11222680-030621-NT-02	WL-11222680-161121-KH-01	WL-11222680-030621-NT-01	WL-11222680-161121-KH-02
Sample Date:		BC CSR[1] DW	06/03/2021	11/16/2021	06/03/2021	11/16/2021
Parameters	**Units**	**a**				
Total Metals (continued)						
Sulphur	ug/L	--	55500	20200	11300	6500
Thallium	ug/L	--	ND (0.020)	ND (0.010)	ND (0.010)	ND (0.010)
Tin	ug/L	2500	ND (10)	ND (5.0)	ND (5.0)	ND (5.0)
Titanium	ug/L	--	12	35.0	164	11.0
Uranium	ug/L	20	1.87	0.15	0.24	ND (0.10)
Vanadium	ug/L	20	11	11.9	13.7	ND (5.0)
Zinc	ug/L	3000	33	36.2	363	ND (5.0)
Zirconium	ug/L	--	0.86 J	1.11	1.16	ND (0.10)
Petroleum Products						
Total Petroleum Hydrocarbons VPH (C6-C10)LessBTEX	ug/L	--	ND (300)	ND (300)	ND (300)	ND (300)
Total Petroleum Hydrocarbons VH (C6-C10)	ug/L	15000	ND (300)	ND (300)	ND (300)	ND (300)
Volatile Organic Compounds						
Benzene	ug/L	5	0.94	0.74	0.42	ND (0.40)
Ethylbenzene	ug/L	140	2.2	4.2	2.3	ND (0.40)
m&p-Xylenes	ug/L	--	1.0	2.7	1.6	ND (0.40)
Methyl tert butyl ether (MTBE)	ug/L	95	ND (4.0)	ND (4.0)	ND (4.0)	ND (4.0)
o-Xylene	ug/L	--	1.6	2.1	1.2	ND (0.40)
Styrene	ug/L	800	ND (0.40)	1.2	0.47	ND (0.40)
Toluene	ug/L	60	2.0	28	8.5	ND (0.40)
Xylenes (total)	ug/L	90	2.6	4.8	2.8	ND (0.40)
PAHs						
1-Methylnaphthalene	ug/L	5.5	34[a]	130[a]	120[a]	0.15
2-Methylnaphthalene	ug/L	15	5.2	180[a]	180[a]	0.16
Acenaphthene	ug/L	250	35	130	140	ND (0.050)
Acenaphthylene	ug/L	--	0.80	2.0	1.8	ND (0.050)
Acridine	ug/L	--	1.9	2.2	1.6	0.087
Anthracene	ug/L	1000	0.81	7.8	10	0.028
Benzo(a)anthracene	ug/L	0.07	0.071[a]	0.68[a]	0.58[a]	ND (0.010)
Benzo(a)pyrene	ug/L	0.01	0.068[a]	0.19[a]	0.13[a]	ND (0.0050)
Benzo(b)fluoranthene/Benzo(j)fluoranthene	ug/L	0.07	0.10[a]	0.29[a]	0.21[a]	ND (0.030)
Benzo(b)pyridine (Quinoline)	ug/L	0.05	ND (0.080)[a]	0.92[a]	ND (0.050)	ND (0.020)
Benzo(g,h,i)perylene	ug/L	--	ND (0.050)	ND (0.050)	ND (0.050)	ND (0.050)
Benzo(k)fluoranthene	ug/L	--	ND (0.050)	0.093	0.070	ND (0.050)
Chrysene	ug/L	7	0.10	0.72	0.65	ND (0.020)
Dibenz(a,h)anthracene	ug/L	0.01	0.0063	0.012[a]	0.0085	ND (0.0030)
Fluoranthene	ug/L	150	1.1	12	13	ND (0.020)
Fluorene	ug/L	150	12	66	75	ND (0.050)
Indeno(1,2,3-cd)pyrene	ug/L	--	ND (0.050)	ND (0.050)	ND (0.050)	ND (0.050)
Naphthalene	ug/L	80	200[a]	1300[a]	950[a]	0.91
PAH high molecular weight	ug/L	--	2.1	21	23	ND (0.050)
PAH low molecular weight	ug/L	--	290	1900	1600	1.3
Phenanthrene	ug/L	--	6.4	81	99	ND (0.050)
Pyrene	ug/L	100	0.65	7.1	8.3	ND (0.020)
Total PAH	ug/L	--	300	1900	1600	1.3

Table 3
Leak Detection System Analytical Results
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Sample Location:			S01-17	S01-17
Sample ID:			W-11222680-030621-NT-01	W-11222680-161121-KH-01
Sample Date:		BC CSR[1] DW	06/03/2021	11/16/2021
Parameters	**Units**	**a**		
Field Parameters				
Conductivity, field	uS/cm	--	918	2400
Oxidation reduction potential (ORP), field	millivolts	--	-17	2
pH, field	s.u.	--	6.97	7.06
Temperature, field	Deg C	--	21.28	17.30
Total dissolved solids, field (TDS)	mg/L	--	5310	153
Turbidity, field	NTU	--	21.2	12.9
General Chemistry				
Alkalinity, bicarbonate (as CaCO3)	mg/L	--	510	530
Alkalinity, carbonate (as CaCO3)	mg/L	--	ND (1.0)	ND (1.0)
Alkalinity (as CaCO3 pH=8.3)	mg/L	--	ND (1.0)	ND (1.0)
Alkalinity, total (as CaCO3)	mg/L	--	420	430
Biochemical oxygen demand (BOD)	mg/L	--	5.8	2.3
Chemical oxygen demand (COD)	mg/L	--	94	103
Chloride (dissolved)	mg/L	250	39	89
Conductivity	uS/cm	--	1000	2400
Hardness (total)	mg/L	--	474	1310
Hardness (dissolved)	mg/L	--	479	1280
Sulfide	mg/L	--	0.033	0.0042 J
Sulphate (Dissolved)	mg/L	500	110	930[a]
Hydrogen sulfide	mg/L	--	0.017	ND (0.0050)
Hydrogen sulfide (unionized)	mg/L	0.05	0.018	ND (0.0050)
Sulfide as H2S	mg/L	--	0.035	0.0045
Hydroxide (as CaCO3)	mg/L	--	ND (1.0)	ND (1.0)
Total dissolved solids (TDS)	mg/L	--	660	2000
Total suspended solids (TSS)	mg/L	--	110	23
Nutrients				
Ammonia-N	mg/L	--	2.2	0.94
Nitrate (as N)	mg/L	10	0.030	0.053
Nitrite (as N)	mg/L	1	ND (0.0050)	0.0126
Nitrite/Nitrate	mg/L	10	0.030	0.065
Orthophosphate	mg/L	--	ND (0.0030)	0.0036
Dissolved Metals				
Aluminum (dissolved)	ug/L	9500	11.2	6.9
Antimony (dissolved)	ug/L	6	ND (1.0)	ND (0.50)
Arsenic (dissolved)	ug/L	10	1.18	0.65
Barium (dissolved)	ug/L	1000	37.1	89.1
Beryllium (dissolved)	ug/L	8	ND (0.20)	ND (0.10)
Bismuth (dissolved)	ug/L	--	ND (2.0)	ND (1.0)
Boron (dissolved)	ug/L	5000	132	2060 J
Cadmium (dissolved)	ug/L	5	ND (0.020)	0.152
Calcium (dissolved)	ug/L	--	148000	418000
Chromium (dissolved)	ug/L	50	ND (2.0)	ND (1.0)
Cobalt (dissolved)	ug/L	20 (i)	8.93	1.54
Copper (dissolved)	ug/L	1500	ND (0.40)	4.43
Iron (dissolved)	ug/L	6500	16800[a]	1250
Lead (dissolved)	ug/L	10	ND (0.40)	ND (0.20)
Lithium (dissolved)	ug/L	8	ND (4.0)	ND (2.0)
Magnesium (dissolved)	ug/L	--	26400	58200
Manganese (dissolved)	ug/L	1500	9730[a]	6050[a]
Mercury (dissolved)	ug/L	1	ND (0.0019)	ND (0.0019)
Molybdenum (dissolved)	ug/L	250	ND (2.0)	1.9
Nickel (dissolved)	ug/L	80	ND (2.0)	2.7
Phosphorus (dissolved)	ug/L	--	ND (20)	10
Potassium (dissolved)	ug/L	--	4170	15400
Selenium (dissolved)	ug/L	10	ND (0.20)	0.21
Silicon (dissolved)	ug/L	--	4930	8910
Silver (dissolved)	ug/L	20	ND (0.040)	ND (0.020)
Sodium (dissolved)	ug/L	200000	32400	102000
Strontium (dissolved)	ug/L	2500	467	1380
Sulfur (dissolved)	ug/L	--	32100	321000
Thallium (dissolved)	ug/L	--	ND (0.020)	0.024
Tin (dissolved)	ug/L	2500	ND (10)	ND (5.0)
Titanium (dissolved)	ug/L	--	ND (10)	ND (5.0)
Uranium (dissolved)	ug/L	20	ND (0.20)	3.50
Vanadium (dissolved)	ug/L	20	ND (10)	ND (5.0)
Zinc (dissolved)	ug/L	3000	ND (10)	8.6
Zirconium (dissolved)	ug/L	--	ND (0.20)	0.41
Total Metals				
Aluminum	ug/L	9500	532	44.6
Antimony	ug/L	6	ND (1.0)	ND (0.50)
Arsenic	ug/L	10	3.37	0.97
Barium	ug/L	1000	47.7	80.1
Beryllium	ug/L	8	ND (0.20)	ND (0.10)
Bismuth	ug/L	--	ND (2.0)	ND (1.0)
Boron	ug/L	5000	129	1630 J
Cadmium	ug/L	5	0.028	0.152
Calcium	ug/L	--	147000	427000
Chromium	ug/L	50	ND (2.0)	ND (1.0)
Cobalt	ug/L	20 (i)	9.73	1.61

Table 3
Leak Detection System Analytical Results
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Sample Location:			S01-17	S01-17
Sample ID:			W-11222680-030621-NT-01	W-11222680-161121-KH-01
Sample Date:		BC CSR[1] DW	06/03/2021	11/16/2021
Parameters	**Units**	**a**		
Total Metals (continued)				
Copper	ug/L	1500	5.4	12.2
Iron	ug/L	6500	38500[a]	6470
Lead	ug/L	10	2.20	0.30
Lithium	ug/L	8	ND (4.0)	ND (2.0)
Magnesium	ug/L	--	26300	60200
Manganese	ug/L	1500	9890[a]	6250[a]
Mercury	ug/L	1	ND (0.0019)	ND (0.0019)
Molybdenum	ug/L	250	ND (2.0)	1.6
Nickel	ug/L	80	ND (2.0)	3.0
Phosphorus	ug/L	--	89	21
Potassium	ug/L	--	4150	16000
Selenium	ug/L	10	ND (0.20)	0.34
Silicon	ug/L	--	5660	9160
Silver	ug/L	20	ND (0.040)	ND (0.020)
Sodium	ug/L	200000	32300	105000
Strontium	ug/L	2500	489	1510
Sulfur	ug/L	--	32500	297000
Thallium	ug/L	--	ND (0.020)	0.019
Tin	ug/L	2500	ND (10)	ND (5.0)
Titanium	ug/L	--	46	ND (5.0)
Uranium	ug/L	20	ND (0.20)	3.09
Vanadium	ug/L	20	ND (10)	ND (5.0)
Zinc	ug/L	3000	13	10.9
Zirconium	ug/L	--	0.67	0.57
Petroleum Products				
Total Petroleum Hydrocarbons VPH (C6-C10)LessBTEX	ug/L	--	ND (300)	ND (300)
Total Petroleum Hydrocarbons VH (C6-C10)	ug/L	15000	ND (300)	ND (300)
Volatile Organic Compounds				
Benzene	ug/L	5	ND (0.40)	ND (0.40)
Ethylbenzene	ug/L	140	ND (0.40)	ND (0.40)
m&p-Xylenes	ug/L	--	ND (0.40)	ND (0.40)
Methyl tert butyl ether (MTBE)	ug/L	95	ND (4.0)	ND (4.0)
o-Xylene	ug/L	--	0.48	ND (0.40)
Styrene	ug/L	800	ND (0.40)	ND (0.40)
Toluene	ug/L	60	0.49	ND (0.40)
Xylenes (total)	ug/L	90	0.48	ND (0.40)
PAHs				
1-Methylnaphthalene	ug/L	5.5	0.69	0.72
2-Methylnaphthalene	ug/L	15	0.88	ND (0.10)
Acenaphthene	ug/L	250	0.19	0.85
Acenaphthylene	ug/L	--	ND (0.050)	ND (0.050)
Acridine	ug/L	--	0.23	0.17
Anthracene	ug/L	1000	0.077	0.028
Benzo(a)anthracene	ug/L	0.07	ND (0.010)	ND (0.010)
Benzo(a)pyrene	ug/L	0.01	ND (0.0050)	ND (0.0050)
Benzo(b)fluoranthene/Benzo(j)fluoranthene	ug/L	0.07	ND (0.030)	ND (0.030)
Benzo(b)pyridine (Quinoline)	ug/L	0.05	0.038	ND (0.020)
Benzo(g,h,i)perylene	ug/L	--	ND (0.050)	ND (0.050)
Benzo(k)fluoranthene	ug/L	--	ND (0.050)	ND (0.050)
Chrysene	ug/L	7	ND (0.020)	ND (0.020)
Dibenz(a,h)anthracene	ug/L	0.01	ND (0.0030)	ND (0.0030)
Fluoranthene	ug/L	150	ND (0.020)	0.027
Fluorene	ug/L	150	0.12	0.16
Indeno(1,2,3-cd)pyrene	ug/L	--	ND (0.050)	ND (0.050)
Naphthalene	ug/L	80	5.8	2.9
PAH high molecular weight	ug/L	--	ND (0.050)	ND (0.050)
PAH low molecular weight	ug/L	--	8.1	4.8
Phenanthrene	ug/L	--	0.059	0.081
Pyrene	ug/L	100	ND (0.020)	ND (0.020)
Total PAH	ug/L	--	8.1	4.9

Table 4
Groundwater Analytical Results
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Campbell River, British Columbia

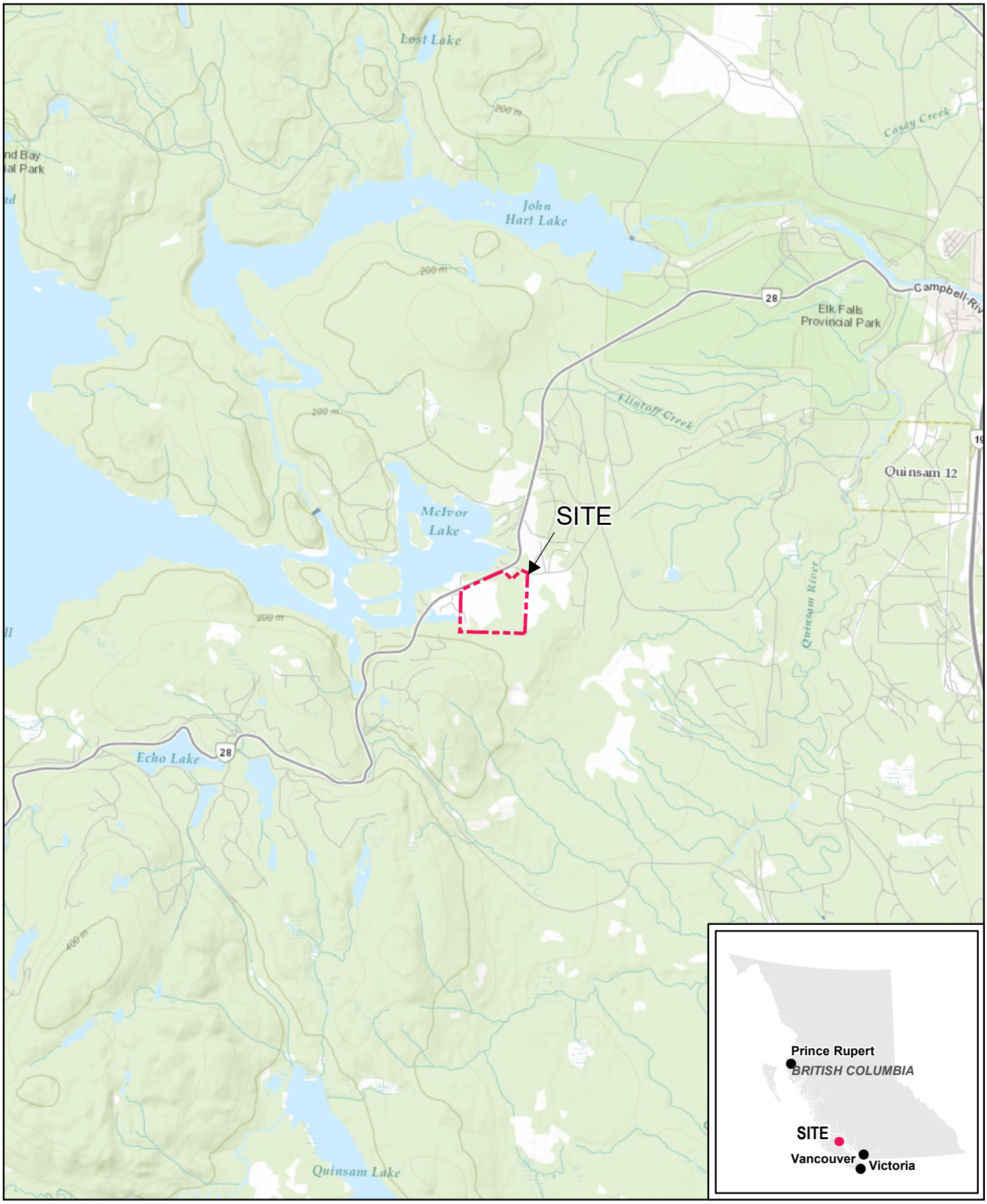
Sample Location:			MW2-14	MW2-14	MW2-14	MW2A-16	MW2A-16	MW2A-16	MW3-14	MW3-14	MW10-17	MW10-17	MW11-19	MW11-19
Sample ID:			WG-11222680-030621-NT-04	WG-11222680-030621-NT-05	WG-11222680-151121-KH-01	WG-11222680-030621-NT-06	WG-11222680-151121-KH-02	WG-11222680-151121-KH-03	WG-11222680-030621-NT-03	WG-11222680-161121-KH-05	WG-11222680-030621-NT-02	WG-11222680-161121-KH-04	WG-11222680-030621-NT-01	WG-11222680-161121-KH-06
Sample Date:		BC CSR[1] DW	06/03/2021	06/03/2021 Duplicate	11/15/2021	06/03/2021	11/15/2021	11/15/2021 Duplicate	06/03/2021	11/16/2021	06/03/2021	11/16/2021	06/03/2021	11/16/2021
Parameters	**Units**	**a**												
Field Parameters														
Conductivity, field	uS/cm	--	135	135	104	60	64	64	99	87	142	136	163	452
Oxidation reduction potential (ORP), field	millivolts	--	229	229	220	199	190	190	239	259	190	201	133	216
pH, field	s.u.	--	7.62	7.62	7.26	8.84	8.31	8.31	7.27	7.28	8.46	7.75	8.00	7.56
Temperature, field	Deg C	--	14.01	14.01	10.63	15.74	9.61	9.61	12.33	6.90	14.83	8.91	12.94	10.64
Total dissolved solids, field (TDS)	mg/L	--	88	88	68	39	45	45	64	57	92	88	9340	294
Turbidity, field	NTU	--	8.1	8.1	6.9	6.6	39.9	39.9	9.7	4.4	4.0	42.6	201	16
General Chemistry														
Alkalinity, bicarbonate (as CaCO3)	mg/L	--	69	66	58	35	49	50	59	50	85	69	78	320
Alkalinity, carbonate (as CaCO3)	mg/L	--	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Alkalinity (as CaCO3 pH=8.3)	mg/L	--	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Alkalinity, total (as CaCO3)	mg/L	--	56	54	48	29	40	41	49	41	70	57	64	260
Chloride (dissolved)	mg/L	250	9.2	9.3	3.2	2.3	ND (1.0)	ND (1.0)	2.6	2.2	3.8	4.5	11	2.8
Conductivity	uS/cm	--	150	150	130	68	87	87	110	100	160	150	180	520
Hardness (dissolved)	mg/L	--	61.1	63.2	54.1	29.0	39.7	41.8	42.8	37.6	66.5	59.2	75.3	257
Sulfide	mg/L	--	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)	0.0092	ND (0.0018)	ND (0.0018)
Sulphate (Dissolved)	mg/L	500	6.1	6.1	ND (8.6)	2.3	ND (4.2)	ND (3.6)	3.2	ND (6.1)	5.2	ND (8.0)	7.2	ND (9.5)
Hydrogen sulfide	mg/L	0.05	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)
Hydrogen sulfide (unionized)	mg/L	--	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)
Sulfide as H2S	mg/L	0.05	ND (0.0020)	ND (0.0020)	ND (0.0020)	ND (0.0020)	ND (0.0020)	ND (0.0020)	ND (0.0020)	ND (0.0020)	ND (0.0020)	0.0097	ND (0.0020)	ND (0.0020)
Hydroxide (as CaCO3)	mg/L	--	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Total dissolved solids (TDS)	mg/L	--	120	100	82	66	58	62	88	74	110	88	130	300
Nutrients														
Ammonia-N	mg/L	--	ND (0.015)	ND (0.015)	ND (0.015)	ND (0.015)	ND (0.015)	ND (0.015)	ND (0.015)	ND (0.015)	ND (0.015)	ND (0.015)	ND (0.015)	ND (0.015)
Nitrate (as N)	mg/L	10	0.240	0.241	0.262 J	0.065	0.039 J	0.038 J	0.322	0.473	0.156	0.494	0.427	2.32
Nitrite (as N)	mg/L	1	ND (0.0050)	ND (0.0050)	ND (0.0050) J	ND (0.0050)	ND (0.0050) J	ND (0.0050) J	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)
Nitrite/Nitrate	mg/L	10	0.240	0.241	0.262 J	0.065	0.039 J	0.038 J	0.322	0.473	0.156	0.494	0.427	2.32
Orthophosphate	mg/L	--	ND (0.0030)	0.0036	0.0076 J	0.029	0.024 J	0.025 J	0.0041	0.0056	0.011	0.014	0.010	0.018
Dissolved Metals														
Aluminum (dissolved)	ug/L	9500	ND (3.0)	ND (3.0)	ND (3.0)	8.0	4.2	5.2 J	ND (3.0)	ND (3.0)	3.1	6.8	19.1	ND (3.0)
Antimony (dissolved)	ug/L	6	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50) J	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)
Arsenic (dissolved)	ug/L	10	ND (0.10)	ND (0.10)	0.15	0.85	0.79	0.85 J	ND (0.10)	ND (0.10)	0.42	0.52	0.27	0.31
Barium (dissolved)	ug/L	1000	2.0	2.0	1.6	2.2	3.0	2.6 J	1.1	1.9	3.5	3.4	5.5	16.6
Beryllium (dissolved)	ug/L	8	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10) J	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)
Bismuth (dissolved)	ug/L	--	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0) J	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Boron (dissolved)	ug/L	5000	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50) J	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)
Cadmium (dissolved)	ug/L	5	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010) J	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)
Calcium (dissolved)	ug/L	--	19100	19900	16700	9320	12800	13300 J	12300	10700	21300	18800	23900	80400
Chromium (dissolved)	ug/L	50	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0) J	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	3.2	ND (1.0)
Cobalt (dissolved)	ug/L	20 (i)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20) J	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)
Copper (dissolved)	ug/L	1500	ND (0.20)	0.20	1.98	ND (0.20)	1.50 J	ND (0.20) J	0.49	1.11	0.46	1.50	0.40	1.90
Iron (dissolved)	ug/L	6500	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0) J	ND (5.0)	ND (5.0)	ND (5.0)	6.6	71.4	ND (5.0)
Lead (dissolved)	ug/L	10	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20) J	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)
Lithium (dissolved)	ug/L	8	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0) J	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)
Magnesium (dissolved)	ug/L	--	3240	3280	2970	1390	1860	2070 J	2930	2650	3230	3010	3790	13600
Manganese (dissolved)	ug/L	1500	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0) J	ND (1.0)	1.1	ND (1.0)	ND (1.0)	1.0	ND (1.0)
Mercury (dissolved)	ug/L	1	ND (0.0019)	ND (0.0019)	ND (0.0019)	ND (0.0019)	ND (0.0019)	ND (0.0019) J	ND (0.0019)	ND (0.0019)	0.0023	ND (0.0019)	0.0021	ND (0.0019)
Molybdenum (dissolved)	ug/L	250	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0) J	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Nickel (dissolved)	ug/L	80	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0) J	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Phosphorus (dissolved)	ug/L	--	ND (10)	ND (10)	ND (10)	24	27	28 J	ND (10)	ND (10)	11	19	12	17
Potassium (dissolved)	ug/L	--	271	275	235	174	197	202 J	189	208	377	365	388	737
Selenium (dissolved)	ug/L	10	0.12	0.11	0.15	ND (0.10)	ND (0.10)	ND (0.10) J	ND (0.10)	0.14	0.11	0.23	0.18	0.26
Silicon (dissolved)	ug/L	--	6550	6860	5300	3810	3240	3390 J	7360	5050	6270	5050	9060	9040
Silver (dissolved)	ug/L	20	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020) J	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)
Sodium (dissolved)	ug/L	200000	4080	4160	3780	969	1080	1160 J	4710	6900	5910	6000	5130	12200
Strontium (dissolved)	ug/L	2500	33.6	33.9	29.1	12.4	16.5	18.4 J	26.5	24.7	31.7	28.9	41.2	141
Sulfur (dissolved)	ug/L	--	ND (3000)	ND (3000)	ND (3000)	ND (3000)	ND (3000)	ND (3000) J	ND (3000)	ND (3000)	ND (3000)	ND (3000)	ND (3000)	ND (3000)
Thallium (dissolved)	ug/L	--	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010) J	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)
Tin (dissolved)	ug/L	2500	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0) J	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)
Titanium (dissolved)	ug/L	--	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0) J	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)
Uranium (dissolved)	ug/L	20	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10) J	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	0.29
Vanadium (dissolved)	ug/L	20	ND (5.0)	ND (5.0)	ND (5.0)	7.1	6.4	7.1 J	ND (5.0)	ND (5.0)	ND (5.0)	5.6	5.1	6.0
Zinc (dissolved)	ug/L	3000	ND (5.0)	ND (5.0)	6.0	ND (5.0)	5.6	ND (5.0) J	ND (5.0)	5.2	ND (5.0)	16.1	ND (5.0)	ND (5.0)
Zirconium (dissolved)	ug/L	--	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10) J	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)

Tables 1-4 Notes

2021 Operations and Monitoring Report
Campbell River, British Columbia

Notes:

(1)	British Columbia Contaminated Site Regulation (Nov 2017) Column 6 for the protection of drinking water (DW).
(2)	Field duplicate was created but not required by monitoring specification. Only limited. Analysis performed.
a	Exceeds Freshwater Aquatic Life (FAW) CSR Guideline.
ND (1.0)	Not detected at the associated reporting limit.
ND (0.08)	Laboratory detection limit exceeds guideline
J	The result is an estimated quantity. The associated numerical value is th eapproximate concentration of the analyte in the sample.
J -	The result is an estimated quantity, but the result may be biased low. concentration of the analyte in the sample.
	Concentration exceeds standard.
--	Currently no standard.
(i)	B.C. Ministry of Environment and Climate Change, 2021. Protocol 9 for Contaminated Sites Version 2.



Paper Size ANSI A

0 400 800 1,200 1,600

Metres

Map Projection: Transverse Mercator
Horizontal Datum: North American 1983
Grid: NAD 1983 UTM Zone 10N

N

GHD

UPLAND EXCAVATING PROPERTY
2021 ANNUAL OPERATIONS AND MONITORING REPORT
UPLAND ORIGINAL LANDFILL

Project No. **11222680**
Revision No. **-**
Date **Feb 23, 2022**

SITE LOCATION MAP

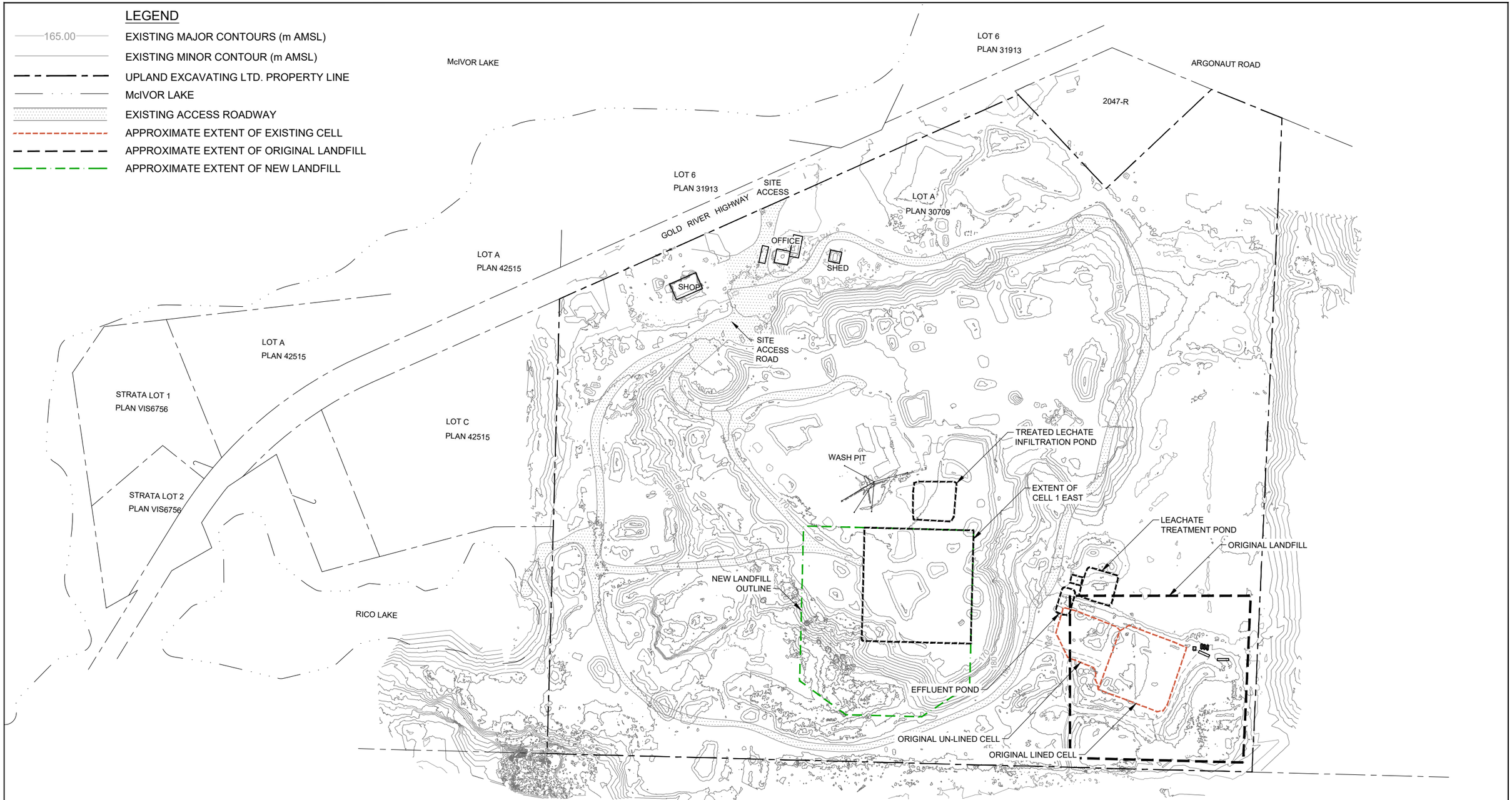
FIGURE 1

O:\GIS\PROJECTS\11222000s\11222680\Layouts\RPT-2021_ANNUAL\11222680_RPT-2021_ANNUAL_GIS001.mxd
Print date: 23 Feb 2022 - 14:30

Data source: ESRI Topographic Basemap, Accessed 2022; ESRI Data & Maps 2008 Data Distribution Application (DDA); GHD.

LEGEND

- 165.00 — EXISTING MAJOR CONTOURS (m AMSL)
- EXISTING MINOR CONTOUR (m AMSL)
- UPLAND EXCAVATING LTD. PROPERTY LINE
- McIVOR LAKE
- EXISTING ACCESS ROADWAY
- APPROXIMATE EXTENT OF EXISTING CELL
- APPROXIMATE EXTENT OF ORIGINAL LANDFILL
- APPROXIMATE EXTENT OF NEW LANDFILL



0 40 80 120m

1:4000

Coordinate System: UTM ZONE 10

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UPLAND EXCAVATING PROPERTY
UPLAND ORIGINAL LANDFILL
2021 ANNUAL OPERATIONS AND MONITORING REPORT

SITE PLAN

Project No. **11222680**
Date **March 2022**

FIGURE 2

Filename: N:\CA\Vancouver\Projects\663\11222680\Digital_Design\ACAD\Figures\RPT004\11222680-GHD-00-00-RPT-EN-D101_OT004.dwg
Plot Date: 30 March 2022 5:35 PM

Data Source: TOPOGRAPHICAL SURVEY MARCH 2, 2020

LEGEND

- 192 — MAJOR CONTOURS (m AMSL)
- MAIN ACCESS ROADWAY
- ACCESS ROADWAY
- TOP OF BERM
- S02-17 — LEACHATE SUMP
- S01-17 — LEAK DETECTION LAYER ACCESS PIPE
- APPROXIMATE EXTENT OF EXISTING CELL

TOP OF BERM
190
EXISTING BUILDING
LEACHATE STORAGE TANKS
SEACAN FOR CHEMICAL STORAGE
S02-17
S03-19
S01-17
UN-LINED CELL
192
TOP OF BERM
ACCESS ROAD
170
180
190
LINED CELL
192
ACCESS ROAD
LEACHATE FRAC TANK
S05-19
TOP OF BERM
ACCESS ROAD

0 7.5 15 22.5m

1:750

Coordinate System:
UTM ZONE 10

N

GHD

UPLAND EXCAVATING PROPERTY
UPLAND ORIGINAL LANDFILL
2021 ANNUAL OPERATIONS AND MONITORING REPORT

ORIGINAL LANDFILL SITE PLAN

Project No. **11222680**
Date **March 2022**

FIGURE 3

Filename: N:\CA\Vancouver\Projects\663\11222680\Digital_Design\ACAD\Figures\RPT004\11222680-GHD-00-00-RPT-EN-D102_OT004.DWG
Plot Date: 30 March 2022 10:48 AM

Data Source: TOPOGRAPHICAL SURVEY MARCH 2, 2020

LEGEND

- 192 — MAJOR CONTOURS (m AMSL)
- ACCESS ROADWAY
- TOP OF BERM
- EXTENT OF CELL 1 EAST
- LEACHATE COLLECTION SYSTEM
- MW6-17 — EXISTING MONITORING WELL
- RW-98020 — EXISTING RESIDENTIAL WELL
- PZ1-19 — EXISTING PIEZOMETER
- BH1-16 — EXISTING BOREHOLE
- SW15-01 — EXISTING SURFACE WATER SAMPLE LOCATION
- RICO GAUGE — EXISTING SURFACE WATER GAUGE
- MW12 — PROPOSED MONITORING WELL
- SVP-1 — PROPOSED SOIL VAPOUR PROBE

SVP-1
SW16-03
MW4A-15
MW4B-15
MW2-14
MW2A-16
BH1-16
BH16-19
BH2-16
MW13
MW3-14
PZ1-19

0 12.5 25 37.5m
1:1250
Coordinate System: UTM ZONE 10

N

GHD

UPLAND EXCAVATING PROPERTY
UPLAND ORIGINAL LANDFILL
2021 ANNUAL OPERATIONS AND MONITORING REPORT

NEW LANDFILL SITE PLAN

Project No. **11222680**
Date **March 2022**

FIGURE 4

Filename: N:\CA\Vancouver\Projects\663\11222680\Digital_Design\ACAD\Figures\RPT004\11222680-GHD-00-00-RPT-EN-D105_OT004.dwg
Plot Date: 30 March 2022 5:38 PM

Data Source: TOPOGRAPHICAL SURVEY MARCH 2, 2020 AND SEPTEMBER 2020. AS-BUILT SURVEY OCTOBER 19, 2021

LEGEND

- 165.00 — EXISTING MAJOR CONTOURS (m AMSL)
- UPLAND EXCAVATING LTD. PROPERTY LINE
- McIVOR LAKE
- EXISTING ACCESS ROADWAY
- APPROXIMATE EXTENT OF EXISTING CELL
- APPROXIMATE EXTENT OF ORIGINAL LANDFILL
- MW3-14 157.1 — MONITORING WELL USED IN CONTOURING
- MW8-17* 172.9 — MONITORING WELL NOT USED IN CONTOURING
- PZ1-19 — EXISTING PIEZOMETER
- RICO GAUGE — SURFACE WATER GAUGE
- 172.8 — GROUNDWATER ELEVATION (m AMSL)
- 170 — GROUNDWATER CONTOUR (m AMSL)
- 178 — INFERRED GROUNDWATER CONTOUR (m AMSL)
- GROUNDWATER FLOW DIRECTION
- APPROXIMATE GROUNDWATER DIVIDE

McIVOR LAKE
176.7 (1)
(MEASURED AT LADORE DAM BY BC HYDRO LOCATED APPROX. 1.7 Km NW)

LOT 6 PLAN 31913
ARGONAUT ROAD
2047-R
LOT A PLAN 30709
LOT A PLAN 42515
LOT C PLAN 42515
STRATA LOT 1 PLAN VIS6756
STRATA LOT 2 PLAN VIS6756
GOLD RIVER HIGHWAY
SITE ACCESS
SITE ACCESS ROAD
OFFICE
SHED
SHOP
WASH PIT
RICO LAKE
RICO GAUGE (178.2)
ORIGINAL LANDFILL
ORIGINAL UN-LINED CELL
ORIGINAL LINED CELL

MW1-14 (162.1)
MW2-14 (154.8)
MW2A-16 (154.9)
MW3-14 (152.9)
MW4A-15* (160.5)
MW4B-15 (160.3)
MW5A-15* (183.5)
MW5B-15* (183.8)
MW6-17* (N/A)
MW7-17 (183.7)
MW8-17 (172.8)
MW9-17 (165.0)
MW10-17 (147.3)
MW11-19 (147.3)
MW15A-18* (176.7)
MW15B-18 (176.5)
PZ1-19* (171.9)

NOTE:
1. BASED ON BC HYDRO RECORD OF WATER ELEVATIONS AT LADORE DAM RECORDED EVERY 3 HOURS. (https://www.bchydro.com/energy-in-bc/our_system/transmission_reservoir_data/previous_reservoir_elevations/vancouver_island/ladore_ldr.html)

0 40 80 120m
1:4000
Coordinate System: UTM ZONE 10

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GHD

UPLAND EXCAVATING PROPERTY
UPLAND ORIGINAL LANDFILL
2021 ANNUAL OPERATIONS AND MONITORING REPORT

GROUNDWATER ELEVATION CONTOURS SAND & GRAVEL AQUIFER-JUNE 3, 2021

Project No. **11222680**
Date **March 2022**

FIGURE 5

Filename: N:\CA\Vancouver\Projects\663\11222680\Digital_Design\ACAD\Figures\RPT004\11222680-GHD-00-00-RPT-EN-D103_OT004.dwg
Plot Date: 30 March 2022 10:14 AM

Data Source: TOPOGRAPHICAL SURVEY MARCH 2, 2020

LEGEND

- 165.00 — EXISTING MAJOR CONTOURS (m AMSL)
- UPLAND EXCAVATING LTD. PROPERTY LINE
- McIVOR LAKE
- EXISTING ACCESS ROADWAY
- APPROXIMATE EXTENT OF EXISTING CELL
- APPROXIMATE EXTENT OF ORIGINAL LANDFILL
- MW3-14 157.1 — MONITORING WELL USED IN CONTOURING
- MW8-17* 172.9 — MONITORING WELL NOT USED IN CONTOURING
- PZ1-19 — EXISTING PIEZOMETER
- RICO GAUGE — SURFACE WATER GAUGE
- 172.8 — GROUNDWATER ELEVATION (m AMSL)
- 170 — GROUNDWATER CONTOUR (m AMSL)
- 178 — INFERRED GROUNDWATER CONTOUR (m AMSL)
- GROUNDWATER FLOW DIRECTION
- APPROXIMATE GROUNDWATER DIVIDE

McIVOR LAKE
176.6 (1)
(MEASURED AT LADORE DAM BY BC HYDRO LOCATED APPROX. 1.7 Km NW)

LOT 6
PLAN 31913

ARGONAUT ROAD

2047-R

LOT A
PLAN 30709

LOT A
PLAN 42515

LOT C
PLAN 42515

STRATA LOT 1
PLAN VIS6756

STRATA LOT 2
PLAN VIS6756

GOLD RIVER HIGHWAY

SITE ACCESS

OFFICE

SHED

SHOP

SITE ACCESS ROAD

WASH PIT

ORIGINAL LANDFILL

ORIGINAL UN-LINED CELL

ORIGINAL LINED CELL

RICO LAKE

RICO GAUGE (178.3)

MW1-14 (166.9)
MW2-14 (157.9)
MW2A-16 (158.0)
MW3-14 (153.6)
MW4A-15* (164.6)
MW4B-15 (164.5)
MW5A-15* (184.0)
MW5B-15* (186.5)
MW6-17 (178.1)
MW7-17 (184.8)
MW8-17 (172.8)
MW9-17 (168.5)
MW10-17 (146.8)
MW11-19 (146.2)
MW15A-18* (177.4)
MW15B-18 (177.1)
PZ1-19* (172.6)

NOTE:
1. BASED ON BC HYDRO RECORD OF WATER ELEVATIONS AT LADORE DAM RECORDED EVERY 3 HOURS. (https://www.bchydro.com/energy-in-bc/our_system/transmission_reservoir_data/previous_reservoir_elevations/vancouver_island/ladore_ldr.html)

0 40 80 120m
1:4000
Coordinate System: UTM ZONE 10

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GHD

UPLAND EXCAVATING PROPERTY
UPLAND ORIGINAL LANDFILL
2021 ANNUAL OPERATIONS AND MONITORING REPORT

GROUNDWATER ELEVATION CONTOURS SAND & GRAVEL AQUIFER-NOV. 15, 2021

Project No. **11222680**
Date **March 2022**

FIGURE 6

Filename: N:\CA\Vancouver\Projects\663\11222680\Digital_Design\ACAD\Figures\RPT004\11222680-GHD-00-00-RPT-EN-D104_OT004.dwg
Plot Date: 30 March 2022 10:17 AM

Data Source: TOPOGRAPHICAL SURVEY MARCH 2, 2020

Appendices

Appendix A

Operational Certificate

August 1, 2019

Tracking Number: 335965
Authorization Number: 107689

REGISTERED MAIL

UPLAND EXCAVATING LTD.
#201-909 ISLAND HIGHWAY
CAMPBELL RIVER BC V9W 2C2

Dear operational certificate holder:

Enclosed is Operational Certificate 107689 issued under the provisions of the *Environmental Management Act*. Your attention is respectfully directed to the terms and conditions outlined in the operational certificate. An annual fee will be determined according to the Permit and Approval Fees and Charges Regulation.

This operational certificate does not authorize entry upon, crossing over, or use for any purpose of private or Crown lands or works, unless and except as authorized by the owner of such lands or works. The responsibility for obtaining such authority rests with the operational certificate holder. It is also the responsibility of the operational certificate holder to ensure that all activities conducted under this authorization are carried out with regard to the rights of third parties, and comply with other applicable legislation that may be in force.

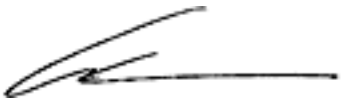
Requirements may also be specified by the *Environmental Management Act* and regulations including, but not limited to, the Contaminated Sites Regulation, Environmental Data Quality Assurance Regulation, Hazardous Waste Regulation, Landfill Gas Management Regulation, Organic Matter Recycling Regulation, Ozone Depleting Substances and Other Halocarbons Regulation, Recycling Regulation, Spill Reporting Regulation, Storage of Recyclable Material Regulation, Waste Discharge Regulation and Codes of Practice.

This decision may be appealed to the Environmental Appeal Board in accordance with Part 8 of the *Environmental Management Act*. An appeal must be delivered within 30 days from the date that notice of this decision is given. For further information, please contact the Environmental Appeal Board at (250) 387-3464.

Administration of this operational certificate will be carried out by staff from the Environmental Protection Division's Regional Operations Branch. Documents pertinent to the operational certificate are to be submitted by email or electronic transfer to the director, in accordance with the ministry Data & Report Submissions website at: http://www2.gov.bc.ca/gov/content/environment/waste-management/waste-discharge-authorization/data-and-report-submissions, or as further instructed.

If you have any questions or concerns, please contact Authorizations - South at Authorizations.South@gov.bc.ca.

Yours truly,



Luc Lachance, P.Eng
for Director, *Environmental Management Act*
Authorizations - South Region

Enclosure

MINISTRY OF ENVIRONMENT &
CLIMATE CHANGE STRATEGY

OPERATIONAL CERTIFICATE

107689

Under the Provisions of the Environmental Management Act

Pursuant to the Approved

Comox Valley Regional District Solid Waste Management Plan

UPLAND EXCAVATING LTD.

#201-909 ISLAND HIGHWAY
CAMPBELL RIVER BC V9W 2C2

Is authorized to manage waste at the Facility located in Campbell River, British Columbia, subject to the requirements listed below. Contravention of any of these requirements is a violation of the *Environmental Management Act* and may lead to prosecution.

Pursuant to section 24(10) of the *Environmental Management Act*, this operational certificate supersedes and cancels Permit PR-10807 issued under section 14 of the *Environmental Management Act*.

1. AUTHORIZED DISCHARGES, FACILITIES AND WORKS

1.1 Original Landfill

This section applies to the Original Landfill.

1.1.1 The maximum rate of waste discharge to the Original Lined Cell is 45,000 tonnes per calendar year.

1.1.2 The characteristics of the waste discharge to the Original Lined Cell must be:

(a) demolition waste,
(b) construction waste,
(c) land clearing waste,
(d) soil in which the concentrations of all substances are less than the lowest applicable industrial land use standard specified for those substances in
(i) the generic numerical soil standards,
(ii) the matrix numerical soil standards, or

Date issued: August 1, 2019

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(iii) a director's interim standard for soil,
referred to in section 41(1)(a) of the Contaminated Sites Regulation, B.C. Reg. 375/96,
(e) sludge from the Original Leachate Management Works, or,
(f) other waste as authorized in writing by the director,
but does not include:
(g) hazardous waste except as authorized pursuant to the Hazardous Waste Regulation, controlled waste, Attractants, and,
(h) waste and/or recyclable material prohibited in writing by the director.

1.1.3 The waste discharge is authorized to the Original Lined Cell approximately located as shown on Site Plan A. Waste discharge to the Original Un-Lined Cell is not authorized.

1.1.4 Authorization to discharge waste to the Original Lined Cell ceases on the earlier of:
(i) the date the Original Lined Cell is filled to capacity with grades not steeper than 3H:1V (33%),
(ii) the date of commencement of waste discharge to the New Landfill.

1.1.5 The authorized works are:
(i) a lined landfill footprint with a maximum area of 0.72 ha (85 m x 85 m) including from bottom to top a base with perimeter berm, 0.3 m sand cushion layer, 0.5 mm thick coated woven polyethylene liner, 0.3 m granular leak detection layer, leak detection riser pipe, 0.5 mm thick coated woven polyethylene liner, 0.3 m sand protection layer, leachate extraction chamber, final cover, and,
(ii) an un-lined landfill footprint with an approximate area of 0.7 ha, final cover,
and related appurtenances, approximately located as shown on Site Plan A.

1.1.6 The operational certificate holder must ensure the Original Landfill, excluding final cover, is complete and fully operational on or before the date of issuance of this operational certificate, and at all times thereafter, until the Original Landfill is decommissioned in compliance with the plan referred to in section 2.9(a) (plan to remove all waste from the Original Landfill) of this operational certificate.

1.2 **Original Leachate Management Works**

This section applies to the management of leachate from the Original Lined Cell.

1.2.1 The operational certificate holder must convey the leachate from the Original Lined Cell, that is to be discharged on the Facility site, to the Original Leachate Management Works.

1.2.2 The maximum rate of treated leachate effluent discharge to the treated leachate infiltration pond is 7,139 m^3 per calendar year.

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1.2.3 The concentration of any substance in the treated leachate effluent discharge to the treated leachate infiltration pond must not be greater than the Contaminated Sites Regulation Generic Numerical Water Standards for Drinking Water (DW), for that substance.

1.2.4 The treated leachate effluent is authorized to be discharged to the treated leachate infiltration pond and infiltrated into the ground. This authorization ceases on the date the Original Leachate Management Works are decommissioned in compliance with the plan referred to in section 2.9(a) (plan to remove all waste from the Original Landfill) of this operational certificate.

1.2.5 The authorized works are leachate conveyance, storage, treatment and discharge works including pumps, pipes, leachate storage and treatment tanks, treated leachate infiltration pond, flow monitoring works, and related appurtenances approximately located as shown on Site Plan A.

1.2.6 Minimum Freeboard must be maintained at all times as follows:
treated leachate infiltration pond: 0.6 m

1.2.7 The operational certificate holder must ensure the Original Leachate Management Works are complete and fully operational on or before the date of commencement of discharge to the treated leachate infiltration pond, and at all times thereafter, until the Original Leachate Management Works are decommissioned in compliance with the plan referred to in section 2.9(a) (plan to remove all waste from the Original Landfill) of this operational certificate.

1.3 **New Landfill**

This section applies to the New Landfill.

1.3.1 The maximum rate of waste discharge to the New Landfill is: (45,000 minus the waste discharge to the Original Lined Cell) tonnes per calendar year.

1.3.2 The characteristics of the waste discharge to the New Landfill must be:
(a) demolition waste,
(b) construction waste,
(c) land clearing waste,
(d) soil in which the concentrations of all substances are less than the lowest applicable industrial land use standard specified for those substances in
(i) the generic numerical soil standards,
(ii) the matrix numerical soil standards, or
(iii) a director's interim standard for soil,
referred to in section 41(1)(a) of the Contaminated Sites Regulation, B.C. Reg. 375/96,
(e) sludge from the New Leachate Management Works or the New Stormwater

Management Works, or,

(f) other waste as authorized in writing by the director,

but does not include:

(g) hazardous waste except as authorized pursuant to the Hazardous Waste Regulation, controlled waste, Attractants, and,

(h) waste and/or recyclable material prohibited in writing by the director.

1.3.3 The waste discharge is authorized to the New Landfill approximately located as shown on Site Plan A.

1.3.4 The authorized works are a lined landfill footprint with a maximum area of 3.60 ha including from bottom to top a base with perimeter berm, secondary base liner, leak detection drainage layer and leak collection pipes and sump, primary base liner, leachate collection drainage layer and leachate collection pipes and sump, pumps, pipes, final cover, and related appurtenances, approximately located as shown on Site Plan A.

1.3.5 The secondary base liner and the primary base liner must each include an upper high density polyethylene double sided textured geomembrane of minimum 1.5 mm thickness and a lower geosynthetic clay liner of hydraulic conductivity less than or equal to 1×10^{-7} cm/s. However, on the south slope of the base more than 1 m above the primary base liner, the geosynthetic clay liners are not required.

1.3.6 The operational certificate holder must ensure the New Landfill, excluding final cover, is complete and fully operational on or before the date of commencement of waste discharge to the New Landfill, and at all times thereafter.

1.4 New Leachate Management Works

This section applies to the management of leachate from the New Landfill.

1.4.1 The operational certificate holder must convey the leachate from the New Landfill, that is to be discharged on the Facility site, to the New Leachate Management Works.

1.4.2 The maximum rate of treated leachate effluent discharge to the treated leachate infiltration pond is 24,633 m^3 per calendar year.

1.4.3 The concentration of any substance in the treated leachate effluent discharge to the treated leachate infiltration pond must not be greater than the Contaminated Sites Regulation Generic Numerical Water Standards for Drinking Water (DW), for that substance.

1.4.4 The treated leachate effluent is authorized to be discharged to the treated leachate infiltration

pond and infiltrated into the ground.

1.4.5 The authorized works are leachate conveyance, treatment and discharge works including pumps, pipes, leachate treatment pond(s), treated leachate infiltration pond, flow monitoring works, and related appurtenances approximately located as shown on Site Plan A.

1.4.6 The leachate treatment pond(s) must include from bottom to top a secondary base liner, leak detection drainage layer and leak collection pipe(s), and a primary base liner. The secondary base liner and the primary base liner must each include an upper high density polyethylene double sided textured geomembrane of minimum 1.5 mm thickness and a lower geosynthetic clay liner of hydraulic conductivity less than or equal to 1×10^{-7} cm/s.

1.4.7 Minimum Freeboard must be maintained at all times as follows:
leachate treatment pond(s): 0.6 m
treated leachate infiltration pond: 0.6 m

1.4.8 The operational certificate holder must ensure the New Leachate Management Works are complete and fully operational on or before the date of commencement of waste discharge to the New Landfill, and at all times thereafter.

1.5 **New Stormwater Management Works**

This section applies to the management of stormwater from the New Landfill.

1.5.1 The operational certificate holder must manage stormwater from the New Landfill such that stormwater is infiltrated into the ground with the authorized works.

1.5.2 The stormwater must not include leachate and the concentration of any substance in the stormwater must not be greater than the Contaminated Sites Regulation Generic Numerical Water Standards for Drinking Water (DW), for that substance.

1.5.3 The authorized works are diversion berm, perimeter berm, mid slope swales, drop down channels, ditches, energy dissipation and sediment traps, stormwater infiltration area, and related appurtenances approximately located as shown on Site Plan A.

1.5.4 Minimum Freeboard must be maintained at all times as follows:
stormwater infiltration area: 0.6 m
all other authorized works: 0.3 m

1.5.5 The operational certificate holder must ensure that adequate authorized works to manage stormwater, such that stormwater is infiltrated into the ground with the authorized works, are

complete and fully operational on or before the date of commencement of waste discharge to the New Landfill, and at all times thereafter.

1.6 Facility Entrance

This section applies to the Facility entrance.

1.6.1 The authorized works are sign(s), gate, fence, weigh scale, and related appurtenances approximately located as shown on Site Plan A.

1.6.2 The operational certificate holder must ensure the authorized works are complete and fully operational on or before the date of issuance of this operational certificate and at all times thereafter.

1.7 Location of Facility

This section applies to the location of the Facility.

1.7.1 The location of the Facility is PID 001-223-321, LOT A, DISTRICT LOT 85, SAYWARD DISTRICT, PLAN 30709 EXCEPT PART IN PLAN EPP15087, approximately located as shown on Site Plan A.

2. GENERAL REQUIREMENTS

2.1 Glossary

The following capitalized terms referred to in this authorization are defined in the Glossary below. Other terms used in this authorization have the same meaning as those defined in the *Environmental Management Act*, applicable regulations, and the Landfill Criteria;

"Attractant" means food or food waste, compost, carcass or part of an animal, fish, or other meat, or other waste or garbage, that could attract bears, birds, rodents, insects, vectors or wildlife, but does not include grass, leaves, weeds, branches and woodwaste;

"Facility" means the Original Landfill, Original Leachate Management Works, New Landfill, New Leachate Management Works, New Stormwater Management Works and the authorized works in section 1.6.1 (Facility Entrance) of this operational certificate;

"Freeboard" means the difference in elevation between the contained liquid level and the top of the containment works at its lowest point;

"Landfill Criteria" means the Landfill Criteria for Municipal Solid Waste Second Edition June 2016, as amended or replaced from time to time;

"New Landfill" means the authorized works in section 1.3.4 of this operational certificate;

"New Leachate Management Works" means the authorized works in section 1.4.5 of this operational certificate;

"New Stormwater Management Works" means the authorized works in section 1.5.3 of this operational certificate;

"Original Landfill" means the Original Lined Cell and the Original Un-Lined Cell;

"Original Leachate Management Works" means the authorized works in section 1.2.5 of this operational certificate;

"Original Lined Cell" means the authorized works in section 1.1.5(i) of this operational certificate;

"Original Un-Lined Cell" means the authorized works in section 1.1.5(ii) of this operational certificate;

"Province" means Her Majesty the Queen in right of British Columbia;

"Regulatory Document" means any document that the operational certificate holder is required to cause to be prepared, prepare or submit to the director or the Province, pursuant to: (i) this authorization; (ii) any regulation made under the *Environmental Management Act* that regulates the Facility described in this authorization or the discharge of waste from that Facility; or (iii) any order issued under the *Environmental Management Act* directed against the operational certificate holder that is related to the Facility described in this authorization or the discharge of waste from that Facility;

"Significant Works" means the Facility excluding the authorized works in section 1.6.1 (Facility Entrance) of this operational certificate.

2.2 **Use of Qualified Professional(s)**

The operational certificate holder must cause a Qualified Professional to:

(a) Design and inspect the construction of the Facility, and,

(b) Certify documents related to the Facility including plans, specifications, drawings, construction

reports, assessments, reviews, investigations, studies, surveys, programs, reports and as-built record drawings.

(d) Submit a completed Declaration of Competency and a Conflict of Interest Disclosure Statement with each document.

2.3 Operations and Closure Plan (OCP)

(a) The operational certificate holder must cause a Qualified Professional to certify and submit an up to date OCP for the Original Landfill and the Original Leachate Management Works, to the director, on or before the earlier of:

(i) 30 days before the date of commencement of waste discharge to the Original Lined Cell,
(ii) 30 days after the date of issuance of this operational certificate.

(b) The OCP must comply with the requirements of this operational certificate, include information specified in relevant items listed in the Landfill Criteria Section 10.3 Design, Operations and Closure Plan including a site layout plan, a filling plan, a lifespan analysis table, a stormwater management plan, a leachate management plan, an environmental monitoring plan, an operations plan, a closure plan, and the information specified in the following sections of this operational certificate:

2.7(a) (soil acceptance plan), and,
2.10(a) (financial security plan).

(c) The operational certificate holder must carry out the most recent OCP and design, construct, operate, inspect, maintain, monitor and close the Original Landfill and the Original Leachate Management Works, in compliance with the most recent OCP and this operational certificate, until the Original Landfill and the Original Leachate Management Works are decommissioned in compliance with the plan referred to in section 2.9(a) (plan to remove all waste from the Original Landfill) of this operational certificate.

2.4 Hydrogeology and Hydrology Characterization Report (HHCR)

(a) The operational certificate holder must cause a Qualified Professional to certify and submit an up to date HHCR, to the director, on or before 90 days before the date of commencement of waste discharge to the New Landfill.

(b) The HHCR must include characterization of the geology, hydrogeology, and surface hydrology at and near the Facility site, and the information specified in all the items listed in the Landfill Criteria, section 10.1 Hydrogeology and Hydrology Characterization Report.

(c) The operational certificate holder must cause a Qualified Professional to certify and submit an updated HHCR to the director, at least once every five years after the date of commencement of waste

discharge to the New Landfill.

2.5 **Design, Operations and Closure Plan (DOCP)**

(a) The operational certificate holder must cause a Qualified Professional to certify and submit an up to date DOCP, for the Facility, to the director, on or before 90 days before the date of commencement of waste discharge to the New Landfill.

(b) The DOCP must comply with the requirements of this operational certificate, include the information specified in all the items listed in the Landfill Criteria Section 10.3 Design, Operations and Closure Plan, and the information specified in the following sections of this operational certificate:

2.6(a) (New Leachate Management Works commissioning plan),
2.7(a) (soil acceptance plan),
2.8(a) (trigger level assessment plan),
2.9(a) (plan to remove all waste from the Original Landfill), and,
2.10(b) (financial security plan).

(c) The operational certificate holder must cause a Qualified Professional to certify and submit an updated DOCP to the director, as necessary to keep the DOCP up to date, at least once every five years after the date of commencement of waste discharge to the New Landfill.

(d) The operational certificate holder must carry out the most recent DOCP and design, construct, operate, inspect, maintain, monitor, and close the Facility, in compliance with most recent DOCP and this operational certificate.

2.6 **New Leachate Management Works Commissioning Plan and Report**

(a) The DOCP submitted pursuant to section 2.5 of this operational certificate must include a New Leachate Management Works commissioning plan that includes:

(i) the expected duration of the New Leachate Management Works commissioning period,
(ii) description of the New Leachate Management Works and design, including treatment of leachate from soil and treated leachate infiltration pond design and infiltration tests,
(iii) the monitoring, sampling and analyses that will be carried out during the New Leachate Management Works commissioning period including the quantity and quality of leachate and treated leachate effluent, and confirmatory sampling before the discharge of any treated leachate effluent to the treated leachate infiltration pond,
(iv) operating procedures that will be carried out during the New Leachate Management Works commissioning period including review of confirmatory sampling results before the discharge of any treated leachate effluent to the treated leachate infiltration pond,
(v) contingency measures that will be carried out during the New Leachate Management Works

commissioning period if the treated leachate effluent quality does not comply with this operational certificate, including storage, retreatment, and transport to an off-site authorized treatment facility,
(vi) New Leachate Management Works commissioning report description, table of contents and summary of contents.

(b) The operational certificate holder must cause a Qualified Professional to certify and submit a New Leachate Management Works commissioning report, that includes the information contemplated in section 2.6(a)(vi) of this operational certificate, to the director, on or before 30 days after the completion of the New Leachate Management Works commissioning period, or as specified by the director.

2.7 **Soil Acceptance Plan**

(a) The OCP submitted pursuant to section 2.3, and the DOCP submitted pursuant to section 2.5, of this operational certificate, must include a soil acceptance plan that includes procedures that will be carried out before soil is accepted at the Facility including receipt and review of documents required by section 2.7(b) of this operational certificate, and consideration of the applicable Original Leachate Management Works or New Leachate Management Works adequacy to treat leachate from the soil.

(b) Before a specific quantity of soil is accepted at the Facility, the operational certificate holder must cause a Qualified Professional to certify and submit to the operational certificate holder, a document pertaining to the specific quantity of soil that includes:
(i) the soil tonnage(s) and soil quality class(es) as described in the most recent version of Technical Guidance 1 on Contaminated Sites Site Characterization and Confirmation Testing,
(ii) the soil origin including applicable civic address, site identification number, parcel identifier, parcel identification number, legal description, and,
(iii) characterization of the soil in accordance with ministry procedures and applicable Contaminated Sites Regulation Guidance, Protocols and Procedures.

2.8 **Trigger Level Assessment Plan**

(a) The DOCP submitted pursuant to section 2.5 of this operational certificate must include a trigger level assessment plan that includes:
(i) Description of the routine monitoring of the quantity and quality of leachate leakage through the primary liner and into the leak detection layer for the New Landfill, and for the leachate treatment pond(s), and related leachate leakage quantities and qualities that will trigger corresponding described increased monitoring, investigations, contingency measures and actions.
(ii) Description of the routine monitoring of groundwater quality immediately downgradient of the New Landfill, the leachate treatment pond(s), and the treated leachate infiltration pond, and related groundwater substance concentrations that will trigger corresponding described increased

monitoring, investigations, contingency measures and actions.

2.9 Plan to Remove all Waste from the Original Landfill

(a) The DOCP submitted pursuant to section 2.5 of this operational certificate must include a plan to remove all waste from the Original Landfill, categorize such waste, discharge all such waste to the New Landfill or to other identified and authorized waste management facility(ies), carry out sampling to confirm all such waste has been removed, and decommission the Original Landfill and the Original Leachate Management Works.

(b) Subject to section 1.3.2 of this operational certificate, waste removed from the Original Landfill is authorized to be discharged to the New Landfill. The tonnage of such waste must not be included for the purpose of determining compliance with section 1.3.1 of this operational certificate.

(c) The director may require the operational certificate holder to carry out and complete the plan referred to in section 2.9(a) of this operational certificate, in accordance with the director's requirements.

(d) If the plan referred to in section 2.9(a) of this operational certificate is carried out, the operational certificate holder must cause a Qualified Professional to certify and submit a report to the director that confirms that the plan has been carried out and completed in accordance with the director's requirements, describes the plan implementation, describes and provides the waste categorization, describes and provides the sampling and results, describes the decommissioning of the Original Landfill and the Original Leachate Management Works, provides photos documenting the implementation of the plan referred to in section 2.9(a) of this operational certificate, and lists the tonnages or volumes, and categories of waste removed and discharged to the New Landfill and to other identified and authorized waste management facility(ies), on or before 60 days after the plan referred to in section 2.9(a) of this operational certificate has been carried out and completed.

2.10 Financial Security

(a) The OCP submitted pursuant to section 2.3 of this operational certificate must include a financial security plan that includes:

(i) the calculations of the amounts of financial security and time periods for each phase of development for the Original Landfill in accordance with the Landfill Criteria Section 8.0 Financial Security, and,

(ii) the amounts of financial security for the corresponding time periods.

(b) The DOCP submitted pursuant to section 2.5 of this operational certificate must include a financial security plan that includes:

(i) the tasks, estimated costs, contingency costs, calculations of the amounts of financial security

and time periods, to carry out and complete the plan referred to in section 2.9(a) of this operational certificate (plan to remove all waste from the Original Landfill),
(ii) the calculations of the amounts of financial security and time periods for each phase of development for the New Landfill in accordance with the Landfill Criteria Section 8.0 Financial Security, and,
(iii) the amounts of financial security for the corresponding time periods.

(c) The operational certificate holder must provide the director with financial security, on or before the earlier of:
(i) 30 days before the date of commencement of waste discharge to the Original Lined Cell,
(ii) 30 days after the date of issuance of this operational certificate,
(iii) 90 days before the date of commencement of waste discharge to the New Landfill,
and at all times thereafter.

(d) The amount of financial security at any time must be equal to or greater than:
(i) Before the report referred to in section 2.9(d) (report that confirms that the plan referred to in section 2.9(a) of this operational certificate has been carried out and completed) of this operational certificate is submitted to the director, the greater amount specified for the corresponding time period in:
- the financial security plan in the most recent OCP,
- the financial security plan in the most recent DOCP.
(ii) On and after the report referred to in section 2.9(d) (report that confirms that the plan referred to in section 2.9(a) of this operational certificate has been carried out and completed) of this operational certificate is submitted to the director, the amount specified for the corresponding time period in the financial security plan in the most recent DOCP.

(e) The form of financial security must be satisfactory to the director.

(f) At the discretion of the director, such financial security may be used among other things:
(i) to correct any inadequacy of the Facility relating to its design, construction, operation, inspection, maintenance, monitoring, closure, and post-closure;
(ii) to correct any default in compliance with this operational certificate or the *Environmental Management Act*; and,
(iii) for remediation of the Facility.

(g) The operational certificate holder must replenish any amounts drawn from the posted financial security within 60 days of such amounts being drawn or as otherwise specified by the director.

2.11 **Construction Report(s)**

(a) The operational certificate holder must cause a Qualified Professional to carry out inspections

before and during the construction or modification of Significant Works, and, after the completion of construction or modification of Significant Works, to certify and submit construction report(s) to the director:

(i) for construction of the New Landfill and the New Leachate Management Works, on or before 30 days before the date of commencement of waste discharge to those new Significant Works, and,
(ii) for all Significant Works, on or before 60 days after the completion of construction or modification of the Significant Works.

(b) The construction report(s) must demonstrate that the Significant Works have been constructed in accordance with this operational certificate and the applicable most recent OCP or DOCP, describe any technical concerns that arose from the inspections and testing and how they were addressed, and include as-built record drawings of the constructed Significant Works, all the inspection and testing reports and results including geologic inspection report, quality control and quality assurance testing, soil test data including field and laboratory data, as described in the Landfill Criteria section 10.2 Construction Report(s).

2.12 **Notification of Commencement of Waste Discharge**

The operational certificate holder must notify the director of:
(a) the date of commencement of waste discharge to the Original Lined Cell, on that date,
(b) the date of commencement of waste discharge to the New Landfill, on that date,
(c) the date the Original Lined Cell has reached capacity, on that date, and,
(d) the date the plan referred to in section 2.9(a) of this operational certificate has been carried out and completed, on that date.

2.13 **Buffer Zone**

The operational certificate holder must ensure that the New Landfill, New Leachate Management Works, and New Stormwater Management Works, are located a minimum of 50 m from the Facility site boundary.

2.14 **Depth to Groundwater**

The operational certificate holder must ensure that the New Landfill secondary base liner, and the New Leachate Management Works leachate treatment pond(s) secondary base liner, are a minimum of 1.5 m above groundwater at all times.

2.15 **Covenant**

On or before the date of commencement of waste discharge to the New Landfill, the operational certificate holder must register a covenant under section 219 (1) of the *Land Title Act*, in a form

acceptable to the director, that binds successors in title to uphold the continued implementation of the closure plan in the most recent DOCP, and prohibits development of the Facility other than as contemplated by this operational certificate or approved by the director. Such covenant must include an acknowledgement that the property was used for the purpose of waste disposal, must be registered as a charge against title to the property on which the facility is located and must be registered in priority to all charges except charges which do not give the holders any rights which might conflict with the covenant.

2.16 Additional Requirements

The director may require the operational certificate holder to:

(a) Cause a Qualified Professional to certify and submit to the director additional, amended or improved documents of the Facility including plans, specifications, drawings, construction reports, assessments, reviews, investigations, studies, surveys, programs, reports and as-built record drawings.

(b) Carry out actions in accordance with the additional, amended or improved documents submitted, and additional actions as specified.

(c) Repair, alter, remove, improve or add to existing facilities and works, or construct new facilities and works, at the Facility.

(d) Temporarily or permanently cease waste discharge to the Original Lined Cell and/or the New Landfill, cover part(s) or all of the Original Landfill and/or the New Landfill with final cover, and close and decommission the Facility, as specified.

2.17 Authorization Requirements

Where this authorization provides that the director may specify a matter or require an action to be carried out, the operational certificate holder must comply with the specification and carry out the action in accordance with the requirements of the director.

3. OPERATING AND PERFORMANCE REQUIREMENTS

3.1 Multiple and/or Spare Works and Auxiliary Power Facilities

The operational certificate holder must provide and install multiple and/or spare works and auxiliary power facilities to ensure the Original Lined Cell, Original Leachate Management Works, New Landfill, New Leachate Management Works, and New Stormwater Management Works, are complete and fully operational as specified in this operational certificate, including during maintenance, breakdowns and electrical power outages.

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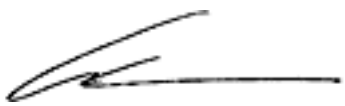

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3.2 **Maintenance of the Facility**

(a) The operational certificate holder must cause persons that are qualified and trained to operate, regularly inspect, and maintain the Facility, in good working order. If components of the Facility have a manufacturer's recommended maintenance schedule, then those components must, at a minimum, be maintained in accordance with that schedule.

(b) The operational certificate holder must prepare documents of the qualification and training of the persons operating, inspecting and maintaining the Facility, and of Facility inspections, operation and maintenance.

3.3 **Facility Manager and Operator Certification**

(a) The operational certificate holder must ensure that at least one person responsible for the management of the Facility is certified, and maintains certification, by The Solid Waste Association of North America (SWANA) as a Manager of Landfill Operations, and at least one person responsible for the operation of the Facility has, within the preceding five years, successfully completed the SWANA Landfill Operations Basics course, on or before the earlier of:

(i) the date of commencement of waste discharge to the Original Lined Cell,

(ii) the date of commencement of waste discharge to the New Landfill,

and at all times thereafter.

(b) The operational certificate holder must prepare documents of the SWANA certification and training of the person(s) responsible for the management and operation of the Facility.

3.4 **New Leachate Management Works Classification and Operator Certification**

(a) The operational certificate holder must have the New Leachate Management Works classified by the Environmental Operators Certification Program (EOCP), on or before the date of commencement of waste discharge to the New Landfill, and at all times thereafter.

(b) The operational certificate holder must ensure that the person(s) responsible for the operation and maintenance of the New Leachate Management Works is(are) certified at an EOCP certification level equivalent to or higher than the EOCP classification level of the New Leachate Management Works, on or before the date of commencement of waste discharge to the New Landfill, and at all times thereafter.

(c) The operational certificate holder must prepare documents of the EOCP classification level of the New Leachate Management Works and the EOCP certification level(s) of the person(s) responsible for the operation and maintenance of the New Leachate Management Works.

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3.5 Groundwater Quality

(a) The operational certificate holder must ensure that the Facility does not cause the concentration of any substance in groundwater flowing from the Facility site boundary to be greater than:

(i) the Contaminated Sites Regulation Generic Numerical Water Standards for Drinking Water (DW), for that substance,

or,

(ii) if the local background concentration of any substance is greater than (i), the local background concentration of that substance.

(b) If section 3.5(a)(ii) of this operational certificate is being used, the operational certificate holder must cause a Qualified Professional to determine the local background concentration of substance(s) in (a), in accordance with the latest approved version of Protocol 9 for Contaminated Sites, Determining Background Groundwater Quality, and include such determination(s) in the Annual Operations and Monitoring Report.

(c) The director may specify more stringent groundwater quality standards than those set out in this section.

3.6 Landfill Gas Management

The operational certificate holder must ensure that:

(a) The Facility does not cause:

(i) combustible gas concentrations to exceed the lower explosive limit of methane (5 percent by volume), or a lower concentration specified by the director, in soil at the Facility site boundary;

(ii) combustible gas concentrations to exceed 20 percent of the lower explosive limit of methane (1 percent by volume) in any building; and

(iii) federal, provincial, or local ambient air quality objectives and standards to be exceeded in air at the Facility site boundary.

(b) Landfill gas is managed in accordance with all migration and health and safety requirements.

3.7 Nuisance

The operational certificate holder must ensure that the Facility does not cause a nuisance including with regard to birds, rodents, insects, odour, noise, dust, litter, vector and wildlife attraction.

3.8 Complaints

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The operational certificate holder must prepare documents of complaints with regard to matters relevant to this operational certificate, including environmental and nuisance complaints. These documents must include the source and nature of the complaint, actions, responses, and corresponding dates and times.

3.9 Regulatory Documents

(a) The operational certificate holder must retain all Regulatory Documents.

(b) The operational certificate holder must retain all Regulatory Documents for the last seven years at the Facility and such documents must be available for immediate inspection at the Facility by a director or an officer.

(c) If requested by a director or an officer, the operational certificate holder must submit the requested Regulatory Documents to the director or officer within 14 days of the request.

4. SAMPLING REQUIREMENTS

4.1 Sampling Procedures

The operational certificate holder must carry out required sampling in accordance with the procedures described in the "British Columbia Field Sampling Manual for Continuous Monitoring and the Collection of Air, Air-Emission, Water, Wastewater, Soil, Sediment, and Biological Samples, 2013 Edition (Permittee)" or most recent edition, or by alternative procedures as authorized by the director. A copy of the above manual is available on the Ministry web page at https://www2.gov.bc.ca/gov/content/environment/research-monitoring-reporting/monitoring/laboratory-standards-quality-assurance.

4.2 Analytical Procedures

The operational certificate holder must carry out required analyses in accordance with procedures described in the "British Columbia Laboratory Manual (2015 Permittee Edition)", or the most recent edition or by alternative procedures as authorized by the director. A copy of the above manual is available on the Ministry web page at https://www2.gov.bc.ca/gov/content/environment/research-monitoring-reporting/monitoring/laboratory-standards-quality-assurance.

4.3 Quality Assurance

(a) The operational certificate holder must obtain from the analytical laboratory(ies) their precision, accuracy and blank data for each sample set submitted by the operational certificate holder and an evaluation of the data acceptability, based on criteria set by such laboratory.

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(b) The operational certificate holder must submit samples to analytical laboratory(ies) that meet the definition of a qualified laboratory under the Environmental Data Quality Assurance Regulation.

(c) The operational certificate holder must collect, prepare and submit for analysis by the analytical laboratory(ies) quality control (QC) samples for each parameter. As a minimum,

(i) The number of QC samples should be 20% of all samples collected (environmental + QC samples) within 48 hours of each other, and

(ii) Include duplicate, field and trip blank samples for each parameter.

5. REPORTING REQUIREMENTS

5.1 Routine Reporting

The operational certificate holder must submit all routine Regulatory Documents required by this operational certificate by email to the Ministry's Routine Environmental Reporting Submission Mailbox at EnvAuthorizationsReporting@gov.bc.ca or as otherwise instructed by the director. For guidelines on how to properly name the files and email subject lines or for more information visit the Ministry website http://www2.gov.bc.ca/gov/content/environment/waste-management/waste-discharge-authorization/data-and-report-submissions/routine-environmental-reporting-submission-mailbox.

5.2 Non-compliance Notification

(a) The operational certificate holder must immediately notify the director or designate by email at EnvironmentalCompliance@gov.bc.ca, or as otherwise instructed by the director of any non-compliance with the requirements of this authorization by the operational certificate holder and must take remedial action to remedy any effects of such non-compliance.

(b) The operational certificate holder must provide the director with written confirmation of all such non-compliance events, including available test results within 24 hours of the original notification by email at EnvironmentalCompliance@gov.bc.ca, or as otherwise instructed by the director.

5.3. Non-compliance Reporting

(a) If the operational certificate holder fails to comply with any of the requirements of this authorization, the operational certificate holder must, within 30 days of such non-compliance, submit to the director a written report that is satisfactory to the director and includes, but is not necessarily limited to, the following:

(i) all relevant test results obtained by the operational certificate holder related to the non-compliance,

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Authorizations - South Region

(ii) an explanation of the most probable cause(s) of the non-compliance, and
(iii) a description of remedial action planned and/or taken by the operational certificate holder to prevent similar non-compliance(s) in the future.

(b) The operational certificate holder must submit all non-compliance reporting required to be submitted under this section by email to the Ministry's Compliance Reporting Submission Mailbox at EnvironmentalCompliance@gov.bc.ca or as otherwise instructed by the director. For guidelines on how to report a non-compliance or for more information visit the Ministry website http://www2.gov.bc.ca/gov/content/environment/waste-management/waste-discharge-authorization/data-and-report-submissions/non-compliance-reporting-mailbox.

5.4 **Annual Operations and Monitoring Report**

(a) The operational certificate holder must cause a Qualified Professional to certify and submit an Annual Operations and Monitoring Report in a format suitable for public release, for the preceding calendar year, to the director on or before March 31 of each year. On or before March 31 of each year, the operational certificate holder must post a copy of the Annual Operations and Monitoring Report online, on a website accessible to the public, and in accordance with any requirements of the director.

(b) The Annual Operations and Monitoring Report must include the following information:
Operations Report:
(i) Summary of OCP implementation that addresses the information in section 2.3(b), and summary of DOCP implementation that addresses the information in 2.5(b), of this operational certificate,
(ii) Summary of construction report(s),
(iii) Annual and cumulative tonnages and categories of waste including soil tonnage(s) and soil quality class(es) discharged to the Original Lined Cell and to the New Landfill,
(iv) Remaining volume and life of the Original Lined Cell and of the New Landfill,
(v) Summary of treated leachate effluent quantity and quality discharged to the treated leachate infiltration pond,
(vi) Summary of complaints and nuisances and description of remedial action planned and/or taken by the operational certificate holder to prevent similar complaints and nuisances in the future,
(vii) Summary of non-compliance notifications and non-compliance reporting and description of remedial action planned and/or taken by the operational certificate holder to prevent similar non-compliance(s) in the future ,
(viii) Annual status form in accordance with the instructions and template at the ministry website https://www2.gov.bc.ca/gov/content/environment/waste-management/waste-discharge-authorization/data-and-report-submissions/annual-status-form
(ix) Summary of OCP and DOCP implementation, and construction of Significant Works, planned for the next calendar year,

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Environmental Monitoring Plan Report:

(x) Site plan(s), sampling locations, stormwater flow paths, groundwater elevations, gradients and flow directions,
(xi) Sampling facilities, frequencies, substances, sampling and analytical procedures,
(xii) Data including laboratory analysis and quality assurance and quality control results,
(xiii) Data tabulation, trend analysis, graphs, diagrams, and interpretation,
(xiv) Trigger level assessment plan monitoring, data, results and interpretation,
(xv) Any determination(s) of the local background concentration of substance(s) in accordance with section 3.5 of this operational certificate,
(xvi) Comparison of the data with the standards for treated leachate effluent discharge, stormwater quality, groundwater quality, and landfill gas management, specified in sections 1.2, 1.4, 1.5, 3.5 and 3.6 of this operational certificate, and identification of any non-compliance and predicted future non-compliance,
(xvii) Results, conclusions, recommendations and changes to the environmental monitoring plan.

(c) The operational certificate holder must upload monitoring data associated with this operational certificate to the Ministry's Environmental Monitoring System (EMS) database, within 45 days of the end of the 3 month period in which the data is collected.

5.5 **Licence to Publish Documents**

(a) Subject to paragraph (b), the operational certificate holder authorizes the Province to publish on the Ministry of Environment and Climate Change Strategy website the entirety of any Regulatory Document.

(b) The Province will not publish any information that could not, if it were subject to a request under section 5 of the *Freedom of Information and Protection of Privacy Act*, be disclosed under that Act.

(c) The operational certificate holder will indemnify and save harmless the Province and the Province's employees and agents from any claim for infringement of copyright or other intellectual property rights that the Province or any of the Province's employees or agents may sustain, incur, suffer or be put to at any time that arise from the publication of a Regulatory Document.

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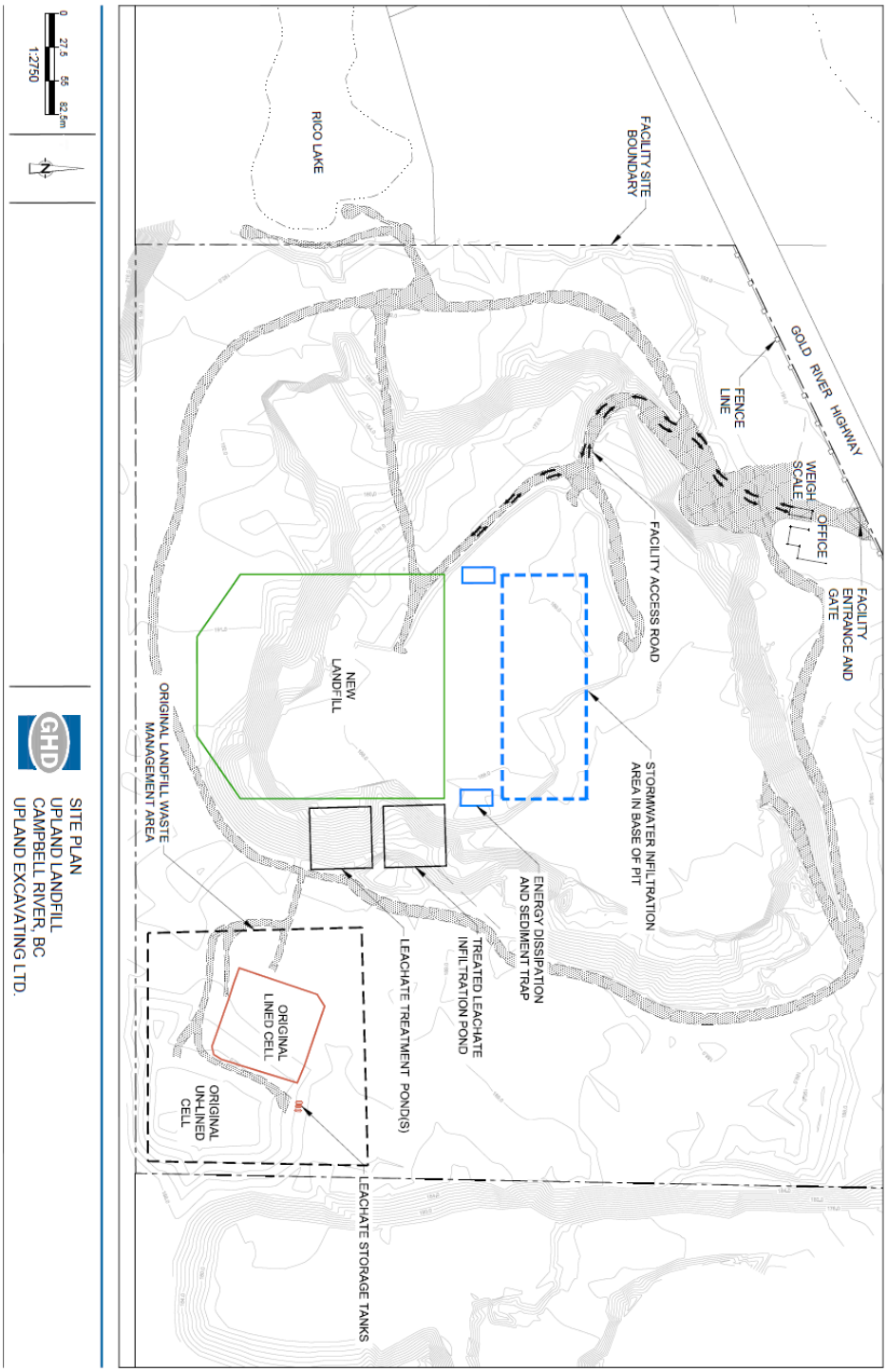
Authorizations - South Region

Site Plan A



Date issued: August 1, 2019

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for Director, *Environmental Management Act*
Authorizations - South Region

Appendix B

Original Landfill Environmental Monitoring Plan

2021/2022 Environmental Monitoring Program Specification
Monitoring Schedule Rationale
Original Landfill
Upland Excavating, Campbell River, BC

Sampling Location	Purpose	Sample Matrix	Hydraulic Monitoring	June	Nov
Groundwater Monitoring Program (17 locations)					
MW2-14	To characterize groundwater quality upgradient of the Original Landfill.	WG	√	√	√
MW2A-16	To characterize groundwater quality upgradient of the Original Landfill.	WG	√	√	√
MW3-14	To characterize groundwater quality upgradient of the Original Landfill.	WG	√	√	√
MW10-17	To characterize groundwater quality cross-gradient of the Original Landfill and monitor for potential Landfill derived impacts to the underlying aquifer.	WG	√	√	√
MW11-19	To characterize groundwater quality downgradient of the Original Landfill and monitor complaince with respect to water quality.	WG	√	√	√
MW1-14, MW4A-15, MW4B-15, MW5A-15, MW5B-15, MW6-17, MW7-17, MW8-17, MW9-17, MW15A-18, MW15B-18, PZ1-19.		WG	√	-	-
Surface Water Monitoring Program (2 locations)					
Rico Gauge	To monitor the water level in Rico Lake via surface water gauge.	WS	√	-	-
McIvor Lake	To monitor the water level in McIvor Lake via BC Hydro Data Records - use link below.	WS	√	-	-
Leak Detection Layer Monitoring Program (1 location)					
S01-17	Leak Detection Layer	W	√	√	√
Leachate Monitoring Program (2 locations)					
S03-19	Leachate Sump	WL	√	√	√
S05-19	Leachate Access Pipe	WL	√	√	√
Field Quality Assurance/Quality Control (QA/QC)[1]					
Field Blank		WG	-	√	-
Trip Blank		W	-	-	√
Groundwater Duplicate		WG	-	-	√
Leachate Duplicate		WL	-	√	-

Notes:

[1] - The number of QC samples should be 20% of all samples collected within 48 hours of each other; and include duplicate, field blank, and trip blank samples for each parameter.

S02-17 - Decommissioned

Ladore Dam: https://www.bchydro.com/energy-in-bc/operations/transmission-reservoir-data/previous-reservoir-elevations/vancouver_island/ladore_ldr.html

2021/2022Environmental Monitoring Program Specification
Analytical Parameters - Groundwater
Original Landfill
Upland Excavating, Campbell River, BC

Groundwater (WG)	Semi-annual	
	June	November
Water Level Monitoring		
Depth to Water	√	√
Depth to Bottom	√	√
Field Parameters		
Conductivity (uS/cm)	√	√
Oxidation reduction potential (mV)	√	√
pH (s.u.)	√	√
Temperature (deg C)	√	√
Total dissolved solids (mg/L)	√	√
Turbidity (ntu)	√	√
General Chemistry		
Dissolved Hardness (as $CaCO_3$)	√	√
Conductivity	√	√
Chloride	√	√
Sulphate	√	√
Sulphide (Low Level) + H_2S Calc	√	√
Sulphide, Un-ionized (as H_2S) (Calc)	√	√
Total Dissolved Solids (TDS)	√	√
Nutrients		
Alkalinity (Speciated)	√	√
Ammonia Nitrogen	√	√
Nitrate (as N)	√	√
Nitrite (as N)	√	√
Nitrite/Nitrate (Calc)	√	√
Orthophosphate	√	√
Dissolved CSR Metals (incl. Hg)	√	√

2021/2022 Environmental Monitoring Program Specification
Analytical Parameters - Leachate Leak Detection Layer
Original Landfill
Upland Excavating, Campbell River, BC

Leak Detection Layer Water (W) & Leachate (WL)	Semi-annual	
	June	November
Water Level Monitoring		
Depth to Water	√	√
Depth to Bottom	√	√
Field Parameters		
Conductivity (uS/cm)	√	√
Oxidation reduction potential (mV)	√	√
pH (s.u.)	√	√
Temperature (deg C)	√	√
Total dissolved solids (mg/L)	√	√
Turbidity (ntu)	√	√
General Chemistry		
Dissolved Hardness (as $CaCO_3$)	√	√
Conductivity	√	√
Chloride	√	√
Sulphate	√	√
Biological Oxygen Demand (BOD)	√	√
Chemical Oxygen Demand (COD)	√	√
Sulphide (Low Level) + H_2S Calc	√	√
Sulphide, Un-ionized (as H_2S) (Calc)	√	√
Total Dissolved Solids (TDS)	√	√
Total Suspended Solids (TSS)	√	√
Nutrients		
Alkalinity (Speciated)	√	√
Ammonia Nitrogen	√	√
Nitrate (as N)	√	√
Nitrite (as N)	√	√
Nitrite/Nitrate	√	√
Orthophosphate	√	√
Metals		
Dissolved CSR Metals (incl. Hg)	√	√
Total CSR Metals (incl. Hg)	√	√
Other		
PAHs	√	√
BTEX/VPH	√	√

Appendix C

Field Sample Keys and Laboratory Reports

Sample Name	Location	Date	Time	Type	Matrix	Parent Sample Name	WaterDepth	DepthUnit	DryYesNo	Notes	Temperature	Temperature Unit	Field pH (s.u.)	ORP	ORP units	Conductivity	Conductivity Unit	Turbidity (NTU)	Dissolved Oxygen (DO)	DO Units	TDS	TDS Units
W-11222680-030621-NT-01	S01-17	06/03/2021	11:30	N	W		7.64	m BTOR	No	orange/brown colour, iron precipitate	21.28	deg C	6.97	-17	millivolts	918	uS/cm	21.2			5310	mg/L
WL-11222680-030621-NT-02	S03-19	06/03/2021	11:00	N	WL		5.89	m BTOR	No	slight yello/brown colour, odour	23.4	deg C	7.2	48	millivolts	1380	uS/cm	5.7			1280	mg/L
WL-11222680-030621-NT-01	S05-19	06/03/2021	10:15	N	WL		5.013	m BTOR	No	Yellow-brown colour, slight odour	22.41	deg C	6.75	53	millivolts	1110	uS/cm	43.6			2200	mg/L
WG-11222680-030621-NT-01	MW11-19	06/03/2021	11:50	N	WG		47.477	m BTOR	No	clear, no odour	12.94	deg C	8.00	133	millivolts	163	uS/cm	201			9340	mg/L
WG-11222680-030621-NT-02	MW10-17	06/03/2021	14:10	N	WG		41.775	m BTOR	No	clear, no odour	14.83	deg C	8.46	190	millivolts	142	uS/cm	4.0			92	mg/L
WG-11222680-030621-NT-03	MW3-14	06/03/2021	15:20	N	WG		15.735	m BTOR	No	clear, no odour	12.33	deg C	7.27	239	millivolts	99	uS/cm	9.7			64	mg/L
WG-11222680-030621-NT-04	MW2-14	06/03/2021	16:00	N	WG		19.02	m BTOR	No	clear, no odour	14.01	deg C	7.62	229	millivolts	135	uS/cm	8.1			88	mg/L
WG-11222680-030621-NT-05	MW2-14 (DUPE)	06/03/2021	16:05	FD	WG	WG-11222680-030621-NT-04					14.01	deg C	7.62	229	millivolts	135	uS/cm	8.1			88	mg/L
WG-11222680-030621-NT-06	MW2A-16	06/03/2021	16:40	N	WG		19.00	m BTOR	No	clear, no odour	15.74	deg C	8.84	199	millivolts	60	uS/cm	6.6			39	mg/L
WG-11222680-030621-NT-07	FIELD BLANK	06/03/2021	16:15	FB	WGQ																	

Your P.O. #: 73523825
Your Project #: 11222680-3-2
Site#: 11222680-3-2
Site Location: UPLAND
Your C.O.C. #: 637458-01-01

Attention: Airesse MacPhee

GHD Limited
455 PHILLIP STREET
WATERLOO, ON
CANADA N2L 3X2

Report Date: 2022/03/14
Report #: R3147022
Version: 2 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

BUREAU VERITAS JOB #: C138325
Received: 2021/06/04, 15:34

Sample Matrix: Ground Water
Samples Received: 7

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity @25C (pp, total), CO3,HCO3,OH	7	N/A	2021/06/07	BBY6SOP-00026	SM 23 2320 B m
Chloride/Sulphate by Auto Colourimetry	7	N/A	2021/06/07	BBY6SOP-00011 / BBY6SOP-00017	SM23-4500-Cl/SO4-E m
Conductivity @25C	7	N/A	2021/06/07	BBY6SOP-00026	SM 23 2510 B m
Sulphide (as H2S) (1)	7	N/A	2021/06/10		Auto Calc
Un-ionized Hydrogen Sulphide as S Calc	7	N/A	2021/06/10	BBY WI-00033	Auto Calc
Hardness (calculated as CaCO3)	7	N/A	2021/06/10	BBY WI-00033	Auto Calc
Mercury (Dissolved) by CV (2)	7	2021/06/07	2021/06/07	AB SOP-00084	BCMOE BCLM Oct2013 m
Na, K, Ca, Mg, S by CRC ICPMS (diss.)	7	N/A	2021/06/10	BBY WI-00033	Auto Calc
Elements by CRC ICPMS (dissolved) (2)	7	N/A	2021/06/09	BBY7SOP-00002	EPA 6020b R2 m
Ammonia-N (Total)	7	N/A	2021/06/09	AB SOP-00007	SM 23 4500 NH3 A G m
Nitrate + Nitrite (N)	7	N/A	2021/06/05	BBY6SOP-00010	SM 23 4500-NO3- I m
Nitrite (N) by CFA	7	N/A	2021/06/05	BBY6SOP-00010	SM 23 4500-NO3- I m
Nitrogen - Nitrate (as N)	7	N/A	2021/06/05	BBY WI-00033	Auto Calc
Filter and HNO3 Preserve for Metals	7	N/A	2021/06/04	BBY7 WI-00004	SM 23 3030B m
Orthophosphate by Konelab (3)	7	N/A	2021/06/05	BBY6SOP-00013	SM 23 4500-P E m
Total Sulphide (1)	7	N/A	2021/06/10	AB SOP-00080	SM 23 4500 S2-A D Fm
Total Dissolved Solids (Filt. Residue)	1	2021/06/08	2021/06/09	BBY6SOP-00033	SM 23 2540 C m
Total Dissolved Solids (Filt. Residue)	6	2021/06/09	2021/06/10	BBY6SOP-00033	SM 23 2540 C m
Field pH	7	N/A	2021/06/09		
Field Temperature	7	N/A	2021/06/09		

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

Bureau Veritas liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or

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Your P.O. #: 73523825
Your Project #: 11222680-3-2
Site#: 11222680-3-2
Site Location: UPLAND
Your C.O.C. #: 637458-01-01

Attention: Airesse MacPhee

GHD Limited
455 PHILLIP STREET
WATERLOO, ON
CANADA N2L 3X2

Report Date: 2022/03/14
Report #: R3147022
Version: 2 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

BUREAU VERITAS JOB #: C138325
Received: 2021/06/04, 15:34

implied. Bureau Veritas has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Bureau Veritas, unless otherwise agreed in writing. Bureau Veritas is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) This test was performed by Bureau Veritas Calgary, 4000 - 19 St. , Calgary, AB, T2E 6P8
(2) Dissolved > Total Imbalance: When applicable, Dissolved and Total results were reviewed and data quality meets acceptable levels unless otherwise noted.
(3) Orthophosphate > Total Phosphorus Imbalance: When applicable, Orthophosphate, Total Phosphorus and dissolved Phosphorus results were reviewed and data quality meets acceptable levels unless otherwise noted.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Thomas Pinchin, Project Solutions Representative
Email: Thomas.Pinchin@bureauveritas.com
Phone# (604) 734 7276
==========
Bureau Veritas has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports.
For Service Group specific validation please refer to the Validation Signature Page.

Bureau Veritas Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

Bureau Veritas Job #: C138325
Report Date: 2022/03/14

GHD Limited
Client Project #: 11222680-3-2
Site Location: UPLAND
Your P.O. #: 73523825
Sampler Initials: NT

RESULTS OF CHEMICAL ANALYSES OF GROUND WATER

Bureau Veritas ID		ZX6716	ZX6716		ZX6717			
Sampling Date		2021/06/03 11:50	2021/06/03 11:50		2021/06/03 14:10			
COC Number		637458-01-01	637458-01-01		637458-01-01			
	UNITS	WG-11222680-030621-NT-01	WG-11222680-030621-NT-01 Lab-Dup	QC Batch	WG-11222680-030621-NT-02	RDL	MDL	QC Batch
ANIONS								
Nitrite (N)	mg/L	<0.0050	N/A	A246059	<0.0050	0.0050	0.0050	A246059
Calculated Parameters								
Filter and HNO3 Preservation	N/A	FIELD	N/A	ONSITE	FIELD	N/A	N/A	ONSITE
Nitrate (N)	mg/L	0.427	N/A	A245127	0.156	0.020	N/A	A245127
Sulphide (as H2S)	mg/L	<0.0020	N/A	A244464	<0.0020	0.0020	N/A	A244464
Field Parameters								
Field pH	pH	8.00	N/A	ONSITE	8.46	N/A	N/A	ONSITE
Field Temperature	°C	12.94	N/A	ONSITE	14.83	N/A	N/A	ONSITE
Misc. Inorganics								
Conductivity	uS/cm	180	N/A	A247658	160	2.0	N/A	A247658
Total Dissolved Solids	mg/L	130	N/A	A250248	110	10	N/A	A248578
Anions								
Alkalinity (PP as CaCO3)	mg/L	<1.0	N/A	A247607	<1.0	1.0	N/A	A247607
Alkalinity (Total as CaCO3)	mg/L	64	N/A	A247607	70	1.0	N/A	A247607
Bicarbonate (HCO3)	mg/L	78	N/A	A247607	85	1.0	N/A	A247607
Carbonate (CO3)	mg/L	<1.0	N/A	A247607	<1.0	1.0	N/A	A247607
Hydroxide (OH)	mg/L	<1.0	N/A	A247607	<1.0	1.0	N/A	A247607
Total Sulphide	mg/L	<0.0018	N/A	A250936	<0.0018	0.0018	N/A	A250936
Chloride (Cl)	mg/L	11	N/A	A247476	3.8	1.0	N/A	A247476
Sulphate (SO4)	mg/L	7.2	N/A	A247476	5.2	1.0	N/A	A247476
Nutrients								
Total Ammonia (N)	mg/L	<0.015	<0.015	A249824	<0.015	0.015	0.0040	A249819
Orthophosphate (P)	mg/L	0.010	N/A	A246072	0.011	0.0030	0.0030	A246072
Nitrate plus Nitrite (N)	mg/L	0.427	N/A	A246057	0.156	0.020	0.020	A246057

RDL = Reportable Detection Limit
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable

Bureau Veritas Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

Bureau Veritas Job #: C138325
Report Date: 2022/03/14

GHD Limited
Client Project #: 11222680-3-2
Site Location: UPLAND
Your P.O. #: 73523825
Sampler Initials: NT

RESULTS OF CHEMICAL ANALYSES OF GROUND WATER

Bureau Veritas ID		ZX6718	ZX6719	ZX6720			
Sampling Date		2021/06/03 15:20	2021/06/03 16:00	2021/06/03 16:05			
COC Number		637458-01-01	637458-01-01	637458-01-01			
	UNITS	WG-11222680-030621-NT-03	WG-11222680-030621-NT-04	WG-11222680-030621-NT-05	RDL	MDL	QC Batch
ANIONS							
Nitrite (N)	mg/L	<0.0050	<0.0050	<0.0050	0.0050	0.0050	A246059
Calculated Parameters							
Filter and HNO3 Preservation	N/A	FIELD	FIELD	FIELD	N/A	N/A	ONSITE
Nitrate (N)	mg/L	0.322	0.240	0.241	0.020	N/A	A245127
Sulphide (as H2S)	mg/L	<0.0020	<0.0020	<0.0020	0.0020	N/A	A245716
Field Parameters							
Field pH	pH	7.27	7.62	7.62	N/A	N/A	ONSITE
Field Temperature	°C	12.33	14.01	14.01	N/A	N/A	ONSITE
Misc. Inorganics							
Conductivity	uS/cm	110	150	150	2.0	N/A	A247658
Total Dissolved Solids	mg/L	88	120	100	10	N/A	A250248
Anions							
Alkalinity (PP as CaCO3)	mg/L	<1.0	<1.0	<1.0	1.0	N/A	A247607
Alkalinity (Total as CaCO3)	mg/L	49	56	54	1.0	N/A	A247607
Bicarbonate (HCO3)	mg/L	59	69	66	1.0	N/A	A247607
Carbonate (CO3)	mg/L	<1.0	<1.0	<1.0	1.0	N/A	A247607
Hydroxide (OH)	mg/L	<1.0	<1.0	<1.0	1.0	N/A	A247607
Total Sulphide	mg/L	<0.0018	<0.0018	<0.0018	0.0018	N/A	A250936
Chloride (Cl)	mg/L	2.6	9.2	9.3	1.0	N/A	A247476
Sulphate (SO4)	mg/L	3.2	6.1	6.1	1.0	N/A	A247476
Nutrients							
Total Ammonia (N)	mg/L	<0.015	<0.015	<0.015	0.015	0.0040	A249819
Orthophosphate (P)	mg/L	0.0041	<0.0030	0.0036	0.0030	0.0030	A246072
Nitrate plus Nitrite (N)	mg/L	0.322	0.240	0.241	0.020	0.020	A246057

RDL = Reportable Detection Limit
N/A = Not Applicable

Bureau Veritas Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

Bureau Veritas Job #: C138325
Report Date: 2022/03/14

GHD Limited
Client Project #: 11222680-3-2
Site Location: UPLAND
Your P.O. #: 73523825
Sampler Initials: NT

RESULTS OF CHEMICAL ANALYSES OF GROUND WATER

Bureau Veritas ID		ZX6721	ZX6722	ZX6722			
Sampling Date		2021/06/03 16:40	2021/06/03 16:15	2021/06/03 16:15			
COC Number		637458-01-01	637458-01-01	637458-01-01			
	UNITS	WG-11222680-030621 -NT-06	WG-11222680-030621 -NT-07	WG-11222680-030621 -NT-07 Lab-Dup	RDL	MDL	QC Batch
ANIONS							
Nitrite (N)	mg/L	<0.0050	<0.0050	N/A	0.0050	0.0050	A246059
Calculated Parameters							
Filter and HNO3 Preservation	N/A	FIELD	FIELD	N/A	N/A	N/A	ONSITE
Nitrate (N)	mg/L	0.065	<0.020	N/A	0.020	N/A	A245127
Sulphide (as H2S)	mg/L	<0.0020	<0.0020	N/A	0.0020	N/A	A245716
Field Parameters							
Field pH	pH	8.84	7	N/A	N/A	N/A	ONSITE
Field Temperature	°C	15.74	23.0	N/A	N/A	N/A	ONSITE
Misc. Inorganics							
Conductivity	uS/cm	68	<2.0	<2.0	2.0	N/A	A247667
Total Dissolved Solids	mg/L	66	<10	N/A	10	N/A	A250248
Anions							
Alkalinity (PP as CaCO3)	mg/L	<1.0	<1.0	<1.0	1.0	N/A	A247664
Alkalinity (Total as CaCO3)	mg/L	29	<1.0	<1.0	1.0	N/A	A247664
Bicarbonate (HCO3)	mg/L	35	<1.0	<1.0	1.0	N/A	A247664
Carbonate (CO3)	mg/L	<1.0	<1.0	<1.0	1.0	N/A	A247664
Hydroxide (OH)	mg/L	<1.0	<1.0	<1.0	1.0	N/A	A247664
Total Sulphide	mg/L	<0.0018	<0.0018	N/A	0.0018	N/A	A250936
Chloride (Cl)	mg/L	2.3	<1.0	N/A	1.0	N/A	A247481
Sulphate (SO4)	mg/L	2.3	<1.0	N/A	1.0	N/A	A247481
Nutrients							
Total Ammonia (N)	mg/L	<0.015	<0.015	N/A	0.015	0.0040	A249819
Orthophosphate (P)	mg/L	0.029	<0.0030	N/A	0.0030	0.0030	A246072
Nitrate plus Nitrite (N)	mg/L	0.065	<0.020	N/A	0.020	0.020	A246057

RDL = Reportable Detection Limit
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable

Bureau Veritas Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

Bureau Veritas Job #: C138325
Report Date: 2022/03/14

GHD Limited
Client Project #: 11222680-3-2
Site Location: UPLAND
Your P.O. #: 73523825
Sampler Initials: NT

MISCELLANEOUS (GROUND WATER)

Bureau Veritas ID		ZX6716	ZX6717	ZX6718			
Sampling Date		2021/06/03 11:50	2021/06/03 14:10	2021/06/03 15:20			
COC Number		637458-01-01	637458-01-01	637458-01-01			
	UNITS	WG-11222680-030621-NT-01	WG-11222680-030621-NT-02	WG-11222680-030621-NT-03	RDL	MDL	QC Batch
Calculated Parameters							
Total Un-ionized Hydrogen Sulfide as S	mg/L	<0.0050	<0.0050	<0.0050	0.0050	0.0050	A250026
Total Un-ionized Hydrogen Sulfide as H2S	mg/L	<0.0050	<0.0050	<0.0050	0.0050	0.0050	A250026
RDL = Reportable Detection Limit							

Bureau Veritas ID		ZX6719	ZX6720	ZX6721			
Sampling Date		2021/06/03 16:00	2021/06/03 16:05	2021/06/03 16:40			
COC Number		637458-01-01	637458-01-01	637458-01-01			
	UNITS	WG-11222680-030621-NT-04	WG-11222680-030621-NT-05	WG-11222680-030621-NT-06	RDL	MDL	QC Batch
Calculated Parameters							
Total Un-ionized Hydrogen Sulfide as S	mg/L	<0.0050	<0.0050	<0.0050	0.0050	0.0050	A250026
Total Un-ionized Hydrogen Sulfide as H2S	mg/L	<0.0050	<0.0050	<0.0050	0.0050	0.0050	A250026
RDL = Reportable Detection Limit							

Bureau Veritas ID		ZX6722			
Sampling Date		2021/06/03 16:15			
COC Number		637458-01-01			
	UNITS	WG-11222680-030621-NT-07	RDL	MDL	QC Batch
Calculated Parameters					
Total Un-ionized Hydrogen Sulfide as S	mg/L	<0.0050	0.0050	0.0050	A250026
Total Un-ionized Hydrogen Sulfide as H2S	mg/L	<0.0050	0.0050	0.0050	A250026
RDL = Reportable Detection Limit					

Bureau Veritas Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

Bureau Veritas Job #: C138325
Report Date: 2022/03/14

GHD Limited
Client Project #: 11222680-3-2
Site Location: UPLAND
Your P.O. #: 73523825
Sampler Initials: NT

CSR DISSOLVED METALS IN WATER WITH CV HG (GROUND WATER)

Bureau Veritas ID		ZX6716	ZX6717		ZX6718			
Sampling Date		2021/06/03 11:50	2021/06/03 14:10		2021/06/03 15:20			
COC Number		637458-01-01	637458-01-01		637458-01-01			
	UNITS	WG-11222680-030621-NT-01	WG-11222680-030621-NT-02	QC Batch	WG-11222680-030621-NT-03	RDL	MDL	QC Batch
Calculated Parameters								
Dissolved Hardness (CaCO3)	mg/L	75.3	66.5	A244920	42.8	0.50	0.50	A244920
Elements								
Dissolved Mercury (Hg)	ug/L	0.0021	0.0023	A247159	<0.0019	0.0019	0.0019	A247292
Dissolved Metals by ICPMS								
Dissolved Aluminum (Al)	ug/L	19.1	3.1	A247730	<3.0	3.0	0.030	A247730
Dissolved Antimony (Sb)	ug/L	<0.50	<0.50	A247730	<0.50	0.50	0.0020	A247730
Dissolved Arsenic (As)	ug/L	0.27	0.42	A247730	<0.10	0.10	0.010	A247730
Dissolved Barium (Ba)	ug/L	5.5	3.5	A247730	1.1	1.0	0.0020	A247730
Dissolved Beryllium (Be)	ug/L	<0.10	<0.10	A247730	<0.10	0.10	0.0030	A247730
Dissolved Bismuth (Bi)	ug/L	<1.0	<1.0	A247730	<1.0	1.0	0.0010	A247730
Dissolved Boron (B)	ug/L	<50	<50	A247730	<50	50	50	A247730
Dissolved Cadmium (Cd)	ug/L	<0.010	<0.010	A247730	<0.010	0.010	0.0020	A247730
Dissolved Chromium (Cr)	ug/L	3.2	<1.0	A247730	<1.0	1.0	0.020	A247730
Dissolved Cobalt (Co)	ug/L	<0.20	<0.20	A247730	<0.20	0.20	0.20	A247730
Dissolved Copper (Cu)	ug/L	0.40	0.46	A247730	0.49	0.20	0.010	A247730
Dissolved Iron (Fe)	ug/L	71.4	<5.0	A247730	<5.0	5.0	0.040	A247730
Dissolved Lead (Pb)	ug/L	<0.20	<0.20	A247730	<0.20	0.20	0.0010	A247730
Dissolved Lithium (Li)	ug/L	<2.0	<2.0	A247730	<2.0	2.0	2.0	A247730
Dissolved Manganese (Mn)	ug/L	1.0	<1.0	A247730	<1.0	1.0	0.030	A247730
Dissolved Molybdenum (Mo)	ug/L	<1.0	<1.0	A247730	<1.0	1.0	0.0020	A247730
Dissolved Nickel (Ni)	ug/L	<1.0	<1.0	A247730	<1.0	1.0	0.010	A247730
Dissolved Phosphorus (P)	ug/L	12	11	A247730	<10	10	1.0	A247730
Dissolved Selenium (Se)	ug/L	0.18	0.11	A247730	<0.10	0.10	0.0060	A247730
Dissolved Silicon (Si)	ug/L	9060	6270	A247730	7360	100	0.30	A247730
Dissolved Silver (Ag)	ug/L	<0.020	<0.020	A247730	<0.020	0.020	0.0020	A247730
Dissolved Strontium (Sr)	ug/L	41.2	31.7	A247730	26.5	1.0	0.0020	A247730
Dissolved Thallium (Tl)	ug/L	<0.010	<0.010	A247730	<0.010	0.010	0.010	A247730
Dissolved Tin (Sn)	ug/L	<5.0	<5.0	A247730	<5.0	5.0	0.0050	A247730
Dissolved Titanium (Ti)	ug/L	<5.0	<5.0	A247730	<5.0	5.0	0.30	A247730
Dissolved Uranium (U)	ug/L	<0.10	<0.10	A247730	<0.10	0.10	0.0010	A247730
Dissolved Vanadium (V)	ug/L	5.1	<5.0	A247730	<5.0	5.0	0.020	A247730

RDL = Reportable Detection Limit

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Bureau Veritas Job #: C138325
Report Date: 2022/03/14

GHD Limited
Client Project #: 11222680-3-2
Site Location: UPLAND
Your P.O. #: 73523825
Sampler Initials: NT

CSR DISSOLVED METALS IN WATER WITH CV HG (GROUND WATER)

Bureau Veritas ID		ZX6716	ZX6717		ZX6718			
Sampling Date		2021/06/03 11:50	2021/06/03 14:10		2021/06/03 15:20			
COC Number		637458-01-01	637458-01-01		637458-01-01			
	UNITS	**WG-11222680-030621 -NT-01**	**WG-11222680-030621 -NT-02**	**QC Batch**	**WG-11222680-030621 -NT-03**	**RDL**	**MDL**	**QC Batch**
Dissolved Zinc (Zn)	ug/L	<5.0	<5.0	A247730	<5.0	5.0	0.050	A247730
Dissolved Zirconium (Zr)	ug/L	<0.10	<0.10	A247730	<0.10	0.10	0.0080	A247730
Dissolved Calcium (Ca)	mg/L	23.9	21.3	A244921	12.3	0.050	0.0010	A244921
Dissolved Magnesium (Mg)	mg/L	3.79	3.23	A244921	2.93	0.050	0.00050	A244921
Dissolved Potassium (K)	mg/L	0.388	0.377	A244921	0.189	0.050	0.0020	A244921
Dissolved Sodium (Na)	mg/L	5.13	5.91	A244921	4.71	0.050	0.0010	A244921
Dissolved Sulphur (S)	mg/L	<3.0	<3.0	A244921	<3.0	3.0	1.0	A244921
RDL = Reportable Detection Limit								

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Bureau Veritas Job #: C138325
Report Date: 2022/03/14

GHD Limited
Client Project #: 11222680-3-2
Site Location: UPLAND
Your P.O. #: 73523825
Sampler Initials: NT

CSR DISSOLVED METALS IN WATER WITH CV HG (GROUND WATER)

Bureau Veritas ID		ZX6718	ZX6719	ZX6720			
Sampling Date		2021/06/03 15:20	2021/06/03 16:00	2021/06/03 16:05			
COC Number		637458-01-01	637458-01-01	637458-01-01			
	UNITS	WG-11222680-030621-NT-03 Lab-Dup	WG-11222680-030621-NT-04	WG-11222680-030621-NT-05	RDL	MDL	QC Batch
Calculated Parameters							
Dissolved Hardness (CaCO3)	mg/L	N/A	61.1	63.2	0.50	0.50	A244920
Elements							
Dissolved Mercury (Hg)	ug/L	<0.0019	<0.0019	<0.0019	0.0019	0.0019	A247292
Dissolved Metals by ICPMS							
Dissolved Aluminum (Al)	ug/L	N/A	<3.0	<3.0	3.0	0.030	A247730
Dissolved Antimony (Sb)	ug/L	N/A	<0.50	<0.50	0.50	0.0020	A247730
Dissolved Arsenic (As)	ug/L	N/A	<0.10	<0.10	0.10	0.010	A247730
Dissolved Barium (Ba)	ug/L	N/A	2.0	2.0	1.0	0.0020	A247730
Dissolved Beryllium (Be)	ug/L	N/A	<0.10	<0.10	0.10	0.0030	A247730
Dissolved Bismuth (Bi)	ug/L	N/A	<1.0	<1.0	1.0	0.0010	A247730
Dissolved Boron (B)	ug/L	N/A	<50	<50	50	50	A247730
Dissolved Cadmium (Cd)	ug/L	N/A	<0.010	<0.010	0.010	0.0020	A247730
Dissolved Chromium (Cr)	ug/L	N/A	<1.0	<1.0	1.0	0.020	A247730
Dissolved Cobalt (Co)	ug/L	N/A	<0.20	<0.20	0.20	0.20	A247730
Dissolved Copper (Cu)	ug/L	N/A	<0.20	0.20	0.20	0.010	A247730
Dissolved Iron (Fe)	ug/L	N/A	<5.0	<5.0	5.0	0.040	A247730
Dissolved Lead (Pb)	ug/L	N/A	<0.20	<0.20	0.20	0.0010	A247730
Dissolved Lithium (Li)	ug/L	N/A	<2.0	<2.0	2.0	2.0	A247730
Dissolved Manganese (Mn)	ug/L	N/A	<1.0	<1.0	1.0	0.030	A247730
Dissolved Molybdenum (Mo)	ug/L	N/A	<1.0	<1.0	1.0	0.0020	A247730
Dissolved Nickel (Ni)	ug/L	N/A	<1.0	<1.0	1.0	0.010	A247730
Dissolved Phosphorus (P)	ug/L	N/A	<10	<10	10	1.0	A247730
Dissolved Selenium (Se)	ug/L	N/A	0.12	0.11	0.10	0.0060	A247730
Dissolved Silicon (Si)	ug/L	N/A	6550	6860	100	0.30	A247730
Dissolved Silver (Ag)	ug/L	N/A	<0.020	<0.020	0.020	0.0020	A247730
Dissolved Strontium (Sr)	ug/L	N/A	33.6	33.9	1.0	0.0020	A247730
Dissolved Thallium (Tl)	ug/L	N/A	<0.010	<0.010	0.010	0.010	A247730
Dissolved Tin (Sn)	ug/L	N/A	<5.0	<5.0	5.0	0.0050	A247730
Dissolved Titanium (Ti)	ug/L	N/A	<5.0	<5.0	5.0	0.30	A247730

RDL = Reportable Detection Limit
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable

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Bureau Veritas Job #: C138325
Report Date: 2022/03/14

GHD Limited
Client Project #: 11222680-3-2
Site Location: UPLAND
Your P.O. #: 73523825
Sampler Initials: NT

CSR DISSOLVED METALS IN WATER WITH CV HG (GROUND WATER)

Bureau Veritas ID		ZX6718	ZX6719	ZX6720			
Sampling Date		2021/06/03 15:20	2021/06/03 16:00	2021/06/03 16:05			
COC Number		637458-01-01	637458-01-01	637458-01-01			
	UNITS	**WG-11222680-030621-NT-03 Lab-Dup**	**WG-11222680-030621-NT-04**	**WG-11222680-030621-NT-05**	**RDL**	**MDL**	**QC Batch**
Dissolved Uranium (U)	ug/L	N/A	<0.10	<0.10	0.10	0.0010	A247730
Dissolved Vanadium (V)	ug/L	N/A	<5.0	<5.0	5.0	0.020	A247730
Dissolved Zinc (Zn)	ug/L	N/A	<5.0	<5.0	5.0	0.050	A247730
Dissolved Zirconium (Zr)	ug/L	N/A	<0.10	<0.10	0.10	0.0080	A247730
Dissolved Calcium (Ca)	mg/L	N/A	19.1	19.9	0.050	0.0010	A244921
Dissolved Magnesium (Mg)	mg/L	N/A	3.24	3.28	0.050	0.00050	A244921
Dissolved Potassium (K)	mg/L	N/A	0.271	0.275	0.050	0.0020	A244921
Dissolved Sodium (Na)	mg/L	N/A	4.08	4.16	0.050	0.0010	A244921
Dissolved Sulphur (S)	mg/L	N/A	<3.0	<3.0	3.0	1.0	A244921

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Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable

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GHD Limited
Client Project #: 11222680-3-2
Site Location: UPLAND
Your P.O. #: 73523825
Sampler Initials: NT

CSR DISSOLVED METALS IN WATER WITH CV HG (GROUND WATER)

Bureau Veritas ID		ZX6721	ZX6722			
Sampling Date		2021/06/03 16:40	2021/06/03 16:15			
COC Number		637458-01-01	637458-01-01			
	UNITS	WG-11222680-030621-NT-06	WG-11222680-030621-NT-07	RDL	MDL	QC Batch
Calculated Parameters						
Dissolved Hardness (CaCO3)	mg/L	29.0	<0.50	0.50	0.50	A244920
Elements						
Dissolved Mercury (Hg)	ug/L	<0.0019	<0.0019	0.0019	0.0019	A247292
Dissolved Metals by ICPMS						
Dissolved Aluminum (Al)	ug/L	8.0	<3.0	3.0	0.030	A247730
Dissolved Antimony (Sb)	ug/L	<0.50	<0.50	0.50	0.0020	A247730
Dissolved Arsenic (As)	ug/L	0.85	<0.10	0.10	0.010	A247730
Dissolved Barium (Ba)	ug/L	2.2	<1.0	1.0	0.0020	A247730
Dissolved Beryllium (Be)	ug/L	<0.10	<0.10	0.10	0.0030	A247730
Dissolved Bismuth (Bi)	ug/L	<1.0	<1.0	1.0	0.0010	A247730
Dissolved Boron (B)	ug/L	<50	<50	50	50	A247730
Dissolved Cadmium (Cd)	ug/L	<0.010	<0.010	0.010	0.0020	A247730
Dissolved Chromium (Cr)	ug/L	<1.0	<1.0	1.0	0.020	A247730
Dissolved Cobalt (Co)	ug/L	<0.20	<0.20	0.20	0.20	A247730
Dissolved Copper (Cu)	ug/L	<0.20	<0.20	0.20	0.010	A247730
Dissolved Iron (Fe)	ug/L	<5.0	<5.0	5.0	0.040	A247730
Dissolved Lead (Pb)	ug/L	<0.20	<0.20	0.20	0.0010	A247730
Dissolved Lithium (Li)	ug/L	<2.0	<2.0	2.0	2.0	A247730
Dissolved Manganese (Mn)	ug/L	<1.0	<1.0	1.0	0.030	A247730
Dissolved Molybdenum (Mo)	ug/L	<1.0	<1.0	1.0	0.0020	A247730
Dissolved Nickel (Ni)	ug/L	<1.0	<1.0	1.0	0.010	A247730
Dissolved Phosphorus (P)	ug/L	24	<10	10	1.0	A247730
Dissolved Selenium (Se)	ug/L	<0.10	<0.10	0.10	0.0060	A247730
Dissolved Silicon (Si)	ug/L	3810	<100	100	0.30	A247730
Dissolved Silver (Ag)	ug/L	<0.020	<0.020	0.020	0.0020	A247730
Dissolved Strontium (Sr)	ug/L	12.4	<1.0	1.0	0.0020	A247730
Dissolved Thallium (Tl)	ug/L	<0.010	<0.010	0.010	0.010	A247730
Dissolved Tin (Sn)	ug/L	<5.0	<5.0	5.0	0.0050	A247730
Dissolved Titanium (Ti)	ug/L	<5.0	<5.0	5.0	0.30	A247730
Dissolved Uranium (U)	ug/L	<0.10	<0.10	0.10	0.0010	A247730
Dissolved Vanadium (V)	ug/L	7.1	<5.0	5.0	0.020	A247730
RDL = Reportable Detection Limit						

Bureau Veritas Job #: C138325
Report Date: 2022/03/14

GHD Limited
Client Project #: 11222680-3-2
Site Location: UPLAND
Your P.O. #: 73523825
Sampler Initials: NT

CSR DISSOLVED METALS IN WATER WITH CV HG (GROUND WATER)

Bureau Veritas ID		ZX6721	ZX6722			
Sampling Date		2021/06/03 16:40	2021/06/03 16:15			
COC Number		637458-01-01	637458-01-01			
	UNITS	WG-11222680-030621-NT-06	WG-11222680-030621-NT-07	RDL	MDL	QC Batch
Dissolved Zinc (Zn)	ug/L	<5.0	<5.0	5.0	0.050	A247730
Dissolved Zirconium (Zr)	ug/L	<0.10	<0.10	0.10	0.0080	A247730
Dissolved Calcium (Ca)	mg/L	9.32	<0.050	0.050	0.0010	A244921
Dissolved Magnesium (Mg)	mg/L	1.39	<0.050	0.050	0.00050	A244921
Dissolved Potassium (K)	mg/L	0.174	<0.050	0.050	0.0020	A244921
Dissolved Sodium (Na)	mg/L	0.969	<0.050	0.050	0.0010	A244921
Dissolved Sulphur (S)	mg/L	<3.0	<3.0	3.0	1.0	A244921
RDL = Reportable Detection Limit						

Bureau Veritas Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

GENERAL COMMENTS

Version 2: Report reissued to amend reportable parameters as per client request on 2022/03/14

Results relate only to the items tested.

Bureau Veritas Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

Bureau Veritas Job #: C138325
Report Date: 2022/03/14

QUALITY ASSURANCE REPORT

GHD Limited
Client Project #: 11222680-3-2
Site Location: UPLAND
Your P.O. #: 73523825
Sampler Initials: NT

			Matrix Spike		Spiked Blank		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
A246057	Nitrate plus Nitrite (N)	2021/06/05	103	80 - 120	113	80 - 120	<0.020	mg/L	0.20 (1)	25
A246059	Nitrite (N)	2021/06/05	4.0 (2)	80 - 120	102	80 - 120	<0.0050	mg/L	NC (1)	20
A246072	Orthophosphate (P)	2021/06/05	NC	80 - 120	93	80 - 120	<0.0030	mg/L	0.017 (1)	20
A247159	Dissolved Mercury (Hg)	2021/06/07	118	80 - 120	108	80 - 120	<0.0019	ug/L	NC (1)	20
A247292	Dissolved Mercury (Hg)	2021/06/07	111 (3)	80 - 120	107	80 - 120	<0.0019	ug/L	NC (4)	20
A247476	Chloride (Cl)	2021/06/07	101	80 - 120	102	80 - 120	<1.0	mg/L		
A247476	Sulphate (SO4)	2021/06/07	NC	80 - 120	95	80 - 120	<1.0	mg/L	3.6 (1)	20
A247481	Chloride (Cl)	2021/06/07	101	80 - 120	102	80 - 120	<1.0	mg/L	3.2 (1)	20
A247481	Sulphate (SO4)	2021/06/07	98	80 - 120	95	80 - 120	<1.0	mg/L	NC (1)	20
A247607	Alkalinity (PP as CaCO3)	2021/06/07					<1.0	mg/L	NC (1)	20
A247607	Alkalinity (Total as CaCO3)	2021/06/07			92	80 - 120	<1.0	mg/L	NC (1)	20
A247607	Bicarbonate (HCO3)	2021/06/07					<1.0	mg/L	NC (1)	20
A247607	Carbonate (CO3)	2021/06/07					<1.0	mg/L	NC (1)	20
A247607	Hydroxide (OH)	2021/06/07					<1.0	mg/L	NC (1)	20
A247658	Conductivity	2021/06/07			99	80 - 120	<2.0	uS/cm		
A247664	Alkalinity (PP as CaCO3)	2021/06/07					<1.0	mg/L	NC (1)	20
A247664	Alkalinity (Total as CaCO3)	2021/06/07	107 (5)	80 - 120	91	80 - 120	<1.0	mg/L	1.6 (1)	20
A247664	Bicarbonate (HCO3)	2021/06/07					<1.0	mg/L	1.6 (1)	20
A247664	Carbonate (CO3)	2021/06/07					<1.0	mg/L	NC (1)	20
A247664	Hydroxide (OH)	2021/06/07					<1.0	mg/L	NC (1)	20
A247667	Conductivity	2021/06/07			99	80 - 120	<2.0	uS/cm	0.30 (1)	10
A247730	Dissolved Aluminum (Al)	2021/06/09	NC	80 - 120	103	80 - 120	<3.0	ug/L	2.7 (1)	20
A247730	Dissolved Antimony (Sb)	2021/06/09	103	80 - 120	102	80 - 120	<0.50	ug/L	NC (1)	20
A247730	Dissolved Arsenic (As)	2021/06/09	107	80 - 120	98	80 - 120	<0.10	ug/L	0.61 (1)	20
A247730	Dissolved Barium (Ba)	2021/06/09	NC	80 - 120	100	80 - 120	<1.0	ug/L	1.7 (1)	20
A247730	Dissolved Beryllium (Be)	2021/06/09	104	80 - 120	99	80 - 120	<0.10	ug/L	NC (1)	20
A247730	Dissolved Bismuth (Bi)	2021/06/09	98	80 - 120	100	80 - 120	<1.0	ug/L	NC (1)	20
A247730	Dissolved Boron (B)	2021/06/09	NC	80 - 120	95	80 - 120	<50	ug/L	4.0 (1)	20
A247730	Dissolved Cadmium (Cd)	2021/06/09	98	80 - 120	100	80 - 120	<0.010	ug/L	8.0 (1)	20
A247730	Dissolved Chromium (Cr)	2021/06/09	96	80 - 120	97	80 - 120	<1.0	ug/L	NC (1)	20
A247730	Dissolved Cobalt (Co)	2021/06/09	93	80 - 120	97	80 - 120	<0.20	ug/L	3.5 (1)	20

Bureau Veritas Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		Spiked Blank		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
A247730	Dissolved Copper (Cu)	2021/06/09	89	80 - 120	94	80 - 120	<0.20	ug/L	2.6 (1)	20
A247730	Dissolved Iron (Fe)	2021/06/09	NC	80 - 120	100	80 - 120	<5.0	ug/L	0.30 (1)	20
A247730	Dissolved Lead (Pb)	2021/06/09	101	80 - 120	103	80 - 120	<0.20	ug/L	NC (1)	20
A247730	Dissolved Lithium (Li)	2021/06/09	103	80 - 120	102	80 - 120	<2.0	ug/L	3.4 (1)	20
A247730	Dissolved Manganese (Mn)	2021/06/09	NC	80 - 120	98	80 - 120	<1.0	ug/L	1.4 (1)	20
A247730	Dissolved Molybdenum (Mo)	2021/06/09	NC	80 - 120	102	80 - 120	<1.0	ug/L	0.53 (1)	20
A247730	Dissolved Nickel (Ni)	2021/06/09	89	80 - 120	96	80 - 120	<1.0	ug/L	3.9 (1)	20
A247730	Dissolved Phosphorus (P)	2021/06/09	110	80 - 120	101	80 - 120	<10	ug/L		
A247730	Dissolved Selenium (Se)	2021/06/09	101	80 - 120	98	80 - 120	<0.10	ug/L	NC (1)	20
A247730	Dissolved Silicon (Si)	2021/06/09	NC	80 - 120	105	80 - 120	<100	ug/L	0.14 (1)	20
A247730	Dissolved Silver (Ag)	2021/06/09	98	80 - 120	98	80 - 120	<0.020	ug/L	NC (1)	20
A247730	Dissolved Strontium (Sr)	2021/06/09	NC	80 - 120	100	80 - 120	<1.0	ug/L	0.45 (1)	20
A247730	Dissolved Thallium (Tl)	2021/06/09	99	80 - 120	100	80 - 120	<0.010	ug/L	NC (1)	20
A247730	Dissolved Tin (Sn)	2021/06/09	101	80 - 120	102	80 - 120	<5.0	ug/L	NC (1)	20
A247730	Dissolved Titanium (Ti)	2021/06/09	102	80 - 120	99	80 - 120	<5.0	ug/L	NC (1)	20
A247730	Dissolved Uranium (U)	2021/06/09	108	80 - 120	102	80 - 120	<0.10	ug/L	NC (1)	20
A247730	Dissolved Vanadium (V)	2021/06/09	100	80 - 120	98	80 - 120	<5.0	ug/L	NC (1)	20
A247730	Dissolved Zinc (Zn)	2021/06/09	NC	80 - 120	99	80 - 120	<5.0	ug/L	2.7 (1)	20
A247730	Dissolved Zirconium (Zr)	2021/06/09	119	80 - 120	97	80 - 120	<0.10	ug/L	NC (1)	20
A248578	Total Dissolved Solids	2021/06/09	102	80 - 120	98	80 - 120	<10	mg/L	4.0 (1)	20
A249819	Total Ammonia (N)	2021/06/09	99	80 - 120	91	80 - 120	<0.015	mg/L	NC (1)	20
A249824	Total Ammonia (N)	2021/06/09	91 (7)	80 - 120	94	80 - 120	<0.015	mg/L	NC (8)	20
A250248	Total Dissolved Solids	2021/06/10	102	80 - 120	103	80 - 120	<10	mg/L	12 (1)	20

Bureau Veritas Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		Spiked Blank		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
A250936	Total Sulphide	2021/06/10	89	80 - 120	119	80 - 120	<0.0018	mg/L	NC (1)	20

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

(1) Duplicate Parent ID

(2) Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.

(3) Matrix Spike Parent ID [ZX6719-03]

(4) Duplicate Parent ID [ZX6718-03]

(5) Matrix Spike Parent ID [ZX6722-01]

(6) Duplicate Parent ID [ZX6722-01]

(7) Matrix Spike Parent ID [ZX6716-04]

(8) Duplicate Parent ID [ZX6716-04]

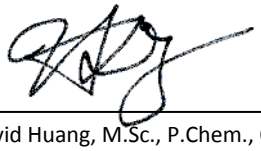
Bureau Veritas Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

Bureau Veritas Job #: C138325
Report Date: 2022/03/14

GHD Limited
Client Project #: 11222680-3-2
Site Location: UPLAND
Your P.O. #: 73523825
Sampler Initials: NT

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:



David Huang, M.Sc., P.Chem., QP, Scientific Services Manager

Bureau Veritas has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Bureau Veritas Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

Bureau Veritas Laboratories
4606 Canada Way, Burnaby, British Columbia Canada V5G 1K5 Tel (604) 734 7276 Toll-free 800-563-6266 Fax (604) 731 2386 www.bvlabs.com

Page 1 of 1

C138325_COC

INVOICE TO:
Company Name: #163 GHD Limited
Contact Name: AP Invoices - 735
Address: 455 PHILLIP STREET, WATERLOO ON N2L 3X2
Phone: (519) 884-0510 Fax: (519) 725-1394
Email: ~~APinvoices-735@ghd.com~~ Invoicing-Canada@ghd.com

Report Information
Company Name:
Contact Name: Airesse MacPhee
Address:
Phone: Fax:
Email: airesse.macphee@ghd.com; NationalEDDSupport@ma

Project Information
Quotation #: C10010
P.O. #: 73523825
Project #: 11222680-~~03~~ 3-2
Project Name: Upland
Site #: GW
Sampled By: N.Turl

Only
Bottle Order #: 637458
Chain Of Custody Record: C#637458-01-01
Project Manager: Nahed Amer

Regulatory Criteria: ☐ CSR ☐ CCME ☐ BC Water Quality ☐ Other

Special Instructions: Groundwater

SAMPLES MUST BE KEPT COOL (< 10°C) FROM TIME OF SAMPLING UNTIL DELIVERY TO BV LABS

ANALYSIS REQUESTED (PLEASE BE SPECIFIC)

Turnaround Time (TAT) Required:
Please provide advance notice for rush projects
Regular (Standard) TAT: ☒
(will be applied if Rush TAT is not specified)
Standard TAT = 5-7 Working days for most tests.
Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.
Job Specific Rush TAT (if applies to entire submission)
1 DAY ☐ 2 Day ☐ 3 Day ☐ Date Required: ☐
Rush Confirmation Number: (call lab for #)

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Metals Field Filtered? (Y / N)	Conductivity, Cl, SO4, NO2, NO3, N+N, ~~NH3~~ OPO4	Speciated Alkalinity	Sulphide + H2S Calc (LL)	Sulphide, Un-ionized (as H2S) (Calc)	Ammonia-N (Total)	Dissolved Metals with CV Hg, Hardness (CSR)	Total Dissolved Solids (Filt. Residue)	# of Bottles	Comments
1		WC-11222680-030621-NT-01	06/03/21	1150	WATER		X	X	X	X	X	X	X	5	SHORT HOLDING TIMES!
2		-02		1410											
3		-03		1520											
4		-04		1600											
5		-05		1605											All bottles were field filtered and preserved as required.
6		-06		1640											
7		-07		1615											
8															
9															
10															

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted	Lab Use Only: Time Sensitive	Temperature (°C) on Receipt	Custody Seal Intact on Cooler?
N.Turl / N.Turl	21/06/04	730	[illegible]	21/06/04	15:34	NA	☑	4, 4, 4 / 5, 4, 4	☑ Yes ☐ No

* UNLESS OTHERWISE AGREED TO IN WRITING, WORK SUBMITTED ON THIS CHAIN OF CUSTODY IS SUBJECT TO BV LABS' STANDARD TERMS AND CONDITIONS. SIGNING OF THIS CHAIN OF CUSTODY DOCUMENT IS ACKNOWLEDGMENT AND ACCEPTANCE OF OUR TERMS WHICH ARE AVAILABLE FOR VIEWING AT WWW.BVLABS.COM/TERMS-AND-CONDITIONS.
* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

White: BV Labs Yellow: Client

Bureau Veritas Canada (2019) Inc.

Your P.O. #: 73523825
Your Project #: 11222680-3-2
Site Location: UPLAND
Your C.O.C. #: 637465-01-01

Attention: Airesse MacPhee

GHD Limited
455 PHILLIP STREET
WATERLOO, ON
CANADA N2L 3X2

Report Date: 2021/06/14
Report #: R3032277
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C138326
Received: 2021/06/04, 15:34

Sample Matrix: Water
Samples Received: 1

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity @25C (pp, total), CO3,HCO3,OH	1	N/A	2021/06/07	BBY6SOP-00026	SM 23 2320 B m
Biochemical Oxygen Demand	1	2021/06/05	2021/06/10	BBY6SOP-00045	SM 23 5210 B m
BTEX/MTBE LH, VH, F1 SIM/MS	1	N/A	2021/06/08	BBY8SOP-00010 / BBY8SOP-00011 / BBY8SOP-00012	BCMOE BCLM Jul 2017
Chloride/Sulphate by Auto Colourimetry	1	N/A	2021/06/07	BBY6SOP-00011 / BBY6SOP-00017	SM23-4500-Cl/SO4-E m
COD by Colorimeter	1	N/A	2021/06/08	BBY6SOP-00024	SM 23 5220 D m
Conductivity @25C	1	N/A	2021/06/07	BBY6SOP-00026	SM 23 2510 B m
Sulphide (as H2S) (1)	1	N/A	2021/06/10		Auto Calc
Un-ionized Hydrogen Sulphide as S Calc	1	N/A	2021/06/10	BBY WI-00033	Auto Calc
Hardness Total (calculated as CaCO3) (2)	1	N/A	2021/06/10	BBY WI-00033	Auto Calc
Hardness (calculated as CaCO3)	1	N/A	2021/06/10	BBY WI-00033	Auto Calc
Mercury (Dissolved) by CV (3)	1	2021/06/07	2021/06/07	AB SOP-00084	BCMOE BCLM Oct2013 m
Mercury (Total) by CV	1	2021/06/07	2021/06/07	AB SOP-00084	BCMOE BCLM Oct2013 m
Na, K, Ca, Mg, S by CRC ICPMS (diss.)	1	N/A	2021/06/10	BBY WI-00033	Auto Calc
Elements by CRC ICPMS (dissolved) (3)	1	N/A	2021/06/09	BBY7SOP-00002	EPA 6020b R2 m
Na, K, Ca, Mg, S by CRC ICPMS (total)	1	2021/06/04	2021/06/10	BBY WI-00033	Auto Calc
Elements by CRC ICPMS (total)	1	2021/06/08	2021/06/09	BBY7SOP-00003 / BBY7SOP-00002	EPA 6020b R2 m
Ammonia-N (Total)	1	N/A	2021/06/09	AB SOP-00007	SM 23 4500 NH3 A G m
Nitrate + Nitrite (N)	1	N/A	2021/06/05	BBY6SOP-00010	SM 23 4500-NO3- I m
Nitrite (N) by CFA	1	N/A	2021/06/05	BBY6SOP-00010	SM 23 4500-NO3- I m
Nitrogen - Nitrate (as N)	1	N/A	2021/06/05	BBY WI-00033	Auto Calc
PAH in Water by GC/MS (SIM)	1	2021/06/07	2021/06/08	BBY8SOP-00021	BCMOE BCLM Jul2017m
Total LMW, HMW, Total PAH Calc (4)	1	N/A	2021/06/08	BBY WI-00033	Auto Calc
Filter and HNO3 Preserve for Metals	1	N/A	2021/06/04	BBY7 WI-00004	SM 23 3030B m
Orthophosphate by Konelab (5)	1	N/A	2021/06/05	BBY6SOP-00013	SM 23 4500-P E m
Total Sulphide (1)	1	N/A	2021/06/10	AB SOP-00080	SM 23 4500 S2-A D Fm
Total Dissolved Solids (Filt. Residue)	1	2021/06/08	2021/06/09	BBY6SOP-00033	SM 23 2540 C m
Total Suspended Solids (NFR)	1	2021/06/09	2021/06/10	BBY6SOP-00034	SM 23 2540 D m
Field pH	1	N/A	2021/06/09		

Your P.O. #: 73523825
Your Project #: 11222680-3-2
Site Location: UPLAND
Your C.O.C. #: 637465-01-01

Attention: Airesse MacPhee

GHD Limited
455 PHILLIP STREET
WATERLOO, ON
CANADA N2L 3X2

Report Date: 2021/06/14
Report #: R3032277
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C138326
Received: 2021/06/04, 15:34

Sample Matrix: Water
Samples Received: 1

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Field Temperature	1	N/A	2021/06/09		
Volatile HC-BTEX (6)	1	N/A	2021/06/08	BBY WI-00033	Auto Calc

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

Bureau Veritas liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Bureau Veritas has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Bureau Veritas, unless otherwise agreed in writing. Bureau Veritas is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) This test was performed by Bureau Veritas Calgary Environmental
(2) "Total Hardness" was calculated from Total Ca and Mg concentrations and may be biased high (Hardness, or Dissolved Hardness, calculated from Dissolved Ca and Mg, should be used for compliance if available).
(3) Dissolved > Total Imbalance: When applicable, Dissolved and Total results were reviewed and data quality meets acceptable levels unless otherwise noted.
(4) Total PAHs in Water include: Quinoline, Naphthalene, 1-Methylnaphthalene, 2-Methylnaphthalene, Acenaphthylene, Acenaphthene, Fluorene, Phenanthrene, Anthracene, Acridine, Fluoranthene, Pyrene, Benzo(a)anthracene, Chrysene, Benzo(b&j)fluoranthene, Benzo(k)fluoranthene, Benzo(a)pyrene, Indeno(1,2,3-cd)pyrene, Dibenz(a,h)anthracene, and Benzo(g,h,i)perylene.
(5) Orthophosphate > Total Phosphorus Imbalance: When applicable, Orthophosphate, Total Phosphorus and dissolved Phosphorus results were reviewed and data quality meets acceptable levels unless otherwise noted.
(6) VPH = VH - (Benzene + Toluene + Ethylbenzene + m & p-Xylene + o-Xylene + Styrene)

Your P.O. #: 73523825
Your Project #: 11222680-3-2
Site Location: UPLAND
Your C.O.C. #: 637465-01-01

Attention: Airesse MacPhee

GHD Limited
455 PHILLIP STREET
WATERLOO, ON
CANADA N2L 3X2

Report Date: 2021/06/14
Report #: R3032277
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C138326
Received: 2021/06/04, 15:34

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Nahed Amer, Customer Solutions Representative
Email: Nahed.AMER@bureauveritas.com
Phone# (604) 734 7276

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BV Labs Job #: C138326
Report Date: 2021/06/14

GHD Limited
Client Project #: 11222680-3-2
Site Location: UPLAND
Your P.O. #: 73523825
Sampler Initials: NT

RESULTS OF CHEMICAL ANALYSES OF WATER

BV Labs ID		ZX6723			
Sampling Date		2021/06/03 11:30			
COC Number		637465-01-01			
	UNITS	W-11222680-030621-NT-01	RDL	MDL	QC Batch
ANIONS					
Nitrite (N)	mg/L	<0.0050	0.0050	0.0050	A246059
Calculated Parameters					
Filter and HNO3 Preservation	N/A	FIELD	N/A	N/A	ONSITE
Nitrate (N)	mg/L	0.030	0.020	N/A	A245127
Sulphide (as H2S)	mg/L	0.035	0.010	N/A	A245716
Demand Parameters					
Biochemical Oxygen Demand	mg/L	5.8	2.0	N/A	A245919
Chemical Oxygen Demand	mg/L	94	10	10	A248187
Field Parameters					
Field pH	pH	6.97	N/A	N/A	ONSITE
Field Temperature	°C	21.28	N/A	N/A	ONSITE
Misc. Inorganics					
Conductivity	uS/cm	1000	2.0	N/A	A247658
Total Dissolved Solids	mg/L	660	10	N/A	A248578
Total Suspended Solids	mg/L	110 (1)	1.1	N/A	A250067
Anions					
Alkalinity (PP as CaCO3)	mg/L	<1.0	1.0	N/A	A247607
Alkalinity (Total as CaCO3)	mg/L	420	1.0	N/A	A247607
Bicarbonate (HCO3)	mg/L	510	1.0	N/A	A247607
Carbonate (CO3)	mg/L	<1.0	1.0	N/A	A247607
Hydroxide (OH)	mg/L	<1.0	1.0	N/A	A247607
Total Sulphide	mg/L	0.033 (2)	0.0090	N/A	A250936
Dissolved Chloride (Cl)	mg/L	39	1.0	N/A	A247476
Dissolved Sulphate (SO4)	mg/L	110	1.0	N/A	A247476
Nutrients					
Total Ammonia (N)	mg/L	2.2 (3)	0.030	0.0080	A249819

RDL = Reportable Detection Limit
N/A = Not Applicable
(1) RDL raised due to limited initial sample amount.
(2) Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.
(3) Detection limits raised due to dilution to bring analyte within the calibrated range.

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BV Labs Job #: C138326
Report Date: 2021/06/14

GHD Limited
Client Project #: 11222680-3-2
Site Location: UPLAND
Your P.O. #: 73523825
Sampler Initials: NT

RESULTS OF CHEMICAL ANALYSES OF WATER

BV Labs ID		ZX6723			
Sampling Date		2021/06/03 11:30			
COC Number		637465-01-01			
	UNITS	**W-11222680-030621-NT-01**	**RDL**	**MDL**	**QC Batch**
Orthophosphate (P)	mg/L	<0.0030	0.0030	0.0030	A246072
Nitrate plus Nitrite (N)	mg/L	0.030	0.020	0.020	A246057
RDL = Reportable Detection Limit					

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BV Labs Job #: C138326
Report Date: 2021/06/14

GHD Limited
Client Project #: 11222680-3-2
Site Location: UPLAND
Your P.O. #: 73523825
Sampler Initials: NT

MISCELLANEOUS (WATER)

BV Labs ID		ZX6723			
Sampling Date		2021/06/03 11:30			
COC Number		637465-01-01			
	UNITS	W-11222680-030621-NT-01	RDL	MDL	QC Batch
Calculated Parameters					
Total Un-ionized Hydrogen Sulfide as S	mg/L	0.017	0.0050	0.0050	A250026
Total Un-ionized Hydrogen Sulfide as H2S	mg/L	0.018	0.0050	0.0050	A250026
RDL = Reportable Detection Limit					

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BV Labs Job #: C138326
Report Date: 2021/06/14

GHD Limited
Client Project #: 11222680-3-2
Site Location: UPLAND
Your P.O. #: 73523825
Sampler Initials: NT

CSR BTEX/VPH IN WATER (WATER)

BV Labs ID		ZX6723			
Sampling Date		2021/06/03 11:30			
COC Number		637465-01-01			
	UNITS	W-11222680-030621-NT-01	RDL	MDL	QC Batch
Calculated Parameters					
VPH (VHW6 to 10 - BTEX)	ug/L	<300	300	300	A245181
Volatiles					
Methyl-tert-butylether (MTBE)	ug/L	<4.0	4.0	4.0	A247298
Benzene	ug/L	<0.40	0.40	0.40	A247298
Toluene	ug/L	0.49	0.40	0.40	A247298
Ethylbenzene	ug/L	<0.40	0.40	0.40	A247298
m & p-Xylene	ug/L	<0.40	0.40	0.40	A247298
o-Xylene	ug/L	0.48	0.40	0.40	A247298
Styrene	ug/L	<0.40	0.40	0.40	A247298
Xylenes (Total)	ug/L	0.48	0.40	0.40	A247298
VH C6-C10	ug/L	<300	300	300	A247298
Surrogate Recovery (%)					
1,4-Difluorobenzene (sur.)	%	106	N/A	N/A	A247298
4-Bromofluorobenzene (sur.)	%	101	N/A	N/A	A247298
D4-1,2-Dichloroethane (sur.)	%	102	N/A	N/A	A247298

RDL = Reportable Detection Limit
N/A = Not Applicable

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BV Labs Job #: C138326
Report Date: 2021/06/14

GHD Limited
Client Project #: 11222680-3-2
Site Location: UPLAND
Your P.O. #: 73523825
Sampler Initials: NT

CSR DISSOLVED METALS IN WATER WITH CV HG (WATER)

BV Labs ID		ZX6723			
Sampling Date		2021/06/03 11:30			
COC Number		637465-01-01			
	UNITS	W-11222680-030621-NT-01	RDL	MDL	QC Batch
Calculated Parameters					
Dissolved Hardness (CaCO3)	mg/L	479	0.50	0.50	A244920
Elements					
Dissolved Mercury (Hg)	ug/L	<0.0019	0.0019	0.0019	A247292
Dissolved Metals by ICPMS					
Dissolved Aluminum (Al)	ug/L	11.2	6.0	0.060	A247730
Dissolved Antimony (Sb)	ug/L	<1.0	1.0	0.0040	A247730
Dissolved Arsenic (As)	ug/L	1.18	0.20	0.020	A247730
Dissolved Barium (Ba)	ug/L	37.1	2.0	0.0040	A247730
Dissolved Beryllium (Be)	ug/L	<0.20	0.20	0.0060	A247730
Dissolved Bismuth (Bi)	ug/L	<2.0	2.0	0.0020	A247730
Dissolved Boron (B)	ug/L	132	100	100	A247730
Dissolved Cadmium (Cd)	ug/L	<0.020	0.020	0.0040	A247730
Dissolved Chromium (Cr)	ug/L	<2.0	2.0	0.040	A247730
Dissolved Cobalt (Co)	ug/L	8.93	0.40	0.40	A247730
Dissolved Copper (Cu)	ug/L	<0.40	0.40	0.020	A247730
Dissolved Iron (Fe)	ug/L	16800	10	0.080	A247730
Dissolved Lead (Pb)	ug/L	<0.40	0.40	0.0020	A247730
Dissolved Lithium (Li)	ug/L	<4.0	4.0	4.0	A247730
Dissolved Manganese (Mn)	ug/L	9730	2.0	0.060	A247730
Dissolved Molybdenum (Mo)	ug/L	<2.0	2.0	0.0040	A247730
Dissolved Nickel (Ni)	ug/L	<2.0	2.0	0.020	A247730
Dissolved Phosphorus (P)	ug/L	<20	20	2.0	A247730
Dissolved Selenium (Se)	ug/L	<0.20	0.20	0.012	A247730
Dissolved Silicon (Si)	ug/L	4930	200	0.60	A247730
Dissolved Silver (Ag)	ug/L	<0.040	0.040	0.0040	A247730
Dissolved Strontium (Sr)	ug/L	467	2.0	0.0040	A247730
Dissolved Thallium (Tl)	ug/L	<0.020	0.020	0.020	A247730
Dissolved Tin (Sn)	ug/L	<10	10	0.010	A247730
Dissolved Titanium (Ti)	ug/L	<10	10	0.60	A247730
Dissolved Uranium (U)	ug/L	<0.20	0.20	0.0020	A247730
Dissolved Vanadium (V)	ug/L	<10	10	0.040	A247730
RDL = Reportable Detection Limit					

BV Labs Job #: C138326
Report Date: 2021/06/14

GHD Limited
Client Project #: 11222680-3-2
Site Location: UPLAND
Your P.O. #: 73523825
Sampler Initials: NT

CSR DISSOLVED METALS IN WATER WITH CV HG (WATER)

BV Labs ID		ZX6723			
Sampling Date		2021/06/03 11:30			
COC Number		637465-01-01			
	UNITS	**W-11222680-030621-NT-01**	**RDL**	**MDL**	**QC Batch**
Dissolved Zinc (Zn)	ug/L	<10	10	0.10	A247730
Dissolved Zirconium (Zr)	ug/L	<0.20	0.20	0.016	A247730
Dissolved Calcium (Ca)	mg/L	148	0.10	0.0020	A244921
Dissolved Magnesium (Mg)	mg/L	26.4	0.10	0.0010	A244921
Dissolved Potassium (K)	mg/L	4.17	0.10	0.0040	A244921
Dissolved Sodium (Na)	mg/L	32.4	0.10	0.0020	A244921
Dissolved Sulphur (S)	mg/L	32.1	6.0	2.0	A244921
RDL = Reportable Detection Limit					

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BV Labs Job #: C138326
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GHD Limited
Client Project #: 11222680-3-2
Site Location: UPLAND
Your P.O. #: 73523825
Sampler Initials: NT

CSR TOTAL METALS IN WATER WITH CV HG (WATER)

BV Labs ID		ZX6723			
Sampling Date		2021/06/03 11:30			
COC Number		637465-01-01			
	UNITS	W-11222680-030621-NT-01	RDL	MDL	QC Batch
Calculated Parameters					
Total Hardness (CaCO3)	mg/L	474	0.50	0.50	A244919
Elements					
Total Mercury (Hg)	ug/L	<0.0019	0.0019	0.0019	A247482
Total Metals by ICPMS					
Total Aluminum (Al)	ug/L	532	6.0	0.060	A248655
Total Antimony (Sb)	ug/L	<1.0	1.0	0.0040	A248655
Total Arsenic (As)	ug/L	3.37	0.20	0.020	A248655
Total Barium (Ba)	ug/L	47.7	2.0	0.0040	A248655
Total Beryllium (Be)	ug/L	<0.20	0.20	0.0060	A248655
Total Bismuth (Bi)	ug/L	<2.0	2.0	0.0020	A248655
Total Boron (B)	ug/L	129	100	100	A248655
Total Cadmium (Cd)	ug/L	0.028	0.020	0.0040	A248655
Total Chromium (Cr)	ug/L	<2.0	2.0	0.040	A248655
Total Cobalt (Co)	ug/L	9.73	0.40	0.40	A248655
Total Copper (Cu)	ug/L	5.4	1.0	0.060	A248655
Total Iron (Fe)	ug/L	38500	20	1.4	A248655
Total Lead (Pb)	ug/L	2.20	0.40	0.0020	A248655
Total Lithium (Li)	ug/L	<4.0	4.0	4.0	A248655
Total Manganese (Mn)	ug/L	9890	2.0	0.060	A248655
Total Molybdenum (Mo)	ug/L	<2.0	2.0	0.0040	A248655
Total Nickel (Ni)	ug/L	<2.0	2.0	0.020	A248655
Total Phosphorus (P)	ug/L	89	20	2.0	A248655
Total Selenium (Se)	ug/L	<0.20	0.20	0.012	A248655
Total Silicon (Si)	ug/L	5660	200	0.60	A248655
Total Silver (Ag)	ug/L	<0.040	0.040	0.0040	A248655
Total Strontium (Sr)	ug/L	489	2.0	0.0040	A248655
Total Thallium (Tl)	ug/L	<0.020	0.020	0.020	A248655
Total Tin (Sn)	ug/L	<10	10	0.010	A248655
Total Titanium (Ti)	ug/L	46	10	0.60	A248655
Total Uranium (U)	ug/L	<0.20	0.20	0.0020	A248655
Total Vanadium (V)	ug/L	<10	10	0.040	A248655
RDL = Reportable Detection Limit					

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BV Labs Job #: C138326
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GHD Limited
Client Project #: 11222680-3-2
Site Location: UPLAND
Your P.O. #: 73523825
Sampler Initials: NT

CSR TOTAL METALS IN WATER WITH CV HG (WATER)

BV Labs ID		ZX6723			
Sampling Date		2021/06/03 11:30			
COC Number		637465-01-01			
	UNITS	**W-11222680-030621-NT-01**	**RDL**	**MDL**	**QC Batch**
Total Zinc (Zn)	ug/L	13	10	0.10	A248655
Total Zirconium (Zr)	ug/L	0.67	0.20	0.016	A248655
Total Calcium (Ca)	mg/L	147	0.10	0.0020	A244922
Total Magnesium (Mg)	mg/L	26.3	0.10	0.0010	A244922
Total Potassium (K)	mg/L	4.15	0.10	0.0040	A244922
Total Sodium (Na)	mg/L	32.3	0.10	0.0020	A244922
Total Sulphur (S)	mg/L	32.5	6.0	2.0	A244922
RDL = Reportable Detection Limit					

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GHD Limited
Client Project #: 11222680-3-2
Site Location: UPLAND
Your P.O. #: 73523825
Sampler Initials: NT

CSR PAH IN WATER BY GC-MS (WATER)

BV Labs ID		ZX6723			
Sampling Date		2021/06/03 11:30			
COC Number		637465-01-01			
	UNITS	W-11222680-030621-NT-01	RDL	MDL	QC Batch
Calculated Parameters					
Low Molecular Weight PAH`s	ug/L	8.1	0.10	0.010	A245041
High Molecular Weight PAH`s	ug/L	<0.050	0.050	0.020	A245041
Total PAH	ug/L	8.1	0.10	0.010	A245041
Polycyclic Aromatics					
Quinoline	ug/L	0.038	0.020	0.020	A246878
Naphthalene	ug/L	5.8	0.10	0.050	A246878
1-Methylnaphthalene	ug/L	0.69	0.050	0.050	A246878
2-Methylnaphthalene	ug/L	0.88	0.10	0.050	A246878
Acenaphthylene	ug/L	<0.050	0.050	0.050	A246878
Acenaphthene	ug/L	0.19	0.050	0.050	A246878
Fluorene	ug/L	0.12	0.050	0.050	A246878
Phenanthrene	ug/L	0.059	0.050	0.050	A246878
Anthracene	ug/L	0.077	0.010	0.010	A246878
Acridine	ug/L	0.23	0.050	0.050	A246878
Fluoranthene	ug/L	<0.020	0.020	0.020	A246878
Pyrene	ug/L	<0.020	0.020	0.020	A246878
Benzo(a)anthracene	ug/L	<0.010	0.010	0.010	A246878
Chrysene	ug/L	<0.020	0.020	0.020	A246878
Benzo(b&j)fluoranthene	ug/L	<0.030	0.030	0.030	A246878
Benzo(k)fluoranthene	ug/L	<0.050	0.050	0.050	A246878
Benzo(a)pyrene	ug/L	<0.0050	0.0050	0.0050	A246878
Indeno(1,2,3-cd)pyrene	ug/L	<0.050	0.050	0.050	A246878
Dibenz(a,h)anthracene	ug/L	<0.0030	0.0030	0.0030	A246878
Benzo(g,h,i)perylene	ug/L	<0.050	0.050	0.050	A246878
Surrogate Recovery (%)					
D10-ANTHRACENE (sur.)	%	100	N/A	N/A	A246878
D8-ACENAPHTHYLENE (sur.)	%	106	N/A	N/A	A246878
D8-NAPHTHALENE (sur.)	%	98	N/A	N/A	A246878
TERPHENYL-D14 (sur.)	%	92	N/A	N/A	A246878

RDL = Reportable Detection Limit
N/A = Not Applicable

GENERAL COMMENTS

CSR DISSOLVED METALS IN WATER WITH CV HG (WATER) Comments

Sample ZX6723 [W-11222680-030621-NT-01] Elements by CRC ICPMS (dissolved): RDL raised due to concentration over linear range, sample dilution required.

CSR TOTAL METALS IN WATER WITH CV HG (WATER) Comments

Sample ZX6723 [W-11222680-030621-NT-01] Elements by CRC ICPMS (total): RDL raised due to concentration over linear range, sample dilution required.

Results relate only to the items tested.

BV Labs Job #: C138326
Report Date: 2021/06/14

QUALITY ASSURANCE REPORT

GHD Limited
Client Project #: 11222680-3-2
Site Location: UPLAND
Your P.O. #: 73523825
Sampler Initials: NT

			Matrix Spike		Spiked Blank		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
A246878	D10-ANTHRACENE (sur.)	2021/06/08	100	50 - 140	98	50 - 140	98	%		
A246878	D8-ACENAPHTHYLENE (sur.)	2021/06/08	99	50 - 140	96	50 - 140	94	%		
A246878	D8-NAPHTHALENE (sur.)	2021/06/08	104	50 - 140	102	50 - 140	100	%		
A246878	TERPHENYL-D14 (sur.)	2021/06/08	117	50 - 140	115	50 - 140	109	%		
A247298	1,4-Difluorobenzene (sur.)	2021/06/07	94	70 - 130	91	70 - 130	118	%		
A247298	4-Bromofluorobenzene (sur.)	2021/06/07	97	70 - 130	95	70 - 130	98	%		
A247298	D4-1,2-Dichloroethane (sur.)	2021/06/07	92	70 - 130	92	70 - 130	100	%		
A245919	Biochemical Oxygen Demand	2021/06/10			98	85 - 115	<2.0	mg/L	2.1 (1)	20
A246057	Nitrate plus Nitrite (N)	2021/06/05	103	80 - 120	113	80 - 120	<0.020	mg/L	0.20 (1)	25
A246059	Nitrite (N)	2021/06/05	4.0 (2)	80 - 120	102	80 - 120	<0.0050	mg/L	NC (1)	20
A246072	Orthophosphate (P)	2021/06/05	NC	80 - 120	93	80 - 120	<0.0030	mg/L	0.017 (1)	20
A246878	1-Methylnaphthalene	2021/06/08	113	50 - 140	106	50 - 140	<0.050	ug/L	7.9 (1)	40
A246878	2-Methylnaphthalene	2021/06/08	108	50 - 140	101	50 - 140	<0.10	ug/L	6.5 (1)	40
A246878	Acenaphthene	2021/06/08	114	50 - 140	109	50 - 140	<0.050	ug/L	4.9 (1)	40
A246878	Acenaphthylene	2021/06/08	109	50 - 140	104	50 - 140	<0.050	ug/L	NC (1)	40
A246878	Acridine	2021/06/08	108	50 - 140	106	50 - 140	<0.050	ug/L	NC (1)	40
A246878	Anthracene	2021/06/08	103	50 - 140	100	50 - 140	<0.010	ug/L	NC (1)	40
A246878	Benzo(a)anthracene	2021/06/08	81	50 - 140	79	50 - 140	<0.010	ug/L	NC (1)	40
A246878	Benzo(a)pyrene	2021/06/08	83	50 - 140	86	50 - 140	<0.0050	ug/L	NC (1)	40
A246878	Benzo(b&j)fluoranthene	2021/06/08	82	50 - 140	84	50 - 140	<0.030	ug/L	NC (1)	40
A246878	Benzo(g,h,i)perylene	2021/06/08	79	50 - 140	89	50 - 140	<0.050	ug/L	NC (1)	40
A246878	Benzo(k)fluoranthene	2021/06/08	88	50 - 140	90	50 - 140	<0.050	ug/L	NC (1)	40
A246878	Chrysene	2021/06/08	81	50 - 140	79	50 - 140	<0.020	ug/L	NC (1)	40
A246878	Dibenz(a,h)anthracene	2021/06/08	80	50 - 140	90	50 - 140	<0.0030	ug/L	NC (1)	40
A246878	Fluoranthene	2021/06/08	107	50 - 140	103	50 - 140	<0.020	ug/L	NC (1)	40
A246878	Fluorene	2021/06/08	106	50 - 140	101	50 - 140	<0.050	ug/L	7.7 (1)	40
A246878	Indeno(1,2,3-cd)pyrene	2021/06/08	87	50 - 140	95	50 - 140	<0.050	ug/L	NC (1)	40
A246878	Naphthalene	2021/06/08	111	50 - 140	104	50 - 140	<0.10	ug/L	14 (1)	40
A246878	Phenanthrene	2021/06/08	106	50 - 140	101	50 - 140	<0.050	ug/L	NC (1)	40
A246878	Pyrene	2021/06/08	105	50 - 140	102	50 - 140	<0.020	ug/L	NC (1)	40
A246878	Quinoline	2021/06/08	118	50 - 140	116	50 - 140	<0.020	ug/L	NC (1)	40

Bureau Veritas Laboratories Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		Spiked Blank		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
A247292	Dissolved Mercury (Hg)	2021/06/07	111	80 - 120	107	80 - 120	<0.0019	ug/L	NC (1)	20
A247298	Benzene	2021/06/08	96	70 - 130	92	70 - 130	<0.40	ug/L	NC (1)	30
A247298	Ethylbenzene	2021/06/08	110	70 - 130	111	70 - 130	<0.40	ug/L	NC (1)	30
A247298	m & p-Xylene	2021/06/08	108	70 - 130	108	70 - 130	<0.40	ug/L	NC (1)	30
A247298	Methyl-tert-butylether (MTBE)	2021/06/08	93	70 - 130	79	70 - 130	<4.0	ug/L	NC (1)	30
A247298	o-Xylene	2021/06/08	107	70 - 130	104	70 - 130	<0.40	ug/L	NC (1)	30
A247298	Styrene	2021/06/08	107	70 - 130	103	70 - 130	<0.40	ug/L	NC (1)	30
A247298	Toluene	2021/06/08	103	70 - 130	103	70 - 130	<0.40	ug/L	NC (1)	30
A247298	VH C6-C10	2021/06/08			81	70 - 130	<300	ug/L	NC (1)	30
A247298	Xylenes (Total)	2021/06/08					<0.40	ug/L	NC (1)	30
A247476	Dissolved Chloride (Cl)	2021/06/07	101	80 - 120	102	80 - 120	<1.0	mg/L		
A247476	Dissolved Sulphate (SO4)	2021/06/07	NC	80 - 120	95	80 - 120	<1.0	mg/L	3.6 (1)	20
A247482	Total Mercury (Hg)	2021/06/07	118	80 - 120	110	80 - 120	<0.0019	ug/L	NC (1)	20
A247607	Alkalinity (PP as CaCO3)	2021/06/07					<1.0	mg/L	NC (1)	20
A247607	Alkalinity (Total as CaCO3)	2021/06/07			92	80 - 120	<1.0	mg/L	NC (1)	20
A247607	Bicarbonate (HCO3)	2021/06/07					<1.0	mg/L	NC (1)	20
A247607	Carbonate (CO3)	2021/06/07					<1.0	mg/L	NC (1)	20
A247607	Hydroxide (OH)	2021/06/07					<1.0	mg/L	NC (1)	20
A247658	Conductivity	2021/06/07			99	80 - 120	<2.0	uS/cm		
A247730	Dissolved Aluminum (Al)	2021/06/09	NC	80 - 120	103	80 - 120	<3.0	ug/L	2.7 (1)	20
A247730	Dissolved Antimony (Sb)	2021/06/09	103	80 - 120	102	80 - 120	<0.50	ug/L	NC (1)	20
A247730	Dissolved Arsenic (As)	2021/06/09	107	80 - 120	98	80 - 120	<0.10	ug/L	0.61 (1)	20
A247730	Dissolved Barium (Ba)	2021/06/09	NC	80 - 120	100	80 - 120	<1.0	ug/L	1.7 (1)	20
A247730	Dissolved Beryllium (Be)	2021/06/09	104	80 - 120	99	80 - 120	<0.10	ug/L	NC (1)	20
A247730	Dissolved Bismuth (Bi)	2021/06/09	98	80 - 120	100	80 - 120	<1.0	ug/L	NC (1)	20
A247730	Dissolved Boron (B)	2021/06/09	NC	80 - 120	95	80 - 120	<50	ug/L	4.0 (1)	20
A247730	Dissolved Cadmium (Cd)	2021/06/09	98	80 - 120	100	80 - 120	<0.010	ug/L	8.0 (1)	20
A247730	Dissolved Chromium (Cr)	2021/06/09	96	80 - 120	97	80 - 120	<1.0	ug/L	NC (1)	20
A247730	Dissolved Cobalt (Co)	2021/06/09	93	80 - 120	97	80 - 120	<0.20	ug/L	3.5 (1)	20
A247730	Dissolved Copper (Cu)	2021/06/09	89	80 - 120	94	80 - 120	<0.20	ug/L	2.6 (1)	20
A247730	Dissolved Iron (Fe)	2021/06/09	NC	80 - 120	100	80 - 120	<5.0	ug/L	0.30 (1)	20

QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		Spiked Blank		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
A247730	Dissolved Lead (Pb)	2021/06/09	101	80 - 120	103	80 - 120	<0.20	ug/L	NC (1)	20
A247730	Dissolved Lithium (Li)	2021/06/09	103	80 - 120	102	80 - 120	<2.0	ug/L	3.4 (1)	20
A247730	Dissolved Manganese (Mn)	2021/06/09	NC	80 - 120	98	80 - 120	<1.0	ug/L	1.4 (1)	20
A247730	Dissolved Molybdenum (Mo)	2021/06/09	NC	80 - 120	102	80 - 120	<1.0	ug/L	0.53 (1)	20
A247730	Dissolved Nickel (Ni)	2021/06/09	89	80 - 120	96	80 - 120	<1.0	ug/L	3.9 (1)	20
A247730	Dissolved Phosphorus (P)	2021/06/09	110	80 - 120	101	80 - 120	<10	ug/L		
A247730	Dissolved Selenium (Se)	2021/06/09	101	80 - 120	98	80 - 120	<0.10	ug/L	NC (1)	20
A247730	Dissolved Silicon (Si)	2021/06/09	NC	80 - 120	105	80 - 120	<100	ug/L	0.14 (1)	20
A247730	Dissolved Silver (Ag)	2021/06/09	98	80 - 120	98	80 - 120	<0.020	ug/L	NC (1)	20
A247730	Dissolved Strontium (Sr)	2021/06/09	NC	80 - 120	100	80 - 120	<1.0	ug/L	0.45 (1)	20
A247730	Dissolved Thallium (Tl)	2021/06/09	99	80 - 120	100	80 - 120	<0.010	ug/L	NC (1)	20
A247730	Dissolved Tin (Sn)	2021/06/09	101	80 - 120	102	80 - 120	<5.0	ug/L	NC (1)	20
A247730	Dissolved Titanium (Ti)	2021/06/09	102	80 - 120	99	80 - 120	<5.0	ug/L	NC (1)	20
A247730	Dissolved Uranium (U)	2021/06/09	108	80 - 120	102	80 - 120	<0.10	ug/L	NC (1)	20
A247730	Dissolved Vanadium (V)	2021/06/09	100	80 - 120	98	80 - 120	<5.0	ug/L	NC (1)	20
A247730	Dissolved Zinc (Zn)	2021/06/09	NC	80 - 120	99	80 - 120	<5.0	ug/L	2.7 (1)	20
A247730	Dissolved Zirconium (Zr)	2021/06/09	119	80 - 120	97	80 - 120	<0.10	ug/L	NC (1)	20
A248187	Chemical Oxygen Demand	2021/06/08	NC	80 - 120	104	80 - 120	<10	mg/L	9.3 (1)	20
A248578	Total Dissolved Solids	2021/06/09	102	80 - 120	98	80 - 120	<10	mg/L	4.0 (1)	20
A248655	Total Aluminum (Al)	2021/06/09	96	80 - 120	100	80 - 120	<3.0	ug/L	NC (1)	20
A248655	Total Antimony (Sb)	2021/06/09	103	80 - 120	101	80 - 120	<0.50	ug/L	NC (1)	20
A248655	Total Arsenic (As)	2021/06/09	104	80 - 120	98	80 - 120	<0.10	ug/L	2.5 (1)	20
A248655	Total Barium (Ba)	2021/06/09	104	80 - 120	100	80 - 120	<1.0	ug/L	1.6 (1)	20
A248655	Total Beryllium (Be)	2021/06/09	94	80 - 120	92	80 - 120	<0.10	ug/L	NC (1)	20
A248655	Total Bismuth (Bi)	2021/06/09	100	80 - 120	102	80 - 120	<1.0	ug/L	NC (1)	20
A248655	Total Boron (B)	2021/06/09	NC	80 - 120	92	80 - 120	<50	ug/L	6.5 (1)	20
A248655	Total Cadmium (Cd)	2021/06/09	97	80 - 120	97	80 - 120	<0.010	ug/L	8.0 (1)	20
A248655	Total Chromium (Cr)	2021/06/09	88	80 - 120	96	80 - 120	<1.0	ug/L	NC (1)	20
A248655	Total Cobalt (Co)	2021/06/09	87	80 - 120	97	80 - 120	<0.20	ug/L	3.5 (1)	20
A248655	Total Copper (Cu)	2021/06/09	81	80 - 120	91	80 - 120	<0.50	ug/L	8.7 (1)	20
A248655	Total Iron (Fe)	2021/06/09	NC	80 - 120	101	80 - 120	<10	ug/L	4.0 (1)	20

Bureau Veritas Laboratories Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		Spiked Blank		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
A248655	Total Lead (Pb)	2021/06/09	104	80 - 120	106	80 - 120	<0.20	ug/L	2.8 (1)	20
A248655	Total Lithium (Li)	2021/06/09	102	80 - 120	95	80 - 120	<2.0	ug/L	5.5 (1)	20
A248655	Total Manganese (Mn)	2021/06/09	NC	80 - 120	97	80 - 120	<1.0	ug/L	5.1 (1)	20
A248655	Total Molybdenum (Mo)	2021/06/09	112	80 - 120	100	80 - 120	<1.0	ug/L	NC (1)	20
A248655	Total Nickel (Ni)	2021/06/09	84	80 - 120	93	80 - 120	<1.0	ug/L	2.9 (1)	20
A248655	Total Phosphorus (P)	2021/06/09	99	80 - 120	99	80 - 120	<10	ug/L		
A248655	Total Selenium (Se)	2021/06/09	94	80 - 120	94	80 - 120	<0.10	ug/L	NC (1)	20
A248655	Total Silicon (Si)	2021/06/09	113	80 - 120	104	80 - 120	<100	ug/L	2.4 (1)	20
A248655	Total Silver (Ag)	2021/06/09	94	80 - 120	96	80 - 120	<0.020	ug/L	NC (1)	20
A248655	Total Strontium (Sr)	2021/06/09	NC	80 - 120	103	80 - 120	<1.0	ug/L	1.8 (1)	20
A248655	Total Thallium (Tl)	2021/06/09	103	80 - 120	102	80 - 120	<0.010	ug/L	NC (1)	20
A248655	Total Tin (Sn)	2021/06/09	97	80 - 120	98	80 - 120	<5.0	ug/L	NC (1)	20
A248655	Total Titanium (Ti)	2021/06/09	97	80 - 120	99	80 - 120	<5.0	ug/L	NC (1)	20
A248655	Total Uranium (U)	2021/06/09	110	80 - 120	105	80 - 120	<0.10	ug/L	NC (1)	20
A248655	Total Vanadium (V)	2021/06/09	95	80 - 120	98	80 - 120	<5.0	ug/L	NC (1)	20
A248655	Total Zinc (Zn)	2021/06/09	NC	80 - 120	97	80 - 120	<5.0	ug/L	2.7 (1)	20
A248655	Total Zirconium (Zr)	2021/06/09	107	80 - 120	98	80 - 120	<0.10	ug/L	NC (1)	20
A249819	Total Ammonia (N)	2021/06/09	99	80 - 120	91	80 - 120	<0.015	mg/L	NC (1)	20
A250067	Total Suspended Solids	2021/06/10	101	80 - 120	99	80 - 120	<1.0	mg/L	13 (1)	20
A250936	Total Sulphide	2021/06/10	89	80 - 120	119	80 - 120	<0.0018	mg/L	NC (1)	20

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

(1) Duplicate Parent ID

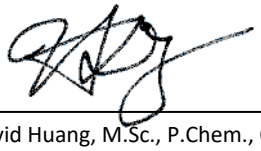
(2) Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.

BV Labs Job #: C138326
Report Date: 2021/06/14

GHD Limited
Client Project #: 11222680-3-2
Site Location: UPLAND
Your P.O. #: 73523825
Sampler Initials: NT

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:



David Huang, M.Sc., P.Chem., QP, Scientific Services Manager

BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports.
For Service Group specific validation please refer to the Validation Signature Page.

Bureau Veritas Laboratories Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

Bureau Veritas Laboratories
4606 Canada Way, Burnaby, British Columbia Canada V5G 1K5 Tel (604) 734 7276 Toll-free 800-563-6266 Fax (604) 731 2386 www.bvlabs.com

C138326_COC

INVOICE TO:
Company Name: #163 GHD Limited
Contact Name: AP Invoices - 735
Address: 455 PHILLIP STREET, WATERLOO ON N2L 3X2
Phone: (519) 884-0510 Fax: (519) 725-1394
Email: APinvoices-735@ghd.com Invoicing-Canada@ghd.com

Report Information
Company Name:
Contact Name: Airesse MacPhee
Address:
Phone: Fax:
Email: airesse.macphee@ghd.com; NationalEDDSupport@ma

Project Information
Quotation #: C10010
P.O. #: 735 23825
Project #: 11222680-03 3-2
Project Name: Upland
Site #: W1
Sampled By: N.Turl

Lab Use Only
Bottle Order #: 637465
Chain Of Custody Record: C#637465-01-01
Project Manager: Nahed Amer

Regulatory Criteria:
- [ ] CSR
- [ ] CCME
- [ ] BC Water Quality
- [ ] Other

Special Instructions: Leak Detection Layer Water

SAMPLES MUST BE KEPT COOL (< 10°C) FROM TIME OF SAMPLING UNTIL DELIVERY TO BV LABS

Turnaround Time (TAT) Required:
Please provide advance notice for rush projects
Regular (Standard) TAT: (will be applied if Rush TAT is not specified) — Standard TAT = 5-7 Working days for most tests. — Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details. [X]
Job Specific Rush TAT (if applies to entire submission): 1 DAY [ ] 2 Day [ ] 3 Day [ ] Date Required: [ ]
Rush Confirmation Number: (call lab for #)

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Metals Field Filtered? (Y / N)	Conductivity, Cl, SO4, NO2, NO3, N+N, Speciated Alk, pH	Sulphide + H2S Calc (LL)	Sulphide, Un-ionized (as H2S) (Calc)	Ammonia-N (Total)	Dissolved Metals with CV Hg, Hardness (CSR)	TDS/TSS	Total Metals with CV Hg (CSR)	PAH	BTEX/VPH	BOD/COD	# of Bottles	Comments
1	W-1122680-030621-NT-01		06/03/21	1130	WATER		X	X	X	X	X	X	X	X	X	X		SHORT HOLDING TIMES!
2																		
3																		
4																		
5																		All bottles were field filtered and preserved as required.
6																		
7																		
8																		
9																		
10																		

RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted	Lab Use Only: Time Sensitive	Temperature (°C) on Receipt	Custody Seal Intact on Cooler?
N.Turl	21/06/04	730	[illegible]	21/06/04	15:34	NA	[ ]	4, 4, 4	[ ] Yes [ ] No
								5, 4, 4	

* UNLESS OTHERWISE AGREED TO IN WRITING, WORK SUBMITTED ON THIS CHAIN OF CUSTODY IS SUBJECT TO BV LABS' STANDARD TERMS AND CONDITIONS. SIGNING OF THIS CHAIN OF CUSTODY DOCUMENT IS ACKNOWLEDGMENT AND ACCEPTANCE OF OUR TERMS WHICH ARE AVAILABLE FOR VIEWING AT WWW.BVLABS.COM/TERMS-AND-CONDITIONS.
* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

White: BV Labs Yellow: Client

Bureau Veritas Canada (2019) Inc.

Your P.O. #: 73523825
Your Project #: 11222680-3-2
Site#: 11222680-3-2
Site Location: UPLAND, LW
Your C.O.C. #: 637465-02-01

Attention: Airesse MacPhee

GHD Limited
455 PHILLIP STREET
WATERLOO, ON
CANADA N2L 3X2

Report Date: 2021/06/14
Report #: R3032279
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C138327
Received: 2021/06/04, 15:34

Sample Matrix: Water
Samples Received: 2

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity @25C (pp, total), CO3,HCO3,OH	2	N/A	2021/06/07	BBY6SOP-00026	SM 23 2320 B m
Biochemical Oxygen Demand	2	2021/06/05	2021/06/10	BBY6SOP-00045	SM 23 5210 B m
BTEX/MTBE LH, VH, F1 SIM/MS	2	N/A	2021/06/08	BBY8SOP-00010 / BBY8SOP-00011 / BBY8SOP-00012	BCMOE BCLM Jul 2017
Chloride/Sulphate by Auto Colourimetry	2	N/A	2021/06/07	BBY6SOP-00011 / BBY6SOP-00017	SM23-4500-Cl/SO4-E m
COD by Colorimeter	2	N/A	2021/06/08	BBY6SOP-00024	SM 23 5220 D m
Conductivity @25C	2	N/A	2021/06/07	BBY6SOP-00026	SM 23 2510 B m
Sulphide (as H2S) (1)	2	N/A	2021/06/10		Auto Calc
Un-ionized Hydrogen Sulphide as S Calc	2	N/A	2021/06/10	BBY WI-00033	Auto Calc
Hardness Total (calculated as CaCO3) (2)	2	N/A	2021/06/10	BBY WI-00033	Auto Calc
Hardness (calculated as CaCO3)	2	N/A	2021/06/10	BBY WI-00033	Auto Calc
Mercury (Dissolved) by CV (3)	2	2021/06/07	2021/06/07	AB SOP-00084	BCMOE BCLM Oct2013 m
Mercury (Total) by CV	2	2021/06/07	2021/06/07	AB SOP-00084	BCMOE BCLM Oct2013 m
Na, K, Ca, Mg, S by CRC ICPMS (diss.)	2	N/A	2021/06/10	BBY WI-00033	Auto Calc
Elements by CRC ICPMS (dissolved) (3)	2	N/A	2021/06/09	BBY7SOP-00002	EPA 6020b R2 m
Na, K, Ca, Mg, S by CRC ICPMS (total)	2	2021/06/04	2021/06/10	BBY WI-00033	Auto Calc
Elements by CRC ICPMS (total)	2	2021/06/08	2021/06/09	BBY7SOP-00003 / BBY7SOP-00002	EPA 6020b R2 m
Ammonia-N (Total)	2	N/A	2021/06/09	AB SOP-00007	SM 23 4500 NH3 A G m
Nitrate + Nitrite (N)	2	N/A	2021/06/05	BBY6SOP-00010	SM 23 4500-NO3- I m
Nitrite (N) by CFA	2	N/A	2021/06/05	BBY6SOP-00010	SM 23 4500-NO3- I m
Nitrogen - Nitrate (as N)	2	N/A	2021/06/05	BBY WI-00033	Auto Calc
PAH in Water by GC/MS (SIM)	2	2021/06/07	2021/06/08	BBY8SOP-00021	BCMOE BCLM Jul2017m
Total LMW, HMW, Total PAH Calc (4)	2	N/A	2021/06/09	BBY WI-00033	Auto Calc
Filter and HNO3 Preserve for Metals	2	N/A	2021/06/04	BBY7 WI-00004	SM 23 3030B m
Orthophosphate by Konelab (5)	2	N/A	2021/06/05	BBY6SOP-00013	SM 23 4500-P E m
Total Sulphide (1)	2	N/A	2021/06/10	AB SOP-00080	SM 23 4500 S2-A D Fm
Total Dissolved Solids (Filt. Residue)	2	2021/06/09	2021/06/10	BBY6SOP-00033	SM 23 2540 C m
Total Suspended Solids (NFR)	2	2021/06/09	2021/06/10	BBY6SOP-00034	SM 23 2540 D m
Field pH	2	N/A	2021/06/09		

Bureau Veritas Laboratories Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

Your P.O. #: 73523825
Your Project #: 11222680-3-2
Site#: 11222680-3-2
Site Location: UPLAND, LW
Your C.O.C. #: 637465-02-01

Attention: Airesse MacPhee

GHD Limited
455 PHILLIP STREET
WATERLOO, ON
CANADA N2L 3X2

Report Date: 2021/06/14
Report #: R3032279
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C138327
Received: 2021/06/04, 15:34

Sample Matrix: Water
Samples Received: 2

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Field Temperature	2	N/A	2021/06/09		
Volatile HC-BTEX (6)	2	N/A	2021/06/08	BBY WI-00033	Auto Calc

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

Bureau Veritas liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Bureau Veritas has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Bureau Veritas, unless otherwise agreed in writing. Bureau Veritas is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.
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Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) This test was performed by Bureau Veritas Calgary Environmental
(2) "Total Hardness" was calculated from Total Ca and Mg concentrations and may be biased high (Hardness, or Dissolved Hardness, calculated from Dissolved Ca and Mg, should be used for compliance if available).
(3) Dissolved > Total Imbalance: When applicable, Dissolved and Total results were reviewed and data quality meets acceptable levels unless otherwise noted.
(4) Total PAHs in Water include: Quinoline, Naphthalene, 1-Methylnaphthalene, 2-Methylnaphthalene, Acenaphthylene, Acenaphthene, Fluorene, Phenanthrene, Anthracene, Acridine, Fluoranthene, Pyrene, Benzo(a)anthracene, Chrysene, Benzo(b&j)fluoranthene, Benzo(k)fluoranthene, Benzo(a)pyrene, Indeno(1,2,3-cd)pyrene, Dibenz(a,h)anthracene, and Benzo(g,h,i)perylene.
(5) Orthophosphate > Total Phosphorus Imbalance: When applicable, Orthophosphate, Total Phosphorus and dissolved Phosphorus results were reviewed and data quality meets acceptable levels unless otherwise noted.
(6) VPH = VH - (Benzene + Toluene + Ethylbenzene + m & p-Xylene + o-Xylene + Styrene)

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Your P.O. #: 73523825
Your Project #: 11222680-3-2
Site#: 11222680-3-2
Site Location: UPLAND, LW
Your C.O.C. #: 637465-02-01

Attention: Airesse MacPhee

GHD Limited
455 PHILLIP STREET
WATERLOO, ON
CANADA N2L 3X2

Report Date: 2021/06/14
Report #: R3032279
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C138327
Received: 2021/06/04, 15:34

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Nahed Amer, Customer Solutions Representative
Email: Nahed.AMER@bureauveritas.com
Phone# (604) 734 7276
==========
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BV Labs Job #: C138327
Report Date: 2021/06/14

GHD Limited
Client Project #: 11222680-3-2
Site Location: UPLAND, LW
Your P.O. #: 73523825

RESULTS OF CHEMICAL ANALYSES OF WATER

BV Labs ID		ZX6724			ZX6725			
Sampling Date		2021/06/03 10:15			2021/06/03 11:00			
COC Number		637465-02-01			637465-02-01			
	UNITS	WL-11222680-030621-NT-01	RDL	MDL	WL-11222680-030621-NT-02	RDL	MDL	QC Batch
ANIONS								
Nitrite (N)	mg/L	0.0695	0.0050	0.0050	0.0107	0.0050	0.0050	A246059
Calculated Parameters								
Nitrate (N)	mg/L	6.46	0.20	N/A	0.036	0.020	N/A	A245127
Sulphide (as H2S)	mg/L	0.072	0.010	N/A	0.24	0.010	N/A	A244464
Demand Parameters								
Biochemical Oxygen Demand	mg/L	10	2.0	N/A	<2.0	2.0	N/A	A245919
Chemical Oxygen Demand	mg/L	136	10	10	152	10	10	A248187
Field Parameters								
Field pH	pH	6.75	N/A	N/A	7.2	N/A	N/A	ONSITE
Field Temperature	°C	22.41	N/A	N/A	23.4	N/A	N/A	ONSITE
Misc. Inorganics								
Conductivity	uS/cm	1100	2.0	N/A	1300	2.0	N/A	A247658
Total Dissolved Solids	mg/L	730	10	N/A	900	10	N/A	A250248
Total Suspended Solids	mg/L	310	1.0	N/A	46	1.0	N/A	A250067
Anions								
Alkalinity (PP as CaCO3)	mg/L	<1.0	1.0	N/A	<1.0	1.0	N/A	A247664
Alkalinity (Total as CaCO3)	mg/L	410	1.0	N/A	570	1.0	N/A	A247664
Bicarbonate (HCO3)	mg/L	500	1.0	N/A	690	1.0	N/A	A247664
Carbonate (CO3)	mg/L	<1.0	1.0	N/A	<1.0	1.0	N/A	A247664
Hydroxide (OH)	mg/L	<1.0	1.0	N/A	<1.0	1.0	N/A	A247664
Total Sulphide	mg/L	0.068 (1)	0.0090	N/A	0.23 (1)	0.0090	N/A	A250946
Dissolved Chloride (Cl)	mg/L	93	1.0	N/A	72	1.0	N/A	A247481
Dissolved Sulphate (SO4)	mg/L	32	1.0	N/A	110	1.0	N/A	A247481
Nutrients								
Total Ammonia (N)	mg/L	6.3 (2)	0.075	0.020	7.5 (2)	0.075	0.020	A249824
Orthophosphate (P)	mg/L	<0.0030	0.0030	0.0030	0.0037	0.0030	0.0030	A246072
Nitrate plus Nitrite (N)	mg/L	6.53 (2)	0.20	0.20	0.047	0.020	0.020	A246057

RDL = Reportable Detection Limit
N/A = Not Applicable
(1) Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.
Sample pH <9, preservation incomplete. Due to volatility of analyte, a low bias in the results is likely.
(2) Detection limits raised due to dilution to bring analyte within the calibrated range.

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BV Labs Job #: C138327
Report Date: 2021/06/14

GHD Limited
Client Project #: 11222680-3-2
Site Location: UPLAND, LW
Your P.O. #: 73523825

MISCELLANEOUS (WATER)

BV Labs ID		ZX6724	ZX6725			
Sampling Date		2021/06/03 10:15	2021/06/03 11:00			
COC Number		637465-02-01	637465-02-01			
	UNITS	WL-11222680-030621-NT-01	WL-11222680-030621-NT-02	RDL	MDL	QC Batch
Calculated Parameters						
Total Un-ionized Hydrogen Sulfide as S	mg/L	0.042	0.080	0.0050	0.0050	A250026
Total Un-ionized Hydrogen Sulfide as H2S	mg/L	0.045	0.085	0.0050	0.0050	A250026
RDL = Reportable Detection Limit						

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BV Labs Job #: C138327
Report Date: 2021/06/14

GHD Limited
Client Project #: 11222680-3-2
Site Location: UPLAND, LW
Your P.O. #: 73523825

CSR BTEX/VPH IN WATER (WATER)

BV Labs ID		ZX6724	ZX6725			
Sampling Date		2021/06/03 10:15	2021/06/03 11:00			
COC Number		637465-02-01	637465-02-01			
	UNITS	WL-11222680-030621-NT-01	WL-11222680-030621-NT-02	RDL	MDL	QC Batch
Calculated Parameters						
VPH (VHW6 to 10 - BTEX)	ug/L	<300	<300	300	300	A245181
Volatiles						
Methyl-tert-butylether (MTBE)	ug/L	<4.0	<4.0	4.0	4.0	A247298
Benzene	ug/L	0.42	0.94	0.40	0.40	A247298
Toluene	ug/L	8.5	2.0	0.40	0.40	A247298
Ethylbenzene	ug/L	2.3	2.2	0.40	0.40	A247298
m & p-Xylene	ug/L	1.6	1.0	0.40	0.40	A247298
o-Xylene	ug/L	1.2	1.6	0.40	0.40	A247298
Styrene	ug/L	0.47	<0.40	0.40	0.40	A247298
Xylenes (Total)	ug/L	2.8	2.6	0.40	0.40	A247298
VH C6-C10	ug/L	<300	<300	300	300	A247298
Surrogate Recovery (%)						
1,4-Difluorobenzene (sur.)	%	98	100	N/A	N/A	A247298
4-Bromofluorobenzene (sur.)	%	99	98	N/A	N/A	A247298
D4-1,2-Dichloroethane (sur.)	%	93	98	N/A	N/A	A247298

RDL = Reportable Detection Limit
N/A = Not Applicable

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BV Labs Job #: C138327
Report Date: 2021/06/14

GHD Limited
Client Project #: 11222680-3-2
Site Location: UPLAND, LW
Your P.O. #: 73523825

CSR DISSOLVED METALS IN WATER WITH CV HG (WATER)

BV Labs ID		ZX6724	ZX6725			
Sampling Date		2021/06/03 10:15	2021/06/03 11:00			
COC Number		637465-02-01	637465-02-01			
	UNITS	WL-11222680-030621-NT-01	WL-11222680-030621-NT-02	RDL	MDL	QC Batch
Calculated Parameters						
Filter and HNO3 Preservation	N/A	FIELD	FIELD	N/A	N/A	ONSITE
Dissolved Hardness (CaCO3)	mg/L	450	622	0.50	0.50	A244920
Elements						
Dissolved Mercury (Hg)	ug/L	<0.0019	0.0023	0.0019	0.0019	A247292
Dissolved Metals by ICPMS						
Dissolved Aluminum (Al)	ug/L	57.6	34.6	3.0	0.030	A247730
Dissolved Antimony (Sb)	ug/L	<0.50	1.04	0.50	0.0020	A247730
Dissolved Arsenic (As)	ug/L	6.65	2.39	0.10	0.010	A247730
Dissolved Barium (Ba)	ug/L	43.6	38.9	1.0	0.0020	A247730
Dissolved Beryllium (Be)	ug/L	<0.10	<0.10	0.10	0.0030	A247730
Dissolved Bismuth (Bi)	ug/L	<1.0	<1.0	1.0	0.0010	A247730
Dissolved Boron (B)	ug/L	214	898	50	50	A247730
Dissolved Cadmium (Cd)	ug/L	<0.010	<0.010	0.010	0.0020	A247730
Dissolved Chromium (Cr)	ug/L	2.1	1.5	1.0	0.020	A247730
Dissolved Cobalt (Co)	ug/L	2.08	1.70	0.20	0.20	A247730
Dissolved Copper (Cu)	ug/L	3.79	1.13	0.20	0.010	A247730
Dissolved Iron (Fe)	ug/L	12500	13800	5.0	0.040	A247730
Dissolved Lead (Pb)	ug/L	<0.20	<0.20	0.20	0.0010	A247730
Dissolved Lithium (Li)	ug/L	<2.0	<2.0	2.0	2.0	A247730
Dissolved Manganese (Mn)	ug/L	5380	7080	1.0	0.030	A247730
Dissolved Molybdenum (Mo)	ug/L	<1.0	<1.0	1.0	0.0020	A247730
Dissolved Nickel (Ni)	ug/L	3.5	1.7	1.0	0.010	A247730
Dissolved Phosphorus (P)	ug/L	121	491	10	1.0	A247730
Dissolved Selenium (Se)	ug/L	0.23	0.30	0.10	0.0060	A247730
Dissolved Silicon (Si)	ug/L	14400	12000	100	0.30	A247730
Dissolved Silver (Ag)	ug/L	<0.020	<0.020	0.020	0.0020	A247730
Dissolved Strontium (Sr)	ug/L	552	654	1.0	0.0020	A247730
Dissolved Thallium (Tl)	ug/L	<0.010	<0.010	0.010	0.010	A247730
Dissolved Tin (Sn)	ug/L	<5.0	<5.0	5.0	0.0050	A247730
Dissolved Titanium (Ti)	ug/L	<5.0	<5.0	5.0	0.30	A247730
Dissolved Uranium (U)	ug/L	0.24	1.24	0.10	0.0010	A247730

RDL = Reportable Detection Limit
N/A = Not Applicable

BV Labs Job #: C138327
Report Date: 2021/06/14

GHD Limited
Client Project #: 11222680-3-2
Site Location: UPLAND, LW
Your P.O. #: 73523825

CSR DISSOLVED METALS IN WATER WITH CV HG (WATER)

BV Labs ID		ZX6724	ZX6725			
Sampling Date		2021/06/03 10:15	2021/06/03 11:00			
COC Number		637465-02-01	637465-02-01			
	UNITS	WL-11222680-030621-NT-01	WL-11222680-030621-NT-02	RDL	MDL	QC Batch
Dissolved Vanadium (V)	ug/L	<5.0	8.1	5.0	0.020	A247730
Dissolved Zinc (Zn)	ug/L	80.8	<5.0	5.0	0.050	A247730
Dissolved Zirconium (Zr)	ug/L	0.67	1.09	0.10	0.0080	A247730
Dissolved Calcium (Ca)	mg/L	134	194	0.050	0.0010	A244921
Dissolved Magnesium (Mg)	mg/L	27.8	33.4	0.050	0.00050	A244921
Dissolved Potassium (K)	mg/L	9.17	9.54	0.050	0.0020	A244921
Dissolved Sodium (Na)	mg/L	54.4	63.4	0.050	0.0010	A244921
Dissolved Sulphur (S)	mg/L	8.7	43.5	3.0	1.0	A244921
RDL = Reportable Detection Limit						

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BV Labs Job #: C138327
Report Date: 2021/06/14

GHD Limited
Client Project #: 11222680-3-2
Site Location: UPLAND, LW
Your P.O. #: 73523825

CSR TOTAL METALS IN WATER WITH CV HG (WATER)

BV Labs ID		ZX6724			ZX6725			
Sampling Date		2021/06/03 10:15			2021/06/03 11:00			
COC Number		637465-02-01			637465-02-01			
	UNITS	WL-11222680-030621-NT-01	RDL	MDL	WL-11222680-030621-NT-02	RDL	MDL	QC Batch
Calculated Parameters								
Total Hardness (CaCO3)	mg/L	432	0.50	0.50	682	0.50	0.50	A244919
Elements								
Total Mercury (Hg)	ug/L	0.0020	0.0019	0.0019	0.0085	0.0019	0.0019	A247482
Total Metals by ICPMS								
Total Aluminum (Al)	ug/L	3920	3.0	0.030	133	6.0	0.060	A248655
Total Antimony (Sb)	ug/L	<0.50	0.50	0.0020	1.1	1.0	0.0040	A248655
Total Arsenic (As)	ug/L	8.65	0.10	0.010	3.44	0.20	0.020	A248655
Total Barium (Ba)	ug/L	53.9	1.0	0.0020	53.8	2.0	0.0040	A248655
Total Beryllium (Be)	ug/L	<0.10	0.10	0.0030	<0.20	0.20	0.0060	A248655
Total Bismuth (Bi)	ug/L	<1.0	1.0	0.0010	<2.0	2.0	0.0020	A248655
Total Boron (B)	ug/L	201	50	50	1030	100	100	A248655
Total Cadmium (Cd)	ug/L	0.077	0.010	0.0020	0.197	0.020	0.0040	A248655
Total Chromium (Cr)	ug/L	4.9	1.0	0.020	<2.0	2.0	0.040	A248655
Total Cobalt (Co)	ug/L	3.82	0.20	0.20	2.67	0.40	0.40	A248655
Total Copper (Cu)	ug/L	42.9	0.50	0.030	14.7	1.0	0.060	A248655
Total Iron (Fe)	ug/L	17800	10	0.70	20500	20	1.4	A248655
Total Lead (Pb)	ug/L	2.66	0.20	0.0010	1.85	0.40	0.0020	A248655
Total Lithium (Li)	ug/L	<2.0	2.0	2.0	<4.0	4.0	4.0	A248655
Total Manganese (Mn)	ug/L	5210	1.0	0.030	8000	2.0	0.060	A248655
Total Molybdenum (Mo)	ug/L	<1.0	1.0	0.0020	<2.0	2.0	0.0040	A248655
Total Nickel (Ni)	ug/L	7.7	1.0	0.010	2.5	2.0	0.020	A248655
Total Phosphorus (P)	ug/L	598	10	1.0	529	20	2.0	A248655
Total Selenium (Se)	ug/L	0.24	0.10	0.0060	0.39	0.20	0.012	A248655
Total Silicon (Si)	ug/L	15800	100	0.30	12100	200	0.60	A248655
Total Silver (Ag)	ug/L	<0.020	0.020	0.0020	<0.040	0.040	0.0040	A248655
Total Strontium (Sr)	ug/L	559	1.0	0.0020	787	2.0	0.0040	A248655
Total Thallium (Tl)	ug/L	<0.010	0.010	0.010	<0.020	0.020	0.020	A248655
Total Tin (Sn)	ug/L	<5.0	5.0	0.0050	<10	10	0.010	A248655
Total Titanium (Ti)	ug/L	164	5.0	0.30	12	10	0.60	A248655
Total Uranium (U)	ug/L	0.24	0.10	0.0010	1.87	0.20	0.0020	A248655
Total Vanadium (V)	ug/L	13.7	5.0	0.020	11	10	0.040	A248655
RDL = Reportable Detection Limit								

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BV Labs Job #: C138327
Report Date: 2021/06/14

GHD Limited
Client Project #: 11222680-3-2
Site Location: UPLAND, LW
Your P.O. #: 73523825

CSR TOTAL METALS IN WATER WITH CV HG (WATER)

BV Labs ID		ZX6724			ZX6725			
Sampling Date		2021/06/03 10:15			2021/06/03 11:00			
COC Number		637465-02-01			637465-02-01			
	UNITS	WL-11222680-030621-NT-01	RDL	MDL	WL-11222680-030621-NT-02	RDL	MDL	QC Batch
Total Zinc (Zn)	ug/L	363	5.0	0.050	33	10	0.10	A248655
Total Zirconium (Zr)	ug/L	1.16	0.10	0.0080	0.86	0.20	0.016	A248655
Total Calcium (Ca)	mg/L	127	0.050	0.0010	213	0.10	0.0020	A244922
Total Magnesium (Mg)	mg/L	28.0	0.050	0.00050	36.6	0.10	0.0010	A244922
Total Potassium (K)	mg/L	9.24	0.050	0.0020	10.6	0.10	0.0040	A244922
Total Sodium (Na)	mg/L	52.5	0.050	0.0010	75.4	0.10	0.0020	A244922
Total Sulphur (S)	mg/L	11.3	3.0	1.0	55.5	6.0	2.0	A244922
RDL = Reportable Detection Limit								

BV Labs Job #: C138327
Report Date: 2021/06/14

GHD Limited
Client Project #: 11222680-3-2
Site Location: UPLAND, LW
Your P.O. #: 73523825

CSR PAH IN WATER BY GC-MS (WATER)

BV Labs ID		ZX6724			ZX6725			
Sampling Date		2021/06/03 10:15			2021/06/03 11:00			
COC Number		637465-02-01			637465-02-01			
	UNITS	WL-11222680-030621-NT-01	RDL	MDL	WL-11222680-030621-NT-02	RDL	MDL	QC Batch
Calculated Parameters								
Low Molecular Weight PAH`s	ug/L	1600	5.0	0.50	290	0.50	0.050	A245041
High Molecular Weight PAH`s	ug/L	23	0.10	0.040	2.1	0.050	0.020	A245041
Total PAH	ug/L	1600	5.0	0.50	300	0.50	0.050	A245041
Polycyclic Aromatics								
Quinoline	ug/L	<0.050 (1)	0.050	0.050	<0.080 (1)	0.080	0.080	A246878
Naphthalene	ug/L	950 (2)	5.0	2.5	200 (2)	0.50	0.25	A246878
1-Methylnaphthalene	ug/L	120 (2)	0.25	0.25	34 (2)	0.25	0.25	A246878
2-Methylnaphthalene	ug/L	180 (2)	0.50	0.25	5.2	0.10	0.050	A246878
Acenaphthylene	ug/L	1.8	0.050	0.050	0.80	0.050	0.050	A246878
Acenaphthene	ug/L	140 (2)	0.25	0.25	35 (2)	0.25	0.25	A246878
Fluorene	ug/L	75 (2)	0.25	0.25	12 (2)	0.25	0.25	A246878
Phenanthrene	ug/L	99 (2)	0.25	0.25	6.4	0.050	0.050	A246878
Anthracene	ug/L	10 (2)	0.050	0.050	0.81	0.010	0.010	A246878
Acridine	ug/L	1.6	0.050	0.050	1.9	0.050	0.050	A246878
Fluoranthene	ug/L	13 (2)	0.10	0.10	1.1	0.020	0.020	A246878
Pyrene	ug/L	8.3 (2)	0.10	0.10	0.65	0.020	0.020	A246878
Benzo(a)anthracene	ug/L	0.58	0.010	0.010	0.071	0.010	0.010	A246878
Chrysene	ug/L	0.65	0.020	0.020	0.10	0.020	0.020	A246878
Benzo(b&j)fluoranthene	ug/L	0.21	0.030	0.030	0.10	0.030	0.030	A246878
Benzo(k)fluoranthene	ug/L	0.070	0.050	0.050	<0.050	0.050	0.050	A246878
Benzo(a)pyrene	ug/L	0.13	0.0050	0.0050	0.068	0.0050	0.0050	A246878
Indeno(1,2,3-cd)pyrene	ug/L	<0.050	0.050	0.050	<0.050	0.050	0.050	A246878
Dibenz(a,h)anthracene	ug/L	0.0085	0.0030	0.0030	0.0063	0.0030	0.0030	A246878
Benzo(g,h,i)perylene	ug/L	<0.050	0.050	0.050	<0.050	0.050	0.050	A246878
Surrogate Recovery (%)								
D10-ANTHRACENE (sur.)	%	93	N/A	N/A	95	N/A	N/A	A246878
D8-ACENAPHTHYLENE (sur.)	%	109	N/A	N/A	106	N/A	N/A	A246878
D8-NAPHTHALENE (sur.)	%	58	N/A	N/A	70	N/A	N/A	A246878
TERPHENYL-D14 (sur.)	%	91	N/A	N/A	92	N/A	N/A	A246878

RDL = Reportable Detection Limit
N/A = Not Applicable
(1) Detection limits raised due to matrix interference.
(2) Detection limits raised due to dilution to bring analyte within the calibrated range.

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GENERAL COMMENTS

CSR TOTAL METALS IN WATER WITH CV HG (WATER) Comments

Sample ZX6725 [WL-11222680-030621-NT-02] Elements by CRC ICPMS (total): RDL raised due to concentration over linear range, sample dilution required.

Results relate only to the items tested.

BV Labs Job #: C138327
Report Date: 2021/06/14

QUALITY ASSURANCE REPORT

GHD Limited
Client Project #: 11222680-3-2
Site Location: UPLAND, LW
Your P.O. #: 73523825

			Matrix Spike		Spiked Blank		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
A246878	D10-ANTHRACENE (sur.)	2021/06/08	100	50 - 140	98	50 - 140	98	%		
A246878	D8-ACENAPHTHYLENE (sur.)	2021/06/08	99	50 - 140	96	50 - 140	94	%		
A246878	D8-NAPHTHALENE (sur.)	2021/06/08	104	50 - 140	102	50 - 140	100	%		
A246878	TERPHENYL-D14 (sur.)	2021/06/08	117	50 - 140	115	50 - 140	109	%		
A247298	1,4-Difluorobenzene (sur.)	2021/06/07	94	70 - 130	91	70 - 130	118	%		
A247298	4-Bromofluorobenzene (sur.)	2021/06/07	97	70 - 130	95	70 - 130	98	%		
A247298	D4-1,2-Dichloroethane (sur.)	2021/06/07	92	70 - 130	92	70 - 130	100	%		
A245919	Biochemical Oxygen Demand	2021/06/10			98	85 - 115	<2.0	mg/L	2.1 (1)	20
A246057	Nitrate plus Nitrite (N)	2021/06/05	103	80 - 120	113	80 - 120	<0.020	mg/L	0.20 (1)	25
A246059	Nitrite (N)	2021/06/05	4.0 (2)	80 - 120	102	80 - 120	<0.0050	mg/L	NC (1)	20
A246072	Orthophosphate (P)	2021/06/05	NC	80 - 120	93	80 - 120	<0.0030	mg/L	0.017 (1)	20
A246878	1-Methylnaphthalene	2021/06/08	113	50 - 140	106	50 - 140	<0.050	ug/L	7.9 (1)	40
A246878	2-Methylnaphthalene	2021/06/08	108	50 - 140	101	50 - 140	<0.10	ug/L	6.5 (1)	40
A246878	Acenaphthene	2021/06/08	114	50 - 140	109	50 - 140	<0.050	ug/L	4.9 (1)	40
A246878	Acenaphthylene	2021/06/08	109	50 - 140	104	50 - 140	<0.050	ug/L	NC (1)	40
A246878	Acridine	2021/06/08	108	50 - 140	106	50 - 140	<0.050	ug/L	NC (1)	40
A246878	Anthracene	2021/06/08	103	50 - 140	100	50 - 140	<0.010	ug/L	NC (1)	40
A246878	Benzo(a)anthracene	2021/06/08	81	50 - 140	79	50 - 140	<0.010	ug/L	NC (1)	40
A246878	Benzo(a)pyrene	2021/06/08	83	50 - 140	86	50 - 140	<0.0050	ug/L	NC (1)	40
A246878	Benzo(b&j)fluoranthene	2021/06/08	82	50 - 140	84	50 - 140	<0.030	ug/L	NC (1)	40
A246878	Benzo(g,h,i)perylene	2021/06/08	79	50 - 140	89	50 - 140	<0.050	ug/L	NC (1)	40
A246878	Benzo(k)fluoranthene	2021/06/08	88	50 - 140	90	50 - 140	<0.050	ug/L	NC (1)	40
A246878	Chrysene	2021/06/08	81	50 - 140	79	50 - 140	<0.020	ug/L	NC (1)	40
A246878	Dibenz(a,h)anthracene	2021/06/08	80	50 - 140	90	50 - 140	<0.0030	ug/L	NC (1)	40
A246878	Fluoranthene	2021/06/08	107	50 - 140	103	50 - 140	<0.020	ug/L	NC (1)	40
A246878	Fluorene	2021/06/08	106	50 - 140	101	50 - 140	<0.050	ug/L	7.7 (1)	40
A246878	Indeno(1,2,3-cd)pyrene	2021/06/08	87	50 - 140	95	50 - 140	<0.050	ug/L	NC (1)	40
A246878	Naphthalene	2021/06/08	111	50 - 140	104	50 - 140	<0.10	ug/L	14 (1)	40
A246878	Phenanthrene	2021/06/08	106	50 - 140	101	50 - 140	<0.050	ug/L	NC (1)	40
A246878	Pyrene	2021/06/08	105	50 - 140	102	50 - 140	<0.020	ug/L	NC (1)	40
A246878	Quinoline	2021/06/08	118	50 - 140	116	50 - 140	<0.020	ug/L	NC (1)	40
A247292	Dissolved Mercury (Hg)	2021/06/07	111	80 - 120	107	80 - 120	<0.0019	ug/L	NC (1)	20

Bureau Veritas Laboratories Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		Spiked Blank		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
A247298	Benzene	2021/06/08	96	70 - 130	92	70 - 130	<0.40	ug/L	NC (1)	30
A247298	Ethylbenzene	2021/06/08	110	70 - 130	111	70 - 130	<0.40	ug/L	NC (1)	30
A247298	m & p-Xylene	2021/06/08	108	70 - 130	108	70 - 130	<0.40	ug/L	NC (1)	30
A247298	Methyl-tert-butylether (MTBE)	2021/06/08	93	70 - 130	79	70 - 130	<4.0	ug/L	NC (1)	30
A247298	o-Xylene	2021/06/08	107	70 - 130	104	70 - 130	<0.40	ug/L	NC (1)	30
A247298	Styrene	2021/06/08	107	70 - 130	103	70 - 130	<0.40	ug/L	NC (1)	30
A247298	Toluene	2021/06/08	103	70 - 130	103	70 - 130	<0.40	ug/L	NC (1)	30
A247298	VH C6-C10	2021/06/08			81	70 - 130	<300	ug/L	NC (1)	30
A247298	Xylenes (Total)	2021/06/08					<0.40	ug/L	NC (1)	30
A247481	Dissolved Chloride (Cl)	2021/06/07	101	80 - 120	102	80 - 120	<1.0	mg/L	3.2 (1)	20
A247481	Dissolved Sulphate (SO4)	2021/06/07	98	80 - 120	95	80 - 120	<1.0	mg/L	NC (1)	20
A247482	Total Mercury (Hg)	2021/06/07	118	80 - 120	110	80 - 120	<0.0019	ug/L	NC (1)	20
A247658	Conductivity	2021/06/07			99	80 - 120	<2.0	uS/cm		
A247664	Alkalinity (PP as CaCO3)	2021/06/07					<1.0	mg/L	NC (1)	20
A247664	Alkalinity (Total as CaCO3)	2021/06/07	107	80 - 120	91	80 - 120	<1.0	mg/L	1.6 (1)	20
A247664	Bicarbonate (HCO3)	2021/06/07					<1.0	mg/L	1.6 (1)	20
A247664	Carbonate (CO3)	2021/06/07					<1.0	mg/L	NC (1)	20
A247664	Hydroxide (OH)	2021/06/07					<1.0	mg/L	NC (1)	20
A247730	Dissolved Aluminum (Al)	2021/06/09	NC	80 - 120	103	80 - 120	<3.0	ug/L	2.7 (1)	20
A247730	Dissolved Antimony (Sb)	2021/06/09	103	80 - 120	102	80 - 120	<0.50	ug/L	NC (1)	20
A247730	Dissolved Arsenic (As)	2021/06/09	107	80 - 120	98	80 - 120	<0.10	ug/L	0.61 (1)	20
A247730	Dissolved Barium (Ba)	2021/06/09	NC	80 - 120	100	80 - 120	<1.0	ug/L	1.7 (1)	20
A247730	Dissolved Beryllium (Be)	2021/06/09	104	80 - 120	99	80 - 120	<0.10	ug/L	NC (1)	20
A247730	Dissolved Bismuth (Bi)	2021/06/09	98	80 - 120	100	80 - 120	<1.0	ug/L	NC (1)	20
A247730	Dissolved Boron (B)	2021/06/09	NC	80 - 120	95	80 - 120	<50	ug/L	4.0 (1)	20
A247730	Dissolved Cadmium (Cd)	2021/06/09	98	80 - 120	100	80 - 120	<0.010	ug/L	8.0 (1)	20
A247730	Dissolved Chromium (Cr)	2021/06/09	96	80 - 120	97	80 - 120	<1.0	ug/L	NC (1)	20
A247730	Dissolved Cobalt (Co)	2021/06/09	93	80 - 120	97	80 - 120	<0.20	ug/L	3.5 (1)	20
A247730	Dissolved Copper (Cu)	2021/06/09	89	80 - 120	94	80 - 120	<0.20	ug/L	2.6 (1)	20
A247730	Dissolved Iron (Fe)	2021/06/09	NC	80 - 120	100	80 - 120	<5.0	ug/L	0.30 (1)	20
A247730	Dissolved Lead (Pb)	2021/06/09	101	80 - 120	103	80 - 120	<0.20	ug/L	NC (1)	20
A247730	Dissolved Lithium (Li)	2021/06/09	103	80 - 120	102	80 - 120	<2.0	ug/L	3.4 (1)	20

Bureau Veritas Laboratories Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		Spiked Blank		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
A247730	Dissolved Manganese (Mn)	2021/06/09	NC	80 - 120	98	80 - 120	<1.0	ug/L	1.4 (1)	20
A247730	Dissolved Molybdenum (Mo)	2021/06/09	NC	80 - 120	102	80 - 120	<1.0	ug/L	0.53 (1)	20
A247730	Dissolved Nickel (Ni)	2021/06/09	89	80 - 120	96	80 - 120	<1.0	ug/L	3.9 (1)	20
A247730	Dissolved Phosphorus (P)	2021/06/09	110	80 - 120	101	80 - 120	<10	ug/L		
A247730	Dissolved Selenium (Se)	2021/06/09	101	80 - 120	98	80 - 120	<0.10	ug/L	NC (1)	20
A247730	Dissolved Silicon (Si)	2021/06/09	NC	80 - 120	105	80 - 120	<100	ug/L	0.14 (1)	20
A247730	Dissolved Silver (Ag)	2021/06/09	98	80 - 120	98	80 - 120	<0.020	ug/L	NC (1)	20
A247730	Dissolved Strontium (Sr)	2021/06/09	NC	80 - 120	100	80 - 120	<1.0	ug/L	0.45 (1)	20
A247730	Dissolved Thallium (Tl)	2021/06/09	99	80 - 120	100	80 - 120	<0.010	ug/L	NC (1)	20
A247730	Dissolved Tin (Sn)	2021/06/09	101	80 - 120	102	80 - 120	<5.0	ug/L	NC (1)	20
A247730	Dissolved Titanium (Ti)	2021/06/09	102	80 - 120	99	80 - 120	<5.0	ug/L	NC (1)	20
A247730	Dissolved Uranium (U)	2021/06/09	108	80 - 120	102	80 - 120	<0.10	ug/L	NC (1)	20
A247730	Dissolved Vanadium (V)	2021/06/09	100	80 - 120	98	80 - 120	<5.0	ug/L	NC (1)	20
A247730	Dissolved Zinc (Zn)	2021/06/09	NC	80 - 120	99	80 - 120	<5.0	ug/L	2.7 (1)	20
A247730	Dissolved Zirconium (Zr)	2021/06/09	119	80 - 120	97	80 - 120	<0.10	ug/L	NC (1)	20
A248187	Chemical Oxygen Demand	2021/06/08	NC	80 - 120	104	80 - 120	<10	mg/L	9.3 (1)	20
A248655	Total Aluminum (Al)	2021/06/09	96	80 - 120	100	80 - 120	<3.0	ug/L	NC (1)	20
A248655	Total Antimony (Sb)	2021/06/09	103	80 - 120	101	80 - 120	<0.50	ug/L	NC (1)	20
A248655	Total Arsenic (As)	2021/06/09	104	80 - 120	98	80 - 120	<0.10	ug/L	2.5 (1)	20
A248655	Total Barium (Ba)	2021/06/09	104	80 - 120	100	80 - 120	<1.0	ug/L	1.6 (1)	20
A248655	Total Beryllium (Be)	2021/06/09	94	80 - 120	92	80 - 120	<0.10	ug/L	NC (1)	20
A248655	Total Bismuth (Bi)	2021/06/09	100	80 - 120	102	80 - 120	<1.0	ug/L	NC (1)	20
A248655	Total Boron (B)	2021/06/09	NC	80 - 120	92	80 - 120	<50	ug/L	6.5 (1)	20
A248655	Total Cadmium (Cd)	2021/06/09	97	80 - 120	97	80 - 120	<0.010	ug/L	8.0 (1)	20
A248655	Total Chromium (Cr)	2021/06/09	88	80 - 120	96	80 - 120	<1.0	ug/L	NC (1)	20
A248655	Total Cobalt (Co)	2021/06/09	87	80 - 120	97	80 - 120	<0.20	ug/L	3.5 (1)	20
A248655	Total Copper (Cu)	2021/06/09	81	80 - 120	91	80 - 120	<0.50	ug/L	8.7 (1)	20
A248655	Total Iron (Fe)	2021/06/09	NC	80 - 120	101	80 - 120	<10	ug/L	4.0 (1)	20
A248655	Total Lead (Pb)	2021/06/09	104	80 - 120	106	80 - 120	<0.20	ug/L	2.8 (1)	20
A248655	Total Lithium (Li)	2021/06/09	102	80 - 120	95	80 - 120	<2.0	ug/L	5.5 (1)	20
A248655	Total Manganese (Mn)	2021/06/09	NC	80 - 120	97	80 - 120	<1.0	ug/L	5.1 (1)	20
A248655	Total Molybdenum (Mo)	2021/06/09	112	80 - 120	100	80 - 120	<1.0	ug/L	NC (1)	20

QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		Spiked Blank		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
A248655	Total Nickel (Ni)	2021/06/09	84	80 - 120	93	80 - 120	<1.0	ug/L	2.9 (1)	20
A248655	Total Phosphorus (P)	2021/06/09	99	80 - 120	99	80 - 120	<10	ug/L		
A248655	Total Selenium (Se)	2021/06/09	94	80 - 120	94	80 - 120	<0.10	ug/L	NC (1)	20
A248655	Total Silicon (Si)	2021/06/09	113	80 - 120	104	80 - 120	<100	ug/L	2.4 (1)	20
A248655	Total Silver (Ag)	2021/06/09	94	80 - 120	96	80 - 120	<0.020	ug/L	NC (1)	20
A248655	Total Strontium (Sr)	2021/06/09	NC	80 - 120	103	80 - 120	<1.0	ug/L	1.8 (1)	20
A248655	Total Thallium (Tl)	2021/06/09	103	80 - 120	102	80 - 120	<0.010	ug/L	NC (1)	20
A248655	Total Tin (Sn)	2021/06/09	97	80 - 120	98	80 - 120	<5.0	ug/L	NC (1)	20
A248655	Total Titanium (Ti)	2021/06/09	97	80 - 120	99	80 - 120	<5.0	ug/L	NC (1)	20
A248655	Total Uranium (U)	2021/06/09	110	80 - 120	105	80 - 120	<0.10	ug/L	NC (1)	20
A248655	Total Vanadium (V)	2021/06/09	95	80 - 120	98	80 - 120	<5.0	ug/L	NC (1)	20
A248655	Total Zinc (Zn)	2021/06/09	NC	80 - 120	97	80 - 120	<5.0	ug/L	2.7 (1)	20
A248655	Total Zirconium (Zr)	2021/06/09	107	80 - 120	98	80 - 120	<0.10	ug/L	NC (1)	20
A249824	Total Ammonia (N)	2021/06/09	91	80 - 120	94	80 - 120	<0.015	mg/L	NC (1)	20
A250067	Total Suspended Solids	2021/06/10	101	80 - 120	99	80 - 120	<1.0	mg/L	13 (1)	20
A250248	Total Dissolved Solids	2021/06/10	102	80 - 120	103	80 - 120	<10	mg/L	12 (1)	20
A250946	Total Sulphide	2021/06/10	42 (2)	80 - 120	84	80 - 120	<0.0018	mg/L	NC (1)	20

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

(1) Duplicate Parent ID

(2) Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.

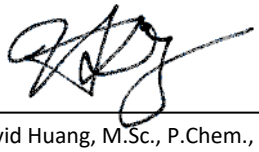
Bureau Veritas Laboratories Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

BV Labs Job #: C138327
Report Date: 2021/06/14

GHD Limited
Client Project #: 11222680-3-2
Site Location: UPLAND, LW
Your P.O. #: 73523825

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:



David Huang, M.Sc., P.Chem., QP, Scientific Services Manager

BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports.
For Service Group specific validation please refer to the Validation Signature Page.

Bureau Veritas Laboratories Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

Bureau Veritas Laboratories
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C138327_COC

INVOICE TO:
Company Name: #163 GHD Limited
Contact Name: AP Invoices - 735
Address: 455 PHILLIP STREET, WATERLOO ON N2L 3X2
Phone: (519) 884-0510 Fax: (519) 725-1394
Email: ~~APinvoices-735@ghd.com~~ Invoicing-canada@ghd.com

Report Information
Company Name:
Contact Name: Airesse MacPhee
Address:
Phone: Fax:
Email: airesse.macphee@ghd.com; NationalEDDSupport@ma

Project Information
Quotation #: C10010
P.O. #: 735-23825
Project #: 11222680-~~RR~~ 3-2
Project Name: Upland
Site #: LW
Sampled By: N.Turl

Only
Bottle Order #: 637465
Project Manager: Nahed Amer

Chain Of Custody Record: C#637465-02-01

Regulatory Criteria:
- [ ] CSR
- [ ] CCME
- [ ] BC Water Quality
- [ ] Other

Special Instructions: Leachate Water

SAMPLES MUST BE KEPT COOL (< 10°C) FROM TIME OF SAMPLING UNTIL DELIVERY TO BV LABS

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Metals Field Filtered? (Y / N)	Conductivity, Cl, SO4, NO2, NO3, N+N, ~~Diss~~, Speciated Alk, CP04	Sulphide + H2S Calc (LL)	Sulphide, Un-ionized (as H2S) (Calc)	Ammonia-N (Total)	Dissolved Metals with CV Hg, Hardness (CSR)	TDS/TSS	Total Metals with CV Hg (CSR)	PAH	BTEX/VPH	BOD/COD	# of Bottles	Comments
1		11-11222680-030621-NT-01	06/03/21	1015	WATER		X	X	X	X	X	X	X	X	X	X		SHORT HOLDING TIMES!
2		↓ ↓ -02	↓	1100	↓		X	X	X	X	X	X	X	X	X	X		
3																		All bottles were field filtered and preserved as required.
4																		
5																		
6																		
7																		
8																		
9																		
10																		

Turnaround Time (TAT) Required:
Please provide advance notice for rush projects
Regular (Standard) TAT: [X]
(will be applied if Rush TAT is not specified)
Standard TAT = 5-7 Working days for most tests.
Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.
Job Specific Rush TAT (if applies to entire submission)
1 DAY [ ] 2 Day [ ] 3 Day [ ] Date Required: [ ]
Rush Confirmation Number: (call lab for #)

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted	Lab Use Only: Time Sensitive	Temperature (°C) on Receipt	Custody Seal Intact on Cooler?
N.Turl	21/06/04	730	[signature]	21/06/04	15:54	NP	[✓]	4, 5, 4	[✓] Yes [ ] No
								5, 4, 4	

* UNLESS OTHERWISE AGREED TO IN WRITING, WORK SUBMITTED ON THIS CHAIN OF CUSTODY IS SUBJECT TO BV LABS' STANDARD TERMS AND CONDITIONS. SIGNING OF THIS CHAIN OF CUSTODY DOCUMENT IS ACKNOWLEDGMENT AND ACCEPTANCE OF OUR TERMS WHICH ARE AVAILABLE FOR VIEWING AT WWW.BVLABS.COM/TERMS-AND-CONDITIONS.
* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

White: BV Labs Yellow: Client

Bureau Veritas Canada (2019) Inc.

Sample Name	Location	Date	Time	Type	Matrix	Parent Sample Name	WaterDepth	DepthUnit	DryYesNo	Notes	Temperature	Temperature Unit	Field pH (s.u.)	ORP	ORP units	Conductivity	Conductivity Unit	Turbidity (NTU)	Dissolved Oxygen (DO)	DO Units	TDS	TDS Units
WG-11222680-151121-KH-01	MW2-14	11/15/2021	13:10	N	WG		15.903	mBTOR	No	clear, no odour	10.63	deg C	7.26	220	millivolts	104	uS/cm	6.9			68	mg/L
WG-11222680-151121-KH-02	MW2A-16	11/15/2021	14:25	N	WG		15.853	mBTOR	No	clear, no odour	9.61	deg C	8.31	190	millivolts	64	uS/cm	39.9			45	mg/L
WG-11222680-151121-KH-03	MW2A-16 (DUPE	11/15/2021	14:30	FD	WG	WG-11222680-151121-KH-02					9.61	deg C	8.31	190	millivolts	64	uS/cm	39.9			45	mg/L
WG-11222680-161121-KH-05	MW3-14	11/16/2021	9:00	N	WG		15.00	mBTOR	No	clear, no odour	6.90	deg C	7.28	259	millivolts	87	uS/cm	4.4			57	mg/L
WG-11222680-161121-KH-06	MW11-19	11/16/2021	12:10	N	WG		48.585	mBTOR	No	grey/silty, no odour, became clear	10.64	deg C	7.56	216	millivolts	452	uS/cm	16			294	mg/L
WG-11222680-161121-KH-04	MW10-17	11/16/2021	9:55	N	WG		42.230	mBTOR	No	light brown, no odour, became clear	8.91	deg C	7.75	201	millivolts	136	uS/cm	42.6			88	mg/L
W-11222680-161121-KH-01	S01-17	11/16/2021	13:50	N	W		5.885	mBTOR	No	rn/yellow tint, no odour, a little orange p	17.30	deg C	7.06	2	millivolts	2400	uS/cm	12.9			153	mg/L
WL-11222680-161121-KH-01	S03-19	11/16/2021	14:50	N	WL		4.420	mBTOR	No	yellow hue, slight sour odour	15.37	deg C	6.90	-51	millivolts	1830	uS/cm	20.1			1.17	mg/L
WL-11222680-161121-KH-02	S05-19	11/16/2021	15:20	N	WL		5.480	mBTOR	No	very slight yellow, slight odour	12.32	deg C	7.71	-34	millivolts	381	uS/cm	8.0			248	mg/L
WG-11222680-161121-KH-07	FIELD BLANK	11/16/2021	17:00	FB	WGQ																	

Your P.O. #: 73523825
Your Project #: 11222680-3-2
Site Location: UPLAND
Your C.O.C. #: 639776-01-01

Attention: 11222680-3-2 Distribution

GHD Limited
455 PHILLIP STREET
WATERLOO, ON
CANADA N2L 3X2

Report Date: 2021/12/30
Report #: R3116226
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C188803
Received: 2021/11/18, 10:25

Sample Matrix: Water
Samples Received: 1

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity @25C (pp, total), CO3,HCO3,OH	1	N/A	2021/11/19	BBY6SOP-00026	SM 23 2320 B m
Biochemical Oxygen Demand	1	2021/11/19	2021/11/24	BBY6SOP-00045	SM 23 5210 B m
BTEX/MTBE LH, VH, F1 SIM/MS	1	N/A	2021/11/19	BBY8SOP-00010 / BBY8SOP-00011 / BBY8SOP-00012	BCMOE BCLM Jul 2017
Chloride/Sulphate by Auto Colourimetry	1	N/A	2021/11/19	BBY6SOP-00011 / BBY6SOP-00017	SM23-4500-Cl/SO4-E m
COD by Colorimeter	1	N/A	2021/11/24	BBY6SOP-00024	SM 23 5220 D m
Conductivity @25C	1	N/A	2021/11/19	BBY6SOP-00026	SM 23 2510 B m
Sulphide (as H2S) (1)	1	N/A	2021/11/20		Auto Calc
Un-ionized Hydrogen Sulphide as S Calc	1	N/A	2021/12/22	BBY WI-00033	Auto Calc
Hardness Total (calculated as CaCO3) (1, 2)	1	N/A	2021/12/10	BBY WI-00033	Auto Calc
Hardness (calculated as CaCO3) (1)	1	N/A	2021/12/10	BBY WI-00033	Auto Calc
Mercury (Dissolved) by CV (3)	1	2021/11/19	2021/11/19	AB SOP-00084	BCMOE BCLM Oct2013 m
Mercury (Total) by CV	1	2021/11/19	2021/11/19	AB SOP-00084	BCMOE BCLM Oct2013 m
Na, K, Ca, Mg, S by CRC ICPMS (diss.) (1)	1	N/A	2021/12/10		Auto Calc
Elements by CRC ICPMS (dissolved) (1, 3)	1	N/A	2021/11/25	CAL SOP-00265	EPA 6020 m
Na, K, Ca, Mg, S by CRC ICPMS (total) (1)	1	2021/11/18	2021/12/10		Auto Calc
Elements by CRC ICPMS (total) (1)	1	2021/11/22	2021/11/25	CAL SOP-00265	EPA 6020 m
Ammonia-N (Total)	1	N/A	2021/11/22	AB SOP-00007	SM 23 4500 NH3 A G m
Nitrate + Nitrite (N)	1	N/A	2021/11/19	BBY6SOP-00010	SM 23 4500-NO3- I m
Nitrite (N) by CFA	1	N/A	2021/11/19	BBY6SOP-00010	SM 23 4500-NO3- I m
Nitrogen - Nitrate (as N)	1	N/A	2021/12/14	BBY WI-00033	Auto Calc
PAH in Water by GC/MS (SIM)	1	2021/11/23	2021/11/23	BBY8SOP-00021	BCMOE BCLM Jul2017m
Total LMW, HMW, Total PAH Calc (4)	1	N/A	2021/12/09	BBY WI-00033	Auto Calc
Filter and HNO3 Preserve for Metals	1	N/A	2021/11/18	BBY7 WI-00004	SM 23 3030B m
Orthophosphate by Konelab (5)	1	N/A	2021/11/19	BBY6SOP-00013	SM 23 4500-P E m
Total Sulphide (1)	1	N/A	2021/11/20	AB SOP-00080	SM 23 4500 S2-A D Fm
Total Dissolved Solids (Filt. Residue)	1	2021/11/22	2021/11/23	BBY6SOP-00033	SM 23 2540 C m
Total Suspended Solids (NFR)	1	2021/11/23	2021/11/24	BBY6SOP-00034	SM 23 2540 D m
Field pH	1	N/A	2021/12/22		
Field Temperature	1	N/A	2021/12/22		

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Your P.O. #: 73523825
Your Project #: 11222680-3-2
Site Location: UPLAND
Your C.O.C. #: 639776-01-01

Attention: 11222680-3-2 Distribution

GHD Limited
455 PHILLIP STREET
WATERLOO, ON
CANADA N2L 3X2

Report Date: 2021/12/30
Report #: R3116226
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C188803
Received: 2021/11/18, 10:25

Sample Matrix: Water
Samples Received: 1

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Volatile HC-BTEX (6)	1	N/A	2021/12/08	BBY WI-00033	Auto Calc

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

Bureau Veritas liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Bureau Veritas has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Bureau Veritas, unless otherwise agreed in writing. Bureau Veritas is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.
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Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) This test was performed by Bureau Veritas Calgary, 4000 - 19 St. , Calgary, AB, T2E 6P8
(2) "Total Hardness" was calculated from Total Ca and Mg concentrations and may be biased high (Hardness, or Dissolved Hardness, calculated from Dissolved Ca and Mg, should be used for compliance if available).
(3) Dissolved > Total Imbalance: When applicable, Dissolved and Total results were reviewed and data quality meets acceptable levels unless otherwise noted.
(4) Total PAHs in Water include: Quinoline, Naphthalene, 1-Methylnaphthalene, 2-Methylnaphthalene, Acenaphthylene, Acenaphthene, Fluorene, Phenanthrene, Anthracene, Acridine, Fluoranthene, Pyrene, Benzo(a)anthracene, Chrysene, Benzo(b&j)fluoranthene, Benzo(k)fluoranthene, Benzo(a)pyrene, Indeno(1,2,3-cd)pyrene, Dibenz(a,h)anthracene, and Benzo(g,h,i)perylene.
(5) Orthophosphate > Total Phosphorus Imbalance: When applicable, Orthophosphate, Total Phosphorus and dissolved Phosphorus results were reviewed and data quality meets acceptable levels unless otherwise noted.
(6) VPH = VH - (Benzene + Toluene + Ethylbenzene + m & p-Xylene + o-Xylene + Styrene)

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Your P.O. #: 73523825
Your Project #: 11222680-3-2
Site Location: UPLAND
Your C.O.C. #: 639776-01-01

Attention: 11222680-3-2 Distribution

GHD Limited
455 PHILLIP STREET
WATERLOO, ON
CANADA N2L 3X2

Report Date: 2021/12/30
Report #: R3116226
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C188803
Received: 2021/11/18, 10:25

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Thomas Pinchin, Project Solutions Representative
Email: Thomas.Pinchin@bureauveritas.com
Phone# (604) 734 7276
==========
BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Bureau Veritas Laboratories Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

GHD Limited
Client Project #: 11222680-3-2
Site Location: UPLAND
Your P.O. #: 73523825

RESULTS OF CHEMICAL ANALYSES OF WATER

Bureau Veritas ID		AKV944			
Sampling Date		2021/11/16 13:50			
COC Number		639776-01-01			
	UNITS	W-11222680-161121-KH-01	RDL	MDL	QC Batch
ANIONS					
Nitrite (N)	mg/L	0.0126	0.0050	0.0050	A432512
Calculated Parameters					
Filter and HNO3 Preservation	N/A	FIELD	N/A	N/A	ONSITE
Nitrate (N)	mg/L	0.053	0.020	N/A	A429808
Sulphide (as H2S)	mg/L	0.0045	0.0020	N/A	A430441
Demand Parameters					
Biochemical Oxygen Demand	mg/L	2.3	2.0	N/A	A431542
Chemical Oxygen Demand	mg/L	103	10	10	A444103
Field Parameters					
Field pH	pH	7.06	N/A	N/A	ONSITE
Field Temperature	°C	17.30	N/A	N/A	ONSITE
Misc. Inorganics					
Conductivity	uS/cm	2400	2.0	N/A	A432454
Total Dissolved Solids	mg/L	2000	10	N/A	A447334
Total Suspended Solids	mg/L	23	1.0	N/A	A448462
Anions					
Alkalinity (PP as CaCO3)	mg/L	<1.0	1.0	N/A	A432452
Alkalinity (Total as CaCO3)	mg/L	430	1.0	N/A	A432452
Bicarbonate (HCO3)	mg/L	530	1.0	N/A	A432452
Carbonate (CO3)	mg/L	<1.0	1.0	N/A	A432452
Hydroxide (OH)	mg/L	<1.0	1.0	N/A	A432452
Total Sulphide	mg/L	0.0042 (1)	0.0018	N/A	A432953
Dissolved Chloride (Cl)	mg/L	89	1.0	N/A	A431793
Dissolved Sulphate (SO4)	mg/L	930	10	N/A	A431793
Nutrients					
Total Ammonia (N)	mg/L	0.94	0.015	0.0040	A438969
Orthophosphate (P)	mg/L	0.0036	0.0030	0.0030	A431613
Nitrate plus Nitrite (N)	mg/L	0.065	0.020	0.020	A432510

RDL = Reportable Detection Limit

N/A = Not Applicable

(1) Sample pH <9, preservation incomplete. Due to volatility of analyte, a low bias in the results is likely.

MISCELLANEOUS (WATER)

Bureau Veritas ID		AKV944			
Sampling Date		2021/11/16 13:50			
COC Number		639776-01-01			
	UNITS	W-11222680-161121-KH-01	RDL	MDL	QC Batch
Calculated Parameters					
Total Un-ionized Hydrogen Sulfide as S	mg/L	<0.0050	0.0050	0.0050	A430830
Total Un-ionized Hydrogen Sulfide as H2S	mg/L	<0.0050	0.0050	0.0050	A430830
RDL = Reportable Detection Limit					

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Bureau Veritas Job #: C188803
Report Date: 2021/12/30

GHD Limited
Client Project #: 11222680-3-2
Site Location: UPLAND
Your P.O. #: 73523825

CSR BTEX/VPH IN WATER (WATER)

Bureau Veritas ID		AKV944	AKV944			
Sampling Date		2021/11/16 13:50	2021/11/16 13:50			
COC Number		639776-01-01	639776-01-01			
	UNITS	W-11222680-161121-KH-01	W-11222680-161121-KH-01 Lab-Dup	RDL	MDL	QC Batch
Calculated Parameters						
VPH (VHW6 to 10 - BTEX)	ug/L	<300	N/A	300	300	A429981
Volatiles						
Methyl-tert-butylether (MTBE)	ug/L	<4.0	<4.0	4.0	4.0	A431671
Benzene	ug/L	<0.40	<0.40	0.40	0.40	A431671
Toluene	ug/L	<0.40	<0.40	0.40	0.40	A431671
Ethylbenzene	ug/L	<0.40	<0.40	0.40	0.40	A431671
m & p-Xylene	ug/L	<0.40	<0.40	0.40	0.40	A431671
o-Xylene	ug/L	<0.40	<0.40	0.40	0.40	A431671
Styrene	ug/L	<0.40	<0.40	0.40	0.40	A431671
Xylenes (Total)	ug/L	<0.40	<0.40	0.40	0.40	A431671
VH C6-C10	ug/L	<300	<300	300	300	A431671
Surrogate Recovery (%)						
1,4-Difluorobenzene (sur.)	%	117	117	N/A	N/A	A431671
4-Bromofluorobenzene (sur.)	%	107	108	N/A	N/A	A431671
D4-1,2-Dichloroethane (sur.)	%	113	92	N/A	N/A	A431671

RDL = Reportable Detection Limit
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable

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GHD Limited
Client Project #: 11222680-3-2
Site Location: UPLAND
Your P.O. #: 73523825

CSR DISSOLVED METALS IN WATER WITH CV HG (WATER)

Bureau Veritas ID		AKV944			
Sampling Date		2021/11/16 13:50			
COC Number		639776-01-01			
	UNITS	W-11222680-161121-KH-01	RDL	MDL	QC Batch
Calculated Parameters					
Dissolved Hardness (CaCO3)	mg/L	1280	0.50	0.50	A430397
Elements					
Dissolved Mercury (Hg)	ug/L	<0.0019	0.0019	0.0019	A431799
Dissolved Metals by ICPMS					
Dissolved Aluminum (Al)	ug/L	6.9	3.0	0.030	A438557
Dissolved Antimony (Sb)	ug/L	<0.50	0.50	0.0020	A438557
Dissolved Arsenic (As)	ug/L	0.65	0.10	0.010	A438557
Dissolved Barium (Ba)	ug/L	89.1	1.0	0.0020	A438557
Dissolved Beryllium (Be)	ug/L	<0.10	0.10	0.0030	A438557
Dissolved Bismuth (Bi)	ug/L	<1.0	1.0	0.0010	A438557
Dissolved Boron (B)	ug/L	2060	50	50	A438557
Dissolved Cadmium (Cd)	ug/L	0.152	0.010	0.0020	A438557
Dissolved Chromium (Cr)	ug/L	<1.0	1.0	0.020	A438557
Dissolved Cobalt (Co)	ug/L	1.54	0.20	0.20	A438557
Dissolved Copper (Cu)	ug/L	4.43	0.20	0.010	A438557
Dissolved Iron (Fe)	ug/L	1250	5.0	0.040	A438557
Dissolved Lead (Pb)	ug/L	<0.20	0.20	0.0010	A438557
Dissolved Lithium (Li)	ug/L	<2.0	2.0	2.0	A438557
Dissolved Manganese (Mn)	ug/L	6050	1.0	0.030	A438557
Dissolved Molybdenum (Mo)	ug/L	1.9	1.0	0.0020	A438557
Dissolved Nickel (Ni)	ug/L	2.7	1.0	0.010	A438557
Dissolved Phosphorus (P)	ug/L	10	10	1.0	A438557
Dissolved Selenium (Se)	ug/L	0.21	0.10	0.0060	A438557
Dissolved Silicon (Si)	ug/L	8910	100	0.30	A438557
Dissolved Silver (Ag)	ug/L	<0.020	0.020	0.0020	A438557
Dissolved Strontium (Sr)	ug/L	1380	1.0	0.0020	A438557
Dissolved Thallium (Tl)	ug/L	0.024	0.010	0.010	A438557
Dissolved Tin (Sn)	ug/L	<5.0	5.0	0.0050	A438557
Dissolved Titanium (Ti)	ug/L	<5.0	5.0	0.30	A438557
Dissolved Uranium (U)	ug/L	3.50	0.10	0.0010	A438557
Dissolved Vanadium (V)	ug/L	<5.0	5.0	0.020	A438557
RDL = Reportable Detection Limit					

CSR DISSOLVED METALS IN WATER WITH CV HG (WATER)

Bureau Veritas ID		AKV944			
Sampling Date		2021/11/16 13:50			
COC Number		639776-01-01			
	UNITS	W-11222680-161121-KH-01	RDL	MDL	QC Batch
Dissolved Zinc (Zn)	ug/L	8.6	5.0	0.050	A438557
Dissolved Zirconium (Zr)	ug/L	0.41	0.10	0.0080	A438557
Dissolved Calcium (Ca)	mg/L	418	0.25	0.0050	A430398
Dissolved Magnesium (Mg)	mg/L	58.2	0.050	0.00050	A430398
Dissolved Potassium (K)	mg/L	15.4	0.050	0.0020	A430398
Dissolved Sodium (Na)	mg/L	102	0.050	0.0010	A430398
Dissolved Sulphur (S)	mg/L	321	15	5.0	A430398
RDL = Reportable Detection Limit					

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GHD Limited
Client Project #: 11222680-3-2
Site Location: UPLAND
Your P.O. #: 73523825

CSR TOTAL METALS IN WATER WITH CV HG (WATER)

Bureau Veritas ID		AKV944			
Sampling Date		2021/11/16 13:50			
COC Number		639776-01-01			
	UNITS	W-11222680-161121-KH-01	RDL	MDL	QC Batch
Calculated Parameters					
Total Hardness (CaCO3)	mg/L	1310	0.50	0.50	A430878
Elements					
Total Mercury (Hg)	ug/L	<0.0019	0.0019	0.0019	A432665
Total Metals by ICPMS					
Total Aluminum (Al)	ug/L	44.6	3.0	0.030	A438559
Total Antimony (Sb)	ug/L	<0.50	0.50	0.0020	A438559
Total Arsenic (As)	ug/L	0.97	0.10	0.010	A438559
Total Barium (Ba)	ug/L	80.1	1.0	0.0020	A438559
Total Beryllium (Be)	ug/L	<0.10	0.10	0.0030	A438559
Total Bismuth (Bi)	ug/L	<1.0	1.0	0.0010	A438559
Total Boron (B)	ug/L	1630	50	50	A438559
Total Cadmium (Cd)	ug/L	0.152	0.010	0.0020	A438559
Total Chromium (Cr)	ug/L	<1.0	1.0	0.020	A438559
Total Cobalt (Co)	ug/L	1.61	0.20	0.20	A438559
Total Copper (Cu)	ug/L	12.2	0.50	0.030	A438559
Total Iron (Fe)	ug/L	6470	10	0.70	A438559
Total Lead (Pb)	ug/L	0.30	0.20	0.0010	A438559
Total Lithium (Li)	ug/L	<2.0	2.0	2.0	A438559
Total Manganese (Mn)	ug/L	6250	1.0	0.030	A438559
Total Molybdenum (Mo)	ug/L	1.6	1.0	0.0020	A438559
Total Nickel (Ni)	ug/L	3.0	1.0	0.010	A438559
Total Phosphorus (P)	ug/L	21	10	1.0	A438559
Total Selenium (Se)	ug/L	0.34	0.10	0.0060	A438559
Total Silicon (Si)	ug/L	9160	100	0.30	A438559
Total Silver (Ag)	ug/L	<0.020	0.020	0.0020	A438559
Total Strontium (Sr)	ug/L	1510	1.0	0.0020	A438559
Total Thallium (Tl)	ug/L	0.019	0.010	0.010	A438559
Total Tin (Sn)	ug/L	<5.0	5.0	0.0050	A438559
Total Titanium (Ti)	ug/L	<5.0	5.0	0.30	A438559
Total Uranium (U)	ug/L	3.09	0.10	0.0010	A438559
Total Vanadium (V)	ug/L	<5.0	5.0	0.020	A438559
RDL = Reportable Detection Limit					

CSR TOTAL METALS IN WATER WITH CV HG (WATER)

Bureau Veritas ID		AKV944			
Sampling Date		2021/11/16 13:50			
COC Number		639776-01-01			
	UNITS	**W-11222680-161121-KH-01**	**RDL**	**MDL**	**QC Batch**
Total Zinc (Zn)	ug/L	10.9	5.0	0.050	A438559
Total Zirconium (Zr)	ug/L	0.57	0.10	0.0080	A438559
Total Calcium (Ca)	mg/L	427	0.25	0.0050	A430273
Total Magnesium (Mg)	mg/L	60.2	0.050	0.00050	A430273
Total Potassium (K)	mg/L	16.0	0.050	0.0020	A430273
Total Sodium (Na)	mg/L	105	0.050	0.0010	A430273
Total Sulphur (S)	mg/L	297	15	5.0	A430273
RDL = Reportable Detection Limit					

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GHD Limited
Client Project #: 11222680-3-2
Site Location: UPLAND
Your P.O. #: 73523825

CSR PAH IN WATER BY GC-MS (WATER)

Bureau Veritas ID		AKV944			
Sampling Date		2021/11/16 13:50			
COC Number		639776-01-01			
	UNITS	W-11222680-161121-KH-01	RDL	MDL	QC Batch
Calculated Parameters					
Low Molecular Weight PAH`s	ug/L	4.8	0.10	0.010	A429811
High Molecular Weight PAH`s	ug/L	<0.050	0.050	0.020	A429811
Total PAH	ug/L	4.9	0.10	0.010	A429811
Polycyclic Aromatics					
Quinoline	ug/L	<0.020	0.020	0.020	A439593
Naphthalene	ug/L	2.9	0.10	0.050	A439593
1-Methylnaphthalene	ug/L	0.72	0.050	0.050	A439593
2-Methylnaphthalene	ug/L	<0.10	0.10	0.050	A439593
Acenaphthylene	ug/L	<0.050	0.050	0.050	A439593
Acenaphthene	ug/L	0.85	0.050	0.050	A439593
Fluorene	ug/L	0.16	0.050	0.050	A439593
Phenanthrene	ug/L	0.081	0.050	0.050	A439593
Anthracene	ug/L	0.028	0.010	0.010	A439593
Acridine	ug/L	0.17	0.050	0.050	A439593
Fluoranthene	ug/L	0.027	0.020	0.020	A439593
Pyrene	ug/L	<0.020	0.020	0.020	A439593
Benzo(a)anthracene	ug/L	<0.010	0.010	0.010	A439593
Chrysene	ug/L	<0.020	0.020	0.020	A439593
Benzo(b&j)fluoranthene	ug/L	<0.030	0.030	0.030	A439593
Benzo(k)fluoranthene	ug/L	<0.050	0.050	0.050	A439593
Benzo(a)pyrene	ug/L	<0.0050	0.0050	0.0050	A439593
Indeno(1,2,3-cd)pyrene	ug/L	<0.050	0.050	0.050	A439593
Dibenz(a,h)anthracene	ug/L	<0.0030	0.0030	0.0030	A439593
Benzo(g,h,i)perylene	ug/L	<0.050	0.050	0.050	A439593
Surrogate Recovery (%)					
D10-ANTHRACENE (sur.)	%	86	N/A	N/A	A439593
D8-ACENAPHTHYLENE (sur.)	%	88	N/A	N/A	A439593
D8-NAPHTHALENE (sur.)	%	82	N/A	N/A	A439593
TERPHENYL-D14 (sur.)	%	86	N/A	N/A	A439593

RDL = Reportable Detection Limit
N/A = Not Applicable

GENERAL COMMENTS

Results relate only to the items tested.

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QUALITY ASSURANCE REPORT

			Matrix Spike		Spiked Blank		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
A431671	1,4-Difluorobenzene (sur.)	2021/11/19	108 (2)	70 - 130	111	70 - 130	117	%		
A431671	4-Bromofluorobenzene (sur.)	2021/11/19	105 (2)	70 - 130	104	70 - 130	106	%		
A431671	D4-1,2-Dichloroethane (sur.)	2021/11/19	100 (2)	70 - 130	95	70 - 130	96	%		
A439593	D10-ANTHRACENE (sur.)	2021/11/23	102	50 - 140	90	50 - 140	94	%		
A439593	D8-ACENAPHTHYLENE (sur.)	2021/11/23	100	50 - 140	88	50 - 140	89	%		
A439593	D8-NAPHTHALENE (sur.)	2021/11/23	97	50 - 140	80	50 - 140	84	%		
A439593	TERPHENYL-D14 (sur.)	2021/11/23	113	50 - 140	100	50 - 140	105	%		
A431542	Biochemical Oxygen Demand	2021/11/24			100	85 - 115	<2.0	mg/L	0.51 (1)	20
A431613	Orthophosphate (P)	2021/11/19	NC	80 - 120	106	80 - 120	<0.0030	mg/L	1.9 (1)	20
A431671	Benzene	2021/11/19	109 (2)	70 - 130	105	70 - 130	<0.40	ug/L	NC (3)	30
A431671	Ethylbenzene	2021/11/19	107 (2)	70 - 130	103	70 - 130	<0.40	ug/L	NC (3)	30
A431671	m & p-Xylene	2021/11/19	104 (2)	70 - 130	101	70 - 130	<0.40	ug/L	NC (3)	30
A431671	Methyl-tert-butylether (MTBE)	2021/11/19	106 (2)	70 - 130	102	70 - 130	<4.0	ug/L	NC (3)	30
A431671	o-Xylene	2021/11/19	110 (2)	70 - 130	106	70 - 130	<0.40	ug/L	NC (3)	30
A431671	Styrene	2021/11/19	107 (2)	70 - 130	106	70 - 130	<0.40	ug/L	NC (3)	30
A431671	Toluene	2021/11/19	98 (2)	70 - 130	95	70 - 130	<0.40	ug/L	NC (3)	30
A431671	VH C6-C10	2021/11/19			71	70 - 130	<300	ug/L	NC (3)	30
A431671	Xylenes (Total)	2021/11/19					<0.40	ug/L	NC (3)	30
A431793	Dissolved Chloride (Cl)	2021/11/19			106	80 - 120	<1.0	mg/L		
A431793	Dissolved Sulphate (SO4)	2021/11/19			101	80 - 120	<1.0	mg/L		
A431799	Dissolved Mercury (Hg)	2021/11/19	95	80 - 120	100	80 - 120	<0.0019	ug/L	NC (1)	20
A432452	Alkalinity (PP as CaCO3)	2021/11/19					<1.0	mg/L	NC (1)	20
A432452	Alkalinity (Total as CaCO3)	2021/11/19	NC	80 - 120	88	80 - 120	<1.0	mg/L	4.8 (1)	20
A432452	Bicarbonate (HCO3)	2021/11/19					<1.0	mg/L	4.8 (1)	20
A432452	Carbonate (CO3)	2021/11/19					<1.0	mg/L	NC (1)	20
A432452	Hydroxide (OH)	2021/11/19					<1.0	mg/L	NC (1)	20
A432454	Conductivity	2021/11/19			100	80 - 120	<2.0	uS/cm	0.20 (1)	10
A432510	Nitrate plus Nitrite (N)	2021/11/19	102	80 - 120	107	80 - 120	<0.020	mg/L	0.79 (1)	25
A432512	Nitrite (N)	2021/11/19	102	80 - 120	104	80 - 120	<0.0050	mg/L	NC (1)	20
A432665	Total Mercury (Hg)	2021/11/19	95	80 - 120	103	80 - 120	<0.0019	ug/L	NC (1)	20
A432953	Total Sulphide	2021/11/20	120	80 - 120	100	80 - 120	<0.0018	mg/L	NC (1)	20
A438557	Dissolved Aluminum (Al)	2021/11/23	98	80 - 120	88	80 - 120	<3.0	ug/L	13 (1)	20

QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		Spiked Blank		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
A438557	Dissolved Antimony (Sb)	2021/11/23	98	80 - 120	88	80 - 120	<0.50	ug/L	NC (1)	20
A438557	Dissolved Arsenic (As)	2021/11/23	98	80 - 120	102	80 - 120	<0.10	ug/L	18 (1)	20
A438557	Dissolved Barium (Ba)	2021/11/23	101	80 - 120	89	80 - 120	<1.0	ug/L	15 (1)	20
A438557	Dissolved Beryllium (Be)	2021/11/23	97	80 - 120	87	80 - 120	<0.10	ug/L	NC (1)	20
A438557	Dissolved Bismuth (Bi)	2021/11/23	101	80 - 120	90	80 - 120	<1.0	ug/L	NC (1)	20
A438557	Dissolved Boron (B)	2021/11/23	103	80 - 120	90	80 - 120	<50	ug/L	NC (1)	20
A438557	Dissolved Cadmium (Cd)	2021/11/23	99	80 - 120	87	80 - 120	<0.010	ug/L	NC (1)	20
A438557	Dissolved Chromium (Cr)	2021/11/23	101	80 - 120	106	80 - 120	<1.0	ug/L	NC (1)	20
A438557	Dissolved Cobalt (Co)	2021/11/23	100	80 - 120	106	80 - 120	<0.20	ug/L	NC (1)	20
A438557	Dissolved Copper (Cu)	2021/11/23	97	80 - 120	104	80 - 120	<0.20	ug/L	6.8 (1)	20
A438557	Dissolved Iron (Fe)	2021/11/23	99	80 - 120	93	80 - 120	<5.0	ug/L	16 (1)	20
A438557	Dissolved Lead (Pb)	2021/11/23	100	80 - 120	89	80 - 120	<0.20	ug/L	NC (1)	20
A438557	Dissolved Lithium (Li)	2021/11/23	100	80 - 120	90	80 - 120	<2.0	ug/L	NC (1)	20
A438557	Dissolved Manganese (Mn)	2021/11/23	101	80 - 120	106	80 - 120	<1.0	ug/L	9.0 (1)	20
A438557	Dissolved Molybdenum (Mo)	2021/11/23	105	80 - 120	90	80 - 120	<1.0	ug/L	NC (1)	20
A438557	Dissolved Nickel (Ni)	2021/11/23	100	80 - 120	106	80 - 120	<1.0	ug/L	NC (1)	20
A438557	Dissolved Phosphorus (P)	2021/11/23	97	80 - 120	96	80 - 120	<10	ug/L	2.1 (1)	20
A438557	Dissolved Selenium (Se)	2021/11/23	94	80 - 120	90	80 - 120	<0.10	ug/L	0.53 (1)	20
A438557	Dissolved Silicon (Si)	2021/11/23	79 (4)	80 - 120	72 (4)	80 - 120	<100	ug/L	11 (1)	20
A438557	Dissolved Silver (Ag)	2021/11/23	97	80 - 120	87	80 - 120	<0.020	ug/L	NC (1)	20
A438557	Dissolved Strontium (Sr)	2021/11/23	99	80 - 120	104	80 - 120	<1.0	ug/L	4.8 (1)	20
A438557	Dissolved Thallium (Tl)	2021/11/23	98	80 - 120	87	80 - 120	<0.010	ug/L	NC (1)	20
A438557	Dissolved Tin (Sn)	2021/11/23	101	80 - 120	90	80 - 120	<5.0	ug/L	NC (1)	20
A438557	Dissolved Titanium (Ti)	2021/11/23	102	80 - 120	103	80 - 120	<5.0	ug/L	NC (1)	20
A438557	Dissolved Uranium (U)	2021/11/23	101	80 - 120	89	80 - 120	<0.10	ug/L	NC (1)	20
A438557	Dissolved Vanadium (V)	2021/11/23	102	80 - 120	108	80 - 120	<5.0	ug/L	4.6 (1)	20
A438557	Dissolved Zinc (Zn)	2021/11/23	92	80 - 120	111	80 - 120	<5.0	ug/L	11 (1)	20
A438557	Dissolved Zirconium (Zr)	2021/11/23	101	80 - 120	101	80 - 120	<0.10	ug/L	NC (1)	20
A438559	Total Aluminum (Al)	2021/11/23	99	80 - 120	103	80 - 120	<3.0	ug/L	4.7 (1)	20
A438559	Total Antimony (Sb)	2021/11/23	95	80 - 120	104	80 - 120	<0.50	ug/L	NC (1)	20
A438559	Total Arsenic (As)	2021/11/23	114	80 - 120	95	80 - 120	<0.10	ug/L	7.6 (1)	20
A438559	Total Barium (Ba)	2021/11/23	NC	80 - 120	103	80 - 120	<1.0	ug/L	0.47 (1)	20

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		Spiked Blank		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
A438559	Total Beryllium (Be)	2021/11/23	92	80 - 120	104	80 - 120	<0.10	ug/L	NC (1)	20
A438559	Total Bismuth (Bi)	2021/11/23	96	80 - 120	105	80 - 120	<1.0	ug/L	NC (1)	20
A438559	Total Boron (B)	2021/11/23	97	80 - 120	104	80 - 120	<50	ug/L	NC (1)	20
A438559	Total Cadmium (Cd)	2021/11/23	93	80 - 120	103	80 - 120	<0.010	ug/L	13 (1)	20
A438559	Total Chromium (Cr)	2021/11/23	113	80 - 120	98	80 - 120	<1.0	ug/L	NC (1)	20
A438559	Total Cobalt (Co)	2021/11/23	112	80 - 120	100	80 - 120	<0.20	ug/L	7.0 (1)	20
A438559	Total Copper (Cu)	2021/11/23	107	80 - 120	97	80 - 120	<0.50	ug/L	8.6 (1)	20
A438559	Total Iron (Fe)	2021/11/23	110	80 - 120	112	80 - 120	<10	ug/L	12 (1)	20
A438559	Total Lead (Pb)	2021/11/23	96	80 - 120	104	80 - 120	<0.20	ug/L	NC (1)	20
A438559	Total Lithium (Li)	2021/11/23	97	80 - 120	105	80 - 120	<2.0	ug/L	NC (1)	20
A438559	Total Manganese (Mn)	2021/11/23	120	80 - 120	101	80 - 120	<1.0	ug/L	7.1 (1)	20
A438559	Total Molybdenum (Mo)	2021/11/23	105	80 - 120	106	80 - 120	<1.0	ug/L	NC (1)	20
A438559	Total Nickel (Ni)	2021/11/23	110	80 - 120	98	80 - 120	<1.0	ug/L	7.4 (1)	20
A438559	Total Phosphorus (P)	2021/11/23	111	80 - 120	90	80 - 120	<10	ug/L	4.9 (1)	20
A438559	Total Selenium (Se)	2021/11/23	99	80 - 120	101	80 - 120	<0.10	ug/L	8.4 (1)	20
A438559	Total Silicon (Si)	2021/11/23	78 (4)	80 - 120	77 (4)	80 - 120	<100	ug/L	6.2 (1)	20
A438559	Total Silver (Ag)	2021/11/23	94	80 - 120	102	80 - 120	<0.020	ug/L	NC (1)	20
A438559	Total Strontium (Sr)	2021/11/23	NC	80 - 120	97	80 - 120	<1.0	ug/L	9.9 (1)	20
A438559	Total Thallium (Tl)	2021/11/23	95	80 - 120	101	80 - 120	<0.010	ug/L	12 (1)	20
A438559	Total Tin (Sn)	2021/11/23	98	80 - 120	105	80 - 120	<5.0	ug/L	NC (1)	20
A438559	Total Titanium (Ti)	2021/11/23	116	80 - 120	95	80 - 120	<5.0	ug/L	NC (1)	20
A438559	Total Uranium (U)	2021/11/23	101	80 - 120	105	80 - 120	<0.10	ug/L	NC (1)	20
A438559	Total Vanadium (V)	2021/11/23	119	80 - 120	102	80 - 120	<5.0	ug/L	NC (1)	20
A438559	Total Zinc (Zn)	2021/11/23	105	80 - 120	100	80 - 120	<5.0	ug/L	12 (1)	20
A438559	Total Zirconium (Zr)	2021/11/23	122 (4)	80 - 120	98	80 - 120	<0.10	ug/L	NC (1)	20
A438969	Total Ammonia (N)	2021/11/22	94	80 - 120	99	80 - 120	<0.015	mg/L	NC (1)	20
A439593	1-Methylnaphthalene	2021/11/23	93	50 - 140	87	50 - 140	<0.050	ug/L		
A439593	2-Methylnaphthalene	2021/11/23	93	50 - 140	88	50 - 140	<0.10	ug/L	NC (1)	40
A439593	Acenaphthene	2021/11/23	95	50 - 140	87	50 - 140	<0.050	ug/L	NC (1)	40
A439593	Acenaphthylene	2021/11/23	93	50 - 140	86	50 - 140	<0.050	ug/L	NC (1)	40
A439593	Acridine	2021/11/23	96	50 - 140	101	50 - 140	<0.050	ug/L	NC (1)	40
A439593	Anthracene	2021/11/23	94	50 - 140	86	50 - 140	<0.010	ug/L	NC (1)	40

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		Spiked Blank		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
A439593	Benzo(a)anthracene	2021/11/23	101	50 - 140	92	50 - 140	<0.010	ug/L	NC (1)	40
A439593	Benzo(a)pyrene	2021/11/23	93	50 - 140	91	50 - 140	<0.0050	ug/L	NC (1)	40
A439593	Benzo(b&j)fluoranthene	2021/11/23	88	50 - 140	82	50 - 140	<0.030	ug/L	NC (1)	40
A439593	Benzo(g,h,i)perylene	2021/11/23	73	50 - 140	84	50 - 140	<0.050	ug/L	NC (1)	40
A439593	Benzo(k)fluoranthene	2021/11/23	94	50 - 140	88	50 - 140	<0.050	ug/L	NC (1)	40
A439593	Chrysene	2021/11/23	95	50 - 140	89	50 - 140	<0.020	ug/L	NC (1)	40
A439593	Dibenz(a,h)anthracene	2021/11/23	79	50 - 140	90	50 - 140	<0.0030	ug/L	NC (1)	40
A439593	Fluoranthene	2021/11/23	104	50 - 140	95	50 - 140	<0.020	ug/L	NC (1)	40
A439593	Fluorene	2021/11/23	95	50 - 140	87	50 - 140	<0.050	ug/L	NC (1)	40
A439593	Indeno(1,2,3-cd)pyrene	2021/11/23	79	50 - 140	90	50 - 140	<0.050	ug/L	NC (1)	40
A439593	Naphthalene	2021/11/23	91	50 - 140	88	50 - 140	<0.10	ug/L	NC (1)	40
A439593	Phenanthrene	2021/11/23	94	50 - 140	88	50 - 140	<0.050	ug/L	NC (1)	40
A439593	Pyrene	2021/11/23	104	50 - 140	95	50 - 140	<0.020	ug/L	NC (1)	40
A439593	Quinoline	2021/11/23	98	50 - 140	105	50 - 140	<0.020	ug/L	NC (1)	40
A444103	Chemical Oxygen Demand	2021/11/24	NC	80 - 120	100	80 - 120	<10	mg/L	0.22 (1)	20
A447334	Total Dissolved Solids	2021/11/23	101	80 - 120	98	80 - 120	<10	mg/L	NC (1)	20
A448462	Total Suspended Solids	2021/11/24	104	80 - 120	102	80 - 120	<1.0	mg/L	NC (1)	20

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

(1) Duplicate Parent ID

(2) Matrix Spike Parent ID [AKV944-12]

(3) Duplicate Parent ID [AKV944-12]

(4) Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.

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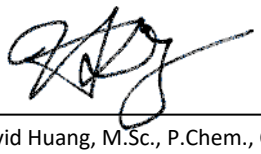
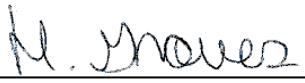
VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:

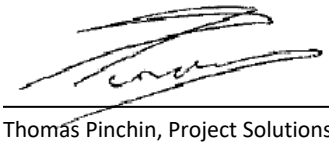


David Huang, M.Sc., P.Chem., QP, Scientific Services Manager

Ghayasuddin Khan, M.Sc., P.Chem., QP, Scientific Specialist, Inorganics



Heather Groves, Dip.BioSci, QP, Senior Laboratory Manager - Inorganics



Thomas Pinchin, Project Solutions Representative

Bureau Veritas Proprietary Software
Logiciel Propriétaire de Bureau Veritas

Automated Statchk

BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports.
For Service Group specific validation please refer to the Validation Signature Page.

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Bureau Veritas Laboratories
4606 Canada Way, Burnaby, British Columbia Canada V5G 1K5 Tel (604) 734 7276 Toll-free 800-563-6266 Fax (604) 731 2386 www.bvna.com

C188803_COC

INVOICE TO:

Company Name: #163 GHD Limited
Contact Name: AP Invoices - 735
Address: 455 PHILLIP STREET, WATERLOO ON N2L 3X2
Phone: (519) 884-0510 Fax: (519) 725-1394
Email: APinvoices-735@ghd.com; INAKing-Canada@ghd.com

Report Information

Company Name:
Contact Name: Airesse MacPhee
Address:
Phone: Fax:
Email: airesse.macphee@ghd.com; NationalEDDSupport@ma

Project Information

Quotation #: C10010
P.O. #:
Project #: 11222680-#A3-2
Project Name: Upland
Site #:
Sampled By: K. Hasler

Chain Of Custody Record

C#639776-01-01

Bureau Veritas Use Only

Bottle Order #: 639776
Project Manager: Nahed Amer

Regulatory Criteria: ☐ CSR ☐ CCME ☐ BC Water Quality ☐ Other

Special Instructions: Leak detection Layer water

SAMPLES MUST BE KEPT COOL (< 10°C) FROM TIME OF SAMPLING UNTIL DELIVERY TO BUREAU VERITAS

ANALYSIS REQUESTED (PLEASE BE SPECIFIC)

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Metals Field Filtered (Y/N)	Conductivity, Cl, SO4, NO2, NO3, N+N, PO4, Speciated Alk	Sulphide + H2S Calc (CCME)	Sulphide, Un-ionized (as H2S) (Calc)	Ammonia-N (Total)	Dissolved Metals with CV Hg. Hardness (CCSR)	TDS/TSS	Total Metals with CV Hg (CCSR)	PAH	BTEX/VPH	BOD/COD	# of Bottles	Comments
1		W-11222680-161121-KH-01	16/11/21	13:50	WATER		X	X	X	X	X	X	X	X	X	X		Short Holding Times!
2																		
3																		All bottles were field filtered and preserved as required
4																		
5																		
6																		
7																		
8																		
9																		
10																		

Turnaround Time (TAT) Required:

Please provide advance notice for rush projects

Regular (Standard) TAT: ☒
(will be applied if Rush TAT is not specified)
Standard TAT = 5-7 Working days for most tests.
Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.

Job Specific Rush TAT (if applies to entire submission)
1 DAY ☐ 2 Day ☐ 3 Day ☐ Date Required: ☐
Rush Confirmation Number: (call lab for #)

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted
Kathleen K. Hasler	21/11/17	22:00	[illegible]	2021/11/18	10:25	

Lab Use Only: Time Sensitive ☐ | Temperature (°C) on Receipt: 2 | 3 | 2 | Custody Seal Intact on Cooler? ☐ Yes ☒ No

4/3/2

* UNLESS OTHERWISE AGREED TO IN WRITING, WORK SUBMITTED ON THIS CHAIN OF CUSTODY IS SUBJECT TO BUREAU VERITAS'S STANDARD TERMS AND CONDITIONS. SIGNING OF THIS CHAIN OF CUSTODY DOCUMENT IS ACKNOWLEDGMENT AND ACCEPTANCE OF OUR TERMS WHICH ARE AVAILABLE FOR VIEWING AT WWW.BVLABS.COM/TERMS-AND-CONDITIONS.
* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

White: Bureau Veritas Yellow: Client

Bureau Veritas Canada (2019) Inc.

Your P.O. #: 73523825
Your Project #: 11222680-3-2
Site Location: UPLAND
Your C.O.C. #: 639777-01-01

Attention: 11222680-3-2 Distribution

GHD Limited
455 PHILLIP STREET
WATERLOO, ON
CANADA N2L 3X2

Report Date: 2021/12/30
Report #: R3116270
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C188804
Received: 2021/11/18, 10:25

Sample Matrix: Water
Samples Received: 3

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity @25C (pp, total), CO3,HCO3,OH	2	N/A	2021/11/19	BBY6SOP-00026	SM 23 2320 B m
Biochemical Oxygen Demand	2	2021/11/19	2021/11/24	BBY6SOP-00045	SM 23 5210 B m
BTEX/MTBE LH, VH, F1 SIM/MS	3	N/A	2021/11/19	BBY8SOP-00010 / BBY8SOP-00011 / BBY8SOP-00012	BCMOE BCLM Jul 2017
Chloride/Sulphate by Auto Colourimetry	2	N/A	2021/11/19	BBY6SOP-00011 / BBY6SOP-00017	SM23-4500-Cl/SO4-E m
COD by Colorimeter	2	N/A	2021/11/24	BBY6SOP-00024	SM 23 5220 D m
Conductivity @25C	2	N/A	2021/11/19	BBY6SOP-00026	SM 23 2510 B m
Sulphide (as H2S) (1)	2	N/A	2021/11/20		Auto Calc
Un-ionized Hydrogen Sulphide as S Calc	2	N/A	2021/12/22	BBY WI-00033	Auto Calc
Hardness Total (calculated as CaCO3) (1, 2)	1	N/A	2021/12/10	BBY WI-00033	Auto Calc
Hardness Total (calculated as CaCO3) (1, 2)	1	N/A	2021/12/15	BBY WI-00033	Auto Calc
Hardness (calculated as CaCO3) (1)	2	N/A	2021/12/10	BBY WI-00033	Auto Calc
Mercury (Dissolved) by CV (3)	2	2021/11/19	2021/11/19	AB SOP-00084	BCMOE BCLM Oct2013 m
Mercury (Total) by CV	1	2021/11/19	2021/11/19	AB SOP-00084	BCMOE BCLM Oct2013 m
Mercury (Total) by CV	1	2021/12/22	2021/12/22	AB SOP-00084	BCMOE BCLM Oct2013 m
Na, K, Ca, Mg, S by CRC ICPMS (diss.) (1)	2	N/A	2021/12/10		Auto Calc
Elements by CRC ICPMS (dissolved) (1, 3)	1	N/A	2021/11/23	CAL SOP-00265	EPA 6020 m
Elements by CRC ICPMS (dissolved) (1, 3)	1	N/A	2021/12/16	CAL SOP-00265	EPA 6020 m
Na, K, Ca, Mg, S by CRC ICPMS (total) (1)	1	2021/11/18	2021/12/10		Auto Calc
Na, K, Ca, Mg, S by CRC ICPMS (total) (1)	1	2021/11/18	2021/12/15		Auto Calc
Elements by CRC ICPMS (total) (1)	1	2021/12/14	2021/12/15	CAL SOP-00265	EPA 6020 m
Elements by CRC ICPMS (total) (1)	1	2021/12/15	2021/12/24	CAL SOP-00265	EPA 6020 m
Ammonia-N (Total)	2	N/A	2021/11/22	AB SOP-00007	SM 23 4500 NH3 A G m
Nitrate + Nitrite (N)	2	N/A	2021/11/19	BBY6SOP-00010	SM 23 4500-NO3- I m
Nitrite (N) by CFA	2	N/A	2021/11/19	BBY6SOP-00010	SM 23 4500-NO3- I m
Nitrogen - Nitrate (as N)	2	N/A	2021/12/14	BBY WI-00033	Auto Calc
PAH in Water by GC/MS (SIM)	1	2021/11/23	2021/11/23	BBY8SOP-00021	BCMOE BCLM Jul2017m
PAH in Water by GC/MS (SIM)	1	2021/11/23	2021/11/24	BBY8SOP-00021	BCMOE BCLM Jul2017m
Total LMW, HMW, Total PAH Calc (4)	1	N/A	2021/12/09	BBY WI-00033	Auto Calc
Total LMW, HMW, Total PAH Calc (4)	1	N/A	2021/12/10	BBY WI-00033	Auto Calc

Your P.O. #: 73523825
Your Project #: 11222680-3-2
Site Location: UPLAND
Your C.O.C. #: 639777-01-01

Attention: 11222680-3-2 Distribution

GHD Limited
455 PHILLIP STREET
WATERLOO, ON
CANADA N2L 3X2

Report Date: 2021/12/30
Report #: R3116270
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C188804
Received: 2021/11/18, 10:25

Sample Matrix: Water
Samples Received: 3

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Filter and HNO3 Preserve for Metals	2	N/A	2021/11/18	BBY7 WI-00004	SM 23 3030B m
Orthophosphate by Konelab (5)	2	N/A	2021/11/19	BBY6SOP-00013	SM 23 4500-P E m
Total Sulphide (1)	2	N/A	2021/11/20	AB SOP-00080	SM 23 4500 S2-A D Fm
Total Dissolved Solids (Filt. Residue)	1	2021/11/19	2021/11/22	BBY6SOP-00033	SM 23 2540 C m
Total Dissolved Solids (Filt. Residue)	1	2021/11/22	2021/11/23	BBY6SOP-00033	SM 23 2540 C m
Total Suspended Solids (NFR)	2	2021/11/23	2021/11/24	BBY6SOP-00034	SM 23 2540 D m
Field pH	2	N/A	2021/12/22		
Field Temperature	2	N/A	2021/12/22		
Volatile HC-BTEX (6)	3	N/A	2021/12/08	BBY WI-00033	Auto Calc

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

Bureau Veritas liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Bureau Veritas has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Bureau Veritas, unless otherwise agreed in writing. Bureau Veritas is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) This test was performed by Bureau Veritas Calgary, 4000 - 19 St. , Calgary, AB, T2E 6P8
(2) "Total Hardness" was calculated from Total Ca and Mg concentrations and may be biased high (Hardness, or Dissolved Hardness, calculated from Dissolved Ca and Mg, should be used for compliance if available).

Your P.O. #: 73523825
Your Project #: 11222680-3-2
Site Location: UPLAND
Your C.O.C. #: 639777-01-01

Attention: 11222680-3-2 Distribution

GHD Limited
455 PHILLIP STREET
WATERLOO, ON
CANADA N2L 3X2

Report Date: 2021/12/30
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CERTIFICATE OF ANALYSIS

BV LABS JOB #: C188804
Received: 2021/11/18, 10:25

(3) Dissolved > Total Imbalance: When applicable, Dissolved and Total results were reviewed and data quality meets acceptable levels unless otherwise noted.
(4) Total PAHs in Water include: Quinoline, Naphthalene, 1-Methylnaphthalene, 2-Methylnaphthalene, Acenaphthylene, Acenaphthene, Fluorene, Phenanthrene, Anthracene, Acridine, Fluoranthene, Pyrene, Benzo(a)anthracene, Chrysene, Benzo(b&j)fluoranthene, Benzo(k)fluoranthene, Benzo(a)pyrene, Indeno(1,2,3-cd)pyrene, Dibenz(a,h)anthracene, and Benzo(g,h,i)perylene.
(5) Orthophosphate > Total Phosphorus Imbalance: When applicable, Orthophosphate, Total Phosphorus and dissolved Phosphorus results were reviewed and data quality meets acceptable levels unless otherwise noted.
(6) VPH = VH - (Benzene + Toluene + Ethylbenzene + m & p-Xylene + o-Xylene + Styrene)

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Thomas Pinchin, Project Solutions Representative
Email: Thomas.Pinchin@bureauveritas.com
Phone# (604) 734 7276

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BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Bureau Veritas Job #: C188804
Report Date: 2021/12/30

GHD Limited
Client Project #: 11222680-3-2
Site Location: UPLAND
Your P.O. #: 73523825
Sampler Initials: KH

RESULTS OF CHEMICAL ANALYSES OF WATER

Bureau Veritas ID		AKV945				AKV946			
Sampling Date		2021/11/16 14:50				2021/11/16 15:20			
COC Number		639777-01-01				639777-01-01			
	UNITS	WL-11222680-161121-KH-01	RDL	MDL	QC Batch	WL-11222680-161121-KH-02	RDL	MDL	QC Batch
ANIONS									
Nitrite (N)	mg/L	0.060 (1)	0.050	0.050	A432512	0.0070	0.0050	0.0050	A432512
Calculated Parameters									
Filter and HNO3 Preservation	N/A	FIELD	N/A	N/A	ONSITE	FIELD	N/A	N/A	ONSITE
Nitrate (N)	mg/L	0.45	0.20	N/A	A429808	0.287	0.020	N/A	A429808
Sulphide (as H2S)	mg/L	0.050	0.0020	N/A	A430441	<0.0020	0.0020	N/A	A430441
Demand Parameters									
Biochemical Oxygen Demand	mg/L	15	2.0	N/A	A432181	2.5	2.0	N/A	A432181
Chemical Oxygen Demand	mg/L	282	10	10	A444103	34	10	10	A444103
Field Parameters									
Field pH	pH	6.90	N/A	N/A	ONSITE	7.71	N/A	N/A	ONSITE
Field Temperature	°C	15.37	N/A	N/A	ONSITE	12.32	N/A	N/A	ONSITE
Misc. Inorganics									
Conductivity	uS/cm	2000	2.0	N/A	A432454	430	2.0	N/A	A432454
Total Dissolved Solids	mg/L	1200	10	N/A	A432205	250	10	N/A	A447334
Total Suspended Solids	mg/L	46	1.0	N/A	A448462	26	1.0	N/A	A448462
Anions									
Alkalinity (PP as CaCO3)	mg/L	<1.0	1.0	N/A	A432452	<1.0	1.0	N/A	A432452
Alkalinity (Total as CaCO3)	mg/L	570	1.0	N/A	A432452	170	1.0	N/A	A432452
Bicarbonate (HCO3)	mg/L	700	1.0	N/A	A432452	200	1.0	N/A	A432452
Carbonate (CO3)	mg/L	<1.0	1.0	N/A	A432452	<1.0	1.0	N/A	A432452
Hydroxide (OH)	mg/L	<1.0	1.0	N/A	A432452	<1.0	1.0	N/A	A432452
Total Sulphide	mg/L	0.047 (2)	0.0018	N/A	A432953	<0.0018	0.0018	N/A	A432953
Dissolved Chloride (Cl)	mg/L	250 (1)	10	N/A	A431793	16	1.0	N/A	A431793
Dissolved Sulphate (SO4)	mg/L	120 (1)	10	N/A	A431793	34	1.0	N/A	A431793
Nutrients									
Total Ammonia (N)	mg/L	41	0.75	0.20	A438969	0.34	0.015	0.0040	A438969
Orthophosphate (P)	mg/L	0.079	0.0030	0.0030	A431613	<0.0030	0.0030	0.0030	A431613
Nitrate plus Nitrite (N)	mg/L	0.51 (1)	0.20	0.20	A432510	0.294	0.020	0.020	A432510

RDL = Reportable Detection Limit
N/A = Not Applicable
(1) RDL raised due to sample matrix interference.
(2) Sample pH <9, preservation incomplete. Due to volatility of analyte, a low bias in the results is likely.

Bureau Veritas Laboratories Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

GHD Limited
Client Project #: 11222680-3-2
Site Location: UPLAND
Your P.O. #: 73523825
Sampler Initials: KH

MERCURY BY COLD VAPOR (WATER)

Bureau Veritas ID		AKV945			
Sampling Date		2021/11/16 14:50			
COC Number		639777-01-01			
	UNITS	WL-11222680-161121-KH-01	RDL	MDL	QC Batch
Elements					
Total Mercury (Hg)	ug/L	<0.038 (1)	0.038	0.038	A454314

RDL = Reportable Detection Limit

(1) Detection limit raised based on sample volume used and sample matrix. Mercury sample analyzed using the HDPE container and nitric acid preservative, these non-conformances can cause stability and high or low biases, results for this test are qualified.

Bureau Veritas Laboratories Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

Bureau Veritas Job #: C188804
Report Date: 2021/12/30

GHD Limited
Client Project #: 11222680-3-2
Site Location: UPLAND
Your P.O. #: 73523825
Sampler Initials: KH

MISCELLANEOUS (WATER)

Bureau Veritas ID		AKV945	AKV946			
Sampling Date		2021/11/16 14:50	2021/11/16 15:20			
COC Number		639777-01-01	639777-01-01			
	UNITS	WL-11222680-161121-KH-01	WL-11222680-161121-KH-02	RDL	MDL	QC Batch
Calculated Parameters						
Total Un-ionized Hydrogen Sulfide as S	mg/L	0.028	<0.0050	0.0050	0.0050	A430830
Total Un-ionized Hydrogen Sulfide as H2S	mg/L	0.030	<0.0050	0.0050	0.0050	A430830
RDL = Reportable Detection Limit						

Bureau Veritas Laboratories Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

Bureau Veritas Job #: C188804
Report Date: 2021/12/30

GHD Limited
Client Project #: 11222680-3-2
Site Location: UPLAND
Your P.O. #: 73523825
Sampler Initials: KH

CSR BTEX/VPH IN WATER (WATER)

Bureau Veritas ID		AKV945	AKV946	AKW078			
Sampling Date		2021/11/16 14:50	2021/11/16 15:20	2021/11/16 15:20			
COC Number		639777-01-01	639777-01-01	639777-01-01			
	UNITS	WL-11222680-161121-KH-01	WL-11222680-161121-KH-02	TRIP BLANK	RDL	MDL	QC Batch
Calculated Parameters							
VPH (VHW6 to 10 - BTEX)	ug/L	<300	<300	<300	300	300	A429981
Volatiles							
Methyl-tert-butylether (MTBE)	ug/L	<4.0	<4.0	<4.0	4.0	4.0	A431671
Benzene	ug/L	0.74	<0.40	<0.40	0.40	0.40	A431671
Toluene	ug/L	28	<0.40	<0.40	0.40	0.40	A431671
Ethylbenzene	ug/L	4.2	<0.40	<0.40	0.40	0.40	A431671
m & p-Xylene	ug/L	2.7	<0.40	<0.40	0.40	0.40	A431671
o-Xylene	ug/L	2.1	<0.40	<0.40	0.40	0.40	A431671
Styrene	ug/L	1.2	<0.40	<0.40	0.40	0.40	A431671
Xylenes (Total)	ug/L	4.8	<0.40	<0.40	0.40	0.40	A431671
VH C6-C10	ug/L	<300	<300	<300	300	300	A431671
Surrogate Recovery (%)							
1,4-Difluorobenzene (sur.)	%	113	105	113	N/A	N/A	A431671
4-Bromofluorobenzene (sur.)	%	106	107	108	N/A	N/A	A431671
D4-1,2-Dichloroethane (sur.)	%	106	95	90	N/A	N/A	A431671

RDL = Reportable Detection Limit
N/A = Not Applicable

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Bureau Veritas Job #: C188804
Report Date: 2021/12/30

GHD Limited
Client Project #: 11222680-3-2
Site Location: UPLAND
Your P.O. #: 73523825
Sampler Initials: KH

CSR DISSOLVED METALS IN WATER WITH CV HG (WATER)

Bureau Veritas ID		AKV945		AKV946			
Sampling Date		2021/11/16 14:50		2021/11/16 15:20			
COC Number		639777-01-01		639777-01-01			
	UNITS	WL-11222680-161121-KH-01	QC Batch	WL-11222680-161121-KH-02	RDL	MDL	QC Batch
Calculated Parameters							
Dissolved Hardness (CaCO3)	mg/L	453	A430397	201	0.50	0.50	A430397
Elements							
Dissolved Mercury (Hg)	ug/L	<0.0019	A431799	<0.0019	0.0019	0.0019	A431799
Dissolved Metals by ICPMS							
Dissolved Aluminum (Al)	ug/L	27.9	A445169	<3.0	3.0	0.030	A438555
Dissolved Antimony (Sb)	ug/L	<0.50	A445169	<0.50	0.50	0.0020	A438555
Dissolved Arsenic (As)	ug/L	3.76	A445169	0.24	0.10	0.010	A438555
Dissolved Barium (Ba)	ug/L	28.6	A445169	14.8	1.0	0.0020	A438555
Dissolved Beryllium (Be)	ug/L	<0.10	A445169	<0.10	0.10	0.0030	A438555
Dissolved Bismuth (Bi)	ug/L	<1.0	A445169	<1.0	1.0	0.0010	A438555
Dissolved Boron (B)	ug/L	464	A445169	56	50	50	A438555
Dissolved Cadmium (Cd)	ug/L	<0.010	A445169	<0.010	0.010	0.0020	A438555
Dissolved Chromium (Cr)	ug/L	5.5	A445169	<1.0	1.0	0.020	A438555
Dissolved Cobalt (Co)	ug/L	3.62	A445169	2.08	0.20	0.20	A438555
Dissolved Copper (Cu)	ug/L	3.91	A445169	3.22	0.20	0.010	A438555
Dissolved Iron (Fe)	ug/L	971	A445169	776	5.0	0.040	A438555
Dissolved Lead (Pb)	ug/L	<0.20	A445169	<0.20	0.20	0.0010	A438555
Dissolved Lithium (Li)	ug/L	<2.0	A445169	<2.0	2.0	2.0	A438555
Dissolved Manganese (Mn)	ug/L	5620	A445169	3120	1.0	0.030	A438555
Dissolved Molybdenum (Mo)	ug/L	<1.0	A445169	<1.0	1.0	0.0020	A438555
Dissolved Nickel (Ni)	ug/L	5.2	A445169	<1.0	1.0	0.010	A438555
Dissolved Phosphorus (P)	ug/L	45	A445169	<10	10	1.0	A438555
Dissolved Selenium (Se)	ug/L	0.53	A445169	<0.10	0.10	0.0060	A438555
Dissolved Silicon (Si)	ug/L	12600	A445169	1550	100	0.30	A438555
Dissolved Silver (Ag)	ug/L	<0.020	A445169	<0.020	0.020	0.0020	A438555
Dissolved Strontium (Sr)	ug/L	809	A445169	212	1.0	0.0020	A438555
Dissolved Thallium (Tl)	ug/L	<0.010	A445169	<0.010	0.010	0.010	A438555
Dissolved Tin (Sn)	ug/L	<5.0	A445169	<5.0	5.0	0.0050	A438555
Dissolved Titanium (Ti)	ug/L	<5.0	A445169	<5.0	5.0	0.30	A438555
Dissolved Uranium (U)	ug/L	<0.10	A445169	<0.10	0.10	0.0010	A438555
Dissolved Vanadium (V)	ug/L	<5.0	A445169	<5.0	5.0	0.020	A438555
RDL = Reportable Detection Limit							

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Report Date: 2021/12/30

GHD Limited
Client Project #: 11222680-3-2
Site Location: UPLAND
Your P.O. #: 73523825
Sampler Initials: KH

CSR DISSOLVED METALS IN WATER WITH CV HG (WATER)

Bureau Veritas ID		AKV945		AKV946			
Sampling Date		2021/11/16 14:50		2021/11/16 15:20			
COC Number		639777-01-01		639777-01-01			
	UNITS	**WL-11222680-161121-KH-01**	**QC Batch**	**WL-11222680-161121-KH-02**	**RDL**	**MDL**	**QC Batch**
Dissolved Zinc (Zn)	ug/L	12.8	A445169	6.8	5.0	0.050	A438555
Dissolved Zirconium (Zr)	ug/L	0.74	A445169	<0.10	0.10	0.0080	A438555
Dissolved Calcium (Ca)	mg/L	138	A430398	62.3	0.050	0.0010	A430398
Dissolved Magnesium (Mg)	mg/L	26.5	A430398	11.0	0.050	0.00050	A430398
Dissolved Potassium (K)	mg/L	17.6	A430398	2.19	0.050	0.0020	A430398
Dissolved Sodium (Na)	mg/L	75.8	A430398	13.1	0.050	0.0010	A430398
Dissolved Sulphur (S)	mg/L	11.4	A430398	11.0	3.0	1.0	A430398
RDL = Reportable Detection Limit							

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Bureau Veritas Job #: C188804
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GHD Limited
Client Project #: 11222680-3-2
Site Location: UPLAND
Your P.O. #: 73523825
Sampler Initials: KH

CSR TOTAL METALS IN WATER WITH CV HG (WATER)

Bureau Veritas ID		AKV945				AKV946			
Sampling Date		2021/11/16 14:50				2021/11/16 15:20			
COC Number		639777-01-01				639777-01-01			
	UNITS	WL-11222680-161121-KH-01	RDL	MDL	QC Batch	WL-11222680-161121-KH-02	RDL	MDL	QC Batch
Calculated Parameters									
Total Hardness (CaCO3)	mg/L	574	0.50	0.50	A430224	173	0.50	0.50	A430224
Elements									
Total Mercury (Hg)	ug/L	N/A	0.0019	0.0019	A432665	<0.0019	0.0019	0.0019	A432665
Total Metals by ICPMS									
Total Aluminum (Al)	ug/L	338	3.0	0.030	A457088	155	3.0	0.030	A444038
Total Antimony (Sb)	ug/L	<0.50	0.50	0.0020	A457088	<0.50	0.50	0.0020	A444038
Total Arsenic (As)	ug/L	10.6	0.10	0.010	A457088	0.27	0.10	0.010	A444038
Total Barium (Ba)	ug/L	89.6	1.0	0.0020	A457088	14.4	1.0	0.0020	A444038
Total Beryllium (Be)	ug/L	<0.10	0.10	0.0030	A457088	<0.10	0.10	0.0030	A444038
Total Bismuth (Bi)	ug/L	<1.0	1.0	0.0010	A457088	<1.0	1.0	0.0010	A444038
Total Boron (B)	ug/L	607	50	50	A457088	63	50	50	A444038
Total Cadmium (Cd)	ug/L	0.076	0.010	0.0020	A457088	0.011	0.010	0.0020	A444038
Total Chromium (Cr)	ug/L	8.7	1.0	0.020	A457088	<1.0	1.0	0.020	A444038
Total Cobalt (Co)	ug/L	3.95	0.20	0.20	A457088	1.72	0.20	0.20	A444038
Total Copper (Cu)	ug/L	31.9	0.50	0.030	A457088	2.25	0.50	0.030	A444038
Total Iron (Fe)	ug/L	30000	10	0.70	A457088	2740	10	0.70	A444038
Total Lead (Pb)	ug/L	0.68	0.20	0.0010	A457088	0.40	0.20	0.0010	A444038
Total Lithium (Li)	ug/L	<2.0	2.0	2.0	A457088	<2.0	2.0	2.0	A444038
Total Manganese (Mn)	ug/L	6230	1.0	0.030	A457088	2410	1.0	0.030	A444038
Total Molybdenum (Mo)	ug/L	<1.0	1.0	0.0020	A457088	<1.0	1.0	0.0020	A444038
Total Nickel (Ni)	ug/L	5.6	1.0	0.010	A457088	<1.0	1.0	0.010	A444038
Total Phosphorus (P)	ug/L	2470	10	1.0	A457088	20	10	1.0	A444038
Total Selenium (Se)	ug/L	0.81	0.10	0.0060	A457088	0.10	0.10	0.0060	A444038
Total Silicon (Si)	ug/L	19900	100	0.30	A457088	1730	100	0.30	A444038
Total Silver (Ag)	ug/L	<0.020	0.020	0.0020	A457088	<0.020	0.020	0.0020	A444038
Total Strontium (Sr)	ug/L	949	1.0	0.0020	A457088	172	1.0	0.0020	A444038
Total Thallium (Tl)	ug/L	<0.010	0.010	0.010	A457088	<0.010	0.010	0.010	A444038
Total Tin (Sn)	ug/L	<5.0	5.0	0.0050	A457088	<5.0	5.0	0.0050	A444038
Total Titanium (Ti)	ug/L	35.0	5.0	0.30	A457088	11.0	5.0	0.30	A444038
Total Uranium (U)	ug/L	0.15	0.10	0.0010	A457088	<0.10	0.10	0.0010	A444038

RDL = Reportable Detection Limit
N/A = Not Applicable

Bureau Veritas Job #: C188804
Report Date: 2021/12/30

GHD Limited
Client Project #: 11222680-3-2
Site Location: UPLAND
Your P.O. #: 73523825
Sampler Initials: KH

CSR TOTAL METALS IN WATER WITH CV HG (WATER)

Bureau Veritas ID		AKV945				AKV946			
Sampling Date		2021/11/16 14:50				2021/11/16 15:20			
COC Number		639777-01-01				639777-01-01			
	UNITS	WL-11222680-161121-KH-01	RDL	MDL	QC Batch	WL-11222680-161121-KH-02	RDL	MDL	QC Batch
Total Vanadium (V)	ug/L	11.9	5.0	0.020	A457088	<5.0	5.0	0.020	A444038
Total Zinc (Zn)	ug/L	36.2	5.0	0.050	A457088	<5.0	5.0	0.050	A444038
Total Zirconium (Zr)	ug/L	1.11	0.10	0.0080	A457088	<0.10	0.10	0.0080	A444038
Total Calcium (Ca)	mg/L	158	0.25	0.0050	A430273	54.6	0.050	0.0010	A430273
Total Magnesium (Mg)	mg/L	43.5	0.050	0.00050	A430273	8.87	0.050	0.00050	A430273
Total Potassium (K)	mg/L	20.3	0.050	0.0020	A430273	1.84	0.050	0.0020	A430273
Total Sodium (Na)	mg/L	126	0.050	0.0010	A430273	11.8	0.050	0.0010	A430273
Total Sulphur (S)	mg/L	20.2	3.0	1.0	A430273	6.5	3.0	1.0	A430273
RDL = Reportable Detection Limit									

Bureau Veritas Laboratories Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

GHD Limited
Client Project #: 11222680-3-2
Site Location: UPLAND
Your P.O. #: 73523825
Sampler Initials: KH

CSR TOTAL METALS IN WATER WITH CV HG (WATER)

Bureau Veritas ID		AKV946			
Sampling Date		2021/11/16 15:20			
COC Number		639777-01-01			
	UNITS	WL-11222680-161121-KH-02 Lab-Dup	RDL	MDL	QC Batch
Total Metals by ICPMS					
Total Aluminum (Al)	ug/L	165	3.0	0.030	A444038
Total Antimony (Sb)	ug/L	<0.50	0.50	0.0020	A444038
Total Arsenic (As)	ug/L	0.29	0.10	0.010	A444038
Total Barium (Ba)	ug/L	14.4	1.0	0.0020	A444038
Total Beryllium (Be)	ug/L	<0.10	0.10	0.0030	A444038
Total Bismuth (Bi)	ug/L	<1.0	1.0	0.0010	A444038
Total Boron (B)	ug/L	73	50	50	A444038
Total Cadmium (Cd)	ug/L	0.014	0.010	0.0020	A444038
Total Chromium (Cr)	ug/L	<1.0	1.0	0.020	A444038
Total Cobalt (Co)	ug/L	1.71	0.20	0.20	A444038
Total Copper (Cu)	ug/L	2.29	0.50	0.030	A444038
Total Iron (Fe)	ug/L	2850	10	0.70	A444038
Total Lead (Pb)	ug/L	0.40	0.20	0.0010	A444038
Total Lithium (Li)	ug/L	<2.0	2.0	2.0	A444038
Total Manganese (Mn)	ug/L	2390	1.0	0.030	A444038
Total Molybdenum (Mo)	ug/L	<1.0	1.0	0.0020	A444038
Total Nickel (Ni)	ug/L	<1.0	1.0	0.010	A444038
Total Phosphorus (P)	ug/L	24	10	1.0	A444038
Total Selenium (Se)	ug/L	0.11	0.10	0.0060	A444038
Total Silicon (Si)	ug/L	1900	100	0.30	A444038
Total Silver (Ag)	ug/L	<0.020	0.020	0.0020	A444038
Total Strontium (Sr)	ug/L	174	1.0	0.0020	A444038
Total Thallium (Tl)	ug/L	<0.010	0.010	0.010	A444038
Total Tin (Sn)	ug/L	<5.0	5.0	0.0050	A444038
Total Titanium (Ti)	ug/L	11.1	5.0	0.30	A444038
Total Uranium (U)	ug/L	<0.10	0.10	0.0010	A444038
Total Vanadium (V)	ug/L	<5.0	5.0	0.020	A444038
Total Zinc (Zn)	ug/L	<5.0	5.0	0.050	A444038

RDL = Reportable Detection Limit
Lab-Dup = Laboratory Initiated Duplicate

GHD Limited
Client Project #: 11222680-3-2
Site Location: UPLAND
Your P.O. #: 73523825
Sampler Initials: KH

CSR TOTAL METALS IN WATER WITH CV HG (WATER)

Bureau Veritas ID		AKV946			
Sampling Date		2021/11/16 15:20			
COC Number		639777-01-01			
	UNITS	**WL-11222680-161121-KH-02 Lab-Dup**	**RDL**	**MDL**	**QC Batch**
Total Zirconium (Zr)	ug/L	<0.10	0.10	0.0080	A444038

RDL = Reportable Detection Limit
Lab-Dup = Laboratory Initiated Duplicate

CSR PAH IN WATER BY GC-MS (WATER)

Bureau Veritas ID		AKV945			AKV946			
Sampling Date		2021/11/16 14:50			2021/11/16 15:20			
COC Number		639777-01-01			639777-01-01			
	UNITS	WL-11222680-161121-KH-01	RDL	MDL	WL-11222680-161121-KH-02	RDL	MDL	QC Batch
Calculated Parameters								
Low Molecular Weight PAH`s	ug/L	1900	5.0	0.50	1.3	0.10	0.010	A429811
High Molecular Weight PAH`s	ug/L	21	0.10	0.040	<0.050	0.050	0.020	A429811
Total PAH	ug/L	1900	5.0	0.50	1.3	0.10	0.010	A429811
Polycyclic Aromatics								
Quinoline	ug/L	0.92	0.020	0.020	<0.020	0.020	0.020	A439593
Naphthalene	ug/L	1300	5.0	2.5	0.91	0.10	0.050	A439593
1-Methylnaphthalene	ug/L	130	0.25	0.25	0.15	0.050	0.050	A439593
2-Methylnaphthalene	ug/L	180	0.50	0.25	0.16	0.10	0.050	A439593
Acenaphthylene	ug/L	2.0	0.050	0.050	<0.050	0.050	0.050	A439593
Acenaphthene	ug/L	130	0.25	0.25	<0.050	0.050	0.050	A439593
Fluorene	ug/L	66	0.25	0.25	<0.050	0.050	0.050	A439593
Phenanthrene	ug/L	81	0.25	0.25	<0.050	0.050	0.050	A439593
Anthracene	ug/L	7.8	0.010	0.010	0.028	0.010	0.010	A439593
Acridine	ug/L	2.2	0.050	0.050	0.087	0.050	0.050	A439593
Fluoranthene	ug/L	12	0.10	0.10	<0.020	0.020	0.020	A439593
Pyrene	ug/L	7.1	0.020	0.020	<0.020	0.020	0.020	A439593
Benzo(a)anthracene	ug/L	0.68	0.010	0.010	<0.010	0.010	0.010	A439593
Chrysene	ug/L	0.72	0.020	0.020	<0.020	0.020	0.020	A439593
Benzo(b&j)fluoranthene	ug/L	0.29	0.030	0.030	<0.030	0.030	0.030	A439593
Benzo(k)fluoranthene	ug/L	0.093	0.050	0.050	<0.050	0.050	0.050	A439593
Benzo(a)pyrene	ug/L	0.19	0.0050	0.0050	<0.0050	0.0050	0.0050	A439593
Indeno(1,2,3-cd)pyrene	ug/L	<0.050	0.050	0.050	<0.050	0.050	0.050	A439593
Dibenz(a,h)anthracene	ug/L	0.012	0.0030	0.0030	<0.0030	0.0030	0.0030	A439593
Benzo(g,h,i)perylene	ug/L	<0.050	0.050	0.050	<0.050	0.050	0.050	A439593
Surrogate Recovery (%)								
D10-ANTHRACENE (sur.)	%	84	N/A	N/A	93	N/A	N/A	A439593
D8-ACENAPHTHYLENE (sur.)	%	93	N/A	N/A	90	N/A	N/A	A439593
D8-NAPHTHALENE (sur.)	%	76	N/A	N/A	84	N/A	N/A	A439593
TERPHENYL-D14 (sur.)	%	77	N/A	N/A	101	N/A	N/A	A439593

RDL = Reportable Detection Limit
N/A = Not Applicable

Bureau Veritas Laboratories Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

GENERAL COMMENTS

Sample AKV945 [WL-11222680-161121-KH-01] : Sample was analyzed past method specified hold time for Mercury (Total) by CV.

Results relate only to the items tested.

Bureau Veritas Laboratories Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

QUALITY ASSURANCE REPORT

			Matrix Spike		Spiked Blank		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
A431671	1,4-Difluorobenzene (sur.)	2021/11/19	108	70 - 130	111	70 - 130	117	%		
A431671	4-Bromofluorobenzene (sur.)	2021/11/19	105	70 - 130	104	70 - 130	106	%		
A431671	D4-1,2-Dichloroethane (sur.)	2021/11/19	100	70 - 130	95	70 - 130	96	%		
A439593	D10-ANTHRACENE (sur.)	2021/11/23	102	50 - 140	90	50 - 140	94	%		
A439593	D8-ACENAPHTHYLENE (sur.)	2021/11/23	100	50 - 140	88	50 - 140	89	%		
A439593	D8-NAPHTHALENE (sur.)	2021/11/23	97	50 - 140	80	50 - 140	84	%		
A439593	TERPHENYL-D14 (sur.)	2021/11/23	113	50 - 140	100	50 - 140	105	%		
A431613	Orthophosphate (P)	2021/11/19	NC	80 - 120	106	80 - 120	<0.0030	mg/L	1.9 (1)	20
A431671	Benzene	2021/11/19	109	70 - 130	105	70 - 130	<0.40	ug/L	NC (1)	30
A431671	Ethylbenzene	2021/11/19	107	70 - 130	103	70 - 130	<0.40	ug/L	NC (1)	30
A431671	m & p-Xylene	2021/11/19	104	70 - 130	101	70 - 130	<0.40	ug/L	NC (1)	30
A431671	Methyl-tert-butylether (MTBE)	2021/11/19	106	70 - 130	102	70 - 130	<4.0	ug/L	NC (1)	30
A431671	o-Xylene	2021/11/19	110	70 - 130	106	70 - 130	<0.40	ug/L	NC (1)	30
A431671	Styrene	2021/11/19	107	70 - 130	106	70 - 130	<0.40	ug/L	NC (1)	30
A431671	Toluene	2021/11/19	98	70 - 130	95	70 - 130	<0.40	ug/L	NC (1)	30
A431671	VH C6-C10	2021/11/19			71	70 - 130	<300	ug/L	NC (1)	30
A431671	Xylenes (Total)	2021/11/19					<0.40	ug/L	NC (1)	30
A431793	Dissolved Chloride (Cl)	2021/11/19			106	80 - 120	<1.0	mg/L		
A431793	Dissolved Sulphate (SO4)	2021/11/19			101	80 - 120	<1.0	mg/L		
A431799	Dissolved Mercury (Hg)	2021/11/19	95	80 - 120	100	80 - 120	<0.0019	ug/L	NC (1)	20
A432181	Biochemical Oxygen Demand	2021/11/24			97	85 - 115	<2.0	mg/L	5.8 (1)	20
A432205	Total Dissolved Solids	2021/11/22	NC	80 - 120	105	80 - 120	<10	mg/L	17 (1)	20
A432452	Alkalinity (PP as CaCO3)	2021/11/19					<1.0	mg/L	NC (1)	20
A432452	Alkalinity (Total as CaCO3)	2021/11/19	NC	80 - 120	88	80 - 120	<1.0	mg/L	4.8 (1)	20
A432452	Bicarbonate (HCO3)	2021/11/19					<1.0	mg/L	4.8 (1)	20
A432452	Carbonate (CO3)	2021/11/19					<1.0	mg/L	NC (1)	20
A432452	Hydroxide (OH)	2021/11/19					<1.0	mg/L	NC (1)	20
A432454	Conductivity	2021/11/19			100	80 - 120	<2.0	uS/cm	0.20 (1)	10
A432510	Nitrate plus Nitrite (N)	2021/11/19	102	80 - 120	107	80 - 120	<0.020	mg/L	0.79 (1)	25
A432512	Nitrite (N)	2021/11/19	102	80 - 120	104	80 - 120	<0.0050	mg/L	NC (1)	20
A432665	Total Mercury (Hg)	2021/11/19	95	80 - 120	103	80 - 120	<0.0019	ug/L	NC (1)	20

Bureau Veritas Laboratories Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		Spiked Blank		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
A432953	Total Sulphide	2021/11/20	120	80 - 120	100	80 - 120	<0.0018	mg/L	NC (1)	20
A438555	Dissolved Aluminum (Al)	2021/11/23	99	80 - 120	98	80 - 120	<3.0	ug/L	0.83 (1)	20
A438555	Dissolved Antimony (Sb)	2021/11/23	99	80 - 120	96	80 - 120	<0.50	ug/L	0.038 (1)	20
A438555	Dissolved Arsenic (As)	2021/11/23	115	80 - 120	105	80 - 120	<0.10	ug/L	13 (1)	20
A438555	Dissolved Barium (Ba)	2021/11/23	99	80 - 120	97	80 - 120	<1.0	ug/L	1.5 (1)	20
A438555	Dissolved Beryllium (Be)	2021/11/23	95	80 - 120	94	80 - 120	<0.10	ug/L	NC (1)	20
A438555	Dissolved Bismuth (Bi)	2021/11/23	98	80 - 120	100	80 - 120	<1.0	ug/L	NC (1)	20
A438555	Dissolved Boron (B)	2021/11/23	107	80 - 120	103	80 - 120	<50	ug/L	0.50 (1)	20
A438555	Dissolved Cadmium (Cd)	2021/11/23	97	80 - 120	95	80 - 120	<0.010	ug/L	NC (1)	20
A438555	Dissolved Chromium (Cr)	2021/11/23	113	80 - 120	113	80 - 120	<1.0	ug/L	0.11 (1)	20
A438555	Dissolved Cobalt (Co)	2021/11/23	107	80 - 120	111	80 - 120	<0.20	ug/L	NC (1)	20
A438555	Dissolved Copper (Cu)	2021/11/23	102	80 - 120	109	80 - 120	<0.20	ug/L	12 (1)	20
A438555	Dissolved Iron (Fe)	2021/11/23	100	80 - 120	100	80 - 120	<5.0	ug/L	NC (1)	20
A438555	Dissolved Lead (Pb)	2021/11/23	98	80 - 120	99	80 - 120	<0.20	ug/L	NC (1)	20
A438555	Dissolved Lithium (Li)	2021/11/23	NC	80 - 120	95	80 - 120	<2.0	ug/L	2.0 (1)	20
A438555	Dissolved Manganese (Mn)	2021/11/23	107	80 - 120	111	80 - 120	<1.0	ug/L	1.7 (1)	20
A438555	Dissolved Molybdenum (Mo)	2021/11/23	NC	80 - 120	100	80 - 120	<1.0	ug/L	0.74 (1)	20
A438555	Dissolved Nickel (Ni)	2021/11/23	106	80 - 120	111	80 - 120	<1.0	ug/L	3.4 (1)	20
A438555	Dissolved Phosphorus (P)	2021/11/23	115	80 - 120	106	80 - 120	<10	ug/L		
A438555	Dissolved Selenium (Se)	2021/11/23	103	80 - 120	91	80 - 120	<0.10	ug/L	1.5 (1)	20
A438555	Dissolved Silicon (Si)	2021/11/23	74 (2)	80 - 120	80	80 - 120	<100	ug/L	0.41 (1)	20
A438555	Dissolved Silver (Ag)	2021/11/23	95	80 - 120	95	80 - 120	<0.020	ug/L	NC (1)	20
A438555	Dissolved Strontium (Sr)	2021/11/23	NC	80 - 120	109	80 - 120	<1.0	ug/L	0.18 (1)	20
A438555	Dissolved Thallium (Tl)	2021/11/23	96	80 - 120	97	80 - 120	<0.010	ug/L	NC (1)	20
A438555	Dissolved Tin (Sn)	2021/11/23	100	80 - 120	97	80 - 120	<5.0	ug/L	NC (1)	20
A438555	Dissolved Titanium (Ti)	2021/11/23	114	80 - 120	114	80 - 120	<5.0	ug/L	NC (1)	20
A438555	Dissolved Uranium (U)	2021/11/23	102	80 - 120	101	80 - 120	<0.10	ug/L	0.78 (1)	20
A438555	Dissolved Vanadium (V)	2021/11/23	112	80 - 120	113	80 - 120	<5.0	ug/L	NC (1)	20
A438555	Dissolved Zinc (Zn)	2021/11/23	112	80 - 120	115	80 - 120	<5.0	ug/L	0.32 (1)	20
A438555	Dissolved Zirconium (Zr)	2021/11/23	116	80 - 120	115	80 - 120	<0.10	ug/L	NC (1)	20
A438969	Total Ammonia (N)	2021/11/22	94	80 - 120	99	80 - 120	<0.015	mg/L	NC (1)	20

QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		Spiked Blank		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
A439593	1-Methylnaphthalene	2021/11/23	93	50 - 140	87	50 - 140	<0.050	ug/L		
A439593	2-Methylnaphthalene	2021/11/23	93	50 - 140	88	50 - 140	<0.10	ug/L	NC (1)	40
A439593	Acenaphthene	2021/11/23	95	50 - 140	87	50 - 140	<0.050	ug/L	NC (1)	40
A439593	Acenaphthylene	2021/11/23	93	50 - 140	86	50 - 140	<0.050	ug/L	NC (1)	40
A439593	Acridine	2021/11/23	96	50 - 140	101	50 - 140	<0.050	ug/L	NC (1)	40
A439593	Anthracene	2021/11/23	94	50 - 140	86	50 - 140	<0.010	ug/L	NC (1)	40
A439593	Benzo(a)anthracene	2021/11/23	101	50 - 140	92	50 - 140	<0.010	ug/L	NC (1)	40
A439593	Benzo(a)pyrene	2021/11/23	93	50 - 140	91	50 - 140	<0.0050	ug/L	NC (1)	40
A439593	Benzo(b&j)fluoranthene	2021/11/23	88	50 - 140	82	50 - 140	<0.030	ug/L	NC (1)	40
A439593	Benzo(g,h,i)perylene	2021/11/23	73	50 - 140	84	50 - 140	<0.050	ug/L	NC (1)	40
A439593	Benzo(k)fluoranthene	2021/11/23	94	50 - 140	88	50 - 140	<0.050	ug/L	NC (1)	40
A439593	Chrysene	2021/11/23	95	50 - 140	89	50 - 140	<0.020	ug/L	NC (1)	40
A439593	Dibenz(a,h)anthracene	2021/11/23	79	50 - 140	90	50 - 140	<0.0030	ug/L	NC (1)	40
A439593	Fluoranthene	2021/11/23	104	50 - 140	95	50 - 140	<0.020	ug/L	NC (1)	40
A439593	Fluorene	2021/11/23	95	50 - 140	87	50 - 140	<0.050	ug/L	NC (1)	40
A439593	Indeno(1,2,3-cd)pyrene	2021/11/23	79	50 - 140	90	50 - 140	<0.050	ug/L	NC (1)	40
A439593	Naphthalene	2021/11/23	91	50 - 140	88	50 - 140	<0.10	ug/L	NC (1)	40
A439593	Phenanthrene	2021/11/23	94	50 - 140	88	50 - 140	<0.050	ug/L	NC (1)	40
A439593	Pyrene	2021/11/23	104	50 - 140	95	50 - 140	<0.020	ug/L	NC (1)	40
A439593	Quinoline	2021/11/23	98	50 - 140	105	50 - 140	<0.020	ug/L	NC (1)	40
A444038	Total Aluminum (Al)	2021/12/15	101	80 - 120	102	80 - 120	<3.0	ug/L	6.0 (3)	20
A444038	Total Antimony (Sb)	2021/12/15	110	80 - 120	116	80 - 120	<0.50	ug/L	NC (3)	20
A444038	Total Arsenic (As)	2021/12/15	95	80 - 120	95	80 - 120	<0.10	ug/L	8.1 (3)	20
A444038	Total Barium (Ba)	2021/12/15	NC	80 - 120	96	80 - 120	<1.0	ug/L	0.14 (3)	20
A444038	Total Beryllium (Be)	2021/12/15	108	80 - 120	102	80 - 120	<0.10	ug/L	NC (3)	20
A444038	Total Bismuth (Bi)	2021/12/15	96	80 - 120	100	80 - 120	<1.0	ug/L	NC (3)	20
A444038	Total Boron (B)	2021/12/15	119	80 - 120	118	80 - 120	<50	ug/L	15 (3)	20
A444038	Total Cadmium (Cd)	2021/12/15	90	80 - 120	97	80 - 120	<0.010	ug/L	NC (3)	20
A444038	Total Chromium (Cr)	2021/12/15	93	80 - 120	97	80 - 120	<1.0	ug/L	NC (3)	20
A444038	Total Cobalt (Co)	2021/12/15	91	80 - 120	96	80 - 120	<0.20	ug/L	0.58 (3)	20
A444038	Total Copper (Cu)	2021/12/15	90	80 - 120	96	80 - 120	<0.50	ug/L	2.1 (3)	20

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		Spiked Blank		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
A444038	Total Iron (Fe)	2021/12/15	100	80 - 120	101	80 - 120	<10	ug/L	3.7 (3)	20
A444038	Total Lead (Pb)	2021/12/15	95	80 - 120	98	80 - 120	<0.20	ug/L	0.83 (3)	20
A444038	Total Lithium (Li)	2021/12/15	114	80 - 120	111	80 - 120	<2.0	ug/L	NC (3)	20
A444038	Total Manganese (Mn)	2021/12/15	91	80 - 120	96	80 - 120	<1.0	ug/L	0.50 (3)	20
A444038	Total Molybdenum (Mo)	2021/12/15	NC	80 - 120	102	80 - 120	<1.0	ug/L	NC (3)	20
A444038	Total Nickel (Ni)	2021/12/15	89	80 - 120	96	80 - 120	<1.0	ug/L	NC (3)	20
A444038	Total Phosphorus (P)	2021/12/15	103	80 - 120	98	80 - 120	<10	ug/L	19 (3)	20
A444038	Total Selenium (Se)	2021/12/15	100	80 - 120	101	80 - 120	<0.10	ug/L	5.4 (3)	20
A444038	Total Silicon (Si)	2021/12/15	87	80 - 120	85	80 - 120	<100	ug/L	9.3 (3)	20
A444038	Total Silver (Ag)	2021/12/15	89	80 - 120	93	80 - 120	<0.020	ug/L	NC (3)	20
A444038	Total Strontium (Sr)	2021/12/15	NC	80 - 120	96	80 - 120	<1.0	ug/L	1.0 (3)	20
A444038	Total Thallium (Tl)	2021/12/15	93	80 - 120	98	80 - 120	<0.010	ug/L	NC (3)	20
A444038	Total Tin (Sn)	2021/12/15	110	80 - 120	113	80 - 120	<5.0	ug/L	NC (3)	20
A444038	Total Titanium (Ti)	2021/12/15	104	80 - 120	100	80 - 120	<5.0	ug/L	0.91 (3)	20
A444038	Total Uranium (U)	2021/12/15	99	80 - 120	98	80 - 120	<0.10	ug/L	NC (3)	20
A444038	Total Vanadium (V)	2021/12/15	97	80 - 120	97	80 - 120	<5.0	ug/L	NC (3)	20
A444038	Total Zinc (Zn)	2021/12/15	91	80 - 120	102	80 - 120	<5.0	ug/L	NC (3)	20
A444038	Total Zirconium (Zr)	2021/12/15	94	80 - 120	107	80 - 120	<0.10	ug/L	NC (3)	20
A444103	Chemical Oxygen Demand	2021/11/24	NC	80 - 120	100	80 - 120	<10	mg/L	0.22 (1)	20
A445169	Dissolved Aluminum (Al)	2021/12/16			83	80 - 120	<3.0	ug/L		
A445169	Dissolved Antimony (Sb)	2021/12/16			120	80 - 120	<0.50	ug/L		
A445169	Dissolved Arsenic (As)	2021/12/16			96	80 - 120	<0.10	ug/L		
A445169	Dissolved Barium (Ba)	2021/12/16			105	80 - 120	<1.0	ug/L		
A445169	Dissolved Beryllium (Be)	2021/12/16			106	80 - 120	<0.10	ug/L		
A445169	Dissolved Bismuth (Bi)	2021/12/16			97	80 - 120	<1.0	ug/L		
A445169	Dissolved Boron (B)	2021/12/16			122 (2)	80 - 120	<50	ug/L		
A445169	Dissolved Cadmium (Cd)	2021/12/16			98	80 - 120	<0.010	ug/L		
A445169	Dissolved Chromium (Cr)	2021/12/16			103	80 - 120	<1.0	ug/L		
A445169	Dissolved Cobalt (Co)	2021/12/16			102	80 - 120	<0.20	ug/L		
A445169	Dissolved Copper (Cu)	2021/12/16			93	80 - 120	<0.20	ug/L		
A445169	Dissolved Iron (Fe)	2021/12/16			102	80 - 120	<5.0	ug/L		

Bureau Veritas Laboratories Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		Spiked Blank		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
A445169	Dissolved Lead (Pb)	2021/12/16			98	80 - 120	<0.20	ug/L		
A445169	Dissolved Lithium (Li)	2021/12/16			112	80 - 120	<2.0	ug/L		
A445169	Dissolved Manganese (Mn)	2021/12/16			102	80 - 120	<1.0	ug/L		
A445169	Dissolved Molybdenum (Mo)	2021/12/16			105	80 - 120	<1.0	ug/L		
A445169	Dissolved Nickel (Ni)	2021/12/16			104	80 - 120	<1.0	ug/L		
A445169	Dissolved Phosphorus (P)	2021/12/16			87	80 - 120	<10	ug/L		
A445169	Dissolved Selenium (Se)	2021/12/16			102	80 - 120	<0.10	ug/L		
A445169	Dissolved Silicon (Si)	2021/12/16			79 (2)	80 - 120	<100	ug/L		
A445169	Dissolved Silver (Ag)	2021/12/16			96	80 - 120	<0.020	ug/L		
A445169	Dissolved Strontium (Sr)	2021/12/16			102	80 - 120	<1.0	ug/L		
A445169	Dissolved Thallium (Tl)	2021/12/16			99	80 - 120	<0.010	ug/L		
A445169	Dissolved Tin (Sn)	2021/12/16			110	80 - 120	<5.0	ug/L		
A445169	Dissolved Titanium (Ti)	2021/12/16			97	80 - 120	<5.0	ug/L		
A445169	Dissolved Uranium (U)	2021/12/16			94	80 - 120	<0.10	ug/L		
A445169	Dissolved Vanadium (V)	2021/12/16			97	80 - 120	<5.0	ug/L		
A445169	Dissolved Zinc (Zn)	2021/12/16			96	80 - 120	<5.0	ug/L		
A445169	Dissolved Zirconium (Zr)	2021/12/16			111	80 - 120	<0.10	ug/L		
A447334	Total Dissolved Solids	2021/11/23	101	80 - 120	98	80 - 120	<10	mg/L	NC (1)	20
A448462	Total Suspended Solids	2021/11/24	104	80 - 120	102	80 - 120	<1.0	mg/L	NC (1)	20
A454314	Total Mercury (Hg)	2021/12/22	76 (2)	80 - 120	108	80 - 120	<0.0019	ug/L	NC (1)	20
A457088	Total Aluminum (Al)	2021/12/24	123 (2)	80 - 120	112	80 - 120	<3.0	ug/L	1.5 (1)	20
A457088	Total Antimony (Sb)	2021/12/24	108	80 - 120	106	80 - 120	<0.50	ug/L	5.2 (1)	20
A457088	Total Arsenic (As)	2021/12/24	97	80 - 120	97	80 - 120	<0.10	ug/L	1.3 (1)	20
A457088	Total Barium (Ba)	2021/12/24	106	80 - 120	103	80 - 120	<1.0	ug/L	6.3 (1)	20
A457088	Total Beryllium (Be)	2021/12/24	117	80 - 120	106	80 - 120	<0.10	ug/L	NC (1)	20
A457088	Total Bismuth (Bi)	2021/12/24	107	80 - 120	108	80 - 120	<1.0	ug/L	NC (1)	20
A457088	Total Boron (B)	2021/12/24	129 (2)	80 - 120	127 (2)	80 - 120	<50	ug/L	1.9 (1)	20
A457088	Total Cadmium (Cd)	2021/12/24	103	80 - 120	105	80 - 120	<0.010	ug/L	5.3 (1)	20
A457088	Total Chromium (Cr)	2021/12/24	103	80 - 120	103	80 - 120	<1.0	ug/L	NC (1)	20
A457088	Total Cobalt (Co)	2021/12/24	100	80 - 120	101	80 - 120	<0.20	ug/L	3.0 (1)	20
A457088	Total Copper (Cu)	2021/12/24	103	80 - 120	105	80 - 120	<0.50	ug/L	4.6 (1)	20

QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		Spiked Blank		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
A457088	Total Iron (Fe)	2021/12/24	115	80 - 120	106	80 - 120	<10	ug/L	2.9 (1)	20
A457088	Total Lead (Pb)	2021/12/24	105	80 - 120	106	80 - 120	<0.20	ug/L	5.0 (1)	20
A457088	Total Lithium (Li)	2021/12/24	116	80 - 120	115	80 - 120	<2.0	ug/L	6.4 (1)	20
A457088	Total Manganese (Mn)	2021/12/24	102	80 - 120	101	80 - 120	<1.0	ug/L	5.7 (1)	20
A457088	Total Molybdenum (Mo)	2021/12/24	110	80 - 120	110	80 - 120	<1.0	ug/L	7.6 (1)	20
A457088	Total Nickel (Ni)	2021/12/24	100	80 - 120	101	80 - 120	<1.0	ug/L	6.0 (1)	20
A457088	Total Phosphorus (P)	2021/12/24	102	80 - 120	102	80 - 120	<10	ug/L		
A457088	Total Selenium (Se)	2021/12/24	101	80 - 120	100	80 - 120	<0.10	ug/L	2.4 (1)	20
A457088	Total Silicon (Si)	2021/12/24	97	80 - 120	92	80 - 120	<100	ug/L	1.4 (1)	20
A457088	Total Silver (Ag)	2021/12/24	101	80 - 120	102	80 - 120	<0.020	ug/L	15 (1)	20
A457088	Total Strontium (Sr)	2021/12/24	109	80 - 120	105	80 - 120	<1.0	ug/L	6.0 (1)	20
A457088	Total Thallium (Tl)	2021/12/24	105	80 - 120	106	80 - 120	<0.010	ug/L	NC (1)	20
A457088	Total Tin (Sn)	2021/12/24	109	80 - 120	109	80 - 120	<5.0	ug/L	NC (1)	20
A457088	Total Titanium (Ti)	2021/12/24	106	80 - 120	105	80 - 120	<5.0	ug/L	NC (1)	20
A457088	Total Uranium (U)	2021/12/24	106	80 - 120	107	80 - 120	<0.10	ug/L	2.5 (1)	20
A457088	Total Vanadium (V)	2021/12/24	103	80 - 120	105	80 - 120	<5.0	ug/L	NC (1)	20
A457088	Total Zinc (Zn)	2021/12/24	106	80 - 120	113	80 - 120	<5.0	ug/L	3.4 (1)	20
A457088	Total Zirconium (Zr)	2021/12/24	104	80 - 120	126 (2)	80 - 120	<0.10	ug/L	13 (1)	20

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

(1) Duplicate Parent ID

(2) Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.

(3) Duplicate Parent ID [AKV946-05]

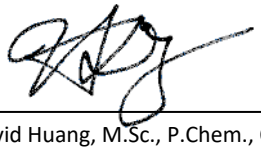
Bureau Veritas Laboratories Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

Bureau Veritas Job #: C188804
Report Date: 2021/12/30

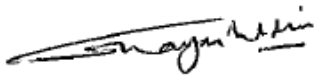
GHD Limited
Client Project #: 11222680-3-2
Site Location: UPLAND
Your P.O. #: 73523825
Sampler Initials: KH

VALIDATION SIGNATURE PAGE

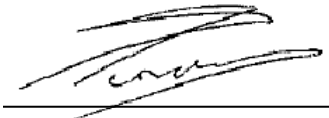
The analytical data and all QC contained in this report were reviewed and validated by:



David Huang, M.Sc., P.Chem., QP, Scientific Services Manager



Ghayasuddin Khan, M.Sc., P.Chem., QP, Scientific Specialist, Inorganics



Thomas Pinchin, Project Solutions Representative

Bureau Veritas Proprietary Software
Logiciel Propriétaire de Bureau Veritas

Automated Statchk

BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports.
For Service Group specific validation please refer to the Validation Signature Page.

Bureau Veritas Laboratories Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

Bureau Veritas Laboratories
4606 Canada Way, Burnaby, British Columbia Canada V5G 1K5 Tel:(604) 734 7276 Toll-free:800-563-6266 Fax:(604) 731 2386 www.bvna.com

Page of

C188804_COC

INVOICE TO:		Report Information		Project Information		Only
Company Name	#163 GHD Limited	Company Name		Quotation #	C10010	Bottle Order #:
Contact Name	AP Invoices - 735	Contact Name	Airesse MacPhee	P.O. #		639777
Address	455 PHILLIP STREET	Address		Project #	11222680-~~28~~ 3-2	Project Manager
	WATERLOO ON N2L 3X2			Project Name	Upland	
Phone	(519) 884-0510 Fax (519) 725-1394	Phone	Fax	Site #		Nahed Amer
Email	APinvoices-735@ghd.com invoicing-canada@ghd.com	Email	airesse.macphee@ghd.com; NationalEDDSupport@ma	Sampled By	K. Hasler	C#639777-01-01

Regulatory Criteria: ☐ CSR ☐ CCME ☐ BC Water Quality ☐ Other

Special Instructions: Leachate water

Turnaround Time (TAT) Required:

Please provide advance notice for rush projects

Regular (Standard) TAT: (will be applied if Rush TAT is not specified): ☒
Standard TAT = 5-7 Working days for most tests.
Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.

Job Specific Rush TAT (if applies to entire submission)
1 DAY ☐ 2 Day ☐ 3 Day ☐ Date Required: _____ ☐
Rush Confirmation Number: _____ (call lab for #)

SAMPLES MUST BE KEPT COOL (< 10°C) FROM TIME OF SAMPLING UNTIL DELIVERY TO BUREAU VERITAS

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Metals Field Filtered (Y / N)	Conductivity, Cl, SO4, NO2, NO3, N+N, PO4, Speciated Alk	Sulphide + H2S Calc (LL)	Sulphide, Un-ionized (as H2S) (Calc)	Ammonia-N (Total)	Dissolved Metals with CV Hg (CSR) Hardness	TDS/TSS	Total Metals with CV Hg (CSR)	PAH	BTEX/VPH	BOD/COD	# of Bottles	Comments
1		WL-11222680-161121-KH-01	16/11/21	14:50	WATER		X	X	X	X	X	X	X	X	X	X		Very short holding times!
2		WL-11222680-161121-KH-02	16/11/21	15:20	↓		↓	↓	↓	↓	↓	↓	↓	↓	↓	↓		
3																		All bottles were filtered and preserved as required.
4																		
5																		
6																		
7																		
8																		
9																		
10																		

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted	Lab Use Only: Time Sensitive	Temperature (°C) on Receipt	Custody Seal Intact on Cooler?
K. Hasler / K. Hasler	21/11/17	22:00	B/LO PUM	2021/11/18	1025		☐	2/3/2	☐ Yes ☒ No

* UNLESS OTHERWISE AGREED TO IN WRITING, WORK SUBMITTED ON THIS CHAIN OF CUSTODY IS SUBJECT TO BUREAU VERITAS'S STANDARD TERMS AND CONDITIONS. SIGNING OF THIS CHAIN OF CUSTODY DOCUMENT IS ACKNOWLEDGMENT AND ACCEPTANCE OF OUR TERMS WHICH ARE AVAILABLE FOR VIEWING AT WWW.BVLABS.COM/TERMS-AND-CONDITIONS.
* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

4/3/2

White: Bureau Veritas Yellow: Client

Bureau Veritas Canada (2019) Inc.

Your Project #: 11222680-3-2
Your C.O.C. #: 639775-01-01

Attention: Airesse MacPhee

GHD Limited
455 PHILLIP STREET
WATERLOO, ON
CANADA N2L 3X2

Report Date: 2022/01/17
Report #: R3122876
Version: 2 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

BV LABS JOB #: C188811
Received: 2021/11/18, 10:25

Sample Matrix: Water
Samples Received: 7

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity @25C (pp, total), CO3,HCO3,OH	7	N/A	2021/11/19	BBY6SOP-00026	SM 23 2320 B m
Chloride/Sulphate by Auto Colourimetry	7	N/A	2021/11/19	BBY6SOP-00011 / BBY6SOP-00017	SM23-4500-Cl/SO4-E m
Conductivity @25C	7	N/A	2021/11/19	BBY6SOP-00026	SM 23 2510 B m
Sulphide (as H2S) (1)	7	N/A	2021/11/20		Auto Calc
Un-ionized Hydrogen Sulphide as S Calc	7	N/A	2021/12/22	BBY WI-00033	Auto Calc
Hardness (calculated as CaCO3) (1)	7	N/A	2021/12/10	BBY WI-00033	Auto Calc
Mercury (Dissolved) by CV (2)	7	2021/11/19	2021/11/19	AB SOP-00084	BCMOE BCLM Oct2013 m
Na, K, Ca, Mg, S by CRC ICPMS (diss.) (1)	7	N/A	2021/12/10		Auto Calc
Elements by CRC ICPMS (dissolved) (1, 2)	7	N/A	2021/11/23	CAL SOP-00265	EPA 6020 m
Ammonia-N (Total)	7	N/A	2021/11/22	AB SOP-00007	SM 23 4500 NH3 A G m
Nitrate + Nitrite (N)	7	N/A	2021/11/19	BBY6SOP-00010	SM 23 4500-NO3- I m
Nitrite (N) by CFA	7	N/A	2021/11/19	BBY6SOP-00010	SM 23 4500-NO3- I m
Nitrogen - Nitrate (as N)	7	N/A	2021/12/14	BBY WI-00033	Auto Calc
Filter and HNO3 Preserve for Metals	6	N/A	2021/11/18	BBY7 WI-00004	SM 23 3030B m
Filter and HNO3 Preserve for Metals	1	N/A	2021/11/19	BBY7 WI-00004	SM 23 3030B m
Orthophosphate by Konelab (3)	7	N/A	2021/11/19	BBY6SOP-00013	SM 23 4500-P E m
Total Sulphide (1)	7	N/A	2021/11/20	AB SOP-00080	SM 23 4500 S2-A D Fm
Total Dissolved Solids (Filt. Residue)	5	2021/11/19	2021/11/22	BBY6SOP-00033	SM 23 2540 C m
Total Dissolved Solids (Filt. Residue)	2	2021/11/22	2021/11/23	BBY6SOP-00033	SM 23 2540 C m
Field pH	7	N/A	2021/12/22		
Field Temperature	7	N/A	2021/12/22		

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

Your Project #: 11222680-3-2
Your C.O.C. #: 639775-01-01

Attention: Airesse MacPhee

GHD Limited
455 PHILLIP STREET
WATERLOO, ON
CANADA N2L 3X2

Report Date: 2022/01/17
Report #: R3122876
Version: 2 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

BV LABS JOB #: C188811
Received: 2021/11/18, 10:25

Bureau Veritas liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Bureau Veritas has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Bureau Veritas, unless otherwise agreed in writing. Bureau Veritas is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) This test was performed by Bureau Veritas Calgary, 4000 - 19 St. , Calgary, AB, T2E 6P8
(2) Dissolved > Total Imbalance: When applicable, Dissolved and Total results were reviewed and data quality meets acceptable levels unless otherwise noted.
(3) Orthophosphate > Total Phosphorus Imbalance: When applicable, Orthophosphate, Total Phosphorus and dissolved Phosphorus results were reviewed and data quality meets acceptable levels unless otherwise noted.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Thomas Pinchin, Project Solutions Representative
Email: Thomas.Pinchin@bureauveritas.com
Phone# (604) 734 7276
==========
BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

RESULTS OF CHEMICAL ANALYSES OF WATER

Bureau Veritas ID		AKV957	AKV957		AKV958			
Sampling Date		2021/11/15 13:10	2021/11/15 13:10		2021/11/15 14:25			
COC Number		639775-01-01	639775-01-01		639775-01-01			
	UNITS	WG-11222680-151121-KH-01	WG-11222680-151121-KH-01 Lab-Dup	QC Batch	WG-11222680-151121-KH-02	RDL	MDL	QC Batch
ANIONS								
Nitrite (N)	mg/L	<0.0050	N/A	A432512	<0.0050	0.0050	0.0050	A432512
Calculated Parameters								
Filter and HNO3 Preservation	N/A	FIELD	N/A	ONSITE	FIELD	N/A	N/A	ONSITE
Nitrate (N)	mg/L	0.262	N/A	A429808	0.039	0.020	N/A	A429808
Sulphide (as H2S)	mg/L	<0.0020	N/A	A430441	<0.0020	0.0020	N/A	A430441
Field Parameters								
Field pH	pH	7.26	N/A	ONSITE	8.31	N/A	N/A	ONSITE
Field Temperature	°C	10.63	N/A	ONSITE	9.61	N/A	N/A	ONSITE
Misc. Inorganics								
Conductivity	uS/cm	130	N/A	A432454	87	2.0	N/A	A432454
Total Dissolved Solids	mg/L	82	N/A	A432205	58	10	N/A	A432205
Anions								
Alkalinity (PP as CaCO3)	mg/L	<1.0	N/A	A432452	<1.0	1.0	N/A	A432452
Alkalinity (Total as CaCO3)	mg/L	48	N/A	A432452	40	1.0	N/A	A432452
Bicarbonate (HCO3)	mg/L	58	N/A	A432452	49	1.0	N/A	A432452
Carbonate (CO3)	mg/L	<1.0	N/A	A432452	<1.0	1.0	N/A	A432452
Hydroxide (OH)	mg/L	<1.0	N/A	A432452	<1.0	1.0	N/A	A432452
Total Sulphide	mg/L	<0.0018	N/A	A432953	<0.0018	0.0018	N/A	A432953
Dissolved Chloride (Cl)	mg/L	3.2	N/A	A431793	<1.0	1.0	N/A	A431796
Dissolved Sulphate (SO4)	mg/L	8.6	N/A	A431793	4.2	1.0	N/A	A431796
Nutrients								
Total Ammonia (N)	mg/L	<0.015	<0.015	A438969	<0.015	0.015	0.0040	A438971
Orthophosphate (P)	mg/L	0.0076	N/A	A431613	0.024	0.0030	0.0030	A431613
Nitrate plus Nitrite (N)	mg/L	0.262	N/A	A432510	0.039	0.020	0.020	A432510

RDL = Reportable Detection Limit
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable

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RESULTS OF CHEMICAL ANALYSES OF WATER

Bureau Veritas ID		AKV959		AKV960	AKV960			
Sampling Date		2021/11/15 14:30		2021/11/16 09:55	2021/11/16 09:55			
COC Number		639775-01-01		639775-01-01	639775-01-01			
	UNITS	WG-11222680-151121 -KH-03	QC Batch	WG-11222680-161121 -KH-04	WG-11222680-161121 -KH-04 Lab-Dup	RDL	MDL	QC Batch
ANIONS								
Nitrite (N)	mg/L	<0.0050	A432512	<0.0050	<0.0050	0.0050	0.0050	A432512
Calculated Parameters								
Filter and HNO3 Preservation	N/A	LAB	A432140	FIELD	N/A	N/A	N/A	ONSITE
Nitrate (N)	mg/L	0.038	A429808	0.494	N/A	0.020	N/A	A429808
Sulphide (as H2S)	mg/L	<0.0020	A430441	0.0097	N/A	0.0020	N/A	A430441
Field Parameters								
Field pH	pH	8.31	ONSITE	7.75	N/A	N/A	N/A	ONSITE
Field Temperature	°C	9.61	ONSITE	8.91	N/A	N/A	N/A	ONSITE
Misc. Inorganics								
Conductivity	uS/cm	87	A432454	150	150	2.0	N/A	A432454
Total Dissolved Solids	mg/L	62	A432205	88	N/A	10	N/A	A447334
Anions								
Alkalinity (PP as CaCO3)	mg/L	<1.0	A432452	<1.0	<1.0	1.0	N/A	A432452
Alkalinity (Total as CaCO3)	mg/L	41	A432452	57	60	1.0	N/A	A432452
Bicarbonate (HCO3)	mg/L	50	A432452	69	73	1.0	N/A	A432452
Carbonate (CO3)	mg/L	<1.0	A432452	<1.0	<1.0	1.0	N/A	A432452
Hydroxide (OH)	mg/L	<1.0	A432452	<1.0	<1.0	1.0	N/A	A432452
Total Sulphide	mg/L	<0.0018	A432953	0.0092	N/A	0.0018	N/A	A432953
Dissolved Chloride (Cl)	mg/L	<1.0	A431793	4.5	N/A	1.0	N/A	A431793
Dissolved Sulphate (SO4)	mg/L	3.6	A431793	8.0	N/A	1.0	N/A	A431793
Nutrients								
Total Ammonia (N)	mg/L	<0.015	A438971	<0.015	N/A	0.015	0.0040	A438969
Orthophosphate (P)	mg/L	0.025	A431613	0.014	N/A	0.0030	0.0030	A431613
Nitrate plus Nitrite (N)	mg/L	0.038	A432510	0.494	0.498	0.020	0.020	A432510

RDL = Reportable Detection Limit
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable

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RESULTS OF CHEMICAL ANALYSES OF WATER

Bureau Veritas ID		AKV961				AKV962			
Sampling Date		2021/11/16 09:00				2021/11/16 12:10			
COC Number		639775-01-01				639775-01-01			
	UNITS	WG-11222680-161121-KH-05	RDL	MDL	QC Batch	WG-11222680-161121-KH-06	RDL	MDL	QC Batch
ANIONS									
Nitrite (N)	mg/L	<0.0050	0.0050	0.0050	A432512	<0.0050	0.0050	0.0050	A432512
Calculated Parameters									
Filter and HNO3 Preservation	N/A	FIELD	N/A	N/A	ONSITE	FIELD	N/A	N/A	ONSITE
Nitrate (N)	mg/L	0.473	0.020	N/A	A429808	2.32	0.040	N/A	A429808
Sulphide (as H2S)	mg/L	<0.0020	0.0020	N/A	A430441	<0.0020	0.0020	N/A	A430441
Field Parameters									
Field pH	pH	7.28	N/A	N/A	ONSITE	7.56	N/A	N/A	ONSITE
Field Temperature	°C	6.90	N/A	N/A	ONSITE	10.64	N/A	N/A	ONSITE
Misc. Inorganics									
Conductivity	uS/cm	100	2.0	N/A	A432454	520	2.0	N/A	A432454
Total Dissolved Solids	mg/L	74	10	N/A	A432205	300	10	N/A	A432205
Anions									
Alkalinity (PP as CaCO3)	mg/L	<1.0	1.0	N/A	A432452	<1.0	1.0	N/A	A432452
Alkalinity (Total as CaCO3)	mg/L	41	1.0	N/A	A432452	260	1.0	N/A	A432452
Bicarbonate (HCO3)	mg/L	50	1.0	N/A	A432452	320	1.0	N/A	A432452
Carbonate (CO3)	mg/L	<1.0	1.0	N/A	A432452	<1.0	1.0	N/A	A432452
Hydroxide (OH)	mg/L	<1.0	1.0	N/A	A432452	<1.0	1.0	N/A	A432452
Total Sulphide	mg/L	<0.0018	0.0018	N/A	A432953	<0.0018	0.0018	N/A	A432953
Dissolved Chloride (Cl)	mg/L	2.2	1.0	N/A	A431793	2.8	1.0	N/A	A431796
Dissolved Sulphate (SO4)	mg/L	6.1	1.0	N/A	A431793	9.5	1.0	N/A	A431796
Nutrients									
Total Ammonia (N)	mg/L	<0.015	0.015	0.0040	A438969	<0.015	0.015	0.0040	A438969
Orthophosphate (P)	mg/L	0.0056	0.0030	0.0030	A431613	0.018	0.0030	0.0030	A431613
Nitrate plus Nitrite (N)	mg/L	0.473	0.020	0.020	A432510	2.32	0.040	0.040	A432510

RDL = Reportable Detection Limit
N/A = Not Applicable

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RESULTS OF CHEMICAL ANALYSES OF WATER

Bureau Veritas ID		AKV963			
Sampling Date		2021/11/16 17:00			
COC Number		639775-01-01			
	UNITS	WG-11222680-161121 -KH-07	RDL	MDL	QC Batch
ANIONS					
Nitrite (N)	mg/L	<0.0050	0.0050	0.0050	A432512
Calculated Parameters					
Filter and HNO3 Preservation	N/A	FIELD	N/A	N/A	ONSITE
Nitrate (N)	mg/L	<0.020	0.020	N/A	A429808
Sulphide (as H2S)	mg/L	<0.0020	0.0020	N/A	A430441
Field Parameters					
Field pH	pH	7.00	N/A	N/A	ONSITE
Field Temperature	°C	8.74	N/A	N/A	ONSITE
Misc. Inorganics					
Conductivity	uS/cm	<2.0	2.0	N/A	A432454
Total Dissolved Solids	mg/L	<10	10	N/A	A447334
Anions					
Alkalinity (PP as CaCO3)	mg/L	<1.0	1.0	N/A	A432452
Alkalinity (Total as CaCO3)	mg/L	1.1	1.0	N/A	A432452
Bicarbonate (HCO3)	mg/L	1.4	1.0	N/A	A432452
Carbonate (CO3)	mg/L	<1.0	1.0	N/A	A432452
Hydroxide (OH)	mg/L	<1.0	1.0	N/A	A432452
Total Sulphide	mg/L	<0.0018	0.0018	N/A	A432953
Dissolved Chloride (Cl)	mg/L	<1.0	1.0	N/A	A431796
Dissolved Sulphate (SO4)	mg/L	2.1	1.0	N/A	A431796
Nutrients					
Total Ammonia (N)	mg/L	0.050	0.015	0.0040	A438969
Orthophosphate (P)	mg/L	<0.0030	0.0030	0.0030	A431613
Nitrate plus Nitrite (N)	mg/L	<0.020	0.020	0.020	A432510

RDL = Reportable Detection Limit
N/A = Not Applicable

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MISCELLANEOUS (WATER)

Bureau Veritas ID		AKV957	AKV958	AKV959			
Sampling Date		2021/11/15 13:10	2021/11/15 14:25	2021/11/15 14:30			
COC Number		639775-01-01	639775-01-01	639775-01-01			
	UNITS	WG-11222680-151121-KH-01	WG-11222680-151121-KH-02	WG-11222680-151121-KH-03	RDL	MDL	QC Batch
Calculated Parameters							
Total Un-ionized Hydrogen Sulfide as S	mg/L	<0.0050	<0.0050	<0.0050	0.0050	0.0050	A430830
Total Un-ionized Hydrogen Sulfide as H2S	mg/L	<0.0050	<0.0050	<0.0050	0.0050	0.0050	A430830
RDL = Reportable Detection Limit							

Bureau Veritas ID		AKV960	AKV961	AKV962			
Sampling Date		2021/11/16 09:55	2021/11/16 09:00	2021/11/16 12:10			
COC Number		639775-01-01	639775-01-01	639775-01-01			
	UNITS	WG-11222680-161121-KH-04	WG-11222680-161121-KH-05	WG-11222680-161121-KH-06	RDL	MDL	QC Batch
Calculated Parameters							
Total Un-ionized Hydrogen Sulfide as S	mg/L	<0.0050	<0.0050	<0.0050	0.0050	0.0050	A430830
Total Un-ionized Hydrogen Sulfide as H2S	mg/L	<0.0050	<0.0050	<0.0050	0.0050	0.0050	A430830
RDL = Reportable Detection Limit							

Bureau Veritas ID		AKV963			
Sampling Date		2021/11/16 17:00			
COC Number		639775-01-01			
	UNITS	WG-11222680-161121-KH-07	RDL	MDL	QC Batch
Calculated Parameters					
Total Un-ionized Hydrogen Sulfide as S	mg/L	<0.0050	0.0050	0.0050	A430830
Total Un-ionized Hydrogen Sulfide as H2S	mg/L	<0.0050	0.0050	0.0050	A430830
RDL = Reportable Detection Limit					

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CSR DISSOLVED METALS IN WATER WITH CV HG (WATER)

Bureau Veritas ID		AKV957	AKV958		AKV959			
Sampling Date		2021/11/15 13:10	2021/11/15 14:25		2021/11/15 14:30			
COC Number		639775-01-01	639775-01-01		639775-01-01			
	UNITS	WG-11222680-151121-KH-01	WG-11222680-151121-KH-02	QC Batch	WG-11222680-151121-KH-03	RDL	MDL	QC Batch
Calculated Parameters								
Dissolved Hardness (CaCO3)	mg/L	54.1	39.7	A430397	41.8	0.50	0.50	A430397
Elements								
Dissolved Mercury (Hg)	ug/L	<0.0019	<0.0019	A431799	<0.0019	0.0019	0.0019	A431805
Dissolved Metals by ICPMS								
Dissolved Aluminum (Al)	ug/L	<3.0	4.2	A438555	5.2	3.0	0.030	A438555
Dissolved Antimony (Sb)	ug/L	<0.50	<0.50	A438555	<0.50	0.50	0.0020	A438555
Dissolved Arsenic (As)	ug/L	0.15	0.79	A438555	0.85	0.10	0.010	A438555
Dissolved Barium (Ba)	ug/L	1.6	3.0	A438555	2.6	1.0	0.0020	A438555
Dissolved Beryllium (Be)	ug/L	<0.10	<0.10	A438555	<0.10	0.10	0.0030	A438555
Dissolved Bismuth (Bi)	ug/L	<1.0	<1.0	A438555	<1.0	1.0	0.0010	A438555
Dissolved Boron (B)	ug/L	<50	<50	A438555	<50	50	50	A438555
Dissolved Cadmium (Cd)	ug/L	<0.010	<0.010	A438555	<0.010	0.010	0.0020	A438555
Dissolved Chromium (Cr)	ug/L	<1.0	<1.0	A438555	<1.0	1.0	0.020	A438555
Dissolved Cobalt (Co)	ug/L	<0.20	<0.20	A438555	<0.20	0.20	0.20	A438555
Dissolved Copper (Cu)	ug/L	1.98	1.50	A438555	<0.20	0.20	0.010	A438555
Dissolved Iron (Fe)	ug/L	<5.0	<5.0	A438555	<5.0	5.0	0.040	A438555
Dissolved Lead (Pb)	ug/L	<0.20	<0.20	A438555	<0.20	0.20	0.0010	A438555
Dissolved Lithium (Li)	ug/L	<2.0	<2.0	A438555	<2.0	2.0	2.0	A438555
Dissolved Manganese (Mn)	ug/L	<1.0	<1.0	A438555	<1.0	1.0	0.030	A438555
Dissolved Molybdenum (Mo)	ug/L	<1.0	<1.0	A438555	<1.0	1.0	0.0020	A438555
Dissolved Nickel (Ni)	ug/L	<1.0	<1.0	A438555	<1.0	1.0	0.010	A438555
Dissolved Phosphorus (P)	ug/L	<10	27	A438555	28	10	1.0	A438555
Dissolved Selenium (Se)	ug/L	0.15	<0.10	A438555	<0.10	0.10	0.0060	A438555
Dissolved Silicon (Si)	ug/L	5300	3240	A438555	3390	100	0.30	A438555
Dissolved Silver (Ag)	ug/L	<0.020	<0.020	A438555	<0.020	0.020	0.0020	A438555
Dissolved Strontium (Sr)	ug/L	29.1	16.5	A438555	18.4	1.0	0.0020	A438555
Dissolved Thallium (Tl)	ug/L	<0.010	<0.010	A438555	<0.010	0.010	0.010	A438555
Dissolved Tin (Sn)	ug/L	<5.0	<5.0	A438555	<5.0	5.0	0.0050	A438555
Dissolved Titanium (Ti)	ug/L	<5.0	<5.0	A438555	<5.0	5.0	0.30	A438555
Dissolved Uranium (U)	ug/L	<0.10	<0.10	A438555	<0.10	0.10	0.0010	A438555
Dissolved Vanadium (V)	ug/L	<5.0	6.4	A438555	7.1	5.0	0.020	A438555
Dissolved Zinc (Zn)	ug/L	6.0	5.6	A438555	<5.0	5.0	0.050	A438555
Dissolved Zirconium (Zr)	ug/L	<0.10	<0.10	A438555	<0.10	0.10	0.0080	A438555

RDL = Reportable Detection Limit

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CSR DISSOLVED METALS IN WATER WITH CV HG (WATER)

Bureau Veritas ID		AKV957	AKV958		AKV959			
Sampling Date		2021/11/15 13:10	2021/11/15 14:25		2021/11/15 14:30			
COC Number		639775-01-01	639775-01-01		639775-01-01			
	UNITS	**WG-11222680-151121-KH-01**	**WG-11222680-151121-KH-02**	**QC Batch**	**WG-11222680-151121-KH-03**	**RDL**	**MDL**	**QC Batch**
Dissolved Calcium (Ca)	mg/L	16.7	12.8	A430398	13.3	0.050	0.0010	A430398
Dissolved Magnesium (Mg)	mg/L	2.97	1.86	A430398	2.07	0.050	0.00050	A430398
Dissolved Potassium (K)	mg/L	0.235	0.197	A430398	0.202	0.050	0.0020	A430398
Dissolved Sodium (Na)	mg/L	3.78	1.08	A430398	1.16	0.050	0.0010	A430398
Dissolved Sulphur (S)	mg/L	<3.0	<3.0	A430398	<3.0	3.0	1.0	A430398
RDL = Reportable Detection Limit								

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CSR DISSOLVED METALS IN WATER WITH CV HG (WATER)

Bureau Veritas ID		AKV960	AKV960		AKV961			
Sampling Date		2021/11/16 09:55	2021/11/16 09:55		2021/11/16 09:00			
COC Number		639775-01-01	639775-01-01		639775-01-01			
	UNITS	WG-11222680-161121-KH-04	WG-11222680-161121-KH-04 Lab-Dup	QC Batch	WG-11222680-161121-KH-05	RDL	MDL	QC Batch
Calculated Parameters								
Dissolved Hardness (CaCO3)	mg/L	59.2	N/A	A430397	37.6	0.50	0.50	A430397
Elements								
Dissolved Mercury (Hg)	ug/L	<0.0019	N/A	A431799	<0.0019	0.0019	0.0019	A431799
Dissolved Metals by ICPMS								
Dissolved Aluminum (Al)	ug/L	6.8	7.8	A438557	<3.0	3.0	0.030	A438555
Dissolved Antimony (Sb)	ug/L	<0.50	<0.50	A438557	<0.50	0.50	0.0020	A438555
Dissolved Arsenic (As)	ug/L	0.52	0.43	A438557	<0.10	0.10	0.010	A438555
Dissolved Barium (Ba)	ug/L	3.4	3.9	A438557	1.9	1.0	0.0020	A438555
Dissolved Beryllium (Be)	ug/L	<0.10	<0.10	A438557	<0.10	0.10	0.0030	A438555
Dissolved Bismuth (Bi)	ug/L	<1.0	<1.0	A438557	<1.0	1.0	0.0010	A438555
Dissolved Boron (B)	ug/L	<50	<50	A438557	<50	50	50	A438555
Dissolved Cadmium (Cd)	ug/L	<0.010	<0.010	A438557	<0.010	0.010	0.0020	A438555
Dissolved Chromium (Cr)	ug/L	<1.0	<1.0	A438557	<1.0	1.0	0.020	A438555
Dissolved Cobalt (Co)	ug/L	<0.20	<0.20	A438557	<0.20	0.20	0.20	A438555
Dissolved Copper (Cu)	ug/L	1.50	1.40	A438557	1.11	0.20	0.010	A438555
Dissolved Iron (Fe)	ug/L	6.6	5.6	A438557	<5.0	5.0	0.040	A438555
Dissolved Lead (Pb)	ug/L	<0.20	<0.20	A438557	<0.20	0.20	0.0010	A438555
Dissolved Lithium (Li)	ug/L	<2.0	<2.0	A438557	<2.0	2.0	2.0	A438555
Dissolved Manganese (Mn)	ug/L	<1.0	1.1	A438557	1.1	1.0	0.030	A438555
Dissolved Molybdenum (Mo)	ug/L	<1.0	<1.0	A438557	<1.0	1.0	0.0020	A438555
Dissolved Nickel (Ni)	ug/L	<1.0	<1.0	A438557	<1.0	1.0	0.010	A438555
Dissolved Phosphorus (P)	ug/L	19	19	A438557	<10	10	1.0	A438555
Dissolved Selenium (Se)	ug/L	0.23	0.23	A438557	0.14	0.10	0.0060	A438555
Dissolved Silicon (Si)	ug/L	5050	4510	A438557	5050	100	0.30	A438555
Dissolved Silver (Ag)	ug/L	<0.020	<0.020	A438557	<0.020	0.020	0.0020	A438555
Dissolved Strontium (Sr)	ug/L	28.9	27.6	A438557	24.7	1.0	0.0020	A438555
Dissolved Thallium (Tl)	ug/L	<0.010	<0.010	A438557	<0.010	0.010	0.010	A438555
Dissolved Tin (Sn)	ug/L	<5.0	<5.0	A438557	<5.0	5.0	0.0050	A438555
Dissolved Titanium (Ti)	ug/L	<5.0	<5.0	A438557	<5.0	5.0	0.30	A438555
Dissolved Uranium (U)	ug/L	<0.10	<0.10	A438557	<0.10	0.10	0.0010	A438555
Dissolved Vanadium (V)	ug/L	5.6	5.3	A438557	<5.0	5.0	0.020	A438555

RDL = Reportable Detection Limit
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable

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CSR DISSOLVED METALS IN WATER WITH CV HG (WATER)

Bureau Veritas ID		AKV960	AKV960		AKV961			
Sampling Date		2021/11/16 09:55	2021/11/16 09:55		2021/11/16 09:00			
COC Number		639775-01-01	639775-01-01		639775-01-01			
	UNITS	**WG-11222680-161121 -KH-04**	**WG-11222680-161121 -KH-04 Lab-Dup**	**QC Batch**	**WG-11222680-161121 -KH-05**	**RDL**	**MDL**	**QC Batch**
Dissolved Zinc (Zn)	ug/L	16.1	14.4	A438557	5.2	5.0	0.050	A438555
Dissolved Zirconium (Zr)	ug/L	<0.10	<0.10	A438557	<0.10	0.10	0.0080	A438555
Dissolved Calcium (Ca)	mg/L	18.8	N/A	A430398	10.7	0.050	0.0010	A430398
Dissolved Magnesium (Mg)	mg/L	3.01	N/A	A430398	2.65	0.050	0.00050	A430398
Dissolved Potassium (K)	mg/L	0.365	N/A	A430398	0.208	0.050	0.0020	A430398
Dissolved Sodium (Na)	mg/L	6.00	N/A	A430398	6.90	0.050	0.0010	A430398
Dissolved Sulphur (S)	mg/L	<3.0	N/A	A430398	<3.0	3.0	1.0	A430398

RDL = Reportable Detection Limit
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable

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CSR DISSOLVED METALS IN WATER WITH CV HG (WATER)

Bureau Veritas ID		AKV962		AKV963			
Sampling Date		2021/11/16 12:10		2021/11/16 17:00			
COC Number		639775-01-01		639775-01-01			
	UNITS	WG-11222680-161121-KH-06	QC Batch	WG-11222680-161121-KH-07	RDL	MDL	QC Batch
Calculated Parameters							
Dissolved Hardness (CaCO3)	mg/L	257	A430397	<0.50	0.50	0.50	A430397
Elements							
Dissolved Mercury (Hg)	ug/L	<0.0019	A431799	<0.0019	0.0019	0.0019	A431799
Dissolved Metals by ICPMS							
Dissolved Aluminum (Al)	ug/L	<3.0	A438555	<3.0	3.0	0.030	A438557
Dissolved Antimony (Sb)	ug/L	<0.50	A438555	<0.50	0.50	0.0020	A438557
Dissolved Arsenic (As)	ug/L	0.31	A438555	<0.10	0.10	0.010	A438557
Dissolved Barium (Ba)	ug/L	16.6	A438555	<1.0	1.0	0.0020	A438557
Dissolved Beryllium (Be)	ug/L	<0.10	A438555	<0.10	0.10	0.0030	A438557
Dissolved Bismuth (Bi)	ug/L	<1.0	A438555	<1.0	1.0	0.0010	A438557
Dissolved Boron (B)	ug/L	<50	A438555	107	50	50	A438557
Dissolved Cadmium (Cd)	ug/L	<0.010	A438555	<0.010	0.010	0.0020	A438557
Dissolved Chromium (Cr)	ug/L	<1.0	A438555	<1.0	1.0	0.020	A438557
Dissolved Cobalt (Co)	ug/L	<0.20	A438555	<0.20	0.20	0.20	A438557
Dissolved Copper (Cu)	ug/L	1.90	A438555	<0.20	0.20	0.010	A438557
Dissolved Iron (Fe)	ug/L	<5.0	A438555	<5.0	5.0	0.040	A438557
Dissolved Lead (Pb)	ug/L	<0.20	A438555	<0.20	0.20	0.0010	A438557
Dissolved Lithium (Li)	ug/L	<2.0	A438555	<2.0	2.0	2.0	A438557
Dissolved Manganese (Mn)	ug/L	<1.0	A438555	<1.0	1.0	0.030	A438557
Dissolved Molybdenum (Mo)	ug/L	<1.0	A438555	<1.0	1.0	0.0020	A438557
Dissolved Nickel (Ni)	ug/L	<1.0	A438555	<1.0	1.0	0.010	A438557
Dissolved Phosphorus (P)	ug/L	17	A438555	<10	10	1.0	A438557
Dissolved Selenium (Se)	ug/L	0.26	A438555	<0.10	0.10	0.0060	A438557
Dissolved Silicon (Si)	ug/L	9040	A438555	<100	100	0.30	A438557
Dissolved Silver (Ag)	ug/L	<0.020	A438555	<0.020	0.020	0.0020	A438557
Dissolved Strontium (Sr)	ug/L	141	A438555	<1.0	1.0	0.0020	A438557
Dissolved Thallium (Tl)	ug/L	<0.010	A438555	<0.010	0.010	0.010	A438557
Dissolved Tin (Sn)	ug/L	<5.0	A438555	<5.0	5.0	0.0050	A438557
Dissolved Titanium (Ti)	ug/L	<5.0	A438555	<5.0	5.0	0.30	A438557
Dissolved Uranium (U)	ug/L	0.29	A438555	<0.10	0.10	0.0010	A438557
Dissolved Vanadium (V)	ug/L	6.0	A438555	<5.0	5.0	0.020	A438557
Dissolved Zinc (Zn)	ug/L	<5.0	A438555	<5.0	5.0	0.050	A438557
Dissolved Zirconium (Zr)	ug/L	<0.10	A438555	<0.10	0.10	0.0080	A438557
RDL = Reportable Detection Limit							

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CSR DISSOLVED METALS IN WATER WITH CV HG (WATER)

Bureau Veritas ID		AKV962		AKV963			
Sampling Date		2021/11/16 12:10		2021/11/16 17:00			
COC Number		639775-01-01		639775-01-01			
	UNITS	WG-11222680-161121-KH-06	QC Batch	WG-11222680-161121-KH-07	RDL	MDL	QC Batch
Dissolved Calcium (Ca)	mg/L	80.4	A430398	0.102	0.050	0.0010	A430398
Dissolved Magnesium (Mg)	mg/L	13.6	A430398	<0.050	0.050	0.00050	A430398
Dissolved Potassium (K)	mg/L	0.737	A430398	<0.050	0.050	0.0020	A430398
Dissolved Sodium (Na)	mg/L	12.2	A430398	<0.050	0.050	0.0010	A430398
Dissolved Sulphur (S)	mg/L	<3.0	A430398	<3.0	3.0	1.0	A430398
RDL = Reportable Detection Limit							

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GENERAL COMMENTS

Version 2: Report reissued to amend sample IDs for samples collected on November 16th as per COC - 2022/01/17

Sample AKV957 [WG-11222680-151121-KH-01] : Sample was analyzed past method specified hold time for Nitrate + Nitrite (N). Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised. Sample was analyzed past method specified hold time for Nitrite (N) by CFA. Sample was analyzed past method specified hold time for Orthophosphate by Konelab.

Sample AKV958 [WG-11222680-151121-KH-02] : Sample was analyzed past method specified hold time for Nitrate + Nitrite (N). Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised. Sample was analyzed past method specified hold time for Nitrite (N) by CFA. Sample was analyzed past method specified hold time for Orthophosphate by Konelab.

Sample AKV959 [WG-11222680-151121-KH-03] : The sample for dissolved metals was filtered and preserved at the lab. Values may not reflect concentrations at the time of sampling. Sample was analyzed past method specified hold time for Nitrate + Nitrite (N). Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised. Sample was analyzed past method specified hold time for Nitrite (N) by CFA. Sample was analyzed past method specified hold time for Orthophosphate by Konelab.

Results relate only to the items tested.

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QUALITY ASSURANCE REPORT

			Matrix Spike		Spiked Blank		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
A431613	Orthophosphate (P)	2021/11/19	NC	80 - 120	106	80 - 120	<0.0030	mg/L	1.9 (1)	20
A431793	Dissolved Chloride (Cl)	2021/11/19			106	80 - 120	<1.0	mg/L		
A431793	Dissolved Sulphate (SO4)	2021/11/19			101	80 - 120	<1.0	mg/L		
A431796	Dissolved Chloride (Cl)	2021/11/19			103	80 - 120	<1.0	mg/L		
A431796	Dissolved Sulphate (SO4)	2021/11/19			104	80 - 120	<1.0	mg/L		
A431799	Dissolved Mercury (Hg)	2021/11/19	95	80 - 120	100	80 - 120	<0.0019	ug/L	NC (1)	20
A431805	Dissolved Mercury (Hg)	2021/11/19	93	80 - 120	103	80 - 120	<0.0019	ug/L	NC (1)	20
A432205	Total Dissolved Solids	2021/11/22	NC	80 - 120	105	80 - 120	<10	mg/L	17 (1)	20
A432452	Alkalinity (PP as CaCO3)	2021/11/19					<1.0	mg/L	NC (3)	20
A432452	Alkalinity (Total as CaCO3)	2021/11/19	NC (2)	80 - 120	88	80 - 120	<1.0	mg/L	4.8 (3)	20
A432452	Bicarbonate (HCO3)	2021/11/19					<1.0	mg/L	4.8 (3)	20
A432452	Carbonate (CO3)	2021/11/19					<1.0	mg/L	NC (3)	20
A432452	Hydroxide (OH)	2021/11/19					<1.0	mg/L	NC (3)	20
A432454	Conductivity	2021/11/19			100	80 - 120	<2.0	uS/cm	0.20 (3)	10
A432510	Nitrate plus Nitrite (N)	2021/11/19	102 (2)	80 - 120	107	80 - 120	<0.020	mg/L	0.79 (3)	25
A432512	Nitrite (N)	2021/11/19	102 (2)	80 - 120	104	80 - 120	<0.0050	mg/L	NC (3)	20
A432953	Total Sulphide	2021/11/20	120	80 - 120	100	80 - 120	<0.0018	mg/L	NC (1)	20
A438555	Dissolved Aluminum (Al)	2021/11/23	99	80 - 120	98	80 - 120	<3.0	ug/L	0.83 (1)	20
A438555	Dissolved Antimony (Sb)	2021/11/23	99	80 - 120	96	80 - 120	<0.50	ug/L	0.038 (1)	20
A438555	Dissolved Arsenic (As)	2021/11/23	115	80 - 120	105	80 - 120	<0.10	ug/L	13 (1)	20
A438555	Dissolved Barium (Ba)	2021/11/23	99	80 - 120	97	80 - 120	<1.0	ug/L	1.5 (1)	20
A438555	Dissolved Beryllium (Be)	2021/11/23	95	80 - 120	94	80 - 120	<0.10	ug/L	NC (1)	20
A438555	Dissolved Bismuth (Bi)	2021/11/23	98	80 - 120	100	80 - 120	<1.0	ug/L	NC (1)	20
A438555	Dissolved Boron (B)	2021/11/23	107	80 - 120	103	80 - 120	<50	ug/L	0.50 (1)	20
A438555	Dissolved Cadmium (Cd)	2021/11/23	97	80 - 120	95	80 - 120	<0.010	ug/L	NC (1)	20
A438555	Dissolved Chromium (Cr)	2021/11/23	113	80 - 120	113	80 - 120	<1.0	ug/L	0.11 (1)	20
A438555	Dissolved Cobalt (Co)	2021/11/23	107	80 - 120	111	80 - 120	<0.20	ug/L	NC (1)	20
A438555	Dissolved Copper (Cu)	2021/11/23	102	80 - 120	109	80 - 120	<0.20	ug/L	12 (1)	20
A438555	Dissolved Iron (Fe)	2021/11/23	100	80 - 120	100	80 - 120	<5.0	ug/L	NC (1)	20
A438555	Dissolved Lead (Pb)	2021/11/23	98	80 - 120	99	80 - 120	<0.20	ug/L	NC (1)	20
A438555	Dissolved Lithium (Li)	2021/11/23	NC	80 - 120	95	80 - 120	<2.0	ug/L	2.0 (1)	20
A438555	Dissolved Manganese (Mn)	2021/11/23	107	80 - 120	111	80 - 120	<1.0	ug/L	1.7 (1)	20
A438555	Dissolved Molybdenum (Mo)	2021/11/23	NC	80 - 120	100	80 - 120	<1.0	ug/L	0.74 (1)	20

QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		Spiked Blank		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
A438555	Dissolved Nickel (Ni)	2021/11/23	106	80 - 120	111	80 - 120	<1.0	ug/L	3.4 (1)	20
A438555	Dissolved Phosphorus (P)	2021/11/23	115	80 - 120	106	80 - 120	<10	ug/L		
A438555	Dissolved Selenium (Se)	2021/11/23	103	80 - 120	91	80 - 120	<0.10	ug/L	1.5 (1)	20
A438555	Dissolved Silicon (Si)	2021/11/23	74 (4)	80 - 120	80	80 - 120	<100	ug/L	0.41 (1)	20
A438555	Dissolved Silver (Ag)	2021/11/23	95	80 - 120	95	80 - 120	<0.020	ug/L	NC (1)	20
A438555	Dissolved Strontium (Sr)	2021/11/23	NC	80 - 120	109	80 - 120	<1.0	ug/L	0.18 (1)	20
A438555	Dissolved Thallium (Tl)	2021/11/23	96	80 - 120	97	80 - 120	<0.010	ug/L	NC (1)	20
A438555	Dissolved Tin (Sn)	2021/11/23	100	80 - 120	97	80 - 120	<5.0	ug/L	NC (1)	20
A438555	Dissolved Titanium (Ti)	2021/11/23	114	80 - 120	114	80 - 120	<5.0	ug/L	NC (1)	20
A438555	Dissolved Uranium (U)	2021/11/23	102	80 - 120	101	80 - 120	<0.10	ug/L	0.78 (1)	20
A438555	Dissolved Vanadium (V)	2021/11/23	112	80 - 120	113	80 - 120	<5.0	ug/L	NC (1)	20
A438555	Dissolved Zinc (Zn)	2021/11/23	112	80 - 120	115	80 - 120	<5.0	ug/L	0.32 (1)	20
A438555	Dissolved Zirconium (Zr)	2021/11/23	116	80 - 120	115	80 - 120	<0.10	ug/L	NC (1)	20
A438557	Dissolved Aluminum (Al)	2021/11/23	98 (5)	80 - 120	88	80 - 120	<3.0	ug/L	13 (6)	20
A438557	Dissolved Antimony (Sb)	2021/11/23	98 (5)	80 - 120	88	80 - 120	<0.50	ug/L	NC (6)	20
A438557	Dissolved Arsenic (As)	2021/11/23	98 (5)	80 - 120	102	80 - 120	<0.10	ug/L	18 (6)	20
A438557	Dissolved Barium (Ba)	2021/11/23	101 (5)	80 - 120	89	80 - 120	<1.0	ug/L	15 (6)	20
A438557	Dissolved Beryllium (Be)	2021/11/23	97 (5)	80 - 120	87	80 - 120	<0.10	ug/L	NC (6)	20
A438557	Dissolved Bismuth (Bi)	2021/11/23	101 (5)	80 - 120	90	80 - 120	<1.0	ug/L	NC (6)	20
A438557	Dissolved Boron (B)	2021/11/23	103 (5)	80 - 120	90	80 - 120	<50	ug/L	NC (6)	20
A438557	Dissolved Cadmium (Cd)	2021/11/23	99 (5)	80 - 120	87	80 - 120	<0.010	ug/L	NC (6)	20
A438557	Dissolved Chromium (Cr)	2021/11/23	101 (5)	80 - 120	106	80 - 120	<1.0	ug/L	NC (6)	20
A438557	Dissolved Cobalt (Co)	2021/11/23	100 (5)	80 - 120	106	80 - 120	<0.20	ug/L	NC (6)	20
A438557	Dissolved Copper (Cu)	2021/11/23	97 (5)	80 - 120	104	80 - 120	<0.20	ug/L	6.8 (6)	20
A438557	Dissolved Iron (Fe)	2021/11/23	99 (5)	80 - 120	93	80 - 120	<5.0	ug/L	16 (6)	20
A438557	Dissolved Lead (Pb)	2021/11/23	100 (5)	80 - 120	89	80 - 120	<0.20	ug/L	NC (6)	20
A438557	Dissolved Lithium (Li)	2021/11/23	100 (5)	80 - 120	90	80 - 120	<2.0	ug/L	NC (6)	20
A438557	Dissolved Manganese (Mn)	2021/11/23	101 (5)	80 - 120	106	80 - 120	<1.0	ug/L	9.0 (6)	20
A438557	Dissolved Molybdenum (Mo)	2021/11/23	105 (5)	80 - 120	90	80 - 120	<1.0	ug/L	NC (6)	20
A438557	Dissolved Nickel (Ni)	2021/11/23	100 (5)	80 - 120	106	80 - 120	<1.0	ug/L	NC (6)	20
A438557	Dissolved Phosphorus (P)	2021/11/23	97 (5)	80 - 120	96	80 - 120	<10	ug/L	2.1 (6)	20
A438557	Dissolved Selenium (Se)	2021/11/23	94 (5)	80 - 120	90	80 - 120	<0.10	ug/L	0.53 (6)	20
A438557	Dissolved Silicon (Si)	2021/11/23	79 (4,5)	80 - 120	72 (4)	80 - 120	<100	ug/L	11 (6)	20

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			Matrix Spike		Spiked Blank		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
A438557	Dissolved Silver (Ag)	2021/11/23	97 (5)	80 - 120	87	80 - 120	<0.020	ug/L	NC (6)	20
A438557	Dissolved Strontium (Sr)	2021/11/23	99 (5)	80 - 120	104	80 - 120	<1.0	ug/L	4.8 (6)	20
A438557	Dissolved Thallium (Tl)	2021/11/23	98 (5)	80 - 120	87	80 - 120	<0.010	ug/L	NC (6)	20
A438557	Dissolved Tin (Sn)	2021/11/23	101 (5)	80 - 120	90	80 - 120	<5.0	ug/L	NC (6)	20
A438557	Dissolved Titanium (Ti)	2021/11/23	102 (5)	80 - 120	103	80 - 120	<5.0	ug/L	NC (6)	20
A438557	Dissolved Uranium (U)	2021/11/23	101 (5)	80 - 120	89	80 - 120	<0.10	ug/L	NC (6)	20
A438557	Dissolved Vanadium (V)	2021/11/23	102 (5)	80 - 120	108	80 - 120	<5.0	ug/L	4.6 (6)	20
A438557	Dissolved Zinc (Zn)	2021/11/23	92 (5)	80 - 120	111	80 - 120	<5.0	ug/L	11 (6)	20
A438557	Dissolved Zirconium (Zr)	2021/11/23	101 (5)	80 - 120	101	80 - 120	<0.10	ug/L	NC (6)	20
A438969	Total Ammonia (N)	2021/11/22	94 (7)	80 - 120	99	80 - 120	<0.015	mg/L	NC (8)	20
A438971	Total Ammonia (N)	2021/11/22	102	80 - 120	101	80 - 120	<0.015	mg/L	0.66 (1)	20
A447334	Total Dissolved Solids	2021/11/23	101 (9)	80 - 120	98	80 - 120	<10	mg/L	NC (1)	20

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

(1) Duplicate Parent ID

(2) Matrix Spike Parent ID [AKV960-01]

(3) Duplicate Parent ID [AKV960-01]

(4) Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.

(5) Matrix Spike Parent ID [AKV960-02]

(6) Duplicate Parent ID [AKV960-02]

(7) Matrix Spike Parent ID [AKV957-05]

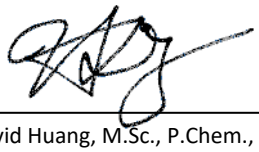
(8) Duplicate Parent ID [AKV957-05]

(9) Matrix Spike Parent ID [AKV963-01]

Bureau Veritas Laboratories Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:



David Huang, M.Sc., P.Chem., QP, Scientific Services Manager

BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports.
For Service Group specific validation please refer to the Validation Signature Page.

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Bureau Veritas Laboratories
4606 Canada Way, Burnaby, British Columbia Canada V5G 1K5 Tel:(604) 734 7276 Toll-free 800-563-6266 Fax:(604) 731 2386 www.bvna.com

Page of

INVOICE TO:

Company Name: #163 GHD Limited
Contact Name: AP Invoices - 735
Address: 455 PHILLIP STREET, WATERLOO ON N2L 3X2
Phone: (519) 884-0510 Fax: (519) 725-1394
Email: ~~APinvoices-735@ghd.com~~ invoicing - canada@ghd.com

Report Information

Company Name:
Contact Name: Airesse MacPhee
Address:
Phone: Fax:
Email: airesse.macphee@ghd.com; NationalEDDSupport@ma

Project Information

Quotation #: C10010
P.O. #:
Project #: 11222680-RA3-2
Project Name: upland
Site #:
Sampled By: K. Hosier

C188811_COC

Only
Bottle Order #: 639775

Chain Of Custody Record: C#639775-01-01
Project Manager: Nahed Amer

Regulatory Criteria:
- [ ] CSR
- [ ] CCME
- [ ] BC Water Quality
- [ ] Other

Special Instructions: Groundwater

SAMPLES MUST BE KEPT COOL (< 10°C) FROM TIME OF SAMPLING UNTIL DELIVERY TO BUREAU VERITAS

Turnaround Time (TAT) Required:

Please provide advance notice for rush projects

Regular (Standard) TAT:
(will be applied if Rush TAT is not specified)
Standard TAT = 5-7 Working days for most tests.
Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.
[X]

Job Specific Rush TAT (if applies to entire submission)
1 DAY [ ] 2 Day [ ] 3 Day [ ] Date Required: [ ]
Rush Confirmation Number: (call lab for #)

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Metals Field Filtered? (Y/N)	Conductivity, Cl, SO4, NO2, NO3, N+N, PO4	Speciated Alkalinity	Sulphide + H2S Calc (LL)	Sulphide, Un-ionized (as H2S) (Calc)	Ammonia-N (Total)	Dissolved Metals with CV Hg, Hardness (CSR)	Total Dissolved Solids (Filt. Residue)	# of Bottles	Comments
1		WG-11222680-151121-KH-01	15/11/21	13:10	WATER		X	X	X	X	X	X	X	5	short holding times!
2		WG-11222680-151121-KH-02	15/11/21	14:25											
3		WG-11222680-151121-KH-03	15/11/21	14:30											All bottles were field filtered and preserved as required
4		WG-11222680-161121-KH-04	16/11/21	9.55											
5		WG-11222680-161121-KH-05	16/11/21	9:00											
6		WG-11222680-161121-KH-06	16/11/21	12:10											
7		WG-11222680-161121-KH-07	16/11/21	17:00											
8															
9															
10															

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED (Y): (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted	Lab Use Only: Time Sensitive	Temperature (°C) on Receipt	Custody Seal Intact on Cooler?
Kathleen / Kathleen Hosier	21/11/17	22:00	[illegible] BLUE POWER	2021/11/18	10:25		[ ]	2/3/2	[ ] Yes [X] No

* UNLESS OTHERWISE AGREED TO IN WRITING, WORK SUBMITTED ON THIS CHAIN OF CUSTODY IS SUBJECT TO BUREAU VERITAS'S STANDARD TERMS AND CONDITIONS. SIGNING OF THIS CHAIN OF CUSTODY DOCUMENT IS ACKNOWLEDGMENT AND ACCEPTANCE OF OUR TERMS WHICH ARE AVAILABLE FOR VIEWING AT WWW.BVLABS.COM/TERMS-AND-CONDITIONS.
* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

4/3/2

White: Bureau Veritas Yellow: Client

Bureau Veritas Canada (2019) Inc.

Your Project #: 11222680-3-2
Your C.O.C. #: 639775-01-01

Attention: Airesse MacPhee

GHD Limited
455 PHILLIP STREET
WATERLOO, ON
CANADA N2L 3X2

Report Date: 2022/01/17
Report #: R3122876
Version: 2 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

BV LABS JOB #: C188811
Received: 2021/11/18, 10:25

Sample Matrix: Water
Samples Received: 7

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity @25C (pp, total), CO3,HCO3,OH	7	N/A	2021/11/19	BBY6SOP-00026	SM 23 2320 B m
Chloride/Sulphate by Auto Colourimetry	7	N/A	2021/11/19	BBY6SOP-00011 / BBY6SOP-00017	SM23-4500-Cl/SO4-E m
Conductivity @25C	7	N/A	2021/11/19	BBY6SOP-00026	SM 23 2510 B m
Sulphide (as H2S) (1)	7	N/A	2021/11/20		Auto Calc
Un-ionized Hydrogen Sulphide as S Calc	7	N/A	2021/12/22	BBY WI-00033	Auto Calc
Hardness (calculated as CaCO3) (1)	7	N/A	2021/12/10	BBY WI-00033	Auto Calc
Mercury (Dissolved) by CV (2)	7	2021/11/19	2021/11/19	AB SOP-00084	BCMOE BCLM Oct2013 m
Na, K, Ca, Mg, S by CRC ICPMS (diss.) (1)	7	N/A	2021/12/10		Auto Calc
Elements by CRC ICPMS (dissolved) (1, 2)	7	N/A	2021/11/23	CAL SOP-00265	EPA 6020 m
Ammonia-N (Total)	7	N/A	2021/11/22	AB SOP-00007	SM 23 4500 NH3 A G m
Nitrate + Nitrite (N)	7	N/A	2021/11/19	BBY6SOP-00010	SM 23 4500-NO3- I m
Nitrite (N) by CFA	7	N/A	2021/11/19	BBY6SOP-00010	SM 23 4500-NO3- I m
Nitrogen - Nitrate (as N)	7	N/A	2021/12/14	BBY WI-00033	Auto Calc
Filter and HNO3 Preserve for Metals	6	N/A	2021/11/18	BBY7 WI-00004	SM 23 3030B m
Filter and HNO3 Preserve for Metals	1	N/A	2021/11/19	BBY7 WI-00004	SM 23 3030B m
Orthophosphate by Konelab (3)	7	N/A	2021/11/19	BBY6SOP-00013	SM 23 4500-P E m
Total Sulphide (1)	7	N/A	2021/11/20	AB SOP-00080	SM 23 4500 S2-A D Fm
Total Dissolved Solids (Filt. Residue)	5	2021/11/19	2021/11/22	BBY6SOP-00033	SM 23 2540 C m
Total Dissolved Solids (Filt. Residue)	2	2021/11/22	2021/11/23	BBY6SOP-00033	SM 23 2540 C m
Field pH	7	N/A	2021/12/22		
Field Temperature	7	N/A	2021/12/22		

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

Your Project #: 11222680-3-2
Your C.O.C. #: 639775-01-01

Attention: Airesse MacPhee

GHD Limited
455 PHILLIP STREET
WATERLOO, ON
CANADA N2L 3X2

Report Date: 2022/01/17
Report #: R3122876
Version: 2 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

BV LABS JOB #: C188811
Received: 2021/11/18, 10:25

Bureau Veritas liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Bureau Veritas has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Bureau Veritas, unless otherwise agreed in writing. Bureau Veritas is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) This test was performed by Bureau Veritas Calgary, 4000 - 19 St. , Calgary, AB, T2E 6P8
(2) Dissolved > Total Imbalance: When applicable, Dissolved and Total results were reviewed and data quality meets acceptable levels unless otherwise noted.
(3) Orthophosphate > Total Phosphorus Imbalance: When applicable, Orthophosphate, Total Phosphorus and dissolved Phosphorus results were reviewed and data quality meets acceptable levels unless otherwise noted.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Thomas Pinchin, Project Solutions Representative
Email: Thomas.Pinchin@bureauveritas.com
Phone# (604) 734 7276
==========
BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

RESULTS OF CHEMICAL ANALYSES OF WATER

Bureau Veritas ID		AKV957	AKV957		AKV958			
Sampling Date		2021/11/15 13:10	2021/11/15 13:10		2021/11/15 14:25			
COC Number		639775-01-01	639775-01-01		639775-01-01			
	UNITS	WG-11222680-151121-KH-01	WG-11222680-151121-KH-01 Lab-Dup	QC Batch	WG-11222680-151121-KH-02	RDL	MDL	QC Batch
ANIONS								
Nitrite (N)	mg/L	<0.0050	N/A	A432512	<0.0050	0.0050	0.0050	A432512
Calculated Parameters								
Filter and HNO3 Preservation	N/A	FIELD	N/A	ONSITE	FIELD	N/A	N/A	ONSITE
Nitrate (N)	mg/L	0.262	N/A	A429808	0.039	0.020	N/A	A429808
Sulphide (as H2S)	mg/L	<0.0020	N/A	A430441	<0.0020	0.0020	N/A	A430441
Field Parameters								
Field pH	pH	7.26	N/A	ONSITE	8.31	N/A	N/A	ONSITE
Field Temperature	°C	10.63	N/A	ONSITE	9.61	N/A	N/A	ONSITE
Misc. Inorganics								
Conductivity	uS/cm	130	N/A	A432454	87	2.0	N/A	A432454
Total Dissolved Solids	mg/L	82	N/A	A432205	58	10	N/A	A432205
Anions								
Alkalinity (PP as CaCO3)	mg/L	<1.0	N/A	A432452	<1.0	1.0	N/A	A432452
Alkalinity (Total as CaCO3)	mg/L	48	N/A	A432452	40	1.0	N/A	A432452
Bicarbonate (HCO3)	mg/L	58	N/A	A432452	49	1.0	N/A	A432452
Carbonate (CO3)	mg/L	<1.0	N/A	A432452	<1.0	1.0	N/A	A432452
Hydroxide (OH)	mg/L	<1.0	N/A	A432452	<1.0	1.0	N/A	A432452
Total Sulphide	mg/L	<0.0018	N/A	A432953	<0.0018	0.0018	N/A	A432953
Dissolved Chloride (Cl)	mg/L	3.2	N/A	A431793	<1.0	1.0	N/A	A431796
Dissolved Sulphate (SO4)	mg/L	8.6	N/A	A431793	4.2	1.0	N/A	A431796
Nutrients								
Total Ammonia (N)	mg/L	<0.015	<0.015	A438969	<0.015	0.015	0.0040	A438971
Orthophosphate (P)	mg/L	0.0076	N/A	A431613	0.024	0.0030	0.0030	A431613
Nitrate plus Nitrite (N)	mg/L	0.262	N/A	A432510	0.039	0.020	0.020	A432510

RDL = Reportable Detection Limit
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable

Bureau Veritas Laboratories Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

RESULTS OF CHEMICAL ANALYSES OF WATER

Bureau Veritas ID		AKV959		AKV960	AKV960			
Sampling Date		2021/11/15 14:30		2021/11/16 09:55	2021/11/16 09:55			
COC Number		639775-01-01		639775-01-01	639775-01-01			
	UNITS	WG-11222680-151121 -KH-03	QC Batch	WG-11222680-161121 -KH-04	WG-11222680-161121 -KH-04 Lab-Dup	RDL	MDL	QC Batch
ANIONS								
Nitrite (N)	mg/L	<0.0050	A432512	<0.0050	<0.0050	0.0050	0.0050	A432512
Calculated Parameters								
Filter and HNO3 Preservation	N/A	LAB	A432140	FIELD	N/A	N/A	N/A	ONSITE
Nitrate (N)	mg/L	0.038	A429808	0.494	N/A	0.020	N/A	A429808
Sulphide (as H2S)	mg/L	<0.0020	A430441	0.0097	N/A	0.0020	N/A	A430441
Field Parameters								
Field pH	pH	8.31	ONSITE	7.75	N/A	N/A	N/A	ONSITE
Field Temperature	°C	9.61	ONSITE	8.91	N/A	N/A	N/A	ONSITE
Misc. Inorganics								
Conductivity	uS/cm	87	A432454	150	150	2.0	N/A	A432454
Total Dissolved Solids	mg/L	62	A432205	88	N/A	10	N/A	A447334
Anions								
Alkalinity (PP as CaCO3)	mg/L	<1.0	A432452	<1.0	<1.0	1.0	N/A	A432452
Alkalinity (Total as CaCO3)	mg/L	41	A432452	57	60	1.0	N/A	A432452
Bicarbonate (HCO3)	mg/L	50	A432452	69	73	1.0	N/A	A432452
Carbonate (CO3)	mg/L	<1.0	A432452	<1.0	<1.0	1.0	N/A	A432452
Hydroxide (OH)	mg/L	<1.0	A432452	<1.0	<1.0	1.0	N/A	A432452
Total Sulphide	mg/L	<0.0018	A432953	0.0092	N/A	0.0018	N/A	A432953
Dissolved Chloride (Cl)	mg/L	<1.0	A431793	4.5	N/A	1.0	N/A	A431793
Dissolved Sulphate (SO4)	mg/L	3.6	A431793	8.0	N/A	1.0	N/A	A431793
Nutrients								
Total Ammonia (N)	mg/L	<0.015	A438971	<0.015	N/A	0.015	0.0040	A438969
Orthophosphate (P)	mg/L	0.025	A431613	0.014	N/A	0.0030	0.0030	A431613
Nitrate plus Nitrite (N)	mg/L	0.038	A432510	0.494	0.498	0.020	0.020	A432510

RDL = Reportable Detection Limit
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable

Bureau Veritas Laboratories Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

RESULTS OF CHEMICAL ANALYSES OF WATER

Bureau Veritas ID		AKV961				AKV962			
Sampling Date		2021/11/16 09:00				2021/11/16 12:10			
COC Number		639775-01-01				639775-01-01			
	UNITS	WG-11222680-161121-KH-05	RDL	MDL	QC Batch	WG-11222680-161121-KH-06	RDL	MDL	QC Batch
ANIONS									
Nitrite (N)	mg/L	<0.0050	0.0050	0.0050	A432512	<0.0050	0.0050	0.0050	A432512
Calculated Parameters									
Filter and HNO3 Preservation	N/A	FIELD	N/A	N/A	ONSITE	FIELD	N/A	N/A	ONSITE
Nitrate (N)	mg/L	0.473	0.020	N/A	A429808	2.32	0.040	N/A	A429808
Sulphide (as H2S)	mg/L	<0.0020	0.0020	N/A	A430441	<0.0020	0.0020	N/A	A430441
Field Parameters									
Field pH	pH	7.28	N/A	N/A	ONSITE	7.56	N/A	N/A	ONSITE
Field Temperature	°C	6.90	N/A	N/A	ONSITE	10.64	N/A	N/A	ONSITE
Misc. Inorganics									
Conductivity	uS/cm	100	2.0	N/A	A432454	520	2.0	N/A	A432454
Total Dissolved Solids	mg/L	74	10	N/A	A432205	300	10	N/A	A432205
Anions									
Alkalinity (PP as CaCO3)	mg/L	<1.0	1.0	N/A	A432452	<1.0	1.0	N/A	A432452
Alkalinity (Total as CaCO3)	mg/L	41	1.0	N/A	A432452	260	1.0	N/A	A432452
Bicarbonate (HCO3)	mg/L	50	1.0	N/A	A432452	320	1.0	N/A	A432452
Carbonate (CO3)	mg/L	<1.0	1.0	N/A	A432452	<1.0	1.0	N/A	A432452
Hydroxide (OH)	mg/L	<1.0	1.0	N/A	A432452	<1.0	1.0	N/A	A432452
Total Sulphide	mg/L	<0.0018	0.0018	N/A	A432953	<0.0018	0.0018	N/A	A432953
Dissolved Chloride (Cl)	mg/L	2.2	1.0	N/A	A431793	2.8	1.0	N/A	A431796
Dissolved Sulphate (SO4)	mg/L	6.1	1.0	N/A	A431793	9.5	1.0	N/A	A431796
Nutrients									
Total Ammonia (N)	mg/L	<0.015	0.015	0.0040	A438969	<0.015	0.015	0.0040	A438969
Orthophosphate (P)	mg/L	0.0056	0.0030	0.0030	A431613	0.018	0.0030	0.0030	A431613
Nitrate plus Nitrite (N)	mg/L	0.473	0.020	0.020	A432510	2.32	0.040	0.040	A432510

RDL = Reportable Detection Limit
N/A = Not Applicable

Bureau Veritas Laboratories Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

RESULTS OF CHEMICAL ANALYSES OF WATER

Bureau Veritas ID		AKV963			
Sampling Date		2021/11/16 17:00			
COC Number		639775-01-01			
	UNITS	WG-11222680-161121 -KH-07	RDL	MDL	QC Batch
ANIONS					
Nitrite (N)	mg/L	<0.0050	0.0050	0.0050	A432512
Calculated Parameters					
Filter and HNO3 Preservation	N/A	FIELD	N/A	N/A	ONSITE
Nitrate (N)	mg/L	<0.020	0.020	N/A	A429808
Sulphide (as H2S)	mg/L	<0.0020	0.0020	N/A	A430441
Field Parameters					
Field pH	pH	7.00	N/A	N/A	ONSITE
Field Temperature	°C	8.74	N/A	N/A	ONSITE
Misc. Inorganics					
Conductivity	uS/cm	<2.0	2.0	N/A	A432454
Total Dissolved Solids	mg/L	<10	10	N/A	A447334
Anions					
Alkalinity (PP as CaCO3)	mg/L	<1.0	1.0	N/A	A432452
Alkalinity (Total as CaCO3)	mg/L	1.1	1.0	N/A	A432452
Bicarbonate (HCO3)	mg/L	1.4	1.0	N/A	A432452
Carbonate (CO3)	mg/L	<1.0	1.0	N/A	A432452
Hydroxide (OH)	mg/L	<1.0	1.0	N/A	A432452
Total Sulphide	mg/L	<0.0018	0.0018	N/A	A432953
Dissolved Chloride (Cl)	mg/L	<1.0	1.0	N/A	A431796
Dissolved Sulphate (SO4)	mg/L	2.1	1.0	N/A	A431796
Nutrients					
Total Ammonia (N)	mg/L	0.050	0.015	0.0040	A438969
Orthophosphate (P)	mg/L	<0.0030	0.0030	0.0030	A431613
Nitrate plus Nitrite (N)	mg/L	<0.020	0.020	0.020	A432510

RDL = Reportable Detection Limit
N/A = Not Applicable

Bureau Veritas Laboratories Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

MISCELLANEOUS (WATER)

Bureau Veritas ID		AKV957	AKV958	AKV959			
Sampling Date		2021/11/15 13:10	2021/11/15 14:25	2021/11/15 14:30			
COC Number		639775-01-01	639775-01-01	639775-01-01			
	UNITS	WG-11222680-151121-KH-01	WG-11222680-151121-KH-02	WG-11222680-151121-KH-03	RDL	MDL	QC Batch
Calculated Parameters							
Total Un-ionized Hydrogen Sulfide as S	mg/L	<0.0050	<0.0050	<0.0050	0.0050	0.0050	A430830
Total Un-ionized Hydrogen Sulfide as H2S	mg/L	<0.0050	<0.0050	<0.0050	0.0050	0.0050	A430830
RDL = Reportable Detection Limit							

Bureau Veritas ID		AKV960	AKV961	AKV962			
Sampling Date		2021/11/16 09:55	2021/11/16 09:00	2021/11/16 12:10			
COC Number		639775-01-01	639775-01-01	639775-01-01			
	UNITS	WG-11222680-161121-KH-04	WG-11222680-161121-KH-05	WG-11222680-161121-KH-06	RDL	MDL	QC Batch
Calculated Parameters							
Total Un-ionized Hydrogen Sulfide as S	mg/L	<0.0050	<0.0050	<0.0050	0.0050	0.0050	A430830
Total Un-ionized Hydrogen Sulfide as H2S	mg/L	<0.0050	<0.0050	<0.0050	0.0050	0.0050	A430830
RDL = Reportable Detection Limit							

Bureau Veritas ID		AKV963			
Sampling Date		2021/11/16 17:00			
COC Number		639775-01-01			
	UNITS	WG-11222680-161121-KH-07	RDL	MDL	QC Batch
Calculated Parameters					
Total Un-ionized Hydrogen Sulfide as S	mg/L	<0.0050	0.0050	0.0050	A430830
Total Un-ionized Hydrogen Sulfide as H2S	mg/L	<0.0050	0.0050	0.0050	A430830
RDL = Reportable Detection Limit					

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CSR DISSOLVED METALS IN WATER WITH CV HG (WATER)

Bureau Veritas ID		AKV957	AKV958		AKV959			
Sampling Date		2021/11/15 13:10	2021/11/15 14:25		2021/11/15 14:30			
COC Number		639775-01-01	639775-01-01		639775-01-01			
	UNITS	WG-11222680-151121-KH-01	WG-11222680-151121-KH-02	QC Batch	WG-11222680-151121-KH-03	RDL	MDL	QC Batch
Calculated Parameters								
Dissolved Hardness (CaCO3)	mg/L	54.1	39.7	A430397	41.8	0.50	0.50	A430397
Elements								
Dissolved Mercury (Hg)	ug/L	<0.0019	<0.0019	A431799	<0.0019	0.0019	0.0019	A431805
Dissolved Metals by ICPMS								
Dissolved Aluminum (Al)	ug/L	<3.0	4.2	A438555	5.2	3.0	0.030	A438555
Dissolved Antimony (Sb)	ug/L	<0.50	<0.50	A438555	<0.50	0.50	0.0020	A438555
Dissolved Arsenic (As)	ug/L	0.15	0.79	A438555	0.85	0.10	0.010	A438555
Dissolved Barium (Ba)	ug/L	1.6	3.0	A438555	2.6	1.0	0.0020	A438555
Dissolved Beryllium (Be)	ug/L	<0.10	<0.10	A438555	<0.10	0.10	0.0030	A438555
Dissolved Bismuth (Bi)	ug/L	<1.0	<1.0	A438555	<1.0	1.0	0.0010	A438555
Dissolved Boron (B)	ug/L	<50	<50	A438555	<50	50	50	A438555
Dissolved Cadmium (Cd)	ug/L	<0.010	<0.010	A438555	<0.010	0.010	0.0020	A438555
Dissolved Chromium (Cr)	ug/L	<1.0	<1.0	A438555	<1.0	1.0	0.020	A438555
Dissolved Cobalt (Co)	ug/L	<0.20	<0.20	A438555	<0.20	0.20	0.20	A438555
Dissolved Copper (Cu)	ug/L	1.98	1.50	A438555	<0.20	0.20	0.010	A438555
Dissolved Iron (Fe)	ug/L	<5.0	<5.0	A438555	<5.0	5.0	0.040	A438555
Dissolved Lead (Pb)	ug/L	<0.20	<0.20	A438555	<0.20	0.20	0.0010	A438555
Dissolved Lithium (Li)	ug/L	<2.0	<2.0	A438555	<2.0	2.0	2.0	A438555
Dissolved Manganese (Mn)	ug/L	<1.0	<1.0	A438555	<1.0	1.0	0.030	A438555
Dissolved Molybdenum (Mo)	ug/L	<1.0	<1.0	A438555	<1.0	1.0	0.0020	A438555
Dissolved Nickel (Ni)	ug/L	<1.0	<1.0	A438555	<1.0	1.0	0.010	A438555
Dissolved Phosphorus (P)	ug/L	<10	27	A438555	28	10	1.0	A438555
Dissolved Selenium (Se)	ug/L	0.15	<0.10	A438555	<0.10	0.10	0.0060	A438555
Dissolved Silicon (Si)	ug/L	5300	3240	A438555	3390	100	0.30	A438555
Dissolved Silver (Ag)	ug/L	<0.020	<0.020	A438555	<0.020	0.020	0.0020	A438555
Dissolved Strontium (Sr)	ug/L	29.1	16.5	A438555	18.4	1.0	0.0020	A438555
Dissolved Thallium (Tl)	ug/L	<0.010	<0.010	A438555	<0.010	0.010	0.010	A438555
Dissolved Tin (Sn)	ug/L	<5.0	<5.0	A438555	<5.0	5.0	0.0050	A438555
Dissolved Titanium (Ti)	ug/L	<5.0	<5.0	A438555	<5.0	5.0	0.30	A438555
Dissolved Uranium (U)	ug/L	<0.10	<0.10	A438555	<0.10	0.10	0.0010	A438555
Dissolved Vanadium (V)	ug/L	<5.0	6.4	A438555	7.1	5.0	0.020	A438555
Dissolved Zinc (Zn)	ug/L	6.0	5.6	A438555	<5.0	5.0	0.050	A438555
Dissolved Zirconium (Zr)	ug/L	<0.10	<0.10	A438555	<0.10	0.10	0.0080	A438555

RDL = Reportable Detection Limit

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CSR DISSOLVED METALS IN WATER WITH CV HG (WATER)

Bureau Veritas ID		AKV957	AKV958		AKV959			
Sampling Date		2021/11/15 13:10	2021/11/15 14:25		2021/11/15 14:30			
COC Number		639775-01-01	639775-01-01		639775-01-01			
	UNITS	**WG-11222680-151121-KH-01**	**WG-11222680-151121-KH-02**	**QC Batch**	**WG-11222680-151121-KH-03**	**RDL**	**MDL**	**QC Batch**
Dissolved Calcium (Ca)	mg/L	16.7	12.8	A430398	13.3	0.050	0.0010	A430398
Dissolved Magnesium (Mg)	mg/L	2.97	1.86	A430398	2.07	0.050	0.00050	A430398
Dissolved Potassium (K)	mg/L	0.235	0.197	A430398	0.202	0.050	0.0020	A430398
Dissolved Sodium (Na)	mg/L	3.78	1.08	A430398	1.16	0.050	0.0010	A430398
Dissolved Sulphur (S)	mg/L	<3.0	<3.0	A430398	<3.0	3.0	1.0	A430398
RDL = Reportable Detection Limit								

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CSR DISSOLVED METALS IN WATER WITH CV HG (WATER)

Bureau Veritas ID		AKV960	AKV960		AKV961			
Sampling Date		2021/11/16 09:55	2021/11/16 09:55		2021/11/16 09:00			
COC Number		639775-01-01	639775-01-01		639775-01-01			
	UNITS	WG-11222680-161121-KH-04	WG-11222680-161121-KH-04 Lab-Dup	QC Batch	WG-11222680-161121-KH-05	RDL	MDL	QC Batch
Calculated Parameters								
Dissolved Hardness (CaCO3)	mg/L	59.2	N/A	A430397	37.6	0.50	0.50	A430397
Elements								
Dissolved Mercury (Hg)	ug/L	<0.0019	N/A	A431799	<0.0019	0.0019	0.0019	A431799
Dissolved Metals by ICPMS								
Dissolved Aluminum (Al)	ug/L	6.8	7.8	A438557	<3.0	3.0	0.030	A438555
Dissolved Antimony (Sb)	ug/L	<0.50	<0.50	A438557	<0.50	0.50	0.0020	A438555
Dissolved Arsenic (As)	ug/L	0.52	0.43	A438557	<0.10	0.10	0.010	A438555
Dissolved Barium (Ba)	ug/L	3.4	3.9	A438557	1.9	1.0	0.0020	A438555
Dissolved Beryllium (Be)	ug/L	<0.10	<0.10	A438557	<0.10	0.10	0.0030	A438555
Dissolved Bismuth (Bi)	ug/L	<1.0	<1.0	A438557	<1.0	1.0	0.0010	A438555
Dissolved Boron (B)	ug/L	<50	<50	A438557	<50	50	50	A438555
Dissolved Cadmium (Cd)	ug/L	<0.010	<0.010	A438557	<0.010	0.010	0.0020	A438555
Dissolved Chromium (Cr)	ug/L	<1.0	<1.0	A438557	<1.0	1.0	0.020	A438555
Dissolved Cobalt (Co)	ug/L	<0.20	<0.20	A438557	<0.20	0.20	0.20	A438555
Dissolved Copper (Cu)	ug/L	1.50	1.40	A438557	1.11	0.20	0.010	A438555
Dissolved Iron (Fe)	ug/L	6.6	5.6	A438557	<5.0	5.0	0.040	A438555
Dissolved Lead (Pb)	ug/L	<0.20	<0.20	A438557	<0.20	0.20	0.0010	A438555
Dissolved Lithium (Li)	ug/L	<2.0	<2.0	A438557	<2.0	2.0	2.0	A438555
Dissolved Manganese (Mn)	ug/L	<1.0	1.1	A438557	1.1	1.0	0.030	A438555
Dissolved Molybdenum (Mo)	ug/L	<1.0	<1.0	A438557	<1.0	1.0	0.0020	A438555
Dissolved Nickel (Ni)	ug/L	<1.0	<1.0	A438557	<1.0	1.0	0.010	A438555
Dissolved Phosphorus (P)	ug/L	19	19	A438557	<10	10	1.0	A438555
Dissolved Selenium (Se)	ug/L	0.23	0.23	A438557	0.14	0.10	0.0060	A438555
Dissolved Silicon (Si)	ug/L	5050	4510	A438557	5050	100	0.30	A438555
Dissolved Silver (Ag)	ug/L	<0.020	<0.020	A438557	<0.020	0.020	0.0020	A438555
Dissolved Strontium (Sr)	ug/L	28.9	27.6	A438557	24.7	1.0	0.0020	A438555
Dissolved Thallium (Tl)	ug/L	<0.010	<0.010	A438557	<0.010	0.010	0.010	A438555
Dissolved Tin (Sn)	ug/L	<5.0	<5.0	A438557	<5.0	5.0	0.0050	A438555
Dissolved Titanium (Ti)	ug/L	<5.0	<5.0	A438557	<5.0	5.0	0.30	A438555
Dissolved Uranium (U)	ug/L	<0.10	<0.10	A438557	<0.10	0.10	0.0010	A438555
Dissolved Vanadium (V)	ug/L	5.6	5.3	A438557	<5.0	5.0	0.020	A438555

RDL = Reportable Detection Limit
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable

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CSR DISSOLVED METALS IN WATER WITH CV HG (WATER)

Bureau Veritas ID		AKV960	AKV960		AKV961			
Sampling Date		2021/11/16 09:55	2021/11/16 09:55		2021/11/16 09:00			
COC Number		639775-01-01	639775-01-01		639775-01-01			
	UNITS	**WG-11222680-161121 -KH-04**	**WG-11222680-161121 -KH-04 Lab-Dup**	**QC Batch**	**WG-11222680-161121 -KH-05**	**RDL**	**MDL**	**QC Batch**
Dissolved Zinc (Zn)	ug/L	16.1	14.4	A438557	5.2	5.0	0.050	A438555
Dissolved Zirconium (Zr)	ug/L	<0.10	<0.10	A438557	<0.10	0.10	0.0080	A438555
Dissolved Calcium (Ca)	mg/L	18.8	N/A	A430398	10.7	0.050	0.0010	A430398
Dissolved Magnesium (Mg)	mg/L	3.01	N/A	A430398	2.65	0.050	0.00050	A430398
Dissolved Potassium (K)	mg/L	0.365	N/A	A430398	0.208	0.050	0.0020	A430398
Dissolved Sodium (Na)	mg/L	6.00	N/A	A430398	6.90	0.050	0.0010	A430398
Dissolved Sulphur (S)	mg/L	<3.0	N/A	A430398	<3.0	3.0	1.0	A430398

RDL = Reportable Detection Limit
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable

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CSR DISSOLVED METALS IN WATER WITH CV HG (WATER)

Bureau Veritas ID		AKV962		AKV963			
Sampling Date		2021/11/16 12:10		2021/11/16 17:00			
COC Number		639775-01-01		639775-01-01			
	UNITS	WG-11222680-161121-KH-06	QC Batch	WG-11222680-161121-KH-07	RDL	MDL	QC Batch
Calculated Parameters							
Dissolved Hardness (CaCO3)	mg/L	257	A430397	<0.50	0.50	0.50	A430397
Elements							
Dissolved Mercury (Hg)	ug/L	<0.0019	A431799	<0.0019	0.0019	0.0019	A431799
Dissolved Metals by ICPMS							
Dissolved Aluminum (Al)	ug/L	<3.0	A438555	<3.0	3.0	0.030	A438557
Dissolved Antimony (Sb)	ug/L	<0.50	A438555	<0.50	0.50	0.0020	A438557
Dissolved Arsenic (As)	ug/L	0.31	A438555	<0.10	0.10	0.010	A438557
Dissolved Barium (Ba)	ug/L	16.6	A438555	<1.0	1.0	0.0020	A438557
Dissolved Beryllium (Be)	ug/L	<0.10	A438555	<0.10	0.10	0.0030	A438557
Dissolved Bismuth (Bi)	ug/L	<1.0	A438555	<1.0	1.0	0.0010	A438557
Dissolved Boron (B)	ug/L	<50	A438555	107	50	50	A438557
Dissolved Cadmium (Cd)	ug/L	<0.010	A438555	<0.010	0.010	0.0020	A438557
Dissolved Chromium (Cr)	ug/L	<1.0	A438555	<1.0	1.0	0.020	A438557
Dissolved Cobalt (Co)	ug/L	<0.20	A438555	<0.20	0.20	0.20	A438557
Dissolved Copper (Cu)	ug/L	1.90	A438555	<0.20	0.20	0.010	A438557
Dissolved Iron (Fe)	ug/L	<5.0	A438555	<5.0	5.0	0.040	A438557
Dissolved Lead (Pb)	ug/L	<0.20	A438555	<0.20	0.20	0.0010	A438557
Dissolved Lithium (Li)	ug/L	<2.0	A438555	<2.0	2.0	2.0	A438557
Dissolved Manganese (Mn)	ug/L	<1.0	A438555	<1.0	1.0	0.030	A438557
Dissolved Molybdenum (Mo)	ug/L	<1.0	A438555	<1.0	1.0	0.0020	A438557
Dissolved Nickel (Ni)	ug/L	<1.0	A438555	<1.0	1.0	0.010	A438557
Dissolved Phosphorus (P)	ug/L	17	A438555	<10	10	1.0	A438557
Dissolved Selenium (Se)	ug/L	0.26	A438555	<0.10	0.10	0.0060	A438557
Dissolved Silicon (Si)	ug/L	9040	A438555	<100	100	0.30	A438557
Dissolved Silver (Ag)	ug/L	<0.020	A438555	<0.020	0.020	0.0020	A438557
Dissolved Strontium (Sr)	ug/L	141	A438555	<1.0	1.0	0.0020	A438557
Dissolved Thallium (Tl)	ug/L	<0.010	A438555	<0.010	0.010	0.010	A438557
Dissolved Tin (Sn)	ug/L	<5.0	A438555	<5.0	5.0	0.0050	A438557
Dissolved Titanium (Ti)	ug/L	<5.0	A438555	<5.0	5.0	0.30	A438557
Dissolved Uranium (U)	ug/L	0.29	A438555	<0.10	0.10	0.0010	A438557
Dissolved Vanadium (V)	ug/L	6.0	A438555	<5.0	5.0	0.020	A438557
Dissolved Zinc (Zn)	ug/L	<5.0	A438555	<5.0	5.0	0.050	A438557
Dissolved Zirconium (Zr)	ug/L	<0.10	A438555	<0.10	0.10	0.0080	A438557
RDL = Reportable Detection Limit							

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CSR DISSOLVED METALS IN WATER WITH CV HG (WATER)

Bureau Veritas ID		AKV962		AKV963			
Sampling Date		2021/11/16 12:10		2021/11/16 17:00			
COC Number		639775-01-01		639775-01-01			
	UNITS	WG-11222680-161121-KH-06	QC Batch	WG-11222680-161121-KH-07	RDL	MDL	QC Batch
Dissolved Calcium (Ca)	mg/L	80.4	A430398	0.102	0.050	0.0010	A430398
Dissolved Magnesium (Mg)	mg/L	13.6	A430398	<0.050	0.050	0.00050	A430398
Dissolved Potassium (K)	mg/L	0.737	A430398	<0.050	0.050	0.0020	A430398
Dissolved Sodium (Na)	mg/L	12.2	A430398	<0.050	0.050	0.0010	A430398
Dissolved Sulphur (S)	mg/L	<3.0	A430398	<3.0	3.0	1.0	A430398
RDL = Reportable Detection Limit							

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GENERAL COMMENTS

Version 2: Report reissued to amend sample IDs for samples collected on November 16th as per COC - 2022/01/17

Sample AKV957 [WG-11222680-151121-KH-01] : Sample was analyzed past method specified hold time for Nitrate + Nitrite (N). Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised. Sample was analyzed past method specified hold time for Nitrite (N) by CFA. Sample was analyzed past method specified hold time for Orthophosphate by Konelab.

Sample AKV958 [WG-11222680-151121-KH-02] : Sample was analyzed past method specified hold time for Nitrate + Nitrite (N). Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised. Sample was analyzed past method specified hold time for Nitrite (N) by CFA. Sample was analyzed past method specified hold time for Orthophosphate by Konelab.

Sample AKV959 [WG-11222680-151121-KH-03] : The sample for dissolved metals was filtered and preserved at the lab. Values may not reflect concentrations at the time of sampling. Sample was analyzed past method specified hold time for Nitrate + Nitrite (N). Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised. Sample was analyzed past method specified hold time for Nitrite (N) by CFA. Sample was analyzed past method specified hold time for Orthophosphate by Konelab.

Results relate only to the items tested.

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QUALITY ASSURANCE REPORT

			Matrix Spike		Spiked Blank		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
A431613	Orthophosphate (P)	2021/11/19	NC	80 - 120	106	80 - 120	<0.0030	mg/L	1.9 (1)	20
A431793	Dissolved Chloride (Cl)	2021/11/19			106	80 - 120	<1.0	mg/L		
A431793	Dissolved Sulphate (SO4)	2021/11/19			101	80 - 120	<1.0	mg/L		
A431796	Dissolved Chloride (Cl)	2021/11/19			103	80 - 120	<1.0	mg/L		
A431796	Dissolved Sulphate (SO4)	2021/11/19			104	80 - 120	<1.0	mg/L		
A431799	Dissolved Mercury (Hg)	2021/11/19	95	80 - 120	100	80 - 120	<0.0019	ug/L	NC (1)	20
A431805	Dissolved Mercury (Hg)	2021/11/19	93	80 - 120	103	80 - 120	<0.0019	ug/L	NC (1)	20
A432205	Total Dissolved Solids	2021/11/22	NC	80 - 120	105	80 - 120	<10	mg/L	17 (1)	20
A432452	Alkalinity (PP as CaCO3)	2021/11/19					<1.0	mg/L	NC (3)	20
A432452	Alkalinity (Total as CaCO3)	2021/11/19	NC (2)	80 - 120	88	80 - 120	<1.0	mg/L	4.8 (3)	20
A432452	Bicarbonate (HCO3)	2021/11/19					<1.0	mg/L	4.8 (3)	20
A432452	Carbonate (CO3)	2021/11/19					<1.0	mg/L	NC (3)	20
A432452	Hydroxide (OH)	2021/11/19					<1.0	mg/L	NC (3)	20
A432454	Conductivity	2021/11/19			100	80 - 120	<2.0	uS/cm	0.20 (3)	10
A432510	Nitrate plus Nitrite (N)	2021/11/19	102 (2)	80 - 120	107	80 - 120	<0.020	mg/L	0.79 (3)	25
A432512	Nitrite (N)	2021/11/19	102 (2)	80 - 120	104	80 - 120	<0.0050	mg/L	NC (3)	20
A432953	Total Sulphide	2021/11/20	120	80 - 120	100	80 - 120	<0.0018	mg/L	NC (1)	20
A438555	Dissolved Aluminum (Al)	2021/11/23	99	80 - 120	98	80 - 120	<3.0	ug/L	0.83 (1)	20
A438555	Dissolved Antimony (Sb)	2021/11/23	99	80 - 120	96	80 - 120	<0.50	ug/L	0.038 (1)	20
A438555	Dissolved Arsenic (As)	2021/11/23	115	80 - 120	105	80 - 120	<0.10	ug/L	13 (1)	20
A438555	Dissolved Barium (Ba)	2021/11/23	99	80 - 120	97	80 - 120	<1.0	ug/L	1.5 (1)	20
A438555	Dissolved Beryllium (Be)	2021/11/23	95	80 - 120	94	80 - 120	<0.10	ug/L	NC (1)	20
A438555	Dissolved Bismuth (Bi)	2021/11/23	98	80 - 120	100	80 - 120	<1.0	ug/L	NC (1)	20
A438555	Dissolved Boron (B)	2021/11/23	107	80 - 120	103	80 - 120	<50	ug/L	0.50 (1)	20
A438555	Dissolved Cadmium (Cd)	2021/11/23	97	80 - 120	95	80 - 120	<0.010	ug/L	NC (1)	20
A438555	Dissolved Chromium (Cr)	2021/11/23	113	80 - 120	113	80 - 120	<1.0	ug/L	0.11 (1)	20
A438555	Dissolved Cobalt (Co)	2021/11/23	107	80 - 120	111	80 - 120	<0.20	ug/L	NC (1)	20
A438555	Dissolved Copper (Cu)	2021/11/23	102	80 - 120	109	80 - 120	<0.20	ug/L	12 (1)	20
A438555	Dissolved Iron (Fe)	2021/11/23	100	80 - 120	100	80 - 120	<5.0	ug/L	NC (1)	20
A438555	Dissolved Lead (Pb)	2021/11/23	98	80 - 120	99	80 - 120	<0.20	ug/L	NC (1)	20
A438555	Dissolved Lithium (Li)	2021/11/23	NC	80 - 120	95	80 - 120	<2.0	ug/L	2.0 (1)	20
A438555	Dissolved Manganese (Mn)	2021/11/23	107	80 - 120	111	80 - 120	<1.0	ug/L	1.7 (1)	20
A438555	Dissolved Molybdenum (Mo)	2021/11/23	NC	80 - 120	100	80 - 120	<1.0	ug/L	0.74 (1)	20

QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		Spiked Blank		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
A438555	Dissolved Nickel (Ni)	2021/11/23	106	80 - 120	111	80 - 120	<1.0	ug/L	3.4 (1)	20
A438555	Dissolved Phosphorus (P)	2021/11/23	115	80 - 120	106	80 - 120	<10	ug/L		
A438555	Dissolved Selenium (Se)	2021/11/23	103	80 - 120	91	80 - 120	<0.10	ug/L	1.5 (1)	20
A438555	Dissolved Silicon (Si)	2021/11/23	74 (4)	80 - 120	80	80 - 120	<100	ug/L	0.41 (1)	20
A438555	Dissolved Silver (Ag)	2021/11/23	95	80 - 120	95	80 - 120	<0.020	ug/L	NC (1)	20
A438555	Dissolved Strontium (Sr)	2021/11/23	NC	80 - 120	109	80 - 120	<1.0	ug/L	0.18 (1)	20
A438555	Dissolved Thallium (Tl)	2021/11/23	96	80 - 120	97	80 - 120	<0.010	ug/L	NC (1)	20
A438555	Dissolved Tin (Sn)	2021/11/23	100	80 - 120	97	80 - 120	<5.0	ug/L	NC (1)	20
A438555	Dissolved Titanium (Ti)	2021/11/23	114	80 - 120	114	80 - 120	<5.0	ug/L	NC (1)	20
A438555	Dissolved Uranium (U)	2021/11/23	102	80 - 120	101	80 - 120	<0.10	ug/L	0.78 (1)	20
A438555	Dissolved Vanadium (V)	2021/11/23	112	80 - 120	113	80 - 120	<5.0	ug/L	NC (1)	20
A438555	Dissolved Zinc (Zn)	2021/11/23	112	80 - 120	115	80 - 120	<5.0	ug/L	0.32 (1)	20
A438555	Dissolved Zirconium (Zr)	2021/11/23	116	80 - 120	115	80 - 120	<0.10	ug/L	NC (1)	20
A438557	Dissolved Aluminum (Al)	2021/11/23	98 (5)	80 - 120	88	80 - 120	<3.0	ug/L	13 (6)	20
A438557	Dissolved Antimony (Sb)	2021/11/23	98 (5)	80 - 120	88	80 - 120	<0.50	ug/L	NC (6)	20
A438557	Dissolved Arsenic (As)	2021/11/23	98 (5)	80 - 120	102	80 - 120	<0.10	ug/L	18 (6)	20
A438557	Dissolved Barium (Ba)	2021/11/23	101 (5)	80 - 120	89	80 - 120	<1.0	ug/L	15 (6)	20
A438557	Dissolved Beryllium (Be)	2021/11/23	97 (5)	80 - 120	87	80 - 120	<0.10	ug/L	NC (6)	20
A438557	Dissolved Bismuth (Bi)	2021/11/23	101 (5)	80 - 120	90	80 - 120	<1.0	ug/L	NC (6)	20
A438557	Dissolved Boron (B)	2021/11/23	103 (5)	80 - 120	90	80 - 120	<50	ug/L	NC (6)	20
A438557	Dissolved Cadmium (Cd)	2021/11/23	99 (5)	80 - 120	87	80 - 120	<0.010	ug/L	NC (6)	20
A438557	Dissolved Chromium (Cr)	2021/11/23	101 (5)	80 - 120	106	80 - 120	<1.0	ug/L	NC (6)	20
A438557	Dissolved Cobalt (Co)	2021/11/23	100 (5)	80 - 120	106	80 - 120	<0.20	ug/L	NC (6)	20
A438557	Dissolved Copper (Cu)	2021/11/23	97 (5)	80 - 120	104	80 - 120	<0.20	ug/L	6.8 (6)	20
A438557	Dissolved Iron (Fe)	2021/11/23	99 (5)	80 - 120	93	80 - 120	<5.0	ug/L	16 (6)	20
A438557	Dissolved Lead (Pb)	2021/11/23	100 (5)	80 - 120	89	80 - 120	<0.20	ug/L	NC (6)	20
A438557	Dissolved Lithium (Li)	2021/11/23	100 (5)	80 - 120	90	80 - 120	<2.0	ug/L	NC (6)	20
A438557	Dissolved Manganese (Mn)	2021/11/23	101 (5)	80 - 120	106	80 - 120	<1.0	ug/L	9.0 (6)	20
A438557	Dissolved Molybdenum (Mo)	2021/11/23	105 (5)	80 - 120	90	80 - 120	<1.0	ug/L	NC (6)	20
A438557	Dissolved Nickel (Ni)	2021/11/23	100 (5)	80 - 120	106	80 - 120	<1.0	ug/L	NC (6)	20
A438557	Dissolved Phosphorus (P)	2021/11/23	97 (5)	80 - 120	96	80 - 120	<10	ug/L	2.1 (6)	20
A438557	Dissolved Selenium (Se)	2021/11/23	94 (5)	80 - 120	90	80 - 120	<0.10	ug/L	0.53 (6)	20
A438557	Dissolved Silicon (Si)	2021/11/23	79 (4,5)	80 - 120	72 (4)	80 - 120	<100	ug/L	11 (6)	20

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			Matrix Spike		Spiked Blank		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
A438557	Dissolved Silver (Ag)	2021/11/23	97 (5)	80 - 120	87	80 - 120	<0.020	ug/L	NC (6)	20
A438557	Dissolved Strontium (Sr)	2021/11/23	99 (5)	80 - 120	104	80 - 120	<1.0	ug/L	4.8 (6)	20
A438557	Dissolved Thallium (Tl)	2021/11/23	98 (5)	80 - 120	87	80 - 120	<0.010	ug/L	NC (6)	20
A438557	Dissolved Tin (Sn)	2021/11/23	101 (5)	80 - 120	90	80 - 120	<5.0	ug/L	NC (6)	20
A438557	Dissolved Titanium (Ti)	2021/11/23	102 (5)	80 - 120	103	80 - 120	<5.0	ug/L	NC (6)	20
A438557	Dissolved Uranium (U)	2021/11/23	101 (5)	80 - 120	89	80 - 120	<0.10	ug/L	NC (6)	20
A438557	Dissolved Vanadium (V)	2021/11/23	102 (5)	80 - 120	108	80 - 120	<5.0	ug/L	4.6 (6)	20
A438557	Dissolved Zinc (Zn)	2021/11/23	92 (5)	80 - 120	111	80 - 120	<5.0	ug/L	11 (6)	20
A438557	Dissolved Zirconium (Zr)	2021/11/23	101 (5)	80 - 120	101	80 - 120	<0.10	ug/L	NC (6)	20
A438969	Total Ammonia (N)	2021/11/22	94 (7)	80 - 120	99	80 - 120	<0.015	mg/L	NC (8)	20
A438971	Total Ammonia (N)	2021/11/22	102	80 - 120	101	80 - 120	<0.015	mg/L	0.66 (1)	20
A447334	Total Dissolved Solids	2021/11/23	101 (9)	80 - 120	98	80 - 120	<10	mg/L	NC (1)	20

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

(1) Duplicate Parent ID

(2) Matrix Spike Parent ID [AKV960-01]

(3) Duplicate Parent ID [AKV960-01]

(4) Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.

(5) Matrix Spike Parent ID [AKV960-02]

(6) Duplicate Parent ID [AKV960-02]

(7) Matrix Spike Parent ID [AKV957-05]

(8) Duplicate Parent ID [AKV957-05]

(9) Matrix Spike Parent ID [AKV963-01]

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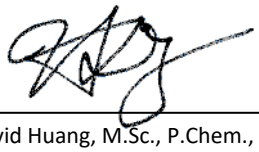
VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:



David Huang, M.Sc., P.Chem., QP, Scientific Services Manager

BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports.
For Service Group specific validation please refer to the Validation Signature Page.

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Bureau Veritas Laboratories
4606 Canada Way, Burnaby, British Columbia Canada V5G 1K5 Tel:(604) 734 7276 Toll-free 800-563-6266 Fax:(604) 731 2386 www.bvna.com

Page of

INVOICE TO:

Company Name: #163 GHD Limited
Contact Name: AP Invoices - 735
Address: 455 PHILLIP STREET, WATERLOO ON N2L 3X2
Phone: (519) 884-0510 Fax: (519) 725-1394
Email: ~~APinvoices-735@ghd.com~~ invoicing - canada@ghd.com

Report Information

Company Name:
Contact Name: Airesse MacPhee
Address:
Phone: Fax:
Email: airesse.macphee@ghd.com; NationalEDDSupport@ma

Project Information

Quotation #: C10010
P.O. #:
Project #: 11222680-RA3-2
Project Name: upland
Site #:
Sampled By: K. Hosier

C188811_COC

Only
Bottle Order #: 639775

Chain Of Custody Record: C#639775-01-01
Project Manager: Nahed Amer

Regulatory Criteria:
- [ ] CSR
- [ ] CCME
- [ ] BC Water Quality
- [ ] Other

Special Instructions: Groundwater

SAMPLES MUST BE KEPT COOL (< 10°C) FROM TIME OF SAMPLING UNTIL DELIVERY TO BUREAU VERITAS

Turnaround Time (TAT) Required:

Please provide advance notice for rush projects

Regular (Standard) TAT:
(will be applied if Rush TAT is not specified)
Standard TAT = 5-7 Working days for most tests.
Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.
[X]

Job Specific Rush TAT (if applies to entire submission)
1 DAY [ ] 2 Day [ ] 3 Day [ ] Date Required: [ ]
Rush Confirmation Number: (call lab for #)

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Metals Field Filtered? (Y/N)	Conductivity, Cl, SO4, NO2, NO3, N+N, PO4	Speciated Alkalinity	Sulphide + H2S Calc (LL)	Sulphide, Un-ionized (as H2S) (Calc)	Ammonia-N (Total)	Dissolved Metals with CV Hg, Hardness (CSR)	Total Dissolved Solids (Filt. Residue)	# of Bottles	Comments
1		WG-11222680-151121-KH-01	15/11/21	13:10	WATER		X	X	X	X	X	X	X	5	short holding times!
2		WG-11222680-151121-KH-02	15/11/21	14:25											
3		WG-11222680-151121-KH-03	15/11/21	14:30											All bottles were field filtered and preserved as required
4		WG-11222680-161121-KH-04	16/11/21	9.55											
5		WG-11222680-161121-KH-05	16/11/21	9:00											
6		WG-11222680-161121-KH-06	16/11/21	12:10											
7		WG-11222680-161121-KH-07	16/11/21	17:00											
8															
9															
10															

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED (Y): (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted	Lab Use Only: Time Sensitive	Temperature (°C) on Receipt	Custody Seal Intact on Cooler?
Kathleen / Kathleen Hosier	21/11/17	22:00	[illegible] BLUE POWER	2021/11/18	10:25		[ ]	2/3/2	[ ] Yes [X] No

* UNLESS OTHERWISE AGREED TO IN WRITING, WORK SUBMITTED ON THIS CHAIN OF CUSTODY IS SUBJECT TO BUREAU VERITAS'S STANDARD TERMS AND CONDITIONS. SIGNING OF THIS CHAIN OF CUSTODY DOCUMENT IS ACKNOWLEDGMENT AND ACCEPTANCE OF OUR TERMS WHICH ARE AVAILABLE FOR VIEWING AT WWW.BVLABS.COM/TERMS-AND-CONDITIONS.
* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

4/3/2

White: Bureau Veritas Yellow: Client

Bureau Veritas Canada (2019) Inc.

Your P.O. #: 73523824
Your Project #: 11222680-3-5
Site#: 0088877-07-GD-UPLAND
Site Location: CAMPBELL RIVER, BC
Your C.O.C. #: G144873

Attention: 11222680-3-5 Distrubution

GHD Limited
455 PHILLIP STREET
WATERLOO, ON
CANADA N2L 3X2

Report Date: 2021/05/21
Report #: R3023229
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C132360
Received: 2021/05/14, 15:00

Sample Matrix: Water
Samples Received: 1

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Hardness Total (calculated as CaCO3) (1)	1	N/A	2021/05/20	BBY WI-00033	Auto Calc
Hardness (calculated as CaCO3)	1	N/A	2021/05/20	BBY WI-00033	Auto Calc
EPH in Water when PAH required	1	2021/05/19	2021/05/19	BBY8SOP-00029	BCMOE BCLM Sep2017 m
Na, K, Ca, Mg, S by CRC ICPMS (diss.)	1	N/A	2021/05/20	BBY WI-00033	Auto Calc
Elements by CRC ICPMS (dissolved) (2)	1	N/A	2021/05/20	BBY7SOP-00002	EPA 6020b R2 m
Na, K, Ca, Mg, S by CRC ICPMS (total)	1	2021/05/18	2021/05/20	BBY WI-00033	Auto Calc
Elements by CRC ICPMS (total)	1	2021/05/19	2021/05/19	BBY7SOP-00003 / BBY7SOP-00002	EPA 6020b R2 m
PAH in Water by GC/MS (SIM)	1	2021/05/19	2021/05/20	BBY8SOP-00021	BCMOE BCLM Jul2017m
Total LMW, HMW, Total PAH Calc (3)	1	N/A	2021/05/21	BBY WI-00033	Auto Calc
Filter and HNO3 Preserve for Metals	1	N/A	2021/05/18	BBY7 WI-00004	SM 23 3030B m
Total Dissolved Solids (Filt. Residue)	1	2021/05/18	2021/05/19	BBY6SOP-00033	SM 23 2540 C m
EPH less PAH in Water by GC/FID (4)	1	N/A	2021/05/21	BBY WI-00033	Auto Calc
VOCs, VH, F1, LH in Water by HS GC/MS	1	N/A	2021/05/19	BBY8SOP-00009 / BBY8SOP-00011 / BBY8SOP-00012	BCMOE BCLM Jul2017 m
Volatile HC-BTEX (5)	1	N/A	2021/05/20	BBY WI-00033	Auto Calc

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

Bureau Veritas liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Bureau Veritas has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Bureau Veritas, unless otherwise agreed in writing. Bureau Veritas is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Bureau Veritas Laboratories Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

Your P.O. #: 73523824
Your Project #: 11222680-3-5
Site#: 0088877-07-GD-UPLAND
Site Location: CAMPBELL RIVER, BC
Your C.O.C. #: G144873

Attention: 11222680-3-5 Distrubution

GHD Limited
455 PHILLIP STREET
WATERLOO, ON
CANADA N2L 3X2

Report Date: 2021/05/21
Report #: R3023229
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C132360
Received: 2021/05/14, 15:00

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.

Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.

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Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) "Total Hardness" was calculated from Total Ca and Mg concentrations and may be biased high (Hardness, or Dissolved Hardness, calculated from Dissolved Ca and Mg, should be used for compliance if available).
(2) Dissolved > Total Imbalance: When applicable, Dissolved and Total results were reviewed and data quality meets acceptable levels unless otherwise noted.
(3) Total PAHs in Water include: Quinoline, Naphthalene, 1-Methylnaphthalene, 2-Methylnaphthalene, Acenaphthylene, Acenaphthene, Fluorene, Phenanthrene, Anthracene, Acridine, Fluoranthene, Pyrene, Benzo(a)anthracene, Chrysene, Benzo(b&j)fluoranthene, Benzo(k)fluoranthene, Benzo(a)pyrene, Indeno(1,2,3-cd)pyrene, Dibenz(a,h)anthracene, and Benzo(g,h,i)perylene.
(4) LEPH = EPH (C10 to C19) - (Acenaphthene + Acridine + Anthracene + Fluorene + Naphthalene + Phenanthrene)
HEPH = EPH (C19 to C32) - (Benzo(a)anthracene + Benzo(a)pyrene + Fluoranthene + Pyrene)
(5) VPH = VH - (Benzene + Toluene + Ethylbenzene + m & p-Xylene + o-Xylene + Styrene)

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Nahed Amer, Customer Solutions Representative
Email: Nahed.AMER@bureauveritas.com
Phone# (604) 734 7276

==========

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BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

BV Labs Job #: C132360
Report Date: 2021/05/21

GHD Limited
Client Project #: 11222680-3-5
Site Location: CAMPBELL RIVER, BC
Your P.O. #: 73523824
Sampler Initials: TS

RESULTS OF CHEMICAL ANALYSES OF WATER

BV Labs ID		ZU5165			
Sampling Date		2021/05/14 13:30			
COC Number		G144873			
	UNITS	SAMPLES FROM TANK 1	RDL	MDL	QC Batch
Calculated Parameters					
Filter and HNO3 Preservation	N/A	FIELD	N/A	N/A	ONSITE
Misc. Inorganics					
Total Dissolved Solids	mg/L	990	10	N/A	A228875

RDL = Reportable Detection Limit
N/A = Not Applicable

Bureau Veritas Laboratories Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

BV Labs Job #: C132360
Report Date: 2021/05/21

GHD Limited
Client Project #: 11222680-3-5
Site Location: CAMPBELL RIVER, BC
Your P.O. #: 73523824
Sampler Initials: TS

LEPH & HEPH WITH CSR/CCME PAH IN WATER (WATER)

BV Labs ID		ZU5165			
Sampling Date		2021/05/14 13:30			
COC Number		G144873			
	UNITS	SAMPLES FROM TANK 1	RDL	MDL	QC Batch
Calculated Parameters					
Low Molecular Weight PAH`s	ug/L	220	1.0	0.10	A228551
High Molecular Weight PAH`s	ug/L	10	0.050	0.020	A228551
Total PAH	ug/L	230	1.0	0.10	A228551
Polycyclic Aromatics					
Quinoline	ug/L	<0.060 (1)	0.060	0.060	A229702
Naphthalene	ug/L	66 (2)	1.0	0.50	A229702
1-Methylnaphthalene	ug/L	26	0.050	0.050	A229702
2-Methylnaphthalene	ug/L	18	0.10	0.050	A229702
Acenaphthylene	ug/L	1.0	0.050	0.050	A229702
Acenaphthene	ug/L	46 (2)	0.50	0.50	A229702
Fluorene	ug/L	32	0.050	0.050	A229702
Phenanthrene	ug/L	22	0.050	0.050	A229702
Anthracene	ug/L	2.0	0.010	0.010	A229702
Acridine	ug/L	4.2	0.050	0.050	A229702
Fluoranthene	ug/L	6.4	0.020	0.020	A229702
Pyrene	ug/L	3.2	0.020	0.020	A229702
Benzo(a)anthracene	ug/L	0.14	0.010	0.010	A229702
Chrysene	ug/L	0.26	0.020	0.020	A229702
Benzo(b&j)fluoranthene	ug/L	0.040	0.030	0.030	A229702
Benzo(k)fluoranthene	ug/L	<0.050	0.050	0.050	A229702
Benzo(a)pyrene	ug/L	0.017	0.0050	0.0050	A229702
Indeno(1,2,3-cd)pyrene	ug/L	<0.050	0.050	0.050	A229702
Dibenz(a,h)anthracene	ug/L	<0.0030	0.0030	0.0030	A229702
Benzo(g,h,i)perylene	ug/L	<0.050	0.050	0.050	A229702
Calculated Parameters					
LEPH (C10-C19 less PAH)	mg/L	0.85	0.20	0.20	A228552
HEPH (C19-C32 less PAH)	mg/L	<0.20	0.20	0.20	A228552

RDL = Reportable Detection Limit
(1) Detection limits raised due to matrix interference.
(2) Detection limits raised due to dilution to bring analyte within the calibrated range.

Bureau Veritas Laboratories Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

BV Labs Job #: C132360
Report Date: 2021/05/21

GHD Limited
Client Project #: 11222680-3-5
Site Location: CAMPBELL RIVER, BC
Your P.O. #: 73523824
Sampler Initials: TS

LEPH & HEPH WITH CSR/CCME PAH IN WATER (WATER)

BV Labs ID		ZU5165			
Sampling Date		2021/05/14 13:30			
COC Number		G144873			
	UNITS	SAMPLES FROM TANK 1	RDL	MDL	QC Batch
Ext. Pet. Hydrocarbon					
EPH (C10-C19)	mg/L	1.0	0.20	0.20	A229716
EPH (C19-C32)	mg/L	<0.20	0.20	0.20	A229716
Surrogate Recovery (%)					
O-TERPHENYL (sur.)	%	84	N/A	N/A	A229716
D10-ANTHRACENE (sur.)	%	90	N/A	N/A	A229702
D8-ACENAPHTHYLENE (sur.)	%	102	N/A	N/A	A229702
D8-NAPHTHALENE (sur.)	%	85	N/A	N/A	A229702
TERPHENYL-D14 (sur.)	%	82	N/A	N/A	A229702

RDL = Reportable Detection Limit
N/A = Not Applicable

Bureau Veritas Laboratories Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

BV Labs Job #: C132360
Report Date: 2021/05/21

GHD Limited
Client Project #: 11222680-3-5
Site Location: CAMPBELL RIVER, BC
Your P.O. #: 73523824
Sampler Initials: TS

CSR DISSOLVED METALS (NO CV-HG) IN WATER

BV Labs ID		ZU5165			
Sampling Date		2021/05/14 13:30			
COC Number		G144873			
	UNITS	SAMPLES FROM TANK 1	RDL	MDL	QC Batch
Calculated Parameters					
Dissolved Hardness (CaCO3)	mg/L	538	0.50	0.50	A228265
Dissolved Metals by ICPMS					
Dissolved Aluminum (Al)	ug/L	88.7	3.0	0.030	A229202
Dissolved Antimony (Sb)	ug/L	<0.50	0.50	0.0020	A229202
Dissolved Arsenic (As)	ug/L	3.13	0.10	0.010	A229202
Dissolved Barium (Ba)	ug/L	25.2	1.0	0.0020	A229202
Dissolved Beryllium (Be)	ug/L	<0.10	0.10	0.0030	A229202
Dissolved Bismuth (Bi)	ug/L	<1.0	1.0	0.0010	A229202
Dissolved Boron (B)	ug/L	510	50	50	A229202
Dissolved Cadmium (Cd)	ug/L	0.018	0.010	0.0020	A229202
Dissolved Chromium (Cr)	ug/L	1.3	1.0	0.020	A229202
Dissolved Cobalt (Co)	ug/L	1.13	0.20	0.20	A229202
Dissolved Copper (Cu)	ug/L	21.2	0.20	0.010	A229202
Dissolved Iron (Fe)	ug/L	32.9	5.0	0.040	A229202
Dissolved Lead (Pb)	ug/L	<0.20	0.20	0.0010	A229202
Dissolved Lithium (Li)	ug/L	<2.0	2.0	2.0	A229202
Dissolved Manganese (Mn)	ug/L	4260	1.0	0.030	A229202
Dissolved Molybdenum (Mo)	ug/L	<1.0	1.0	0.0020	A229202
Dissolved Nickel (Ni)	ug/L	2.3	1.0	0.010	A229202
Dissolved Phosphorus (P)	ug/L	29	10	1.0	A229202
Dissolved Selenium (Se)	ug/L	0.40	0.10	0.0060	A229202
Dissolved Silicon (Si)	ug/L	7530	100	0.30	A229202
Dissolved Silver (Ag)	ug/L	<0.020	0.020	0.0020	A229202
Dissolved Strontium (Sr)	ug/L	660	1.0	0.0020	A229202
Dissolved Thallium (Tl)	ug/L	0.018	0.010	0.010	A229202
Dissolved Tin (Sn)	ug/L	<5.0	5.0	0.0050	A229202
Dissolved Titanium (Ti)	ug/L	<5.0	5.0	0.30	A229202
Dissolved Uranium (U)	ug/L	0.25	0.10	0.0010	A229202
Dissolved Vanadium (V)	ug/L	<5.0	5.0	0.020	A229202
Dissolved Zinc (Zn)	ug/L	<5.0	5.0	0.050	A229202
RDL = Reportable Detection Limit					

Bureau Veritas Laboratories Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

BV Labs Job #: C132360
Report Date: 2021/05/21

GHD Limited
Client Project #: 11222680-3-5
Site Location: CAMPBELL RIVER, BC
Your P.O. #: 73523824
Sampler Initials: TS

CSR DISSOLVED METALS (NO CV-HG) IN WATER

BV Labs ID		ZU5165			
Sampling Date		2021/05/14 13:30			
COC Number		G144873			
	UNITS	SAMPLES FROM TANK 1	RDL	MDL	QC Batch
Dissolved Zirconium (Zr)	ug/L	0.48	0.10	0.0080	A229202
Dissolved Calcium (Ca)	mg/L	163	0.050	0.0010	A228549
Dissolved Magnesium (Mg)	mg/L	32.1	0.050	0.00050	A228549
Dissolved Potassium (K)	mg/L	12.1	0.050	0.0020	A228549
Dissolved Sodium (Na)	mg/L	119	0.050	0.0010	A228549
Dissolved Sulphur (S)	mg/L	15.1	3.0	1.0	A228549
RDL = Reportable Detection Limit					

Bureau Veritas Laboratories Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

BV Labs Job #: C132360
Report Date: 2021/05/21

GHD Limited
Client Project #: 11222680-3-5
Site Location: CAMPBELL RIVER, BC
Your P.O. #: 73523824
Sampler Initials: TS

CSR TOTAL METALS (NO CV-HG) IN WATER

BV Labs ID		ZU5165			
Sampling Date		2021/05/14 13:30			
COC Number		G144873			
	UNITS	SAMPLES FROM TANK 1	RDL	MDL	QC Batch
Calculated Parameters					
Total Hardness (CaCO3)	mg/L	503	0.50	0.50	A228548
Total Metals by ICPMS					
Total Aluminum (Al)	ug/L	175	3.0	0.030	A229582
Total Antimony (Sb)	ug/L	<0.50	0.50	0.0020	A229582
Total Arsenic (As)	ug/L	3.01	0.10	0.010	A229582
Total Barium (Ba)	ug/L	25.4	1.0	0.0020	A229582
Total Beryllium (Be)	ug/L	<0.10	0.10	0.0030	A229582
Total Bismuth (Bi)	ug/L	<1.0	1.0	0.0010	A229582
Total Boron (B)	ug/L	486	50	50	A229582
Total Cadmium (Cd)	ug/L	0.021	0.010	0.0020	A229582
Total Chromium (Cr)	ug/L	1.4	1.0	0.020	A229582
Total Cobalt (Co)	ug/L	1.11	0.20	0.20	A229582
Total Copper (Cu)	ug/L	22.2	0.50	0.030	A229582
Total Iron (Fe)	ug/L	204	10	0.70	A229582
Total Lead (Pb)	ug/L	<0.20	0.20	0.0010	A229582
Total Lithium (Li)	ug/L	<2.0	2.0	2.0	A229582
Total Manganese (Mn)	ug/L	4210	1.0	0.030	A229582
Total Molybdenum (Mo)	ug/L	<1.0	1.0	0.0020	A229582
Total Nickel (Ni)	ug/L	2.3	1.0	0.010	A229582
Total Phosphorus (P)	ug/L	53	10	1.0	A229582
Total Selenium (Se)	ug/L	0.34	0.10	0.0060	A229582
Total Silicon (Si)	ug/L	6950	100	0.30	A229582
Total Silver (Ag)	ug/L	<0.020	0.020	0.0020	A229582
Total Strontium (Sr)	ug/L	668	1.0	0.0020	A229582
Total Thallium (Tl)	ug/L	<0.010	0.010	0.010	A229582
Total Tin (Sn)	ug/L	<5.0	5.0	0.0050	A229582
Total Titanium (Ti)	ug/L	<5.0	5.0	0.30	A229582
Total Uranium (U)	ug/L	0.26	0.10	0.0010	A229582
Total Vanadium (V)	ug/L	<5.0	5.0	0.020	A229582
Total Zinc (Zn)	ug/L	5.6	5.0	0.050	A229582
RDL = Reportable Detection Limit					

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BV Labs Job #: C132360
Report Date: 2021/05/21

GHD Limited
Client Project #: 11222680-3-5
Site Location: CAMPBELL RIVER, BC
Your P.O. #: 73523824
Sampler Initials: TS

CSR TOTAL METALS (NO CV-HG) IN WATER

BV Labs ID		ZU5165			
Sampling Date		2021/05/14 13:30			
COC Number		G144873			
	UNITS	**SAMPLES FROM TANK 1**	**RDL**	**MDL**	**QC Batch**
Total Zirconium (Zr)	ug/L	0.39	0.10	0.0080	A229582
Total Calcium (Ca)	mg/L	148	0.050	0.0010	A228550
Total Magnesium (Mg)	mg/L	32.1	0.050	0.00050	A228550
Total Potassium (K)	mg/L	11.8	0.050	0.0020	A228550
Total Sodium (Na)	mg/L	114	0.050	0.0010	A228550
Total Sulphur (S)	mg/L	15.6	3.0	1.0	A228550
RDL = Reportable Detection Limit					

Bureau Veritas Laboratories Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

GHD Limited
Client Project #: 11222680-3-5
Site Location: CAMPBELL RIVER, BC
Your P.O. #: 73523824
Sampler Initials: TS

CSR VOC + VPH IN WATER (WATER)

BV Labs ID		ZU5165			
Sampling Date		2021/05/14 13:30			
COC Number		G144873			
	UNITS	SAMPLES FROM TANK 1	RDL	MDL	QC Batch
Calculated Parameters					
VPH (VHW6 to 10 - BTEX)	ug/L	<300	300	300	A228553
Volatiles					
VH C6-C10	ug/L	<300	300	300	A228790
1,1,1,2-tetrachloroethane	ug/L	<0.50	0.50	0.50	A228790
1,1,1-trichloroethane	ug/L	<0.50	0.50	0.50	A228790
1,1,2,2-tetrachloroethane	ug/L	<0.50	0.50	0.50	A228790
1,1,2Trichloro-1,2,2Trifluoroethane	ug/L	<2.0	2.0	2.0	A228790
1,1,2-trichloroethane	ug/L	<0.50	0.50	0.50	A228790
1,1-dichloroethane	ug/L	<0.50	0.50	0.50	A228790
1,1-dichloroethene	ug/L	<0.50	0.50	0.50	A228790
1,2,3-trichlorobenzene	ug/L	<2.0	2.0	2.0	A228790
1,2,4-trichlorobenzene	ug/L	<2.0	2.0	2.0	A228790
1,2-dibromoethane	ug/L	<0.20	0.20	0.20	A228790
1,2-dichlorobenzene	ug/L	<0.50	0.50	0.50	A228790
1,2-dichloroethane	ug/L	<0.50	0.50	0.50	A228790
1,2-dichloropropane	ug/L	<0.50	0.50	0.50	A228790
1,3,5-trimethylbenzene	ug/L	<2.0	2.0	2.0	A228790
1,3-Butadiene	ug/L	<0.50	0.50	0.50	A228790
1,3-dichlorobenzene	ug/L	<0.50	0.50	0.50	A228790
1,3-dichloropropane	ug/L	<1.0	1.0	1.0	A228790
1,4-dichlorobenzene	ug/L	<0.50	0.50	0.50	A228790
Benzene	ug/L	<0.40	0.40	0.40	A228790
Bromobenzene	ug/L	<2.0	2.0	2.0	A228790
Bromodichloromethane	ug/L	7.1	1.0	1.0	A228790
Bromoform	ug/L	<1.0	1.0	1.0	A228790
Bromomethane	ug/L	<1.0	1.0	1.0	A228790
Carbon tetrachloride	ug/L	<0.50	0.50	0.50	A228790
Chlorobenzene	ug/L	<0.50	0.50	0.50	A228790
Chlorodibromomethane	ug/L	<1.0	1.0	1.0	A228790
Chloroethane	ug/L	<1.0	1.0	1.0	A228790
RDL = Reportable Detection Limit					

BV Labs Job #: C132360
Report Date: 2021/05/21

GHD Limited
Client Project #: 11222680-3-5
Site Location: CAMPBELL RIVER, BC
Your P.O. #: 73523824
Sampler Initials: TS

CSR VOC + VPH IN WATER (WATER)

BV Labs ID		ZU5165			
Sampling Date		2021/05/14 13:30			
COC Number		G144873			
	UNITS	SAMPLES FROM TANK 1	RDL	MDL	QC Batch
Chloroform	ug/L	24	1.0	1.0	A228790
Chloromethane	ug/L	<1.0	1.0	1.0	A228790
cis-1,2-dichloroethene	ug/L	<1.0	1.0	1.0	A228790
cis-1,3-dichloropropene	ug/L	<1.0	1.0	1.0	A228790
Dichlorodifluoromethane	ug/L	<2.0	2.0	2.0	A228790
Dichloromethane	ug/L	<2.0	2.0	2.0	A228790
Ethylbenzene	ug/L	<0.40	0.40	0.40	A228790
Hexachlorobutadiene	ug/L	<0.50	0.50	0.50	A228790
Isopropylbenzene	ug/L	<2.0	2.0	2.0	A228790
Methyl-tert-butylether (MTBE)	ug/L	<4.0	4.0	4.0	A228790
Styrene	ug/L	<0.50	0.50	0.50	A228790
Tetrachloroethene	ug/L	<0.50	0.50	0.50	A228790
Toluene	ug/L	1.2	0.40	0.40	A228790
trans-1,2-dichloroethene	ug/L	<1.0	1.0	1.0	A228790
trans-1,3-dichloropropene	ug/L	<1.0	1.0	1.0	A228790
Trichloroethene	ug/L	<0.50	0.50	0.50	A228790
Trichlorofluoromethane	ug/L	<4.0	4.0	4.0	A228790
Vinyl chloride	ug/L	<0.50	0.50	0.50	A228790
m & p-Xylene	ug/L	0.65	0.40	0.40	A228790
o-Xylene	ug/L	0.46	0.40	0.40	A228790
Xylenes (Total)	ug/L	1.1	0.40	0.40	A228790
Surrogate Recovery (%)					
1,4-Difluorobenzene (sur.)	%	100	N/A	N/A	A228790
4-Bromofluorobenzene (sur.)	%	94	N/A	N/A	A228790
D4-1,2-Dichloroethane (sur.)	%	107	N/A	N/A	A228790

RDL = Reportable Detection Limit
N/A = Not Applicable

GENERAL COMMENTS

Results relate only to the items tested.

BV Labs Job #: C132360
Report Date: 2021/05/21

QUALITY ASSURANCE REPORT

GHD Limited
Client Project #: 11222680-3-5
Site Location: CAMPBELL RIVER, BC
Your P.O. #: 73523824
Sampler Initials: TS

			Matrix Spike		Spiked Blank		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
A228790	1,4-Difluorobenzene (sur.)	2021/05/19	98	50 - 140	98	50 - 140	101	%		
A228790	4-Bromofluorobenzene (sur.)	2021/05/19	109	50 - 140	102	50 - 140	85	%		
A228790	D4-1,2-Dichloroethane (sur.)	2021/05/19	112	50 - 140	98	50 - 140	89	%		
A229702	D10-ANTHRACENE (sur.)	2021/05/19	90	50 - 140	92	50 - 140	95	%		
A229702	D8-ACENAPHTHYLENE (sur.)	2021/05/19	89	50 - 140	90	50 - 140	92	%		
A229702	D8-NAPHTHALENE (sur.)	2021/05/19	88	50 - 140	89	50 - 140	92	%		
A229702	TERPHENYL-D14 (sur.)	2021/05/19	80	50 - 140	91	50 - 140	99	%		
A229716	O-TERPHENYL (sur.)	2021/05/19	97	60 - 140	87	60 - 140	87	%		
A228790	1,1,1,2-tetrachloroethane	2021/05/19	105	50 - 140	97	60 - 130	<0.50	ug/L	NC (1)	30
A228790	1,1,1-trichloroethane	2021/05/19	108	50 - 140	102	60 - 130	<0.50	ug/L	NC (1)	30
A228790	1,1,2,2-tetrachloroethane	2021/05/19	108	50 - 140	88	60 - 130	<0.50	ug/L	NC (1)	30
A228790	1,1,2Trichloro-1,2,2Trifluoroethane	2021/05/19	90	50 - 140	91	60 - 130	<2.0	ug/L	NC (1)	30
A228790	1,1,2-trichloroethane	2021/05/19	105	50 - 140	92	60 - 130	<0.50	ug/L	NC (1)	30
A228790	1,1-dichloroethane	2021/05/19	109	50 - 140	97	60 - 130	<0.50	ug/L	NC (1)	30
A228790	1,1-dichloroethene	2021/05/19	89	50 - 140	84	60 - 130	<0.50	ug/L	NC (1)	30
A228790	1,2,3-trichlorobenzene	2021/05/19	124	50 - 140	103	60 - 130	<2.0	ug/L	NC (1)	30
A228790	1,2,4-trichlorobenzene	2021/05/19	117	50 - 140	99	60 - 130	<2.0	ug/L	NC (1)	30
A228790	1,2-dibromoethane	2021/05/19	106	50 - 140	101	60 - 130	<0.20	ug/L	NC (1)	30
A228790	1,2-dichlorobenzene	2021/05/19	123	50 - 140	103	60 - 130	<0.50	ug/L	NC (1)	30
A228790	1,2-dichloroethane	2021/05/19	104	50 - 140	89	60 - 130	<0.50	ug/L	NC (1)	30
A228790	1,2-dichloropropane	2021/05/19	102	50 - 140	91	60 - 130	<0.50	ug/L	NC (1)	30
A228790	1,3,5-trimethylbenzene	2021/05/19	128	50 - 140	112	60 - 130	<2.0	ug/L	NC (1)	30
A228790	1,3-Butadiene	2021/05/19	116	50 - 140	107	50 - 140	<0.50	ug/L	NC (1)	30
A228790	1,3-dichlorobenzene	2021/05/19	123	50 - 140	107	60 - 130	<0.50	ug/L	NC (1)	30
A228790	1,3-dichloropropane	2021/05/19	106	50 - 140	95	60 - 130	<1.0	ug/L	NC (1)	30
A228790	1,4-dichlorobenzene	2021/05/19	114	50 - 140	96	60 - 130	<0.50	ug/L	NC (1)	30
A228790	Benzene	2021/05/19	102	50 - 140	93	60 - 130	<0.40	ug/L	NC (1)	30
A228790	Bromobenzene	2021/05/19	115	50 - 140	100	60 - 130	<2.0	ug/L	NC (1)	30
A228790	Bromodichloromethane	2021/05/19	104	50 - 140	98	60 - 130	<1.0	ug/L	NC (1)	30
A228790	Bromoform	2021/05/19	112	50 - 140	93	60 - 130	<1.0	ug/L	NC (1)	30
A228790	Bromomethane	2021/05/19	103	50 - 140	83	50 - 140	<1.0	ug/L	NC (1)	30

Bureau Veritas Laboratories Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		Spiked Blank		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
A228790	Carbon tetrachloride	2021/05/19	110	50 - 140	99	60 - 130	<0.50	ug/L	NC (1)	30
A228790	Chlorobenzene	2021/05/19	100	50 - 140	98	60 - 130	<0.50	ug/L	NC (1)	30
A228790	Chlorodibromomethane	2021/05/19	116	50 - 140	102	60 - 130	<1.0	ug/L	NC (1)	30
A228790	Chloroethane	2021/05/19	81	50 - 140	75	50 - 140	<1.0	ug/L	NC (1)	30
A228790	Chloroform	2021/05/19	108	50 - 140	104	60 - 130	<1.0	ug/L	NC (1)	30
A228790	Chloromethane	2021/05/19	103	50 - 140	95	50 - 140	<1.0	ug/L	NC (1)	30
A228790	cis-1,2-dichloroethene	2021/05/19	104	50 - 140	101	60 - 130	<1.0	ug/L	NC (1)	30
A228790	cis-1,3-dichloropropene	2021/05/19	91	50 - 140	79	50 - 140	<1.0	ug/L	NC (1)	30
A228790	Dichlorodifluoromethane	2021/05/19	105	50 - 140	100	50 - 140	<2.0	ug/L	NC (1)	30
A228790	Dichloromethane	2021/05/19	115	50 - 140	101	60 - 130	<2.0	ug/L	NC (1)	30
A228790	Ethylbenzene	2021/05/19	108	50 - 140	112	60 - 130	<0.40	ug/L	NC (1)	30
A228790	Hexachlorobutadiene	2021/05/19	122	50 - 140	103	60 - 130	<0.50	ug/L	NC (1)	30
A228790	Isopropylbenzene	2021/05/19	115	50 - 140	105	60 - 130	<2.0	ug/L	NC (1)	30
A228790	m & p-Xylene	2021/05/19	115	50 - 140	113	60 - 130	<0.40	ug/L	NC (1)	30
A228790	Methyl-tert-butylether (MTBE)	2021/05/19	99	50 - 140	87	60 - 130	<4.0	ug/L	NC (1)	30
A228790	o-Xylene	2021/05/19	105	50 - 140	98	60 - 130	<0.40	ug/L	NC (1)	30
A228790	Styrene	2021/05/19	91	50 - 140	85	60 - 130	<0.50	ug/L	NC (1)	30
A228790	Tetrachloroethene	2021/05/19	110	50 - 140	101	60 - 130	<0.50	ug/L	NC (1)	30
A228790	Toluene	2021/05/19	101	50 - 140	96	60 - 130	<0.40	ug/L	NC (1)	30
A228790	trans-1,2-dichloroethene	2021/05/19	100	50 - 140	89	60 - 130	<1.0	ug/L	NC (1)	30
A228790	trans-1,3-dichloropropene	2021/05/19	91	50 - 140	78	50 - 140	<1.0	ug/L	NC (1)	30
A228790	Trichloroethene	2021/05/19	110	50 - 140	99	60 - 130	<0.50	ug/L	NC (1)	30
A228790	Trichlorofluoromethane	2021/05/19	101	50 - 140	99	60 - 130	<4.0	ug/L	NC (1)	30
A228790	VH C6-C10	2021/05/19			72	70 - 130	<300	ug/L	NC (1)	30
A228790	Vinyl chloride	2021/05/19	102	50 - 140	95	50 - 140	<0.50	ug/L	NC (1)	30
A228790	Xylenes (Total)	2021/05/19					<0.40	ug/L	NC (1)	30
A228875	Total Dissolved Solids	2021/05/19	103	80 - 120	97	80 - 120	<10	mg/L	0.70 (1)	20
A229202	Dissolved Aluminum (Al)	2021/05/20	105	80 - 120	103	80 - 120	<3.0	ug/L		
A229202	Dissolved Antimony (Sb)	2021/05/20	109	80 - 120	104	80 - 120	<0.50	ug/L		
A229202	Dissolved Arsenic (As)	2021/05/20	106	80 - 120	101	80 - 120	<0.10	ug/L		
A229202	Dissolved Barium (Ba)	2021/05/20	103	80 - 120	101	80 - 120	<1.0	ug/L		

Bureau Veritas Laboratories Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		Spiked Blank		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
A229202	Dissolved Beryllium (Be)	2021/05/20	105	80 - 120	103	80 - 120	<0.10	ug/L		
A229202	Dissolved Bismuth (Bi)	2021/05/20	99	80 - 120	98	80 - 120	<1.0	ug/L		
A229202	Dissolved Boron (B)	2021/05/20	107	80 - 120	106	80 - 120	<50	ug/L		
A229202	Dissolved Cadmium (Cd)	2021/05/20	107	80 - 120	102	80 - 120	<0.010	ug/L		
A229202	Dissolved Chromium (Cr)	2021/05/20	100	80 - 120	97	80 - 120	<1.0	ug/L		
A229202	Dissolved Cobalt (Co)	2021/05/20	101	80 - 120	98	80 - 120	<0.20	ug/L		
A229202	Dissolved Copper (Cu)	2021/05/20	100	80 - 120	97	80 - 120	<0.20	ug/L		
A229202	Dissolved Iron (Fe)	2021/05/20	106	80 - 120	106	80 - 120	<5.0	ug/L		
A229202	Dissolved Lead (Pb)	2021/05/20	100	80 - 120	99	80 - 120	<0.20	ug/L		
A229202	Dissolved Lithium (Li)	2021/05/20	101	80 - 120	103	80 - 120	<2.0	ug/L		
A229202	Dissolved Manganese (Mn)	2021/05/20	102	80 - 120	101	80 - 120	<1.0	ug/L		
A229202	Dissolved Molybdenum (Mo)	2021/05/20	105	80 - 120	101	80 - 120	<1.0	ug/L		
A229202	Dissolved Nickel (Ni)	2021/05/20	102	80 - 120	99	80 - 120	<1.0	ug/L		
A229202	Dissolved Phosphorus (P)	2021/05/20	114	80 - 120	107	80 - 120	<10	ug/L		
A229202	Dissolved Selenium (Se)	2021/05/20	112	80 - 120	105	80 - 120	<0.10	ug/L		
A229202	Dissolved Silicon (Si)	2021/05/20	109	80 - 120	109	80 - 120	<100	ug/L		
A229202	Dissolved Silver (Ag)	2021/05/20	100	80 - 120	98	80 - 120	<0.020	ug/L		
A229202	Dissolved Strontium (Sr)	2021/05/20	99	80 - 120	99	80 - 120	<1.0	ug/L		
A229202	Dissolved Thallium (Tl)	2021/05/20	100	80 - 120	98	80 - 120	<0.010	ug/L		
A229202	Dissolved Tin (Sn)	2021/05/20	100	80 - 120	98	80 - 120	<5.0	ug/L		
A229202	Dissolved Titanium (Ti)	2021/05/20	106	80 - 120	100	80 - 120	<5.0	ug/L		
A229202	Dissolved Uranium (U)	2021/05/20	103	80 - 120	102	80 - 120	<0.10	ug/L		
A229202	Dissolved Vanadium (V)	2021/05/20	102	80 - 120	99	80 - 120	<5.0	ug/L		
A229202	Dissolved Zinc (Zn)	2021/05/20	99	80 - 120	94	80 - 120	<5.0	ug/L	NC (1)	20
A229202	Dissolved Zirconium (Zr)	2021/05/20	99	80 - 120	98	80 - 120	<0.10	ug/L		
A229582	Total Aluminum (Al)	2021/05/19	109	80 - 120	100	80 - 120	<3.0	ug/L	11 (1)	20
A229582	Total Antimony (Sb)	2021/05/19	100	80 - 120	100	80 - 120	<0.50	ug/L	NC (1)	20
A229582	Total Arsenic (As)	2021/05/19	103	80 - 120	97	80 - 120	<0.10	ug/L	6.5 (1)	20
A229582	Total Barium (Ba)	2021/05/19	100	80 - 120	98	80 - 120	<1.0	ug/L	1.3 (1)	20
A229582	Total Beryllium (Be)	2021/05/19	96	80 - 120	98	80 - 120	<0.10	ug/L	NC (1)	20
A229582	Total Bismuth (Bi)	2021/05/19	93	80 - 120	101	80 - 120	<1.0	ug/L	NC (1)	20

QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		Spiked Blank		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
A229582	Total Boron (B)	2021/05/19	98	80 - 120	98	80 - 120	<50	ug/L	1.4 (1)	20
A229582	Total Cadmium (Cd)	2021/05/19	97	80 - 120	99	80 - 120	<0.010	ug/L	19 (1)	20
A229582	Total Chromium (Cr)	2021/05/19	93	80 - 120	96	80 - 120	<1.0	ug/L	NC (1)	20
A229582	Total Cobalt (Co)	2021/05/19	92	80 - 120	97	80 - 120	<0.20	ug/L	NC (1)	20
A229582	Total Copper (Cu)	2021/05/19	86	80 - 120	96	80 - 120	<0.50	ug/L	10 (1)	20
A229582	Total Iron (Fe)	2021/05/19	100	80 - 120	103	80 - 120	<10	ug/L	1.4 (1)	20
A229582	Total Lead (Pb)	2021/05/19	96	80 - 120	99	80 - 120	<0.20	ug/L	2.6 (1)	20
A229582	Total Lithium (Li)	2021/05/19	NC	80 - 120	96	80 - 120	<2.0	ug/L	2.4 (1)	20
A229582	Total Manganese (Mn)	2021/05/19	95	80 - 120	99	80 - 120	<1.0	ug/L	2.4 (1)	20
A229582	Total Molybdenum (Mo)	2021/05/19	118	80 - 120	101	80 - 120	<1.0	ug/L	2.3 (1)	20
A229582	Total Nickel (Ni)	2021/05/19	90	80 - 120	97	80 - 120	<1.0	ug/L	NC (1)	20
A229582	Total Phosphorus (P)	2021/05/19	100	80 - 120	99	80 - 120	<10	ug/L	2.1 (1)	20
A229582	Total Selenium (Se)	2021/05/19	100	80 - 120	98	80 - 120	<0.10	ug/L	NC (1)	20
A229582	Total Silicon (Si)	2021/05/19	NC	80 - 120	102	80 - 120	<100	ug/L	0.27 (1)	20
A229582	Total Silver (Ag)	2021/05/19	NC	80 - 120	97	80 - 120	<0.020	ug/L	0.94 (1)	20
A229582	Total Strontium (Sr)	2021/05/19	NC	80 - 120	98	80 - 120	<1.0	ug/L	0.67 (1)	20
A229582	Total Thallium (Tl)	2021/05/19	94	80 - 120	101	80 - 120	<0.010	ug/L	NC (1)	20
A229582	Total Tin (Sn)	2021/05/19	100	80 - 120	99	80 - 120	<5.0	ug/L	NC (1)	20
A229582	Total Titanium (Ti)	2021/05/19	108	80 - 120	102	80 - 120	<5.0	ug/L	0.69 (1)	20
A229582	Total Uranium (U)	2021/05/19	101	80 - 120	100	80 - 120	<0.10	ug/L	1.8 (1)	20
A229582	Total Vanadium (V)	2021/05/19	97	80 - 120	96	80 - 120	<5.0	ug/L	NC (1)	20
A229582	Total Zinc (Zn)	2021/05/19	90	80 - 120	98	80 - 120	<5.0	ug/L	NC (1)	20
A229582	Total Zirconium (Zr)	2021/05/19	110	80 - 120	100	80 - 120	<0.10	ug/L	NC (1)	20
A229702	1-Methylnaphthalene	2021/05/19	92	50 - 140	94	50 - 140	<0.050	ug/L	1.8 (1)	40
A229702	2-Methylnaphthalene	2021/05/19	90	50 - 140	91	50 - 140	<0.10	ug/L	0 (1)	40
A229702	Acenaphthene	2021/05/19	97	50 - 140	98	50 - 140	<0.050	ug/L	1.9 (1)	40
A229702	Acenaphthylene	2021/05/19	90	50 - 140	92	50 - 140	<0.050	ug/L	NC (1)	40
A229702	Acridine	2021/05/19	102	50 - 140	102	50 - 140	<0.050	ug/L	NC (1)	40
A229702	Anthracene	2021/05/19	89	50 - 140	90	50 - 140	<0.010	ug/L	1.1 (1)	40
A229702	Benzo(a)anthracene	2021/05/19	90	50 - 140	94	50 - 140	<0.010	ug/L	NC (1)	40
A229702	Benzo(a)pyrene	2021/05/19	72	50 - 140	95	50 - 140	<0.0050	ug/L	NC (1)	40

QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		Spiked Blank		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
A229702	Benzo(b&j)fluoranthene	2021/05/19	75	50 - 140	95	50 - 140	<0.030	ug/L	NC (1)	40
A229702	Benzo(g,h,i)perylene	2021/05/19	30 (2)	50 - 140	93	50 - 140	<0.050	ug/L	NC (1)	40
A229702	Benzo(k)fluoranthene	2021/05/19	76	50 - 140	95	50 - 140	<0.050	ug/L	NC (1)	40
A229702	Chrysene	2021/05/19	90	50 - 140	93	50 - 140	<0.020	ug/L	NC (1)	40
A229702	Dibenz(a,h)anthracene	2021/05/19	30 (2)	50 - 140	95	50 - 140	<0.0030	ug/L	NC (1)	40
A229702	Fluoranthene	2021/05/19	97	50 - 140	97	50 - 140	<0.020	ug/L	NC (1)	40
A229702	Fluorene	2021/05/19	91	50 - 140	93	50 - 140	<0.050	ug/L	2.4 (1)	40
A229702	Indeno(1,2,3-cd)pyrene	2021/05/19	40 (2)	50 - 140	94	50 - 140	<0.050	ug/L	NC (1)	40
A229702	Naphthalene	2021/05/19	93	50 - 140	93	50 - 140	<0.10	ug/L	1.8 (1)	40
A229702	Phenanthrene	2021/05/19	91	50 - 140	91	50 - 140	<0.050	ug/L	0.95 (1)	40
A229702	Pyrene	2021/05/19	94	50 - 140	95	50 - 140	<0.020	ug/L	NC (1)	40
A229702	Quinoline	2021/05/19	108	50 - 140	108	50 - 140	<0.020	ug/L	NC (1)	40
A229716	EPH (C10-C19)	2021/05/19	110	60 - 140	92	70 - 130	<0.20	mg/L	2.5 (1)	30
A229716	EPH (C19-C32)	2021/05/19	121	60 - 140	101	70 - 130	<0.20	mg/L	NC (1)	30

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

(1) Duplicate Parent ID

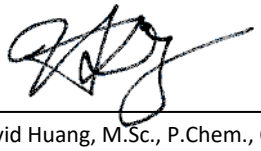
(2) Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.

BV Labs Job #: C132360
Report Date: 2021/05/21

GHD Limited
Client Project #: 11222680-3-5
Site Location: CAMPBELL RIVER, BC
Your P.O. #: 73523824
Sampler Initials: TS

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:



David Huang, M.Sc., P.Chem., QP, Scientific Services Manager

BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Bureau Veritas Laboratories Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

Burnaby: 4606 Canada Way, Burnaby, BC V5G 1K5 Toll Free (833) 282-5227
Victoria: 851 Viewfield Road, Unit 1, Victoria, BC V9A 4V2 Toll Free (833) 282-5227
bvlabs.com

CHAIN OF CUSTODY RECORD

G 144873

Page 1 of 1

Invoice Information	Report Information (if differs from invoice)	Project Information	Turnaround Time (TAT) Required
Company: GHD	Company:	Quotation	☐ 5 - 7 Days Regular (Most analyses)
Contact Name: ROSE MARIE ROCCA	Contact Name:	P.O. #/AFE#: 0898877-0702	PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS
Address: 10271 SHELLBRIDGE WAY	Address:		Rush TAT (Surcharges will be applied)
RICHMOND PC: BC	PC:	Project #: UPLAND LANDFILL	☐ Same Day ☐ 2 Days
Phone/Fax: (604) 341-5477	Phone/Fax:	Site Location: CAMPBELL RIVER BC	☐ 1 Day ☐ 3-4 Days
Email: ROSE-MARIE.ROCCA@GHD.COM	Email: BFAGAN@NORTHWINDENG.COM	Site #: 0898877-GD-UPLAND	Date Required:
Copies: ADRESSEMPLOYEE@GHD.COM	Copies:	Sampled By: T. STUART	Rush Confirmation #:

Laboratory Use Only

	YES	NO	Cooler ID	Temp		
Seal Present		X	1			
Seal Intact	—					
Cooling Media	X			8	8	7
	YES	NO	Cooler ID			
Seal Present		X	2			
Seal Intact	—					
Cooling Media	X			1	2	2
	YES	NO	Cooler ID			
Seal Present						
Seal Intact						
Cooling Media						

Depot Reception

Bureau Veritas
RECEIVED IN COURTENAY
B OD
MAY 14 2021
By: [signature]
Temps: 7 11 17

Regulatory Criteria

- ☐ BC CSR
- ☐ YK CSR
- ☐ CCME
- ☐ Drinking Water
- ☒ BC Water Quality
- ☐ Other

Analysis Requested

	Sample Identification	Date Sampled (yyyy/mm/dd)	Time Sampled (hh:mm)	Matrix	# of Containers	BTEXS / VPH	BTEX F1	PAH	EPH	Dissolved Metals	Dissolved Mercury	Total Metals	Total Mercury	Chloride	TSS	pH	Nitrite	HOLD - DO NOT ANALYZE	Special Instructions
1	SAMPLES FROM TANK 1	2021/05/14	1:39pm	H_2O	7	✓		✓		✓		✓			✓				
2																			
3																			
4																			
5																			
6																			
7																			
8																			
9																			
10																			

Unless otherwise agreed to in writing, work submitted on this Chain of Custody is subject to Bureau Veritas' standard Terms and Conditions. Signing of this Chain of Custody document is acknowledgement and acceptar

Relinquished by: (Signature/ Print)	Date (yyyy/mm/dd):	Time (hh:mm):	Received by: (Signature/ Print)	Date (yyyy/mm/dd):	Time (hh:mm):
B Fagan	May 14/21	3:00	[signature] 2020 TAOC	2021/05/15	10:00

C132360_COC

COC-1020

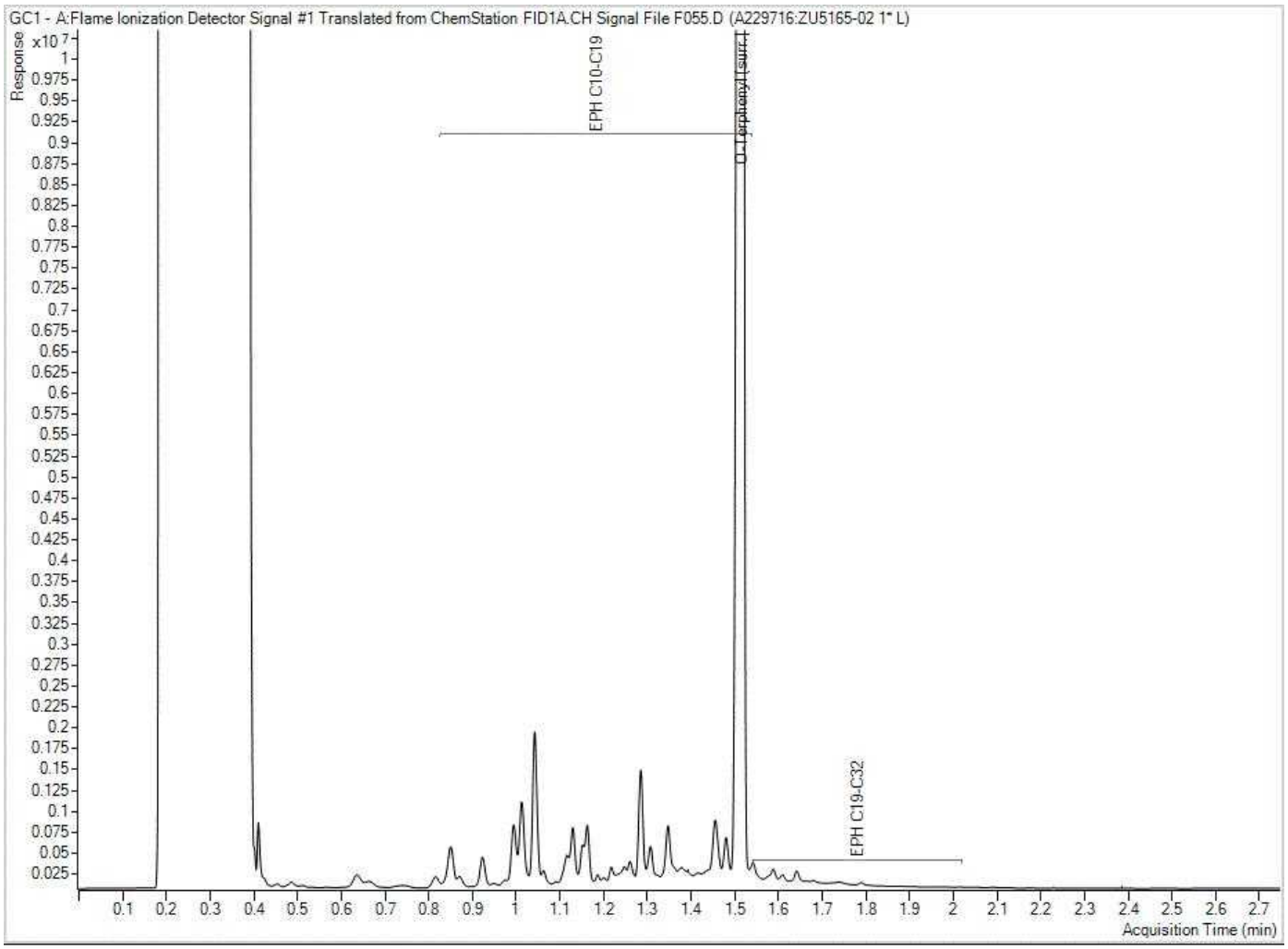
Bureau Veritas Shaping a World of Trust©

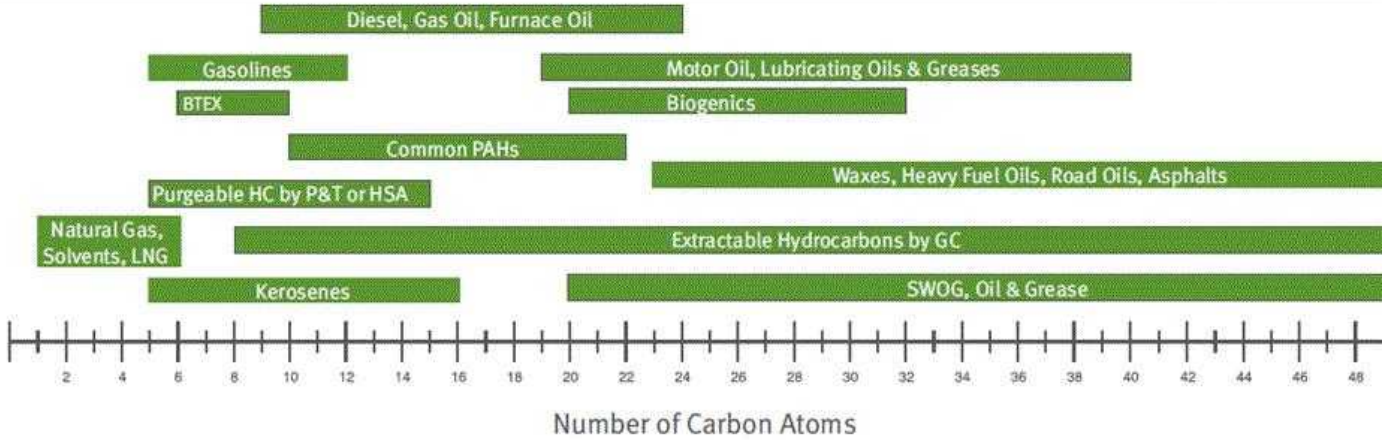
CD-00077/13

BV Labs Job #: C132360
Report Date: 2021/05/21
BV Labs Sample: ZU5165

GHD Limited
Client Project #: 11222680-3-5
Site Reference: CAMPBELL RIVER, BC
Client ID: SAMPLES FROM TANK 1

EPH in Water when PAH required Chromatogram





Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Appendix D

Data Validation and Assessment Memorandum

Technical Memorandum

January 28, 2022

To	Rose Marie Rocca, Natasha Turl, Kathleen Hasler, Melissa Jenkins, David R Barton	**Tel**	604-248-3661
Copy to		**Email**	Airesse.MacPhee@ghd.com
From	Airesse MacPhee/an/01	**Ref. No.**	11222680
Subject	Data Quality Assessment and Verification		

Laboratory:	Bureau Veritas Canada
Lab Job No.:	C138325, C138326, C138327, C188803, C188804, C188811
Date(s) Sampled:	June and November 2021
Media Sampled:	Groundwater, Leak Detection Layer Water, Leachate Water

QA/QC	Criteria	Pass	Qualifiers	Fail	N/A
Holding Times	Analyte specific	☐	☒	☐	☐
Temperature	<10ºC at receipt	☒	☐	☐	☐
Sample Preservation	Required container/preservatives	☐	☒	☐	☐
Field Duplicate (blind)	Matrix Specific	☐	☒	☐	☐
Field Blank (blind)	Non detect	☐	☒	☐	☐
Trip Blank	Non detect	☒	☐	☐	☐
Lab QA/QC	Within standard recoveries	☐	☒	☐	☐

The following results are qualified due to holding time exceedances:

Lab Report #	Sample Date (mm/dd/yyyy)	Sample ID	Analyte	Result	Qualifier	Units
C188804	11/16/2021	WL-11222680-161121-KH-01	Mercury	0.038	UJ	µg/L
C188811	11/15/2021	WG-11222680-151121-KH-01	Nitrate (as N)	0.262	J	mg/L
C188811	11/15/2021	WG-11222680-151121-KH-02	Nitrate (as N)	0.039	J	mg/L
C188811	11/15/2021	WG-11222680-151121-KH-03	Nitrate (as N)	0.038	J	mg/L
C188811	11/15/2021	WG-11222680-151121-KH-01	Nitrite (as N)	0.0050	UJ	mg/L
C188811	11/15/2021	WG-11222680-151121-KH-02	Nitrite (as N)	0.0050	UJ	mg/L
C188811	11/15/2021	WG-11222680-151121-KH-03	Nitrite (as N)	0.0050	UJ	mg/L
C188811	11/15/2021	WG-11222680-151121-KH-01	Nitrite/Nitrate	0.262	J	mg/L
C188811	11/15/2021	WG-11222680-151121-KH-02	Nitrite/Nitrate	0.039	J	mg/L
C188811	11/15/2021	WG-11222680-151121-KH-03	Nitrite/Nitrate	0.038	J	mg/L

Lab Report #	Sample Date (mm/dd/yyyy)	Sample ID	Analyte	Result	Qualifier	Units
C188811	11/15/2021	WG-11222680-151121-KH-01	Orthophosphate	0.0076	J	mg/L
C188811	11/15/2021	WG-11222680-151121-KH-02	Orthophosphate	0.024	J	mg/L
C188811	11/15/2021	WG-11222680-151121-KH-03	Orthophosphate	0.025	J	mg/L

The following results are qualified because the samples were filtered/preserved upon receipts at the laboratory instead of in the field:

Lab Report #	Sample Date (mm/dd/yyyy)	Sample ID	Analyte	Result	Qualifier	Units
C188811	11/15/2021	WG-11222680-151121-KH-03	Aluminum (dissolved)	5.2	J	µg/L
C188811	11/15/2021	WG-11222680-151121-KH-03	Antimony (dissolved)	0.50	UJ	µg/L
C188811	11/15/2021	WG-11222680-151121-KH-03	Arsenic (dissolved)	0.85	J	µg/L
C188811	11/15/2021	WG-11222680-151121-KH-03	Barium (dissolved)	2.6	J	µg/L
C188811	11/15/2021	WG-11222680-151121-KH-03	Beryllium (dissolved)	0.10	UJ	µg/L
C188811	11/15/2021	WG-11222680-151121-KH-03	Bismuth (dissolved)	1.0	UJ	µg/L
C188811	11/15/2021	WG-11222680-151121-KH-03	Boron (dissolved)	50	UJ	µg/L
C188811	11/15/2021	WG-11222680-151121-KH-03	Cadmium (dissolved)	0.010	UJ	µg/L
C188811	11/15/2021	WG-11222680-151121-KH-03	Calcium (dissolved)	13.3	J	µg/L
C188811	11/15/2021	WG-11222680-151121-KH-03	Chromium (dissolved)	1.0	UJ	µg/L
C188811	11/15/2021	WG-11222680-151121-KH-03	Cobalt (dissolved)	0.20	UJ	µg/L
C188811	11/15/2021	WG-11222680-151121-KH-03	Copper (dissolved)	0.20	UJ	µg/L
C188811	11/15/2021	WG-11222680-151121-KH-03	Iron (dissolved)	5.0	UJ	µg/L
C188811	11/15/2021	WG-11222680-151121-KH-03	Lead (dissolved)	0.20	UJ	µg/L
C188811	11/15/2021	WG-11222680-151121-KH-03	Lithium (dissolved)	2.0	UJ	µg/L
C188811	11/15/2021	WG-11222680-151121-KH-03	Magnesium (dissolved)	2.07	J	mg/L
C188811	11/15/2021	WG-11222680-151121-KH-03	Manganese (dissolved)	1.0	UJ	µg/L
C188811	11/15/2021	WG-11222680-151121-KH-03	Mercury (dissolved)	0.0019	UJ	µg/L
C188811	11/15/2021	WG-11222680-151121-KH-03	Molybdenum (dissolved)	1.0	UJ	µg/L
C188811	11/15/2021	WG-11222680-151121-KH-03	Nickel (dissolved)	1.0	UJ	µg/L
C188811	11/15/2021	WG-11222680-151121-KH-03	Phosphorus (dissolved)	28	J	µg/L
C188811	11/15/2021	WG-11222680-151121-KH-03	Potassium (dissolved)	0.202	J	mg/L
C188811	11/15/2021	WG-11222680-151121-KH-03	Selenium (dissolved)	0.10	UJ	µg/L
C188811	11/15/2021	WG-11222680-151121-KH-03	Silicon (dissolved)	3390	J	µg/L
C188811	11/15/2021	WG-11222680-151121-KH-03	Silver (dissolved)	0.020	UJ	µg/L
C188811	11/15/2021	WG-11222680-151121-KH-03	Sodium (dissolved)	1.16	J	mg/L
C188811	11/15/2021	WG-11222680-151121-KH-03	Strontium (dissolved)	18.4	J	µg/L
C188811	11/15/2021	WG-11222680-151121-KH-03	Sulfur (dissolved)	3.0	UJ	mg/L
C188811	11/15/2021	WG-11222680-151121-KH-03	Thallium (dissolved)	0.010	UJ	µg/L
C188811	11/15/2021	WG-11222680-151121-KH-03	Tin (dissolved)	5.0	UJ	µg/L

Lab Report #	Sample Date (mm/dd/yyyy)	Sample ID	Analyte	Result	Qualifier	Units
C188811	11/15/2021	WG-11222680-151121-KH-03	Titanium (dissolved)	5.0	UJ	µg/L
C188811	11/15/2021	WG-11222680-151121-KH-03	Uranium (dissolved)	0.10	UJ	µg/L
C188811	11/15/2021	WG-11222680-151121-KH-03	Vanadium (dissolved)	7.1	J	µg/L
C188811	11/15/2021	WG-11222680-151121-KH-03	Zinc (dissolved)	5.0	UJ	µg/L
C188811	11/15/2021	WG-11222680-151121-KH-03	Zirconium (dissolved)	0.10	UJ	µg/L

The following results are qualified because the ample received was pH <9, indicating incomplete preservation. Due to volatility of analyte, a low bias in the results is likely:

Lab Report #	Sample Date (mm/dd/yyyy)	Sample ID	Analyte	Result	Qualifier	Units
C138327	06/03/2021	WL-11222680-030621-NT-01	Sulfide	0.068	J-	mg/L
C138327	06/03/2021	WL-11222680-030621-NT-02	Sulfide	0.23	J-	mg/L
C188803	11/16/2021	W-11222680-161121-KH-01	Sulfide	0.0042	J-	mg/L
C188804	11/16/2021	WL-11222680-161121-KH-01	Sulfide	0.047	J-	mg/L

The following results are qualified due to field blank detections:

Lab Report #	Sample Date (mm/dd/yyyy)	Sample ID	Analyte	Result	Qualifier	Units
C188811	11/15/2021	WG-11222680-151121-KH-01	Sulfate (dissolved)	8.6	U	mg/L
C188811	11/15/2021	WG-11222680-151121-KH-02	Sulfate (dissolved)	4.2	U	mg/L
C188811	11/15/2021	WG-11222680-151121-KH-03	Sulfate (dissolved)	3.6	U	mg/L
C188811	11/16/2021	WG-11222680-151121-KH-04	Sulfate (dissolved)	8.0	U	mg/L
C188811	11/16/2021	WG-11222680-151121-KH-05	Sulfate (dissolved)	6.1	U	mg/L
C188811	11/16/2021	WG-11222680-151121-KH-06	Sulfate (dissolved)	9.5	U	mg/L

The following results are qualified based on dissolved results that are significantly higher than the total results:

Lab Report #	Sample Date (mm/dd/yyyy)	Sample ID	Analyte	Result	Qualifier	Units
C138327	06/03/2021	WL-11222680-030621-NT-02	Zirconium	0.86	J	µg/L
C138327	06/03/2021	WL-11222680-030621-NT-02	Zirconium (dissolved)	1.09	J	µg/L
C188803	11/16/2021	W-11222680-161121-KH-01	Boron	1630	J	µg/L
C188803	11/16/2021	W-11222680-161121-KH-01	Boron (dissolved)	2060	J	µg/L

The following results are qualified due to field duplicate variability:

Lab Report #	Sample Date (mm/dd/yyyy)	Sample ID	Analyte	Result	Qualifier	Units
C188811	11/15/2021	WG-11222680-151121-KH-02	Copper (dissolved)	1.50	J	µg/L
C188811	11/15/2021	WG-11222680-151121-KH-03	Copper (dissolved)	0.20	UJ	µg/L

Conclusion:

Based on the assessment detailed in the foregoing, the data summarized are acceptable with the specific qualifications noted above.

Notes:

N - Nitrogen
U - The analyte was analyzed for, but was not detected above the level of the reported sample quantitation limit.
UJ - The analyte was analyzed for, but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.
J - The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
J- - The result is an estimated quantity, but the result may be biased low.

Data verification reference documents:

1. "USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review", USEPA 540/R-94-013, September 2016.
2. "USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review", United States Environmental Protection Agency (USEPA) 540/R-99-008, September 2016.
3. "British Columbia Environmental Laboratory Manual", Analysis, Reporting & Knowledge Services Knowledge Management Branch Ministry of Environment and Climate Change Strategy Province of British Columbia, April 2020.

Regards

Airesse MacPhee
Data Management - Data Validator

Appendix E

Concentration Versus Time Plots

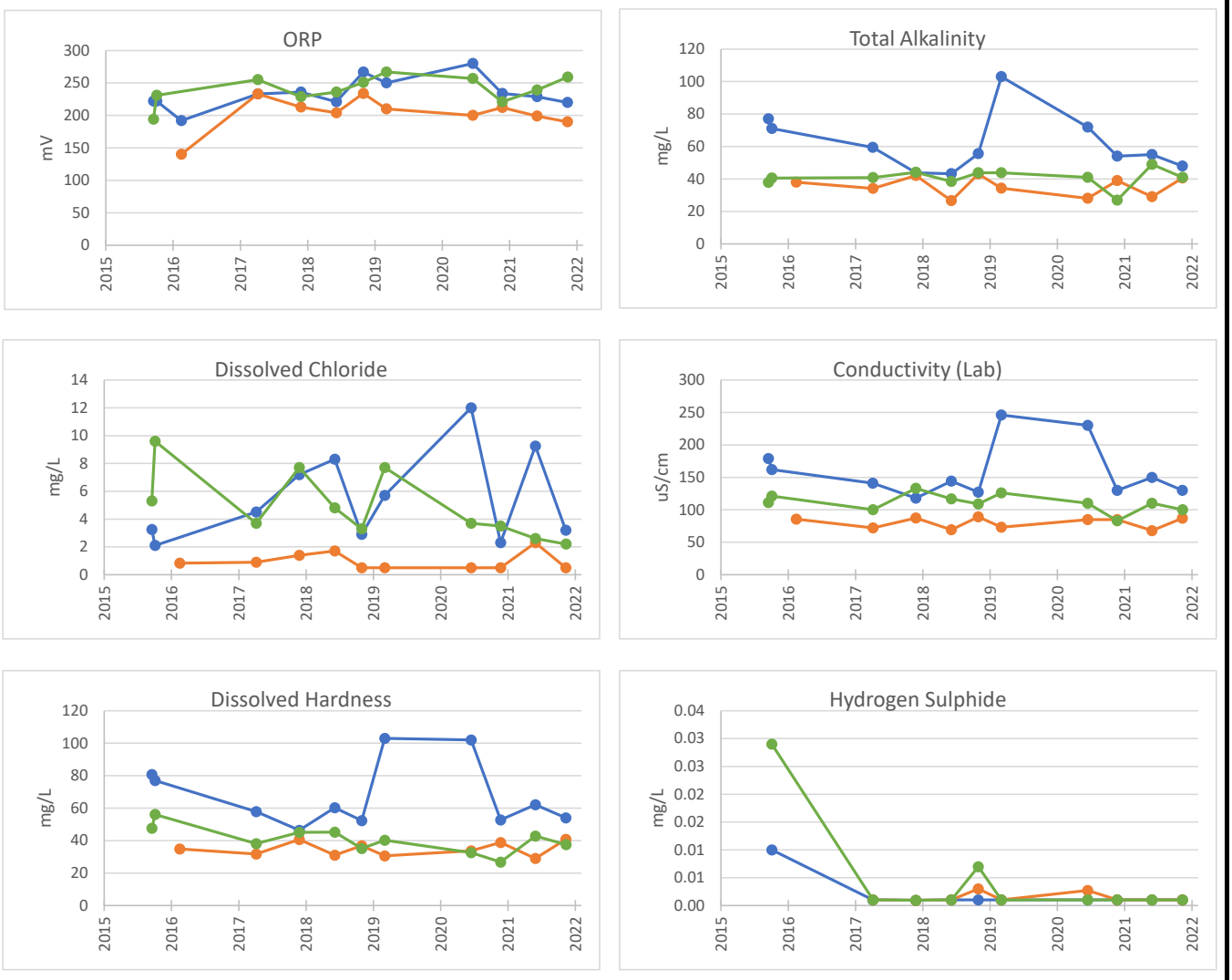


figure 1.1
CONCENTRATION VERSUS TIME - UPGRADIENT
2021 ANNUAL OPERATIONS AND MONITORING REPORT
UPLAND ORIGINAL LANDFILL, CAMPBELL RIVER, BC

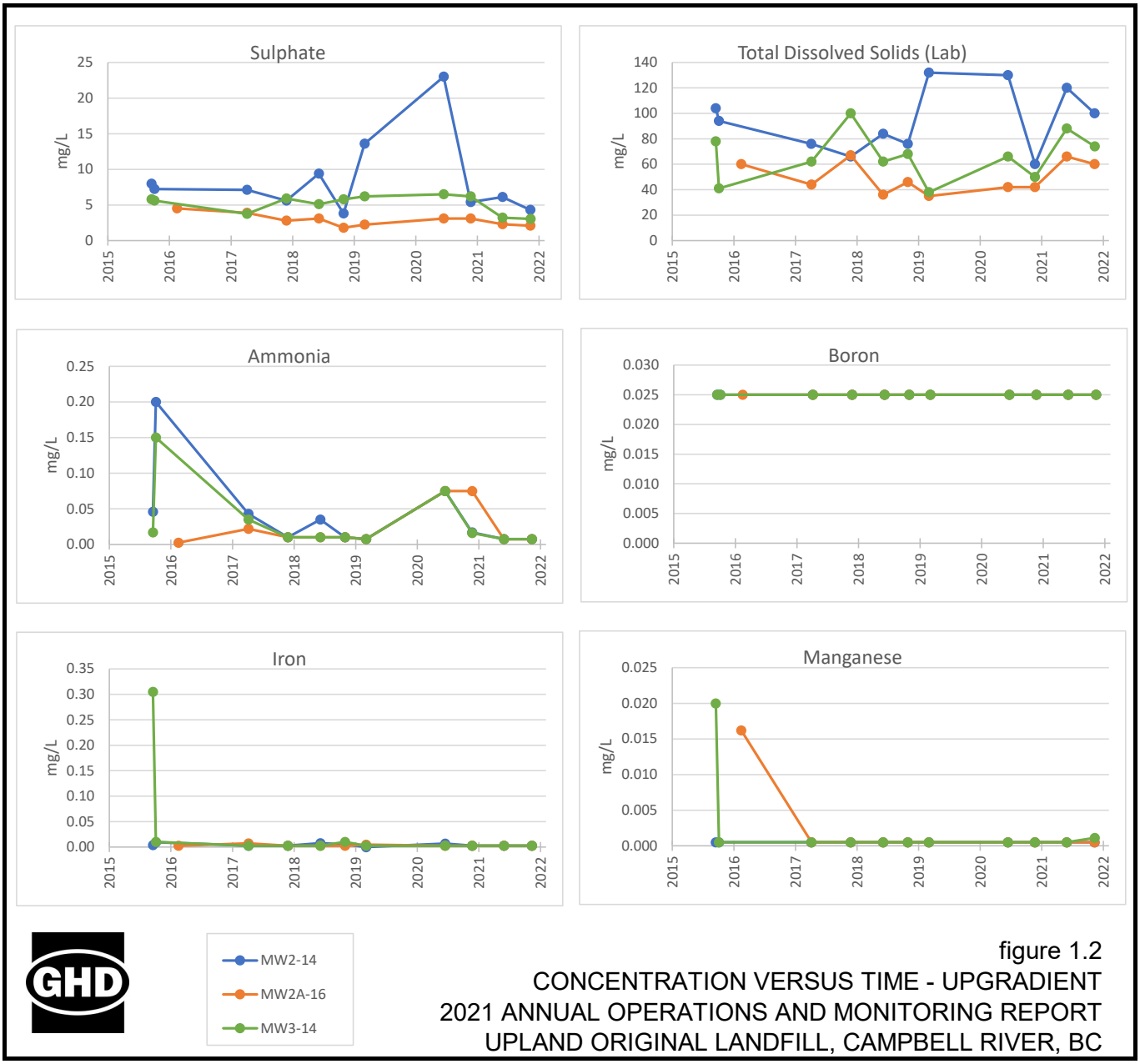
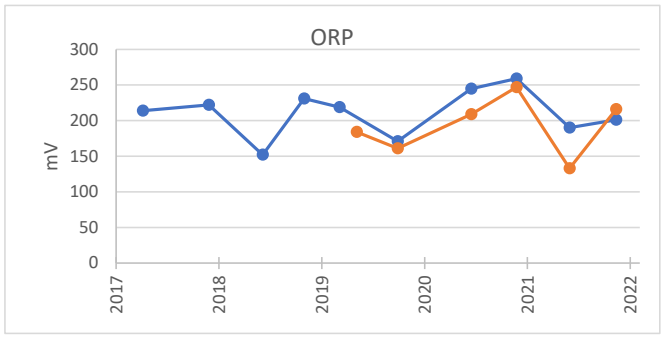
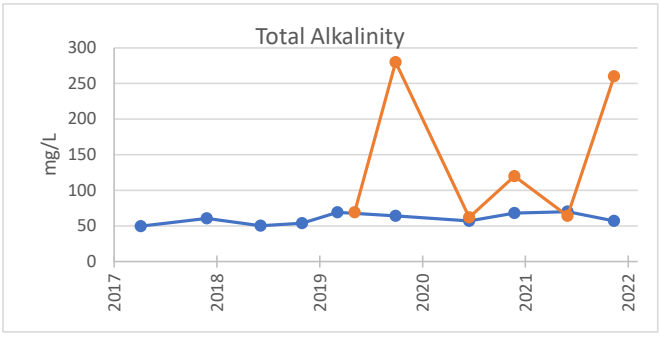
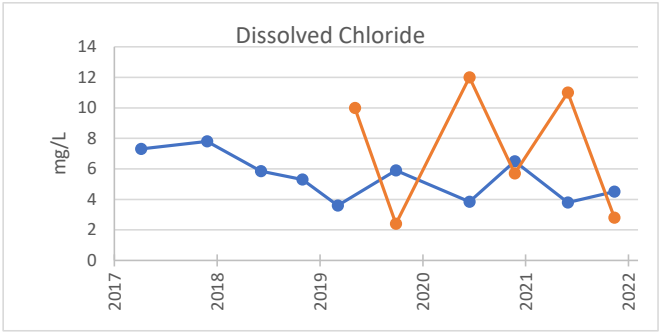
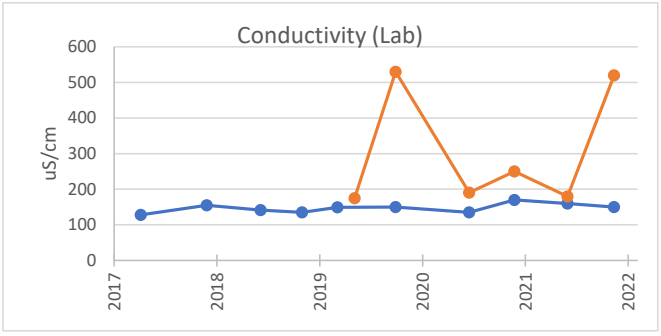


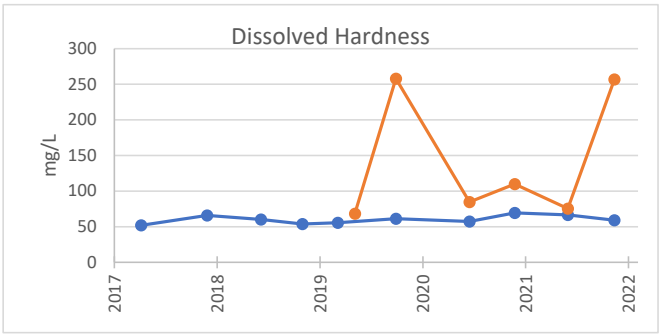
figure 1.2
CONCENTRATION VERSUS TIME - UPGRADIENT
2021 ANNUAL OPERATIONS AND MONITORING REPORT
UPLAND ORIGINAL LANDFILL, CAMPBELL RIVER, BC

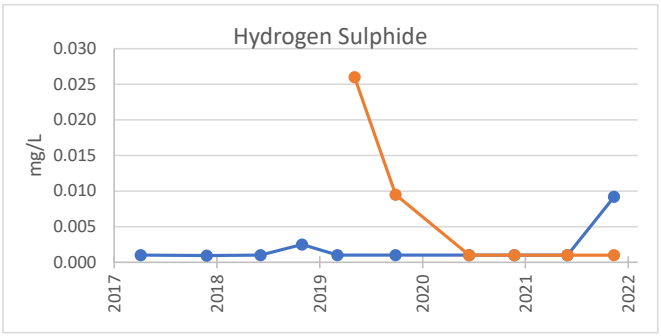












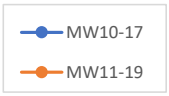
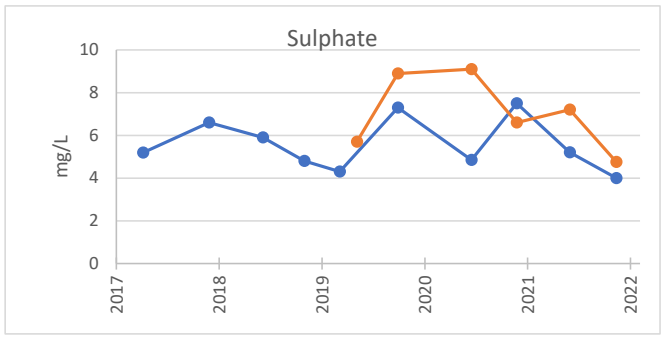
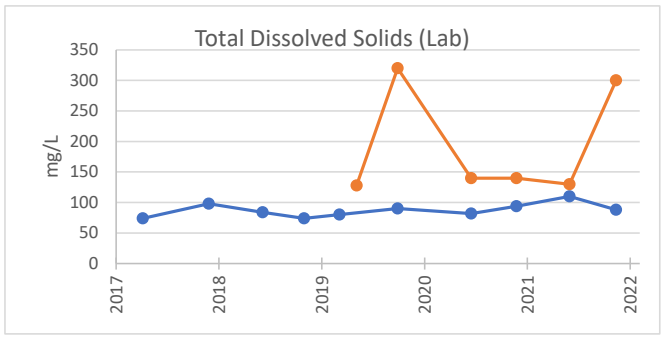
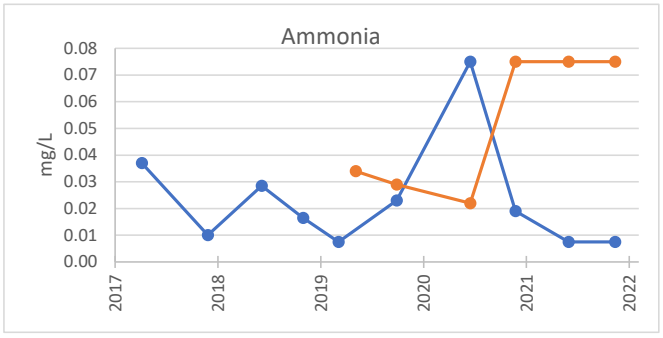
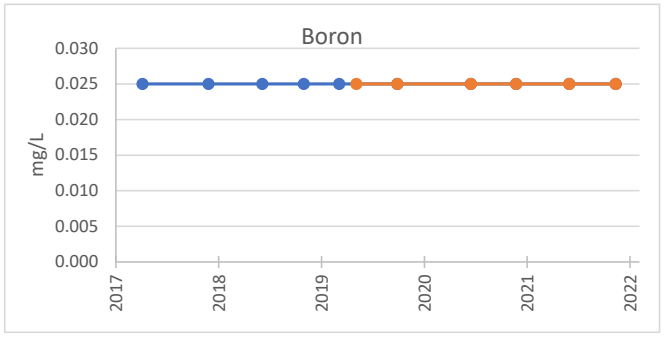


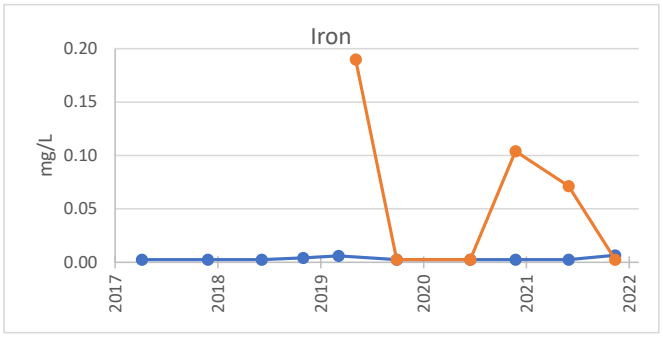
figure 1.3
CONCENTRATION VERSUS TIME - DOWNGRADIENT
2021 ANNUAL OPERATIONS AND MONITORING REPORT
UPLAND ORIGINAL LANDFILL, CAMPBELL RIVER, BC

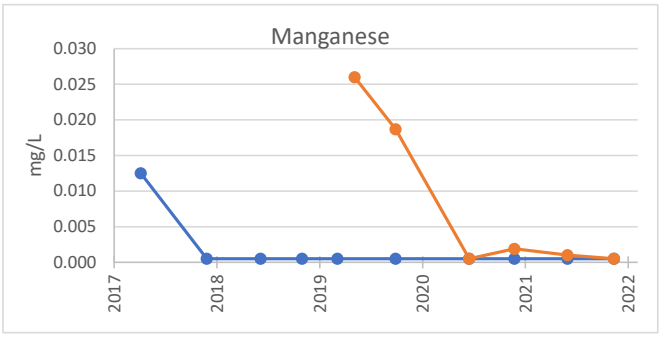












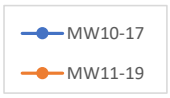


figure 1.4
CONCENTRATION VERSUS TIME - DOWNGRADIENT
2021 ANNUAL OPERATIONS AND MONITORING REPORT
UPLAND ORIGINAL LANDFILL, CAMPBELL RIVER, BC

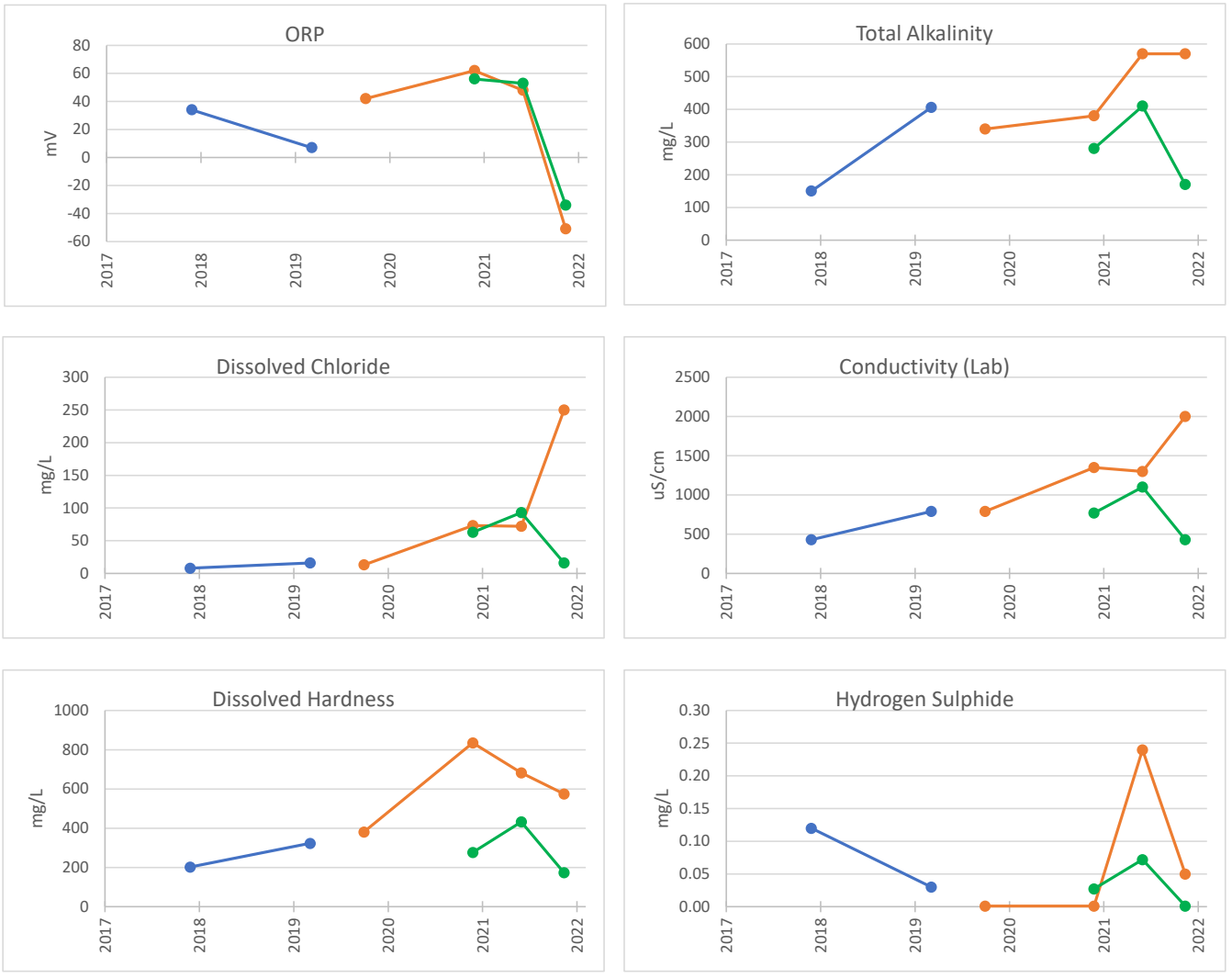
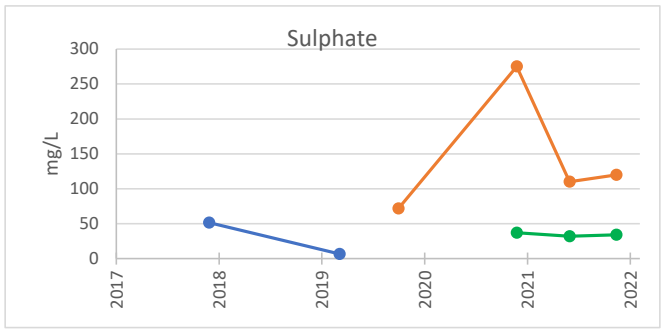
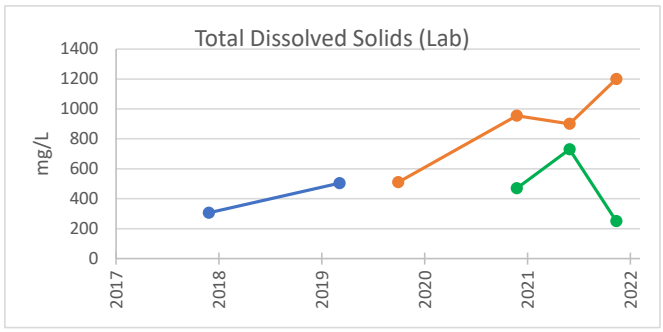
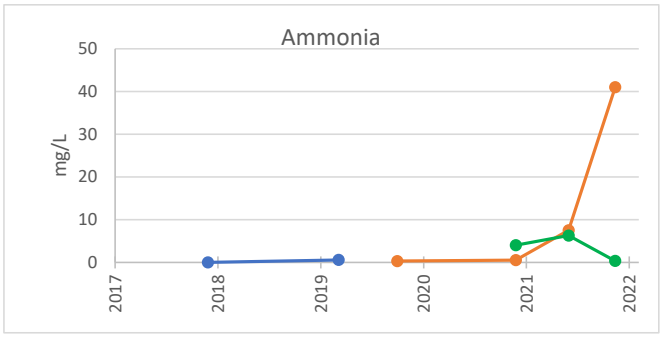
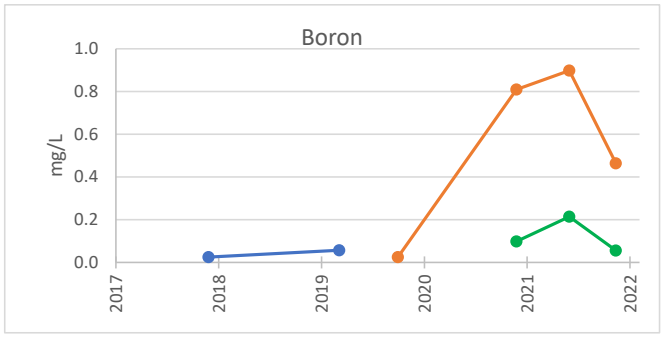


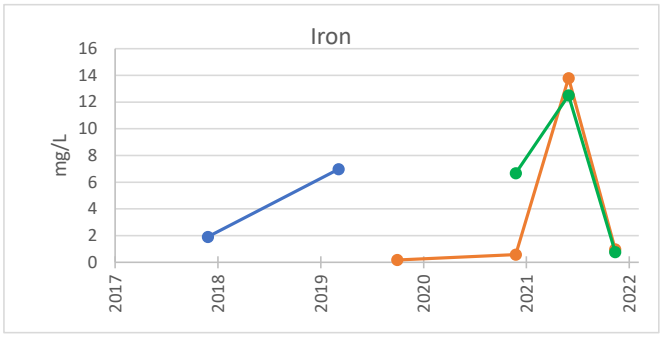
figure 1.5
CONCENTRATION VERSUS TIME - LEACHATE
2021 ANNUAL OPERATIONS AND MONITORING REPORT
UPLAND ORIGINAL LANDFILL, CAMPBELL RIVER, BC

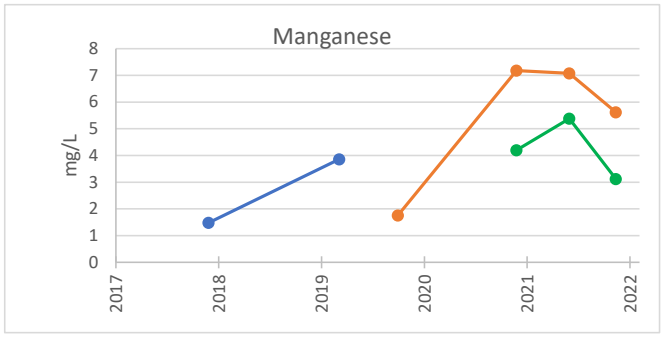












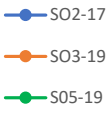
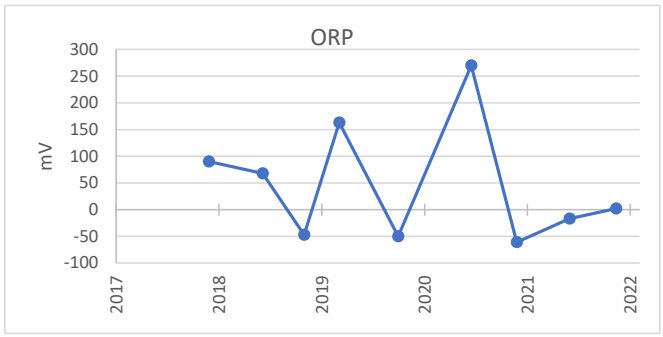
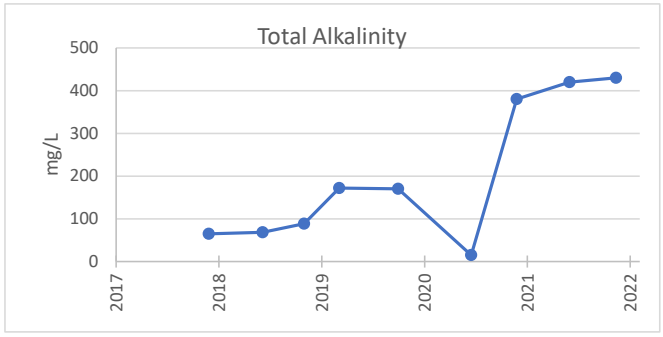
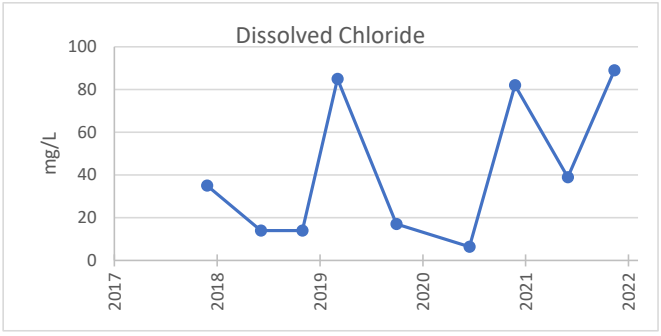
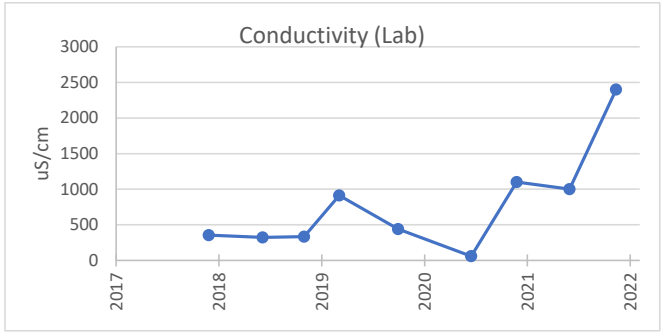


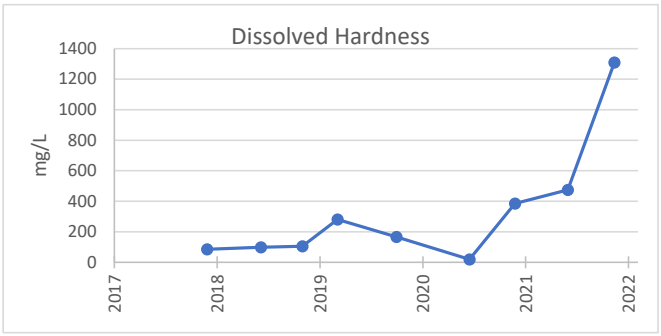
figure 1.6
CONCENTRATION VERSUS TIME - LEACHATE
2021 ANNUAL OPERATIONS AND MONITORING REPORT
UPLAND ORIGINAL LANDFILL, CAMPBELL RIVER, BC











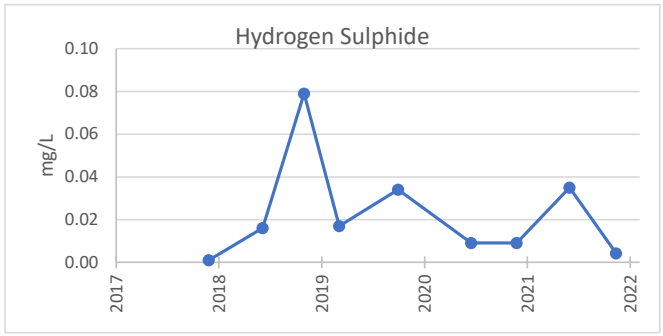


figure 1.7
CONCENTRATION VERSUS TIME - LEAK DETECTION
2021 ANNUAL OPERATIONS AND MONITORING REPORT
UPLAND ORIGINAL LANDFILL, CAMPBELL RIVER, BC

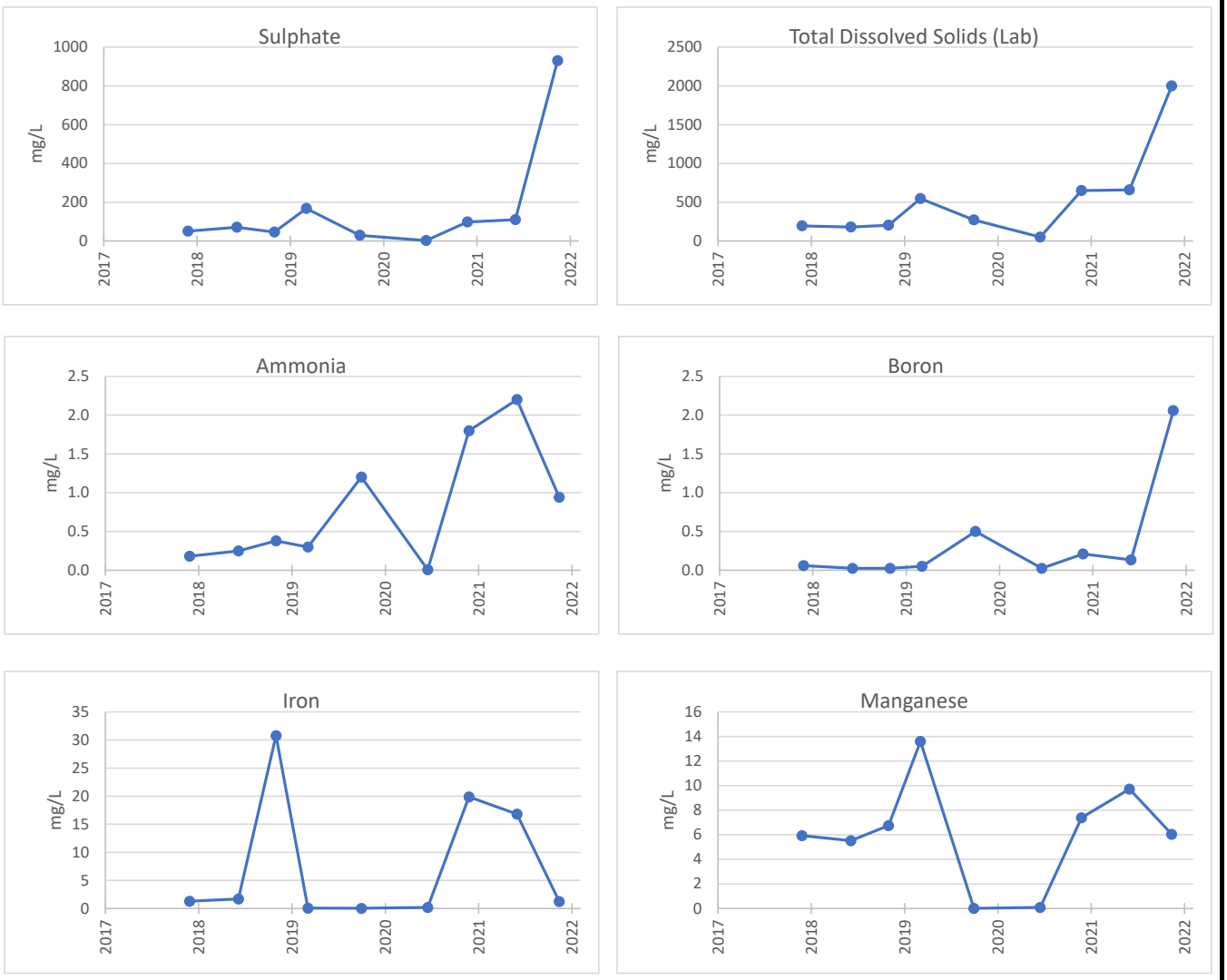


figure 1.8
CONCENTRATION VERSUS TIME - LEAK DETECTION
2021 ANNUAL OPERATIONS AND MONITORING REPORT
UPLAND ORIGINAL LANDFILL, CAMPBELL RIVER, BC

Appendix F

Annual Status Form

AUTHORIZATION NUMBER: 107689
AUTHORIZATION TYPE: Refuse, Permit
LEGAL AUTHORIZATION HOLDER NAME: Upland Excavating Ltd.

AUTHORIZED PERSON NAME: Terry Stuart
AUTHORIZED PERSON SIGNATURE:
SIGNATURE DATE: March 31, 2022

I understand that it is an offense to mislead a government official, and I declare that all of the information presented is accurate and true.
I have been given the authority by the authorization holder to sign this form.

CONDITION NUMBER	CONDITION DESCRIPTION	COMPLIANT? (Yes/No/ND)	ACTION TAKEN
1.1.1	The maximum rate of waste discharge to the Original Lined Cell is 45,000 tonnes per calendar year.	Yes	N/A - Refer to Section 2.5 of the annual report.
1.1.2	The characteristics of the waste discharge to the Original Lined Cell must be: (a) demolition waste, (b) construction waste, (c) land clearing waste, (d) soil in which the concentrations of all substances are less than the lowest applicable industrial land use standard specified for those substances in (i) the generic numerical soil standards, (ii) the matrix numerical soil standards, or (iii) a director's interim standard for soil, referred to in section 41(1)(a) of the Contaminated Sites Regulation, B.C. Reg. 375/96, (e) sludge from the Original Leachate Management Works, or, (f) other waste as authorized in writing by the director, but does not include: (g) hazardous waste except as authorized pursuant to the Hazardous Waste Regulation, controlled waste, Attractants, and, (h) waste and/or recyclable material prohibited in writing by the director.	Yes	N/A - Refer to Section 2.5 of the annual report.
1.1.3	The waste discharge is authorized to the Original Lined Cell approximately located as shown on Site Plan A. Waste discharge to the Original Un-Lined Cell is not authorized.	Yes	N/A - Waste was only discharged to the Original Lined Cell. Refer to Section 2.1 of the annual report.
1.1.4	Authorization to discharge waste to the Original Lined Cell ceases on the earlier of: (i) the date the Original Lined Cell is filled to capacity with grades not steeper than 3H:1V (33%), (ii) the date of commencement of waste discharge to the New Landfill.	Yes	N/A - Refer to Section 2.1 of the annual report.
1.1.5	The authorized works are: (i) a lined landfill footprint with a maximum area of 0.72 ha (85 m x 85 m) including from bottom to top a base with perimeter berm, 0.3 m sand cushion layer, 0.5 mm thick coated woven polyethylene liner, 0.3 m granular leak detection layer, leak detection riser pipe, 0.5 mm thick coated woven polyethylene liner, 0.3 m sand protection layer, leachate extraction chamber, final cover, and, (ii) an un-lined landfill footprint with an approximate area of 0.7 ha, final cover, and related appurtenances, approximately located as shown on Site Plan A	Yes	N/A - Refer to Section 2.1 of the annual report.
1.1.6	The operational certificate holder must ensure the Original Landfill, excluding final cover, is complete and fully operational on or before the date of issuance of this operational certificate, and at all times thereafter, until the Original Landfill is decommissioned in compliance with the plan referred to in section 2.9(a) (plan to remove all waste from the Original Landfill) of this operational certificate.	Yes	N/A
1.2.1	The operational certificate holder must convey the leachate from the Original Lined Cell, that is to be discharged on the Facility site, to the Original Leachate Management Works.	Yes	N/A - Refer to Section 2.2 of the annual report.
1.2.2	The maximum rate of treated leachate effluent discharge to the treated leachate infiltration pond is 7,139 m3 per calendar year.	Yes	N/A - Refer to Section 2.7 of the annual report.
1.2.3	The concentration of any substance in the treated leachate effluent discharge to the treated leachate infiltration pond must not be greater than the Contaminated Sites Regulation Generic Numerical Water Standards for Drinking Water (DW), for that substance.	Yes	N/A - Refer to Section 2.7 of the annual report.
1.2.4	The treated leachate effluent is authorized to be discharged to the treated leachate infiltration pond and infiltrated into the ground. This authorization ceases on the date the Original Leachate Management Works are decommissioned in compliance with the plan referred to in section 2.9(a) (plan to remove all waste from the Original Landfill) of this operational certificate.	Yes	N/A - The Original Leachate Management Works have not yet been decomissioned.
1.2.6	Minimum Freeboard must be maintained at all times as follows: treated leachate infiltration pond: 0.6 m	Yes	N/A
1.2.7	The operational certificate holder must ensure the Original Leachate Management Works are complete and fully operational on or before the date of commencement of discharge to the treated leachate infiltration pond, and at all times thereafter, until the Original Leachate Management Works are decommissioned in compliance with the plan referred to in section 2.9(a) (plan to remove all waste from the Original Landfill) of this operational certificate.	Yes	N/A - Refer to Section 2.2 of the annual report, the Original Leachate Management Works have not yet been decomissioned
1.3.1	The maximum rate of waste discharge to the New Landfill is: (45,000 minus the waste discharge to the Original Lined Cell) tonnes per calendar year.	Yes	N/A - Refer to Section 3.5 of the annual report.

AUTHORIZATION NUMBER: 107689
AUTHORIZATION TYPE: Refuse, Permit
LEGAL AUTHORIZATION HOLDER NAME: Upland Excavating Ltd.

AUTHORIZED PERSON NAME: Terry Stuart
AUTHORIZED PERSON SIGNATURE:
SIGNATURE DATE: March 31, 2022

I understand that it is an offense to mislead a government official, and I declare that all of the information presented is accurate and true.
I have been given the authority by the authorization holder to sign this form.

CONDITION NUMBER	CONDITION DESCRIPTION	COMPLIANT? (Yes/No/ND)	ACTION TAKEN
1.3.2	The characteristics of the waste discharge to the New Landfill must be: (a) demolition waste, (b) construction waste, (c) land clearing waste, (d) soil in which the concentrations of all substances are less than the lowest applicable industrial land use standard specified for those substances in (i) the generic numerical soil standards, (ii) the matrix numerical soil standards, or (iii) a director's interim standard for soil, referred to in section 41(1)(a) of the Contaminated Sites Regulation, B.C. Reg. 375/96, (e) sludge from the New Leachate Management Works or the New Stormwater Management Works, or, (f) other waste as authorized in writing by the director, but does not include: (g) hazardous waste except as authorized pursuant to the Hazardous Waste Regulation, controlled waste, Attractants, and, (h) waste and/or recyclable material prohibited in writing by the director.	Yes	N/A - Refer to Section 3.5 of the annual report.
1.3.3	The waste discharge is authorized to the New Landfill approximately located as shown on Site Plan A.	Yes	N/A - Refer to Section 3.5 of the annual report.
1.3.6	The operational certificate holder must ensure the New Landfill, excluding final cover, is complete and fully operational on or before the date of commencement of waste discharge to the New Landfill, and at all times thereafter.	Yes	N/A - Refer to Section 3.1 of the annual report.
1.4.1	The operational certificate holder must convey the leachate from the New Landfill, that is to be discharged on the Facility site, to the New Leachate Management Works.	Yes	N/A - Refer to Section 3.2 of the annual report.
1.4.2	The maximum rate of treated leachate effluent discharge to the treated leachate infiltration pond is 24,633 m3 per calendar year.	Yes	N/A - Refer to Section 3.7 of the annual report.
1.4.3	The concentration of any substance in the treated leachate effluent discharge to the treated leachate infiltration pond must not be greater than the Contaminated Sites Regulation Generic Numerical Water Standards for Drinking Water (DW), for that substance.	Yes	N/A - Refer to Section 3.8 of the annual report.
1.4.4	The treated leachate effluent is authorized to be discharged to the treated leachate infiltration pond and infiltrated into the ground.	Yes	N/A - Refer to Section 3.7 of the annual report.
1.4.5	The authorized works are leachate conveyance, treatment and discharge works including pumps, pipes, leachate treatment pond(s), treated leachate infiltration pond, flow monitoring works, and related appurtenances approximately located as shown on Site Plan A.	Yes	N/A - Refer to Section 3.2 of the annual report.
1.4.7	Minimum Freeboard must be maintained at all times as follows: leachate treatment pond(s): 0.6 m treated leachate infiltration pond: 0.6 m	Yes	N/A
1.4.8	The operational certificate holder must ensure the New Leachate Management Works are complete and fully operational on or before the date of commencement of waste discharge to the New Landfill, and at all times thereafter	Yes	N/A - Refer to Section 3.2 of the annual report.
1.5.1	The operational certificate holder must manage stormwater from the New Landfill such that stormwater is infiltrated into the ground with the authorized works.	Yes	N/A - Refer to Section 3.3 of the annual report
1.5.2	The stormwater must not include leachate and the concentration of any substance in the stormwater must not be greater than the Contaminated Sites Regulation Generic Numerical Water Standards for Drinking Water (DW), for that substance	Yes	N/A - Refer to Section 3.3 of the annual report, samples will be collected as part of the EMP which begins in 2022
1.5.4	Minimum Freeboard must be maintained at all times as follows: stormwater infiltration area: 0.6 m all other authorized works: 0.3 m	Yes	N/A

AUTHORIZATION NUMBER: 107689
AUTHORIZATION TYPE: Refuse, Permit
LEGAL AUTHORIZATION HOLDER NAME: Upland Excavating Ltd.

AUTHORIZED PERSON NAME: Terry Stuart
AUTHORIZED PERSON SIGNATURE:
SIGNATURE DATE: March 31, 2022

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I have been given the authority by the authorization holder to sign this form.

CONDITION NUMBER	CONDITION DESCRIPTION	COMPLIANT? (Yes/No/ND)	ACTION TAKEN
1.5.5	The operational certificate holder must ensure that adequate authorized works to manage stormwater, such that stormwater is infiltrated into the ground with the authorized works, are complete and fully operational on or before the date of commencement of waste discharge to the New Landfill, and at all times thereafter.	Yes	N/A - Refer to Section 3.3 of the annual report
2.70	Before a specific quantity of soil is accepted at the Facility, the operational certificate holder must cause a Qualified Professional to certify and submit to the operational certificate holder, a document pertaining to the specific quantity of soil that includes: (i) the soil tonnage(s) and soil quality class(es) as described in the most recent version of Technical Guidance 1 on Contaminated Sites Site Characterization and Confirmation Testing, (ii) the soil origin including applicable civic address, site identification number, parcel identifier, parcel identification number, legal description, and, (iii) characterization of the soil in accordance with ministry procedures and applicable Contaminated Sites Regulation Guidance, Protocols and Procedures.	Yes	N/A - Refer to Section 3.3 of the annual report.
2.11	The operational certificate holder must cause a Qualified Professional to carry out inspections before and during the construction or modification of Significant Works, and, after the completion of construction or modification of Significant Works, to certify and submit construction report(s) to the director for all Significant Works, on or before 60 days after the completion of construction or modification of the Significant Works.	Yes	N/A - Refer to Sections 3.1 of the annual report.
2.1	The operational certificate holder must notify the director of the date of commencement of waste discharge to the Original Lined Cell, on that date.	Yes	N/A
3.1	The operational certificate holder must provide and install multiple and/or spare works and auxiliary power facilities to ensure the Original Lined Cell, Original Leachate Management Works, New Landfill, New Leachate Management Works, and New Storm water Management Works, are complete and fully operational as specified in this operational certificate, including during maintenance, breakdowns and electrical power outages.	Yes	N/A
3.2	The operational certificate holder must cause persons that are qualified and trained to operate, regularly inspect, and maintain the Facility, in good working order. If components of the Facility have a manufacturer's recommended maintenance schedule, then those components must, at a minimum, be maintained in accordance with that schedule.	Yes	N/A
3.2	The operational certificate holder must prepare documents of the qualification and training of the persons operating, inspecting and maintaining the Facility, and of Facility inspections, operation and maintenance.	Yes	N/A
3.3	The operational certificate holder must ensure that at least one person responsible for the management of the Facility is certified, and maintains certification, by The Solid Waste Association of North America (SWANA) as a Manager of Landfill Operations, and at least one person responsible for the operation of the Facility has, within the preceding five years, successfully completed the SWANA Landfill Operations Basics course, on or before the earlier of: (i) the date of commencement of waste discharge to the Original Lined Cell, (ii) the date of commencement of waste discharge to the New Landfill, and at all times thereafter.	Yes	N/A
3.3	The operational certificate holder must prepare documents of the SWANA certification and training of the person(s) responsible for the management and operation of the Facility.	Yes	N/A
3.5	The operational certificate holder must ensure that the Facility does not cause the concentration of any substance in groundwater flowing from the Facility site boundary to be greater than: (i) the Contaminated Sites Regulation Generic Numerical Water Standards for Drinking Water (DW), for that substance, or (ii) if the local background concentration of any substance is greater than (i), the local background concentration of that substance.	Yes	N/A - Refer to Section 7 of the annual report.
3.7	The operational certificate holder must ensure that the Facility does not cause a nuisance including with regard to birds, rodents, insects, odour, noise, dust, litter, vector and wildlife attraction.	Yes	N/A
3.8	The operational certificate holder must prepare documents of complaints with regard to matters relevant to this operational certificate, including environmental and nuisance complaints. These documents must include the source and nature of the complaint, actions, responses, and corresponding dates and times.	Yes	N/A

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CONDITION NUMBER	CONDITION DESCRIPTION	COMPLIANT? (Yes/No/ND)	ACTION TAKEN
4.1	The operational certificate holder must carry out required sampling in accordance with the procedures described in the "British Columbia Field Sampling Manual for Continuous Monitoring and the Collection of Air, Air-Emission, Water, Wastewater, Soil, Sediment, and Biological Samples, 2013 Edition (Permittee)" or most recent edition, or by alternative procedures as authorized by the director.	Yes	N/A - Refer to Section 5.3 of the annual report.
4.2	The operational certificate holder must carry out required analyses in accordance with procedures described in the "British Columbia Laboratory Manual (2015 Permittee Edition)", or the most recent edition or by alternative procedures as authorized by the director.	Yes	N/A - Refer to Sections 5.4 of the annual report.
4.3	The operational certificate holder must obtain from the analytical laboratory(ies) their precision, accuracy and blank data for each sample set submitted by the operational certificate holder and an evaluation of the data acceptability, based on criteria set by such laboratory.	Yes	N/A - Refer toAppC of the annual report.
4.3	The operational certificate holder must submit samples to analytical laboratory(ies) that meet the definition of a qualified laboratory under the Environmental Data Quality Assurance Regulation.	Yes	N/A - Refer to Section 5.4 of the annual report.
4.3	The operational certificate holder must collect, prepare and submit for analysis by the analytical laboratory(ies) quality control (QC) samples for each parameter. As a minimum, the number of QC samples should be 20% of all samples collected (environmental + QC samples) within 48 hours of each other, and include duplicate, field and trip blank samples for each parameter.	Yes	N/A - Refer to Section 5.2 and AppB of the annual report.
5.2	The operational certificate holder must immediately notify the director or designate by email at EnvironmentalCompliance@gov.bc.ca, or as otherwise instructed by the director of any non-compliance with the requirements of this authorization by the operational certificate holder and must take remedial action to remedy any effects of such non-compliance.	Yes	N/A - No non-compliances. Refer to Sections 2.8 and 3.8 of the annual report.
5.2	The operational certificate holder must provide the director with written confirmation of all non-compliance events, including available test results within 24 hours of the original notification by email at EnvironmentalCompliance@gov.bc.ca, or as otherwise instructed by the director.	Yes	N/A - No non-compliances. Refer to Sections 2.8 and 3.8 of the annual report.
5.3	If the operational certificate holder fails to comply with any of the requirements of this authorization, the operational certificate holder must, within 30 days of such non-compliance, submit to the director a written report that is satisfactory to the director and includes, but is not necessarily limited to, the following: (i) all relevant test results obtained by the operational certificate holder related to the non-compliance, ii) an explanation of the most probable cause(s) of the non-compliance, and (iii) a description of remedial action planned and/or taken by the operational certificate holder to prevent similar non-compliance(s) in the future.	Yes	N/A - No non-compliances. Refer to Sections 2.8 and 3.8 of the annual report.
5.3	The operational certificate holder must submit all non-compliance reporting required to be submitted under this section by email to the Ministry's Compliance Reporting Submission Mailbox at EnvironmentalCompliance@gov.bc.ca or as otherwise instructed by the director.	Yes	N/A - No non-compliances. Refer to Sections 2.8 and 3.8 of the annual report.
5.4	The operational certificate holder must cause a Qualified Professional to certify and submit an Annual Operations and Monitoring Report in a format suitable for public release, for the preceding calendar year, to the director on or before March 31 of each year. On or before March 31 of each year, the operational certificate holder must post a copy of the Annual Operations and Monitoring Report online, on a website accessible to the public, and in accordance with any requirements of the director.	Yes	N/A
5.4	The Annual Operations and Monitoring Report must include a summary of OCP implementation that addresses the information in section 2.3(b), and summary of DOCP implementation that addresses the information in 2.5(b), of this operational certificate.	Yes	N/A - Refer to sections 2.3 and 3.3 of the annual report.
5.4	The Annual Operations and Monitoring Report must include a summary of construction reports.	Yes	N/A - Refer to section 3.1 of the annual report.
5.4	The Annual Operations and Monitoring Report must include annual and cumulative tonnages and categories of waste including soil tonnage(s) and soil quality class(es) discharged to the Original Lined Cell and to the New Landfill.	Yes	N/A - Refer to sections 2.5 and 3.5 of the annual report.
5.4	The Annual Operations and Monitoring Report must include remaining volume and life of the Original Lined Cell and of the New Landfill.	Yes	N/A - Refer to sections 2.5 and 3.5 of the annual report.
5.4	The Annual Operations and Monitoring Report must include a summary of treated leachate effluent quantity and quality discharged to the treated leachate infiltration pond.	Yes	N/A - Refer to sections 2.7 and 3.7 of the annual report.
5.4	The Annual Operations and Monitoring Report must include a summary of complaints and nuisances and description of remedial action planned and/or taken by the operational certificate holder to prevent similar complaints and nuisances in the future.	Yes	N/A - Refer to sections 2.9 and 3.9 of the annual report.
5.4	The Annual Operations and Monitoring Report must include a summary of non-compliance notifications and non-compliance reporting and description of remedial action planned and/or taken by the operational certificate holder to prevent similar non-compliance(s) in the future.	Yes	N/A - Refer to sections 2.8 and 3.8 of the annual report.

Authorized Person Initial:

Date: March 31, 2022

AUTHORIZATION NUMBER: 107689
AUTHORIZATION TYPE: Refuse, Permit
LEGAL AUTHORIZATION HOLDER NAME: Upland Excavating Ltd.

AUTHORIZED PERSON NAME: Terry Stuart
AUTHORIZED PERSON SIGNATURE:
SIGNATURE DATE: March 31, 2022

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CONDITION NUMBER	CONDITION DESCRIPTION	COMPLIANT? (Yes/No/ND)	ACTION TAKEN
5.4	The Annual Operations and Monitoring Report must include an annual status form in accordance with the instructions and template at the ministry website https://www2.gov.bc.ca/gov/content/environment/waste-management/waste-discharge-authorization/data-and-report-submissions/annual-status-form	Yes	N/A - Refer to this form (Appendix F of the annual report).
5.4	The Annual Operations and Monitoring Report must include a summary of OCP and DOCP implementation, and construction of Significant Works, planned for the next calendar year.	Yes	N/A - Refer to sections 2.3, 2.4, 3.3 and 3.4 of the annual report.
5.4	The Environmental Monitoring Plan Report must include site plan(s), sampling locations, storm water flow paths, groundwater elevations, gradients and flow directions.	Yes	N/A - Refer to Figures of the annual report.
5.4	The Environmental Monitoring Plan Report must include data including laboratory analysis and quality assurance and quality control results.	Yes	N/A - Refer to Appendices C and D of the annual report.
5.4	The Environmental Monitoring Plan Report must include data tabulation, trend analysis, graphs, diagrams, and interpretation.	Yes	N/A - Refer to Tables and AppE of the annual report.
5.4	The Environmental Monitoring Plan Report must include trigger level assessment plan monitoring, data, results and interpretation.	Yes	N/A - A trigger level assessment plan is not needed for the Original Lined Cell, the New Landfill EMP and trigger level response plan monitoring begins in 2022.
5.4	The Environmental Monitoring Plan Report must include any determination(s) of the local background concentration of substance(s) in accordance with section 3.5 of this operational certificate.	Yes	N/A - Local determination(s) on local background concentration of substances was not needed.
5.4	The Environmental Monitoring Plan Report must include comparison of the data with the standards for treated leachate effluent discharge, storm water quality, groundwater quality, and landfill gas management, specified in sections 1.2, 1.4, 1.5, 3.5 and 3.6 of this operational certificate, and identification of any non-compliance and predicted future non-compliance.	Yes	N/A - Refer to sections 6 and 7 of the annual report for groundwater. Northwin confirms that treated leachate effluent met CSR DW Standards. Stormwater quality monitoring begins at the New Landfill after the construction of the stormwater ditches. LFG monitoring begins after the installation of the probes.
5.4	The Environmental Monitoring Plan Report must include results, conclusions, recommendations and changes to the environmental monitoring plan.	Yes	N/A - Refer to sections 8 and 9 of the annual report.
5.4	The operational certificate holder must upload monitoring data associated with this operational certificate to the Ministry's Environmental Monitoring System (EMS) database, within 45 days of the end of the 3 month period in which the data is collected.	Yes	N/A - Data has been uploaded to the EMS by the laboratory.

Appendix G

New Landfill Environmental Monitoring Plan

Table 1

Environmental Monitoring Program Specification - 2022
Monitoring Schedule Rationale
New Landfill
Upland Excavating, Campbell River, BC

Sampling Location	Purpose	Sample Matrix	Hydraulic Monitoring	March/ April	June	August/ September	November
Groundwater Monitoring Program (9 locations)							
Upgradient Monitoring Wells (5 locations)							
MW6-17	To monitor upgradient groundwater quality	WG	√	√	√	√	√
MW9-17	To monitor upgradient groundwater quality	WG	√	√	√	√	√
MW1-14	To monitor upgradient groundwater quality	WG	√	√	√	√	√
MW4A-15	To monitor upgradient groundwater quality	WG	√	√	√	√	√
MW4B-15	To monitor upgradient groundwater quality	WG	√	√	√	√	√
Cross-Gradient Monitoring Wells (2 Locations)							
MW2-14	To monitor cross-gradient groundwater quality	WG	√	√	√	√	√
MW2A-16	To monitor cross-gradient groundwater quality	WG	√	√	√	√	√
Downgradient Compliance Monitoring Wells (2 Locations)							
MW10-17	To monitor downgradient groundwater quality	WG	√	√	√	√	√
MW12-17	To monitor downgradient groundwater quality	WG	√	√	√	√	√
Surface Water Monitoring Program (2 locations) (Quarterly water level monitoring, annual sampling)							
Rico Gauge	To monitor the water level in Rico Lake via surface water gauge.	n/a	√	√	√	√	√
SW15-02	To monitor surface water quality in Rico Lake	WS	-	-	-	-	√
McIvor Lake	To monitor the water level in McIvor Lake via BC Hydro Data Records - use link in notes below. **Look up and record on day of monitoring event** - data is only available for a limited period on BC Hydro website	n/a	√	√	√	√	√
SW15-01	To monitor surface water quality in McIvor Lake	WS	-	-	-	-	√
East Surface Water Ditch[1]	To monitor surface water quality in the perimeter ditches when water is present and flowing.	WS	-	√	√	√	√
West Surface Water Ditch[1]	To monitor surface water quality in the perimeter ditches when water is present and flowing.	WS	-	√	√	√	√
Leachate Monitoring Program (2 locations)							
S06-21	To characteize leachate quality collected from the Leachate Sump at northeast end of Landfill. Sampling location is from the leachate collection system sump riser pipe.	WL	n/a	√	√	√	√
TLIP[2]	To assess leachate treatment performance. Only collect sample if Upland is currently discharging treated leachate into pond. Sampling location is the end of the leachate discharge pipe.	WL	n/a	√	√	√	√
Leak Detection Monitoring Program (2 Locations) - Quarterly Measurement (2 locations, no samples collected)							
LS1	To monitor leakage through the primary liner of the landfill as part of the Triger Level Response Plan - If Leakage rate is increasing or is at or above 10.1 m3 per quarter during a single monitoring event, Immidiately contact PM. Sampling location is at the lysimeter	n/a	√	√	√	√	√
LS2	To monitor leakage through the primary liner of the TLIP as part of the Triger Level Response Plan - If Leakage rate is increasing or is at or above 10.1 m3 per quarter during a single monitoring event, Immidiately contact PM. Sampling location is at the lysimeter	n/a	√	√	√	√	√
Field Quality Assurance/Quality Control (QA/QC)[3]							
Field Blank		WG	-	√	-	√	√
Trip Blank		W	-	-	-	-	√
Groundwater Duplicate		WG	-	-	√	-	√
Leachate Duplicate		WL	-	√	-	√	-

Notes:

[1] - Surface water should be sampled in the perimeter ditches only if water is present and flowing. Stagnant water should not be sampled.

[2] - Treated Leachate Infiltration Pond (TLIP). Only collect a sample if Upland is currently discharging treated leachate into the pond. Sample collection point is the end of the treated leachate discharge pipe/hose. Do not collect stagnant leachate from the pond.

[3] - The number of QC samples should be 20% of all samples collected within 48 hours of each other;
and include duplicate, field blank, and trip blank samples for each parameter. Add QA/QC samples to the November event if 20% has not been reached.

McIvor Lake water level. Look up current water level at the Ladore Dam: https://www.bchydro.com/energy-in-bc/operations/transmission-reservoir-data/previous-reservoir-elevations/vancouver_island/ladore_ldr.html

Environmental Monitoring Program Specification - 2022
Analytical Parameters - Groundwater
New Landfill
Upland Excavating, Campbell River, BC

Groundwater (WG)	Quarterly			
	March/April	June	August/September	November
Water Level Monitoring				
Depth to Water	√	√	√	√
Depth to Bottom	√	√	√	√
Field Parameters				
Conductivity (uS/cm)	√	√	√	√
Oxidation reduction potential (mV)	√	√	√	√
pH (s.u.)	√	√	√	√
Temperature (deg C)	√	√	√	√
Total dissolved solids (mg/L)	√	√	√	√
Turbidity (ntu)	√	√	√	√
General Chemistry				
Dissolved Hardness (as $CaCO_3$)	√	√	√	√
Conductivity	√	√	√	√
Chloride	√	√	√	√
Sulphate	√	√	√	√
Sulphide, Un-ionized (as H_2S)	√	√	√	√
Total Dissolved Solids (TDS)	√	√	√	√
Nutrients				
Alkalinity (Speciated)	√	√	√	√
Ammonia Nitrogen	√	√	√	√
Nitrate (as N)	√	√	√	√
Nitrite (as N)	√	√	√	√
Nitrite/Nitrate (Calc)	√	√	√	√
Orthophosphate	√	√	√	√
LEPH/HEPH	√	√	√	√
Dissolved CSR Metals (incl. Hg)	√	√	√	√

Environmental Monitoring Program Specification - 2022
Analytical Parameters - Groundwater
New Landfill
Upland Excavating, Campbell River, BC

Groundwater (WG)	Quarterly			
	March/April	June	August/September	November
Water Level Monitoring				
Water level at Rico Gauge	√	√	√	√
Record water level using BC Hydro Data Records - use link in Table 1.	√	√	√	√
Field Parameters				
Conductivity (uS/cm)	√	√	√	√
Oxidation reduction potential (mV)	√	√	√	√
pH (s.u.)	√	√	√	√
Temperature (deg C)	√	√	√	√
Total dissolved solids (mg/L)	√	√	√	√
Turbidity (ntu)	√	√	√	√
General Chemistry				
Dissolved Hardness (as $CaCO_3$)	√	√	√	√
Conductivity	√	√	√	√
Chloride	√	√	√	√
Sulphate	√	√	√	√
Sulphide, Un-ionized (as H_2S)	√	√	√	√
Total Dissolved Solids (TDS)	√	√	√	√
Nutrients				
Alkalinity (Speciated)	√	√	√	√
Ammonia Nitrogen	√	√	√	√
Nitrate (as N)	√	√	√	√
Nitrite (as N)	√	√	√	√
Nitrite/Nitrate (Calc)	√	√	√	√
Orthophosphate	√	√	√	√
LEPH/HEPH	-	-	-	√
Total CSR Metals (incl. Hg)	√	√	√	√

Environmental Monitoring Program Specification - 2022
Analytical Parameters - Leachate Leak Detection Layer
New Landfill
Upland Excavating, Campbell River, BC

Leachate (WL)	Quarterly			
	March/April	June	August/September	November
Water Level Monitoring				
Depth to Water	√	√	√	√
Depth to Bottom	√	√	√	√
Field Parameters				
Conductivity (uS/cm)	√	√	√	√
Oxidation reduction potential (mV)	√	√	√	√
pH (s.u.)	√	√	√	√
Temperature (deg C)	√	√	√	√
Total dissolved solids (mg/L)	√	√	√	√
Turbidity (ntu)	√	√	√	√
General Chemistry				
Dissolved Hardness (as $CaCO_3$)	√	√	√	√
Conductivity	√	√	√	√
Chloride	√	√	√	√
Sulphate	√	√	√	√
Sulphide, Un-ionized (as H_2S)	√	√	√	√
Biological Oxygen Demand (BOD)	√	√	√	√
Chemical Oxygen Demand (COD)	√	√	√	√
Total Dissolved Solids (TDS)	√	√	√	√
Total Suspended Solids (TSS)	√	√	√	√
Nutrients				
Alkalinity (Speciated)	√	√	√	√
Ammonia Nitrogen	√	√	√	√
Nitrate (as N)	√	√	√	√
Nitrite (as N)	√	√	√	√
Nitrite/Nitrate	√	√	√	√
Orthophosphate	√	√	√	√
LEPH/HEPH	√	√	√	√
Metals				
Total CSR Metals (incl. Hg)	√	√	√	√
Other				
PFOS, PFOA, PFBS	-	-	-	√
BTEX/VPH	-	-	-	√

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