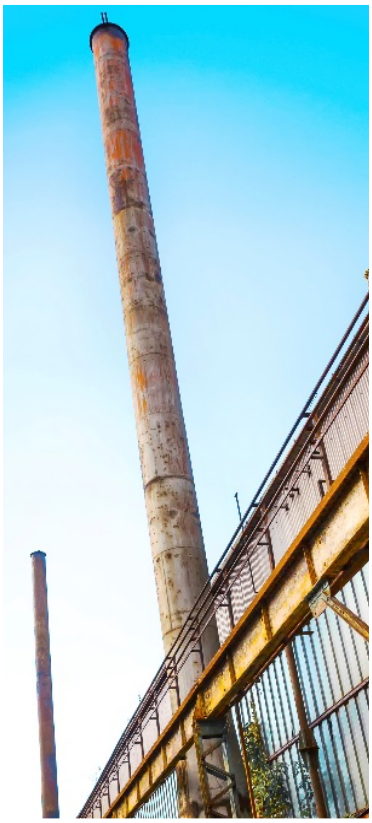
2020 Operations and Monitoring Report

for the Original Upland Landfill
Campbell River, British Columbia



Northwin Environmental

Table of Contents

Figure Index

Figure Index (following text)

Table Index

Table Index (following text)

Appendix Index

1. Introduction

GHD has been retained by Northwin Environment Ltd. (Northwin) to prepare this 2020 Annual Operations and Monitoring Report (Annual Report) for the Upland Original Landfill (Original Landfill or 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 2020 (Reporting Period). An evaluation of the operational and environmental performance of the landfill is provided with recommendations made for the ongoing landfill development 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 Background

The Site is approximately 48 hectares in size and is accessed from the north via an entrance from Gold River Highway. Currently, the Site encompasses a large sand and gravel pit (Pit) and the Original 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 for the Original Landfill 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 Northwin (previously known as Upland) and GHD dated November 10, 2017.

The OC was issued on August 1, 2019.

As shown on Site Plan A of the OC, the Original Landfill waste management area is located outside of the Pit near the southeast corner of the Site. The Original Landfill is comprised of the Original Lined Cell, Original Un-Lined Cell and Original Leachate Management Works (i.e., three leachate storage tanks), as shown on Figure 3. The OC authorizes waste discharge to the Original Lined Cell. Waste discharge to the Original Un-Lined Cell is not currently authorized.

An Operations and Closure Plan (OCP) for the landfill was submitted to the ENV on May 22, 2019. An updated OCP (Revision 1) was updated and submitted to the ENV on October 4, 2019.

1.2 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.

2. Site 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 Original Leachate Management Works. The Original Leachate Management Works are described in Section 2.2.

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 are discharged to the Original Lined Cell, and no waste is discharged to the Original Un-Lined Cell.

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.

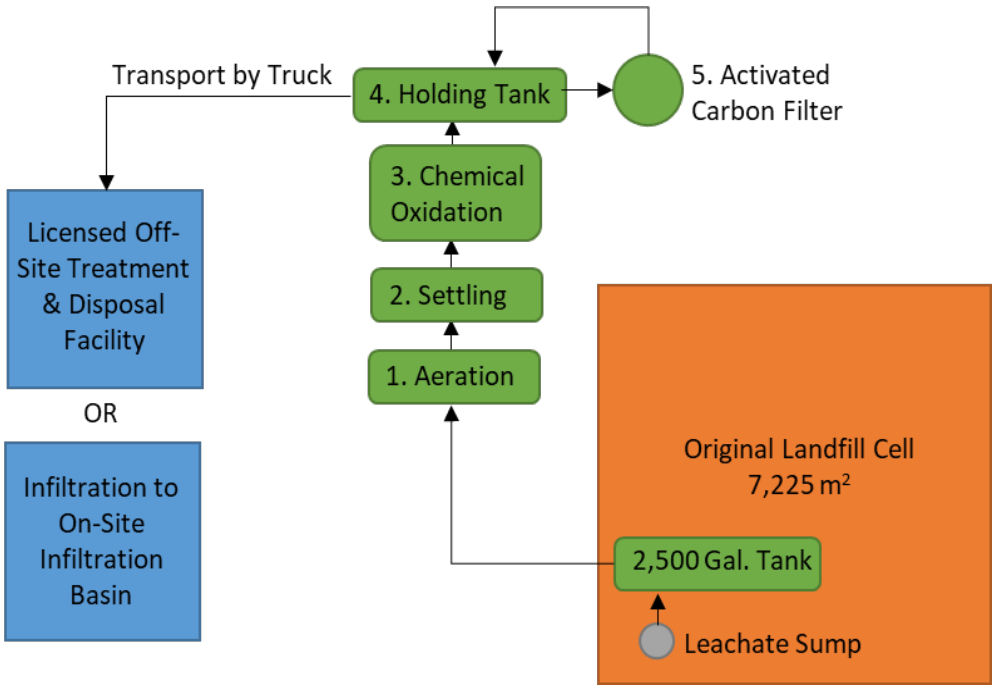


Figure 2.1 Leachate Management Works Schematic

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 Contaminated Site Regulation (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 DW standards will be accepted by Tervita Corporation (Newalta) located in Nanaimo, BC, or another provincially licensed facility. In 2020, treated leachate effluent met the CSR DW standards and was discharged to the on-Site infiltration basin.

2.3 Summary of OCP Implementation

During the Reporting Period, the Original Landfill operated in accordance with the OCP, including:

- 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, in November 2019, a polyethylene tarp was placed over all areas that received waste to minimize leachate generation.
- Site signage and security – new landfill signage was erected at the main entrance of the Site in November 2019. The signage included all information specified in Section 6.10 of the Landfill Criteria.
- Float Switch in Leachate Sump S03-19 – the leachate collection sump S03-19 provides collection and extraction of leachate from the northern portion of the lined cell. The sump has been set to automatically drain the sump to the leachate collection tank using a float switch.
- Installation of Leachate Sump S05-19 – the leachate collection sump S05-19 was installed to provide collection and extraction of leachate from the southern portion of the lined cell.
- Leachate collection – leachate is extracted from the landfill by active pumping from the sump S05-19, and the leachate collection chamber to a 6,600-gallon leachate storage tank.
- Original Leachate Management Works – construction of a pilot leachate treatment system was completed in 2020. The works include leachate collection extraction, storage and treatment from the Original Lined Cell.

2.4 Significant Works and Construction Reports

As defined in Section 2.1 of the OC, the significant works applicable to the Original Landfill include the Original Lined Cell, the Original Un-Lined Cell and the Original Leachate Management Works (conveyance, storage, treatment and discharge).

Since the submission of the 2019 Annual Operations and Monitoring report, the construction of the Original Leachate Management Works was completed. The Leachate Treatment Pilot System Construction Report documents the as-constructed features and effluent results of the treatment system. The report was submitted to the ENV on September 23, 2020.

No other significant works occurred.

2.5 Waste Acceptance

Waste is accepted at the landfill by appointment only. The wastes authorized for discharge into the Original Lined Cell are listed in Section 1.1.2 of the OC and includes:

- Demolition waste
- Construction waste
- Land clearing waste
- Sludge from the Original Leachate Management Works
- Soil meeting applicable CSR industrial land use standards
- Other waste as authorized in writing by the Director

In 2020, demolition, construction, land clearing (C&D waste) and soil meeting applicable CSR industrial land use (IL) standards (soil) was accepted for discharge at the landfill. Creosote timbers were also accepted as C&D waste.

Prior to the acceptance of C&D waste and soil, the C&D waste and soil was subject to a screening process. The C&D Waste Acceptance Policy and the Soil Acceptance Policy are described in the OCP, Sections 8.2 and 8.3, respectively.

2.6 Waste Tonnage and Volume

In 2020, Northwin accepted a total 12,303 metric tonnage or approximately 7,812 m^3 of waste for discharge to the Original Lined Cell.

- 849 metric tonnes of C&D waste or approximately 653 m^3 of C&D waste
- 11,454 metric tonnes of soil or approximately 7,159 m^3 of soil

Accepted soil is classified as industrial quality. No creosote timbers, hazardous waste, controlled waste, attractants, and/or recyclable material were received in 2020. 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.

2.7 Airspace Consumption – Total Original Landfill

As shown in Table 2.1, the total airspace consumption from January 1 through to December 31, 2020 is 7,812 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, 2020, was completed based on accepted total tonnages received for discharge to the Original Lined Cell.

Table 2.1 Airspace Consumption

	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

Table 2.1 Airspace Consumption

	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
Jan 1 thru Dec 31, 2020	0	7,812	7,812
Total Airspace Consumed	**35,000**	**17,703**	**52,703**
Total Capacity	**35,000**	**39,746**	**74,746**

2.8 Remaining Site Life – Original Lined Cell

The remaining lifespan of the Original Lined Cell has been calculated based on the maximum allowable annual fill rate and the apparent density of the anticipated wastes (see Section 2.6).

As shown in Table 2.2, the remaining Site life for the Original Lined Cell is 2.8 years, which is based on the 2020 airspace consumption of 7,812 m^3.

Table 2.2 Lifespan Analysis

Year	Waste Disposal Rate – tonnes	Airspace Consumption – m^3	Cumulative Waste in Place – tonnes	Cumulative Airspace Consumption – m^3
Pre-October 2019	5,779	4,446	5,779	4,446
Oct 5, 2019 – Dec 31, 2019	7,078	5,445	12,857	9,891
2020	12,303	7,812	25,160	17,703
Maximum Capacity				**39,746**
Airspace Available				**22,043**
Remaining Site Life Based on 2020 Airspace Consumption				**2.8 years**

2.9 Leachate Quantities Collected

The annual leachate generation was estimated as part of the OCP (Section 6.2). Based on the result of the water balance model and conceptual model for the landfill, the theoretical annual generation rate is approximately 7,139 m^3.

In 2020, the 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. In 2020, Northwin collected, treated and discharged approximately 148 m^3 of leachate.

2.10 Site Non-Compliance

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

2.11 Public Complaints

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

3. Site Physical Setting

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

3.1 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 1,323 millimetres (mm) of precipitation in 2020 with much of the rainfall occurring between November and January.

3.2 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.

3.3 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.

[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.

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.

3.4 Hydrogeologic Setting a

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

An unconfined aquifer exists within sand and gravel overlying bedrock at the Site. In 2020, the water table was present approximately 42-44 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.

4. 2020 Environmental Monitoring Program

This section presents the 2020 EMP and specification, sampling methodology, laboratory program, and quality assurance/quality control (QA/QC) program developed for the Site. Monitoring locations are presented on Figures 4 and 5.

4.1 Environmental Monitoring Program

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 leak detection layer locations. The objective of each component of the EMP is provided below.

Groundwater

The objective of the groundwater monitoring program 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 publically 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 4.1, below.

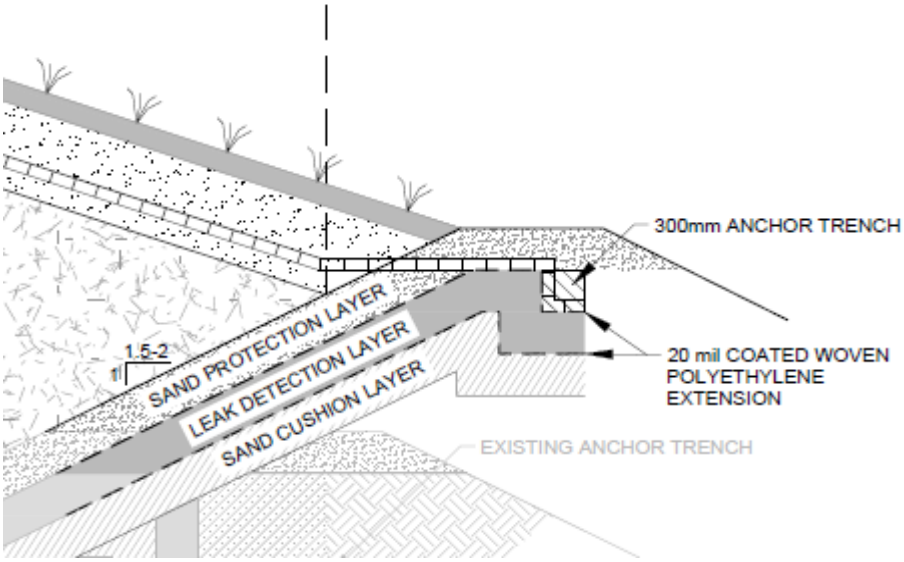


Figure 4.1 The Leak Detection Layer

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.

4.2 2020 Environmental Monitoring Program Summary

The 2020 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 monitoring 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.
- 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 three two duplicates, two trip blanks, and one field blank as part of the quality assurance/quality control program.
- Field sample key (FSK) preparation and environmental database updates.

4.3 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.

4.4 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.

4.5 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 2020 EMP has been determined to be acceptable for use in this Annual Report.

5. EMP Results and Water Quality Assessment

This section presents the EMP results and an assessment of groundwater and leak detection layer water for any 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 (2015 to 2018 data). 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.

5.1 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 4 and 5. 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 March (coinciding with the spring freshet) and reach their lowest levels in September (following periods of relatively lower precipitation).

5.2 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), PAHs, VOCs and 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 COD, BOD, TOC, ammonia, and nitrogen as well as high concentrations of calcium and magnesium due to the nature of the C&D waste.
- Containing increased metal concentrations as compared to 2019 likely derived from the acceptance of soil that meets the applicable soil discharge standards for the Site (IL). Metal concentrations are less than the applicable water quality standards (Section 6.1).
- Containing VOC concentrations less than applicable standards (Section 6.1) likely derived from the acceptance of soil that meets the applicable soil discharge standards for the Site (IL).
- Containing PAH concentrations greater than standards (in 2019) likely derived from the presence of the creosote treated wood waste within the lined cell.

5.3 Treated Leachate Effluent Quality

Treated leachate effluent was sampled by GHD field staff on June 18, 2020 and August 26, 2020. The samples were collected from the outlet of the Baker tank used for treated effluent storage and submitted to Bureau Veritas Laboratories for analysis.

Analytical results from the June 18 samples showed concentrations of dissolved chloride, dissolved manganese, and total manganese in these samples exceeded the CSR Schedule 3.2 Drinking Water Quality standards (CSR DW standards). Following additional treatment of the treated leachate effluent, GHD collected additional samples on August 26, 2020, from the treated leachate effluent holding tank. Concentrations for dissolved chloride, dissolved manganese, and total manganese in these samples were found to be below the CSR DW standards, which are the discharge criteria for the Site. The treated leachate effluent quality results and interpretation were provided to the ENV in the *Leachate Treatment Pilot System Construction Report* dated September 23, 2020.

5.4 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 contaminated soils:

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

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	Caused by the increased amount of cations and anions in solution due to the waste materials and dissolution of salts.

Parameter	Description
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.
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.

5.1 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, polycyclic aromatic hydrocarbons (PAHs) and volatile petroleum hydrocarbons (VOCs). The 2020 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 5.1 Leachate Water Quality Summary of Key Parameters

Parameter	Upgradient Concentration Range	Cross-Gradient Concentration Range	Downgradient Concentration Range	Leak Detection System	Leachate Concentration Range
ORP (millivolts)	200 - 280	245 - 259	209 - 247	-61 – 270	56 - 224
TDS (lab)	42 - 130	70 - 94	140 - 140	36 - 7180	240 - 1300
Dissolved Hardness	26.8 - 102	57 - 69.4	84.8 - 110	19.4 – 385	296 - 1030

Table 5.1 Leachate Water Quality Summary of Key Parameters

Parameter	Upgradient Concentration Range	Cross-Gradient Concentration Range	Downgradient Concentration Range	Leak Detection System	Leachate Concentration Range
Conductivity (lab) (uS/cm)	83 - 230	130 - 170	190 - 250	59 – 1100	770 - 1700
Bicarbonate	33 - 88	69 - 83	76 - 140	19 - 460	340 - 480
Alkalinity	27 - 72	56 - 68	62 - 120	15 - 380	280 - 400
Chloride	2.3 - 12	3.2 - 6.5	5.7 - 12	6.4 – 82	49 - 310
Sulphur	<3.0 – 7.70	<3.0	<3.0 – 3.1	<3.0- 30.8	13 - 165
Sulphate	3.1 - 23	4.8 - 7.5	6.6 - 9.1	1.9 – 98	37 - 350
Hydrogen Sulphide	<0.0019 - 0.0027	<0.0019 - <0.0020	<0.0020	<0.0020	<0.002 - 0.029
Dissolved Boron	<0.05	<0.05	<0.050	<0.05 - 0.211	<0.05 - 0.836
Dissolved Iron	<0.005 - 0.007	<0.005	<0.005 - 0.10	0.172 - 19.9	0.0289 - 6.68
Dissolved Manganese	<0.001	<0.001	<0.001 – 0.002	0.0898 - 7.39	1.98 - 7.39
Total Boron	--	--	--	<0.05 - 0.227	<0.05 - 1.39
Total Iron	--	--	--	5.48 - 26.1	0.486 - 12.8
Total Manganese	--	--	--	0.122 - 7.41	1.88 - 7.3
Total PAHs	--	--	<0.00010	<0.0001 - 0.002	<0.0001 - 0.16

Notes: Units are in mg/L unless otherwise noted; RED - greater than CSR DW standards; -- data not available.

General Chemistry Parameters and Nutrients

Elevated concentrations of general chemistry and nutrients were detected in the leak detection system compared to up-gradient groundwater. Elevated parameters include TDS, dissolved hardness, conductivity, bicarbonate, alkalinity, chloride, sulphur, and sulphate. The concentrations of these parameters measured in water from the leak detection system pipe (S01-19) are comparable to the concentrations measured in the leachate samples.

Water sampled from the leak detection system showed considerable variation in concentration between the June and November monitoring events. All of the general chemistry parameters and nutrients showed higher concentration in the November event than in the June event. In November, reducing conditions were apparent as indicated by a negative oxidation reduction potential (ORP) value and increased concentrations of dissolved metals that are sensitive to changes in ORP (e.g., iron and manganese). Metal concentrations are further discussed in the section below. At this time long term water quality trends are not apparent.

Metals

Elevated concentrations of metals were detected in the leak detection system. Iron and manganese show highly variable concentrations between monitoring events and appear to vary with ORP, this was also observed in the monitoring events carried out in 2018 and 2019.

In 2020, ORP varied from 270 mV to -61 mV between the June and November monitoring events. As was observed in previous years, the reducing conditions (negative ORP) are associated with significant increases in iron and manganese concentrations (0.172 to 19.9 mg/L and 0.089 to 7.39 mg/L, respectively).

In general, the metal analytes that are less sensitive to changes in ORP do not show significant variability in concentration between monitoring events.

PAHs and Petroleum Products

PAH compounds in the leak detection system water samples were less than the laboratory reporting levels (i.e., not detected) with the exception of 1-methylnaphthalene, acenaphthene, anthracene, fluorene, and naphthalene which were detected in the November monitoring event. All PAH compounds were reported at concentrations significantly below the BC CSR standards. The total PAH concentration increased from not detected in 2019 to 2.0 ug/L in 2020. Petroleum products were not detected in the leak detection layer water samples.

VOCs

VOCs were not detected in the leak detection system water sample.

5.2 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, polycyclic aromatic hydrocarbons (PAHs) and volatile petroleum hydrocarbons (VOCs). The 2020 analytical results are presented in Table 4.

A summary of the indicator parameter concentrations reported in the upgradient wells (MW2-14, MW2A-16, MW3-14), and cross-gradient well (MW10-17) are presented in Table 5.1.

Up-gradient Groundwater Monitoring Wells

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

The 2020 dataset was compared to historical concentrations. Little variation was observed between the 2017 to 2020 monitoring events at the up-gradient groundwater monitoring wells with the exception of MW2-14. Monitoring well MW2-14 showed higher concentrations of alkalinity, sulphate, TDS, turbidity, conductivity, hardness, bicarbonate, calcium, magnesium, and sodium in the March 2019 and/or June 2020 monitoring events. Concentrations of these parameters at MW2-14 in the November 2020 monitoring event however are within or below historical ranges. Because this spike in concentrations is not observed at either of the other two up-gradient monitoring wells (MW2A-16 and MW3-14), it is possible that the cause was localized to monitoring well MW2-14.

With the exception of the spike in concentrations at MW2-14, groundwater quality at the up-gradient monitoring wells has been stable since monitoring began in 2014.

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 as relatively fresh water with 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.

Downgradient Groundwater Monitoring Well

The water quality at the downgradient well (MW11-19) showed similar analyte concentrations during the June and November monitoring events. No exceedances of the CSR DW standards occurred in the 2020 monitoring events.

6. 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.

As presented in Table 4, downgradient groundwater concentrations were significantly less than the applicable CSR DW Standards (i.e., well below 20% of the standard) indicating Site compliance with respect to water quality.

6.1 Applicable Water Quality Standards

The downgradient groundwater analytical results have been assessed to the BC CSR Generic Numerical Water standards for DW, Schedule 3.2 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 4 and 5) 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.

6.2 Downgradient Groundwater Quality Assessment

Water quality compliance at the Site boundary was assessed by comparing groundwater concentrations from samples collected at MW11-19 to CSR DW standards. As presented in Table 4, groundwater concentrations were significantly less than the applicable CSR DW Standards (i.e., well below 20% of the standard) indicating Site compliance with respect to water quality.

7. 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

- The Original Landfill was compliant with the operational conditions of the OC during the Reporting Period, and no complaints were received.
- Since the submission of the 2019 Annual Operations and Monitoring report, the construction of the Original Leachate Management Works was completed. The works included leachate collection extraction, storage, and treatment from the Original Lined Cell. No other significant works occurred.
- The Leachate Treatment Pilot System Construction Report documents the as-constructed features and effluent results of the leachate treatment system. The report was submitted to the ENV on September 23, 2020.
- An estimated total of 653 m^3 of C&D waste and 7,159 m^3 of soil was discharged to the Original Lined Cell in 2020.
- The 2020 airspace consumption was estimated at 7,812 m^3.
- The total remaining airspace for the Original Landfill is estimated at 22,043 m^3.
- The remaining life for the Original Lined Cell is 2.8 years if waste is discharged at the same rate as 2020.

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.
- Leachate is characterized as a weak leachate. In general metal concentrations have increased from 2019 to 2020, and VOCs and PAHs are present in leachate likely derived from the continued 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. PAH compounds were detected

in the leak detection water with total PAH increasing slightly from not detected in 2019 to 2.0 ug/L in 2020. Petroleum products are not detected in the leak detection water but are detected in leachate. The ORP, iron and manganese levels measured in the leak detection water showed significant variability between monitoring events, consistent with the 2018 and 2019 results.

- Iron and manganese are present in the leak detection water at concentrations greater than the treated leachate effluent discharge criteria, which are the CSR DW standards.
- Groundwater quality at the up-gradient and cross-gradient monitoring wells is consistent with previous water quality monitoring results with the exception of MW2-14 which experienced a spike in several analyte concentrations between 2019 and 2020 and has since returned to historical levels.

8. Recommendations

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

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.

Water Quality Monitoring Recommendations

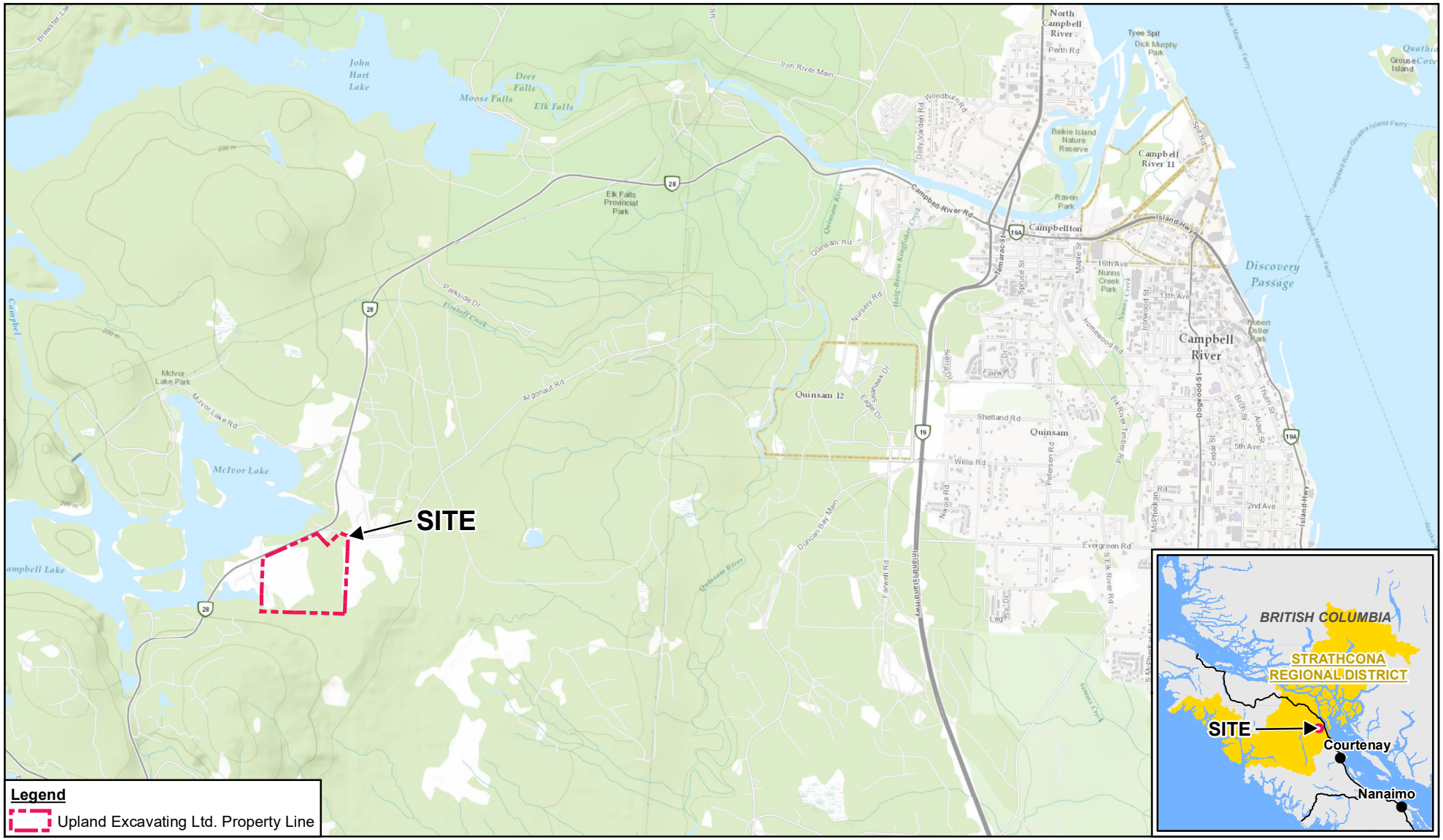
- Continue to complete the environmental monitoring program as outlined in Appendix B.

All of Which is Respectfully Submitted,

GHD

Rose Marie Rocca, P. Geo

Deacon Liddy, P. Eng.



Source: CanVec Edition 1.1 © Department of Natural Resources Canada, all rights reserved. National Road Network 2.0 GeoBase. ESRI Base Data, 2008.

0 500 1,000 1,500
Meters

Coordinate System:
NAD 1983 UTM Zone 10N

UPLAND EXCAVATING PROPERTY
2020 ANNUAL OPERATIONS AND MONITORING REPORT
UPLAND ORIGINAL LANDFILL

11222680
Mar 17, 2021

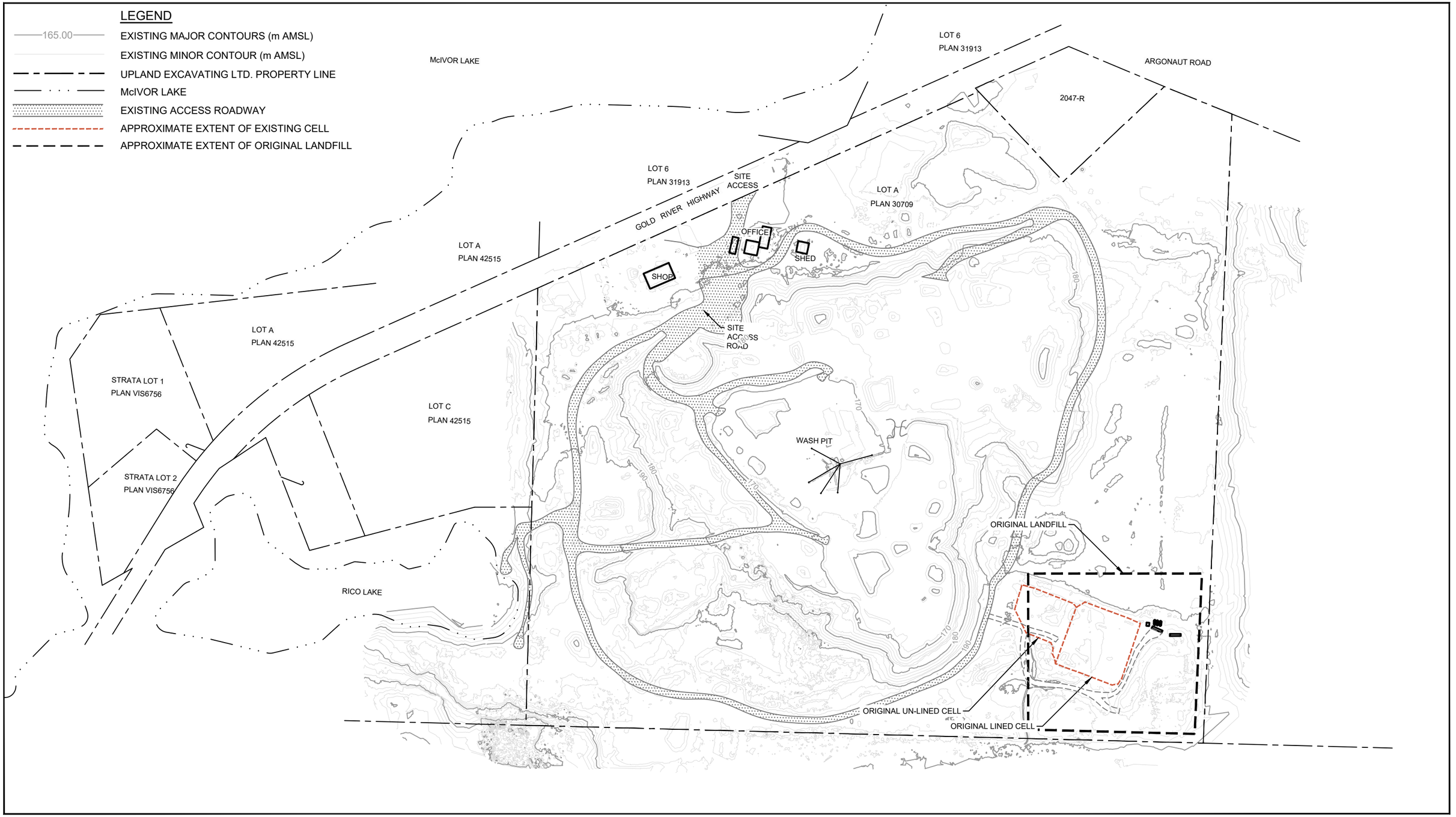
SITE LOCATION MAP

FIGURE 1

GIS File: Q:\GIS\PROJECTS\11222000s\11222680\Layouts\RPT-2020_ANNUAL\11222680(RPT-2020_ANNUAL)GIS001.mxd

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



SOURCE: TOPOGRAPHICAL SURVEY MARCH 2, 2020

0 40 80 120m

SCALE = 1:4000

UPLAND EXCAVATING PROPERTY
2020 ANNUAL OPERATIONS AND MONITORING REPORT
UPLAND ORIGINAL LANDFILL

SITE PLAN

11222680

Jan 18, 2021

FIGURE 2

CAD File: N:\CA\Vancouver\Projects\663\11222680\Digital_Design\ACAD\Figures\RPT-2020_ANNUAL\11222680(RPT-2020_ANNUAL)OT001.dwg

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

UN-LINED CELL

S02-17

S03-19

S01-17

EXISTING BUILDING

LEACHATE STORAGE TANKS

SEACAN FOR CHEMICAL STORAGE

LEACHATE FRAC TANK

TOP OF BERM

ACCESS ROAD

192

LINED CELL

ACCESS ROAD

170

180

190

192

S05-19

TOP OF BERM

ACCESS ROAD

SOURCE: TOPOGRAPHICAL SURVEY CONDUCTED BY McELHANNEY ASSOCIATES LAND SURVEYING LTD., NOVEMBER 21, 2016 AND DECEMBER 15, 2017.

0 6 12 18 24m

GHD

UPLAND EXCAVATING PROPERTY
2020 ANNUAL OPERATIONS AND MONITORING REPORT
UPLAND ORIGINAL LANDFILL

11222680

Jan 18, 2021

ORIGINAL LANDFILL SITE PLAN

FIGURE 3

CAD File: N:\CA\Vancouver\Projects\663\11222680\Digital_Design\ACAD\Figures\RPT-2020_ANNUAL\11222680(RPT-2020_ANNUAL)OT002.DWG

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 6 PLAN 31913
GOLD RIVER HIGHWAY
SITE ACCESS
OFFICE
SHED
SHOP
SITE ACCESS ROAD
LOT A PLAN 42515
LOT A PLAN 42515
LOT C PLAN 42515
STRATA LOT 1 PLAN VIS6756
STRATA LOT 2 PLAN VIS6756
WASH PIT
ORIGINAL LANDFILL
ORIGINAL UN-LINED CELL
ORIGINAL LINED CELL
RICO LAKE
RICO GAUGE (178.1)

MW9-17 (166.7)
MW8-17 (172.8)
MW1-14 (164.6)
MW6-17
MW7-17 (183.8)
MW15B-18 (175.4)
MW15A-18* (176.7)
MW4A-15* (163.0)
MW4B-15 (162.8)
MW2-14 (157.2)
MW2A-16 (157.2)
MW3-14 (154.6)
MW10-17 (145.3)
PZ1-19* (171.9)
MW5A-15* (183.4)
MW5B-15* (183.7)
MW11-19 (148.1)

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)

SOURCE: TOPOGRAPHICAL SURVEY MARCH 2, 2020

0 40 80 120m
SCALE = 1:4000

GHD

UPLAND EXCAVATING PROPERTY
2020 ANNUAL OPERATIONS AND MONITORING REPORT
UPLAND ORIGINAL LANDFILL

GROUNDWATER ELEVATION CONTOURS SAND & GRAVEL AQUIFER - JUNE 17, 2020

11222680
Mar 17, 2021

FIGURE 4

CAD File: N:\CA\Vancouver\Projects\663\11222680\Digital_Design\ACAD\Figures\RPT-2020_ANNUAL\11222680(RPT-2020_ANNUAL)OT003.dwg

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
LOT A PLAN 42515
LOT A PLAN 30709
LOT C PLAN 42515
STRATA LOT 1 PLAN VIS6756
STRATA LOT 2 PLAN VIS6756
ARGONAUT ROAD
2047-R
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 (178.1)

MW1-14 (164.6)
MW2-14 (157.2)
MW2A-16 (156.6)
MW3-14 (155.5)
MW4A-15* (163.1)
MW4B-15 (162.9)
MW5A-15* (185.5)
MW5B-15* (185.1)
MW6-17 (177.8)
MW7-17 (184.5)
MW8-17
MW9-17 (166.2)
MW10-17 (145.1)
MW11-19 (146.0)
MW15A-18*
MW15B-18*
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)

SOURCE: TOPOGRAPHICAL SURVEY MARCH 2, 2020

0 40 80 120m
SCALE = 1:4000

GHD

UPLAND EXCAVATING PROPERTY
2020 ANNUAL OPERATIONS AND MONITORING REPORT
UPLAND ORIGINAL LANDFILL

GROUNDWATER ELEVATION CONTOURS SAND & GRAVEL AQUIFER - NOVEMBER 26, 2020

11222680
Mar 17, 2021

FIGURE 5

CAD File: N:\CA\Vancouver\Projects\663\11222680\Digital_Design\ACAD\Figures\RPT-2020_ANNUAL\11222680(RPT-2020_ANNUAL)OT004.dwg

Table 1

Water Level Monitoring Data
2020 Operations and Monitoring Report
for the Original Upland Landfill
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:			**17-Jun-20**	**26-Nov-20**	**17-Jun-20**	**26-Nov-20**	**Primary Constituent**
MW1-14	11.0	172.9	8.3	8.4	164.6	164.6	Sand/gravel (S&G Aquifer)
MW2-14	21.6	173.8	16.7	16.7	157.2	157.2	Sand/gravel (S&G Aquifer)
MW2A-16	45.4	173.9	16.6	17.2	157.2	156.6	Sand (S&G Aquifer)
MW3-14	18.6	168.6	14.0	13.1	154.6	155.5	Sand/gravel (S&G Aquifer)
MW4A-15	21.3	169.3	6.3	6.3	163.0	163.1	Bedrock (S&G Aquifer)
MW4B-15	18.3	169.3	6.5	6.4	162.8	162.9	Sand (S&G Aquifer)
MW5A-15	10.7	191.9	8.4	6.4	183.4	185.5	Bedrock (Shallow Aquifer)
MW5B-15	8.2	192.0	8.3	7.0	183.7	185.1	Sand/Silt with clay (Shallow Aquifer)
MW6-17	11.3	*185.4*	-	7.6	-	177.8	Sand (S&G Aquifer)
MW7-17	4.3	*187.5*	3.7	3.1	183.8	184.5	Gravel (Shallow Aquifer)
MW8-17	18.8	*192.5*	19.7	-	172.8	-	Gravel (S&G Aquifer)
MW9-17	33.5	*191.7*	25.0	25.4	166.7	166.2	Sand/gravel (S&G Aquifer)
MW10-17	46.3	*189.1*	43.7	44.0	145.3	145.1	Sand (S&G Aquifer)
MW15A-18	15.2	183.1	6.4	-	176.7	-	Bedrock (S&G Aquifer)
MW15B-18	9.0	183.2	7.8	-	175.4	-	Silty/Clayey Sand (S&G Aquifer)
MW11-19	54.9	194.8	46.7	48.8	148.1	146.0	Sand (S&G Aquifer)
PZ1-19	20.4	192.1	20.2	19.6	171.9	172.6	Sand/Silty Gravel (Shallow Aquifer)
McIvor Lake**	-	-	-	-	176.7	176.6	-
SW15-02 Rico Lake*	-	180.3	2.2	2.4	178.1	178.0	-

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
2020 Operations and Monitoring Report
for the Original Upland Landfill
Campbell River, British Columbia

Sample Location:			S03-19	S05-19	S03-19	S03-19	S05-19
Sample ID:			Dry	Dry	WL-088877-271120-RP-06	WL-088877-271120-RP-07	WL-088877-271120-RP-09
Sample Date:		BC CSR[(1)] DW	06/18/2020	06/18/2020	11/27/2020	11/27/2020 Duplicate	11/27/2020
Parameters	**Units**	**a**					
Field Parameters							
Conductivity, field	uS/cm	--	--	--	2040	2040	311
Oxidation reduction potential (ORP), field	millivolts	--	--	--	62	62	56
pH, field	s.u.	--	--	--	6.58	6.58	6.41
Temperature, field	Deg C	--	--	--	11.93	11.93	14.48
Total dissolved solids, field (TDS)	g/L	--	--	--	1.30	1.30	240
Turbidity, field	NTU	--	--	--	41.2	41.2	49.0
General Chemistry							
Alkalinity (as CaCO3 pH=8.3)	mg/L	--	--	--	ND (1.0)	ND (1.0)	ND (1.0)
Alkalinity, total (as CaCO3)	mg/L	--	--	--	370	390	280
Biochemical oxygen demand (BOD)	mg/L	--	--	--	9.7 J	7.6 J	3.2
Chemical oxygen demand (COD)	mg/L	--	--	--	151	123	92
Chloride (dissolved)	mg/L	250	--	--	49 J	97 J	63
Conductivity	uS/cm	--	--	--	1100 J	1600 J	770
Hardness	mg/L	--	--	--	1030 J	717 J	296
Hardness (dissolved)	mg/L	--	--	--	855	815	276
Hydrogen sulfide	mg/L	0.05	--	--	ND (0.0020) J	ND (0.0020) J	0.027 J
Hydroxide (as CaCO3)	mg/L	--	--	--	ND (1.0)	ND (1.0)	ND (1.0)
Orthophosphate	mg/L	--	--	--	ND (0.0030)	ND (0.0030)	0.017
Sulfide	mg/L	0.05 *ref only	--	--	ND (0.0018) J	ND (0.0018) J	0.026 J
Sulphate (Dissolved)	mg/L	500	--	--	200 J	350 J	37
Total dissolved solids (TDS)	mg/L	--	--	--	810 J	1100 J	470
Total suspended solids (TSS)	mg/L	--	--	--	20	21	69
Nutrients							
Ammonia-N	mg/L	--	--	--	0.55	0.53	4.0
Bicarbonate (as CaCO3)	mg/L	--	--	--	450	470	340
Carbonate (as CaCO3)	mg/L	--	--	--	ND (1.0)	ND (1.0)	ND (1.0)
Nitrate (as N)	mg/L	10	--	--	1.04	1.09	0.18
Nitrite (as N)	mg/L	1	--	--	ND (0.10)	ND (0.10)	0.10
Nitrite/Nitrate	mg/L	10	--	--	1.04	1.09	0.28
Dissolved Metals							
Aluminum (dissolved)	ug/L	9500	--	--	9.3	8.8	57.8
Antimony (dissolved)	ug/L	6	--	--	ND (0.50)	ND (0.50)	ND (0.50)
Arsenic (dissolved)	ug/L	10	--	--	1.16	1.11	5.36
Barium (dissolved)	ug/L	1000	--	--	49.1	47.7	27.6
Beryllium (dissolved)	ug/L	8	--	--	ND (0.10)	ND (0.10)	ND (0.10)
Bismuth (dissolved)	ug/L	--	--	--	ND (1.0)	ND (1.0)	ND (1.0)
Boron (dissolved)	ug/L	5000	--	--	782	836	98
Cadmium (dissolved)	ug/L	5	--	--	0.119	0.139	0.016
Calcium (dissolved)	ug/L	--	--	--	265000	252000	79400
Chromium (dissolved)	ug/L	50	--	--	ND (1.0)	ND (1.0)	1.3
Cobalt (dissolved)	ug/L	20	--	--	5.14	4.82	5.60
Copper (dissolved)	ug/L	1500	--	--	26.6 J	33.4 J	8.94
Iron (dissolved)	ug/L	6500	--	--	784 J	371 J	6680a
Lead (dissolved)	ug/L	10	--	--	ND (0.20)	0.21	ND (0.20)
Lithium (dissolved)	ug/L	8	--	--	ND (2.0)	ND (2.0)	ND (2.0)
Magnesium (dissolved)	ug/L	--	--	--	47300	44700	19000
Manganese (dissolved)	ug/L	1500	--	--	7390[a]	6960[a]	4200a
Mercury (dissolved)	ug/L	1	--	--	0.0035	0.0036	ND (0.0019)
Molybdenum (dissolved)	ug/L	250	--	--	2.0	1.9	ND (1.0)
Nickel (dissolved)	ug/L	80	--	--	3.9	3.6	4.2
Phosphorus (dissolved)	ug/L	--	--	--	-	-	-
Potassium (dissolved)	ug/L	--	--	--	4740	4620	6410
Selenium (dissolved)	ug/L	10	--	--	0.36	0.33	0.23
Silicon (dissolved)	ug/L	--	--	--	9180	8890	11600
Silver (dissolved)	ug/L	20	--	--	ND (0.020)	ND (0.020)	ND (0.020)
Sodium (dissolved)	ug/L	200000	--	--	91600	86900 J	28600
Strontium (dissolved)	ug/L	2500	--	--	914	899	321
Sulphur (Dissolved)	ug/L	--	--	--	165000	157000 J	13000
Thallium (dissolved)	ug/L	--	--	--	ND (0.010)	ND (0.010)	ND (0.010)
Tin (dissolved)	ug/L	2500	--	--	ND (5.0)	ND (5.0)	ND (5.0)
Titanium (dissolved)	ug/L	--	--	--	ND (5.0)	ND (5.0)	ND (5.0)
Uranium (dissolved)	ug/L	20	--	--	6.15	5.99 J	0.15
Vanadium (dissolved)	ug/L	20	--	--	ND (5.0)	ND (5.0)	ND (5.0)
Zinc (dissolved)	ug/L	3000	--	--	18.0	16.7	20.2
Zirconium (dissolved)	ug/L	--	--	--	0.36	0.38	0.49
Total Metals							
Aluminum	ug/L	9500	--	--	92.4 J	367 J	1160
Antimony	ug/L	6	--	--	ND (1.0)	ND (0.50)	ND (0.50)
Arsenic	ug/L	10	--	--	1.75 J	1.37 J	8.19
Barium	ug/L	1000	--	--	65.6 J	46.8 J	35.1
Beryllium	ug/L	8	--	--	ND (0.20)	ND (0.10)	ND (0.10)
Bismuth	ug/L	--	--	--	ND (2.0)	ND (1.0)	ND (1.0)
Boron	ug/L	5000	--	--	1390 J	698 J	106
Cadmium	ug/L	5	--	--	0.250 J	0.130 J	0.038
Calcium	ug/L	--	--	--	319000 J	226000 J	86100
Chromium	ug/L	50	--	--	ND (2.0)	2.0	2.6
Cobalt	ug/L	20	--	--	5.56	4.97	6.55
Copper	ug/L	1500	--	--	48.9 J	81.3 J	21.5
Iron	ug/L	6500	--	--	3130	3500	12800a
Lead	ug/L	10	--	--	2.12 J	6.50 J	2.34
Lithium	ug/L	8	--	--	ND (4.0)	ND (2.0)	ND (2.0)
Magnesium	ug/L	--	--	--	55900 J	37100 J	19600
Manganese	ug/L	1500	--	--	7300[a]	6850[a]	4530a
Mercury	ug/L	1	--	--	0.0152 J	0.0123 J	0.0030
Molybdenum	ug/L	250	--	--	2.8 J	1.7 J	1.0
Nickel	ug/L	80	--	--	5.2 J	3.9 J	5.3
Phosphorus	ug/L	--	--	--	-	-	-
Potassium	ug/L	--	--	--	5190	4270	6990
Selenium	ug/L	10	--	--	0.42	0.33	0.29
Silicon	ug/L	--	--	--	8470	9630	13600
Silver	ug/L	20	--	--	ND (0.040)	ND (0.020)	0.023
Sodium	ug/L	200000	--	--	120000 J	66700 J	31200
Strontium	ug/L	2500	--	--	1110 J	770 J	337
Sulphur	ug/L	--	--	--	224000 J	127000 J	12100
Thallium	ug/L	--	--	--	ND (0.020)	ND (0.010)	ND (0.010)
Tin	ug/L	2500	--	--	ND (10)	ND (5.0)	ND (5.0)
Titanium	ug/L	--	--	--	ND (10) J	29.5 J	70.7
Uranium	ug/L	20	--	--	10.0 J	4.62 J	0.21
Vanadium	ug/L	20	--	--	ND (10)	ND (5.0)	10.2
Zinc	ug/L	3000	--	--	19 J	31.4 J	32.1
Zirconium	ug/L	--	--	--	0.50	0.48	0.66
Petroleum Products							
Total Petroleum Hydrocarbons VPH (C6-C10)LessBTEX	ug/L	--	--	--	ND (300)	ND (300)	ND (300)
Total Petroleum Hydrocarbons VH (C6-C10)	ug/L	15000	--	--	ND (300)	ND (300)	ND (300)
Volatile Organic Compounds							
Benzene	ug/L	5	--	--	ND (0.40)	ND (0.40)	ND (0.40)
Ethylbenzene	ug/L	140	--	--	ND (0.40)	ND (0.40)	ND (0.40)
m&p-Xylenes	ug/L	--	--	--	ND (0.40)	ND (0.40)	ND (0.40)
Methyl tert butyl ether (MTBE)	ug/L	95	--	--	ND (4.0)	ND (4.0)	ND (4.0)
o-Xylene	ug/L	--	--	--	ND (0.40)	ND (0.40)	ND (0.40)
Styrene	ug/L	800	--	--	ND (0.40)	ND (0.40)	ND (0.40)
Toluene	ug/L	60	--	--	ND (0.40)	ND (0.40)	0.48
Xylenes (total)	ug/L	90	--	--	ND (0.40)	ND (0.40)	ND (0.40)
PAHs							
1-Methylnaphthalene	ug/L	5.5	--	--	2.8	2.4	11a
2-Methylnaphthalene	ug/L	15	--	--	0.78 J	0.60 J	15
Acenaphthene	ug/L	250	--	--	3.8	3.3	15
Acenaphthylene	ug/L	--	--	--	0.060	0.056	0.20
Acridine	ug/L	--	--	--	0.20	0.16	0.37
Anthracene	ug/L	1000	--	--	0.24	0.24	2.3
Benzo(a)anthracene	ug/L	0.07	--	--	0.011	0.012	0.20a
Benzo(a)pyrene	ug/L	0.01	--	--	ND (0.0050)	ND (0.0050)	0.058a
Benzo(b)fluoranthene/Benzo(j)fluoranthene	ug/L	0.07	--	--	ND (0.030)	ND (0.030)	0.095a
Benzo(b)pyridine (Quinoline)	ug/L	0.05	--	--	ND (0.020)	ND (0.020)	0.12a
Benzo(g,h,i)perylene	ug/L	--	--	--	ND (0.050)	ND (0.050)	ND (0.050)
Benzo(k)fluoranthene	ug/L	--	--	--	ND (0.050)	ND (0.050)	ND (0.050)
Chrysene	ug/L	7	--	--	ND (0.020)	ND (0.020)	0.26
Dibenz(a,h)anthracene	ug/L	0.01	--	--	ND (0.0030)	ND (0.0030)	0.0047
Fluoranthene	ug/L	150	--	--	0.25	0.23	3.9
Fluorene	ug/L	150	--	--	1.7	1.5	11
Indeno(1,2,3-cd)pyrene	ug/L	--	--	--	ND (0.050)	ND (0.050)	ND (0.050)
Naphthalene	ug/L	80	--	--	15 J	12 J	83a
PAH high molecular weight	ug/L	--	--	--	0.42	0.40	7.3
PAH low molecular weight	ug/L	--	--	--	25	21	150
Phenanthrene	ug/L	--	--	--	0.97	0.90	13
Pyrene	ug/L	100	--	--	0.16	0.15	2.8
Total PAH	ug/L	--	--	--	26 J	21 J	160

Table 3

Leak Detection System Analytical Results
2020 Operations and Monitoring Report
for the Original Upland Landfill
Campbell River, British Columbia

Sample Location:			S01-17	S01-17
Sample ID:			W-88877-180620-NT-01	WL-088877-271120-RP-08
Sample Date:		BC CSR[(1)] DW	06/18/2020	11/27/2020
Parameters	**Units**	**a**		
Field Parameters				
Conductivity, field	uS/cm	--	56	1130
Dissolved oxygen (DO), field	mg/L	--	4.50	-
Oxidation reduction potential (ORP), field	millivolts	--	270	-61
pH, field	s.u.	--	7.34	6.87
Temperature, field	Deg C	--	16.14	11.44
Total dissolved solids, field (TDS)	g/L	--	0.04	7.18
Turbidity, field	NTU	--	2.8	29.5
General Chemistry				
Alkalinity (as CaCO3 pH=8.3)	mg/L	--	ND (1.0)	ND (1.0)
Alkalinity, total (as CaCO3)	mg/L	--	15	380
Biochemical oxygen demand (BOD)	mg/L	--	ND (2.0)	3.2
Chemical oxygen demand (COD)	mg/L	--	19	72
Chloride (dissolved)	mg/L	250	6.4	82
Conductivity	uS/cm	--	59	1100
Hardness	mg/L	--	19.4	385
Hardness (dissolved)	mg/L	--	18.5	387
Hydrogen sulfide	mg/L	0.05	ND (0.0020)	ND (0.0020) J
Hydroxide (as CaCO3)	mg/L	--	ND (1.0)	ND (1.0)
Orthophosphate	mg/L	--	ND (0.0030)	ND (0.0030)
Sulfide	mg/L	0.05 *ref only	ND (0.0018)	ND (0.0018) J
Sulphate (Dissolved)	mg/L	500	1.9	98
Total dissolved solids (TDS)	mg/L	--	50	650
Total suspended solids (TSS)	mg/L	--	8.8	76
Nutrients				
Ammonia-N	mg/L	--	ND (0.015)	1.8
Bicarbonate (as CaCO3)	mg/L	--	19	460
Carbonate (as CaCO3)	mg/L	--	ND (1.0)	ND (1.0)
Nitrate (as N)	mg/L	10	ND (0.020)	ND (0.10)
Nitrite (as N)	mg/L	1	ND (0.0050)	ND (0.10)
Nitrite/Nitrate	mg/L	10	ND (0.020)	ND (0.10)
Dissolved Metals				
Aluminum (dissolved)	ug/L	9500	4.5	15.3
Antimony (dissolved)	ug/L	6	ND (0.50)	ND (0.50)
Arsenic (dissolved)	ug/L	10	0.11	0.82
Barium (dissolved)	ug/L	1000	2.6	41.5
Beryllium (dissolved)	ug/L	8	ND (0.10)	ND (0.10)
Bismuth (dissolved)	ug/L	--	ND (1.0)	ND (1.0)
Boron (dissolved)	ug/L	5000	ND (50)	211
Cadmium (dissolved)	ug/L	5	ND (0.010)	0.012
Calcium (dissolved)	ug/L	--	5480	114000
Chromium (dissolved)	ug/L	50	ND (1.0)	ND (1.0)
Cobalt (dissolved)	ug/L	20	0.26	7.10
Copper (dissolved)	ug/L	1500	0.66	1.02
Iron (dissolved)	ug/L	6500	172	**19900[a]**
Lead (dissolved)	ug/L	10	ND (0.20)	ND (0.20)
Lithium (dissolved)	ug/L	8	ND (2.0)	ND (2.0)
Magnesium (dissolved)	ug/L	--	1170	24900
Manganese (dissolved)	ug/L	1500	89.8	**7390[a]**
Mercury (dissolved)	ug/L	1	ND (0.0019)	ND (0.0019)
Molybdenum (dissolved)	ug/L	250	ND (1.0)	ND (1.0)
Nickel (dissolved)	ug/L	80	ND (1.0)	ND (1.0)
Phosphorus (dissolved)	ug/L	--	ND (10)	-
Potassium (dissolved)	ug/L	--	174	7430
Selenium (dissolved)	ug/L	10	ND (0.10)	0.15
Silicon (dissolved)	ug/L	--	1300	4890
Silver (dissolved)	ug/L	20	ND (0.020)	ND (0.020)
Sodium (dissolved)	ug/L	200000	4030	69600
Strontium (dissolved)	ug/L	2500	18.0	438
Sulfur (dissolved)	ug/L	--	ND (3000)	30800
Thallium (dissolved)	ug/L	--	ND (0.010)	ND (0.010)
Tin (dissolved)	ug/L	2500	ND (5.0)	ND (5.0)
Titanium (dissolved)	ug/L	--	ND (5.0)	ND (5.0)
Uranium (dissolved)	ug/L	20	ND (0.10)	ND (0.10)
Vanadium (dissolved)	ug/L	20	ND (5.0)	ND (5.0)
Zinc (dissolved)	ug/L	3000	ND (5.0)	7.5
Zirconium (dissolved)	ug/L	--	ND (0.10)	0.18
Total Metals				
Aluminum	ug/L	9500	202	637
Antimony	ug/L	6	ND (0.50)	ND (0.50)
Arsenic	ug/L	10	0.37	1.48
Barium	ug/L	1000	5.2	45.6
Beryllium	ug/L	8	ND (0.10)	ND (0.10)
Bismuth	ug/L	--	ND (1.0)	ND (1.0)
Boron	ug/L	5000	ND (50)	227
Cadmium	ug/L	5	0.020	0.041
Calcium	ug/L	--	5790	115000
Chromium	ug/L	50	ND (1.0)	ND (1.0)
Cobalt	ug/L	20	0.72	7.51
Copper	ug/L	1500	2.18	4.93
Iron	ug/L	6500	5480	**26100[a]**
Lead	ug/L	10	2.43	3.02
Lithium	ug/L	8	ND (2.0)	ND (2.0)
Magnesium	ug/L	--	1200	23900
Manganese	ug/L	1500	122	**7410[a]**
Mercury	ug/L	1	ND (0.0019)	0.0028
Molybdenum	ug/L	250	ND (1.0)	ND (1.0)
Nickel	ug/L	80	ND (1.0)	1.5
Phosphorus	ug/L	--	18	-
Potassium	ug/L	--	179	7280
Selenium	ug/L	10	ND (0.10)	0.18
Silicon	ug/L	--	1640	5650
Silver	ug/L	20	ND (0.020)	0.022
Sodium	ug/L	200000	4170	66100
Strontium	ug/L	2500	19.4	448
Sulfur	ug/L	--	ND (3000)	30600
Thallium	ug/L	--	ND (0.010)	ND (0.010)
Tin	ug/L	2500	ND (5.0)	ND (5.0)
Titanium	ug/L	--	13.0	54.1
Uranium	ug/L	20	ND (0.10)	ND (0.10)
Vanadium	ug/L	20	ND (5.0)	5.3
Zinc	ug/L	3000	12.4	17.1
Zirconium	ug/L	--	0.10	0.46
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	--	ND (0.40)	ND (0.40)
Styrene	ug/L	800	ND (0.40)	ND (0.40)
Toluene	ug/L	60	ND (0.40)	ND (0.40)
Xylenes (total)	ug/L	90	ND (0.40)	ND (0.40)
PAHs				
1-Methylnaphthalene	ug/L	5.5	ND (0.050)	0.077
2-Methylnaphthalene	ug/L	15	ND (0.10)	ND (0.10)
Acenaphthene	ug/L	250	ND (0.050)	1.3
Acenaphthylene	ug/L	--	ND (0.050)	ND (0.050)
Acridine	ug/L	--	ND (0.050)	ND (0.050)
Anthracene	ug/L	1000	ND (0.010)	0.030
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	ND (0.020)	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)	ND (0.020)
Fluorene	ug/L	150	ND (0.050)	0.26
Indeno(1,2,3-cd)pyrene	ug/L	--	ND (0.050)	ND (0.050)
Naphthalene	ug/L	80	ND (0.10)	0.33
PAH high molecular weight	ug/L	--	ND (0.050)	ND (0.050)
PAH low molecular weight	ug/L	--	ND (0.10)	2.0
Phenanthrene	ug/L	--	ND (0.050)	ND (0.050)
Pyrene	ug/L	100	ND (0.020)	ND (0.020)
Total PAH	ug/L	--	ND (0.10)	2.0

Table 4

Groundwater Analytical Results
2020 Operations and Monitoring Report
for the Original Upland Landfill
Campbell River, British Columbia

Well Location:			Upgradient	Upgradient	Upgradient	Upgradient	Upgradient	Upgradient	Cross-Gradient	Cross-Gradient	Cross-Gradient	Downgradient	Downgradient
Sample Location:			MW2-14	MW2-14	MW2A-16	MW2A-16	MW3-14	MW3-14	MW10-17	MW10-17	MW10-17	MW11-19	MW11-19
Sample ID:			WG-88877-180620-NT-06	WG-088877-261120-RP-04	WG-88877-180620-NT-07	WG-088877-261120-RP-03	WG-88877-180620-NT-04	WG-088877-261120-RP-02	WG-88877-180620-NT-02	WG-88877-180620-NT-03	WG-088877-271120-RP-05	WG-88877-180620-NT-01	WG-088877-261120-RP-01
Sample Date:		BC CSR[1] DW	06/18/2020	11/26/2020	06/18/2020	11/26/2020	06/18/2020	11/26/2020	06/18/2020	06/18/2020 Duplicate	11/27/2020	06/18/2020	11/26/2020
Parameters	**Units**	**a**											
Field Parameters													
Conductivity, field	uS/cm	--	205	109	65	73	99	72	123	123	153	206	220
Oxidation reduction potential (ORP), field	millivolts	--	280	234	200	212	257	221	245	245	259	209	247
pH, field	s.u.	--	7.05	7.52	8.20	8.19	7.10	7.42	7.24	7.24	7.44	5.32	6.6
Temperature, field	Deg C	--	11.43	10.77	13.05	11.50	11.10	6.10	11.78	11.78	10.74	14.24	11.61
Total dissolved solids, field (TDS)	mg/L	--	133	71	42	48	64	47	80	80	99	134	142
Turbidity, field	NTU	--	3.1	13.1	1.6	7.0	44.3	4.8	4.3	4.3	5.8	190	82.1
General Chemistry													
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)
Alkalinity, total (as CaCO3)	mg/L	--	72	54	28	39	41	27	56	58	68	62	120
Chloride (dissolved)	mg/L	250	12	2.3	ND (1.0)	ND (1.0)	3.7	3.5	3.2 J	4.5 J	6.5	12	5.7
Conductivity	uS/cm	--	230	130	85	85	110	83	130	140	170	190	250
Hardness (dissolved)	mg/L	--	102	52.7	33.7	38.9	32.6	26.8	57.4	57.0	69.4	84.8	110
Hydrogen sulfide	mg/L	0.05	ND (0.0019)	ND (0.0020) J	0.0027	ND (0.0020) J	ND (0.0019)	ND (0.0020) J	ND (0.0019)	ND (0.0019)	ND (0.0020) J	ND (0.0019)	ND (0.0020) J
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)
Orthophosphate	mg/L	--	0.0049	0.0077	0.024	0.023	0.0053	0.0050	0.012	0.013	0.012	0.010	0.011
Sulfide	mg/L	0.05 *ref only	ND (0.0018)	ND (0.0018) J	0.0026	ND (0.0018) J	ND (0.0018)	ND (0.0018) J	ND (0.0018)	ND (0.0018)	ND (0.0018) J	ND (0.0018)	ND (0.0018) J
Sulphate (Dissolved)	mg/L	500	23	5.4	3.1	3.1	6.5	6.2	4.9	4.8	7.5	9.1	6.6
Total dissolved solids (TDS)	mg/L	--	130	60	42	42	66	50	94	70	94	140	140
Nutrients													
Ammonia-N	mg/L	--	ND (0.015)	0.017	ND (0.015)	ND (0.015)	ND (0.015)	0.016	ND (0.015)	ND (0.015)	0.019	0.022	ND (0.015)
Bicarbonate (as CaCO3)	mg/L	--	88	66	34	47	49	33	69	71	83	76	140
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)
Nitrate (as N)	mg/L	10	1.06	0.24	0.041	ND (0.10)	0.417	0.52	0.338	0.345	0.34	1.89	0.37
Nitrite (as N)	mg/L	1	ND (0.0050)	ND (0.10)	ND (0.0050)	ND (0.10)	ND (0.0050)	ND (0.10)	ND (0.0050)	ND (0.0050)	ND (0.10)	ND (0.0050)	ND (0.10)
Nitrite/Nitrate	mg/L	10	1.06	0.24	0.041	ND (0.10)	0.417	0.52	0.338	0.345	0.34	1.89	0.37
Dissolved Metals													
Aluminum (dissolved)	ug/L	9500	ND (3.0)	ND (3.0)	5.1	5.6	ND (3.0)	ND (3.0)	ND (3.0)	ND (3.0)	3.6	ND (3.0)	134
Antimony (dissolved)	ug/L	6	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	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)	0.12	0.78	0.81	ND (0.10)	ND (0.10)	0.44	0.43	0.39	0.27	0.25
Barium (dissolved)	ug/L	1000	2.6	1.4	2.9	2.8	1.1	ND (1.0)	2.9	3.0	3.6	6.7	8.2
Beryllium (dissolved)	ug/L	8	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	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)	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)	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)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)
Calcium (dissolved)	ug/L	--	32100	16400	10800	12500	9440	7780	18300	18200	22100	26900	35000
Chromium (dissolved)	ug/L	50	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)	1.3	1.3
Cobalt (dissolved)	ug/L	20	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)
Copper (dissolved)	ug/L	1500	1.77	1.08	0.37	0.59	0.20	1.18	0.20	ND (0.20)	0.76	0.20	1.54
Iron (dissolved)	ug/L	6500	7.0	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	104
Lead (dissolved)	ug/L	10	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	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)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)
Magnesium (dissolved)	ug/L	--	5290	2840	1600	1830	2190	1790	2850	2830	3420	4260	5610
Manganese (dissolved)	ug/L	1500	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)	1.9
Mercury (dissolved)	ug/L	1	ND (0.0019)	ND (0.0019)	ND (0.0019)	ND (0.0019)	ND (0.0019)	0.0022	ND (0.0019)	ND (0.0019)	0.0032	ND (0.0019)	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)	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)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Phosphorus (dissolved)	ug/L	--	ND (10)	-	27	-	ND (10)	-	17	15	-	12	-
Potassium (dissolved)	ug/L	--	286	226	163	197	200	159	337	334	375	382	486
Selenium (dissolved)	ug/L	10	0.19	0.10	ND (0.10)	ND (0.10)	0.28	0.22	0.18	0.17	0.15	0.20	0.20
Silicon (dissolved)	ug/L	--	6590	6020	3840	3930	5610	3340	5910	5870	5880	8880	8800
Silver (dissolved)	ug/L	20	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)
Sodium (dissolved)	ug/L	200000	4890	3920	977	1130	9430	5170	6560	6430	6540	5160	7730
Strontium (dissolved)	ug/L	2500	51.7	26.4	14.0	16.4	20.0	14.7	25.4	25.6	31.5	44.3	56.9
Sulfur (dissolved)	ug/L	--	7700	ND (3000)	ND (3000)	ND (3000)	ND (3000)	ND (3000)	ND (3000)	ND (3000)	ND (3000)	3100	ND (3000)
Thallium (dissolved)	ug/L	--	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	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)	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)	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)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)
Vanadium (dissolved)	ug/L	20	ND (5.0)	ND (5.0)	6.1	6.7	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	5.1
Zinc (dissolved)	ug/L	3000	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	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)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)

2020 Operations and Monitoring Report
for the Original Upland Landfill
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.
ND	Not detected at the associated reporting limit.
J	Estimated concentration.
(i)	Cobalt concentrations in groundwater do not exceed the referenced cobalt interim background groundwater concentration estimate. Standard confirmed in email received from ENV, November 7, 2017.
J	The analyte was positively identified; the associated numerical value is the estimated concentration of the analyte in the sample.
	Exceeds standard.
--	Currently no standard.

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.

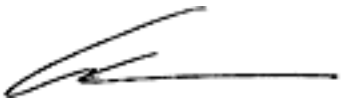
Requirements may also be specified by the *Environmental Management Act* and regulations including, but not limited to, the Contaminated Sites Regulation, Environmental Data Quality Assurance Regulation, Hazardous Waste Regulation, Landfill Gas Management Regulation, Organic Matter Recycling Regulation, 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

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

(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.

Date issued: August 1, 2019

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

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

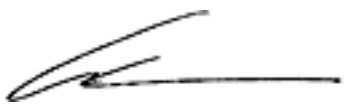
Where this authorization provides that the director may specify a matter or require an action to be carried out, the operational certificate holder must comply with the specification and carry out the action in accordance with the requirements of the director.

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.

Date issued: August 1, 2019



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

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.

Date issued: August 1, 2019

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

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

Date issued: August 1, 2019

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

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.

Date issued: August 1, 2019

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

(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,

Date issued: August 1, 2019

Luc Lachance, P.Eng
for Director, *Environmental Management Act*
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,

Date issued: August 1, 2019

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

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.

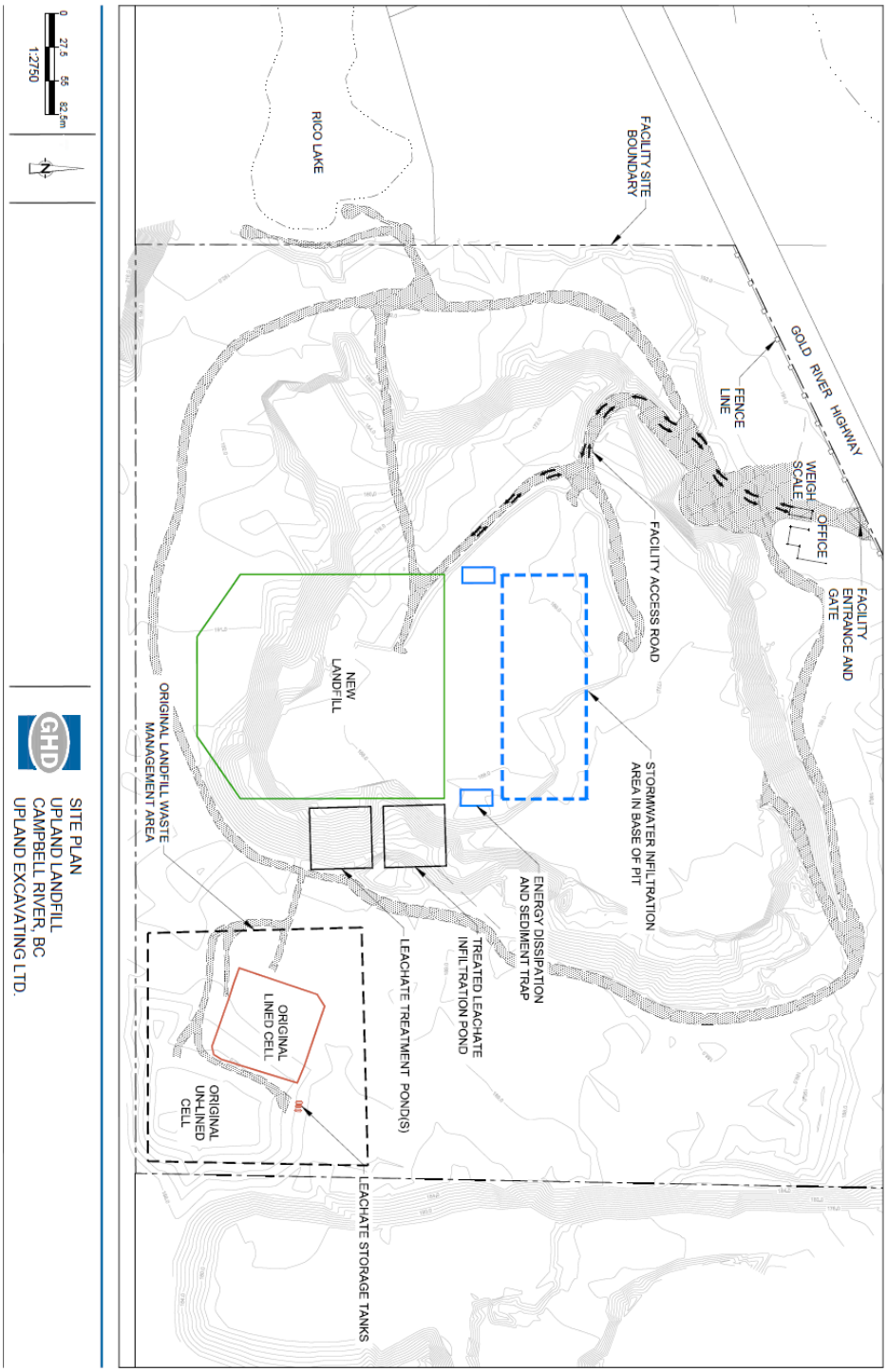
(b) The Province will not publish any information that could not, if it were subject to a request under section 5 of the *Freedom of Information and Protection of Privacy Act*, be disclosed under that Act.

(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.

Date issued: August 1, 2019

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

Site Plan A



Date issued: August 1, 2019

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

Appendix B
EMP Specification

Table 1

2021 Environmental Monitoring Program Specification
Original Landfill
Northwin Environmental, 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					
Field Blank		WG	-	√	-
Trip Blank		W	-	-	√
Groundwater Duplicate		WG	-	-	√
Leachate Duplicate		WL	-	√	-

Notes:

S02-17 - Decommissioned

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 - 2021
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 as S (Low Level) + 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)	√	√

Environmental Monitoring Program Specification - 2021
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 as S (Low Level) + 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

EMS ID	Lab Report Number	Sample Name	Date	Time	Temperature	Temperature Unit	Field pH (s.u.)	ORP	ORP units	Conductivity	Conductivity Unit	Turbidity (NTU)	Dissolved Oxygen (DO)	DO Units	TDS	TDS Units
E320215	C042096	WG-88877-180620-NT-01	06/18/2020	09:00	14.24	deg C	5.32	209	millivolts	206	uS/cm	190			134	mg/L
E320214	C042096	WG-88877-180620-NT-02	06/18/2020	09:45	11.78	deg C	7.24	245	millivolts	123	uS/cm	4.3			80	mg/L
E320214	C042096	WG-88877-180620-NT-03	06/18/2020	09:55	11.78	deg C	7.24	245	millivolts	123	uS/cm	4.3			80	
E320213	C042096	WG-88877-180620-NT-04	06/18/2020	12:00	11.10	deg C	7.10	257	millivolts	99	uS/cm	44.3			64	mg/L
N/A	C042096	WG-88877-180620-NT-05	06/18/2020	12:15												
E320211	C042096	WG-88877-180620-NT-06	06/18/2020	13:00	11.43	deg C	7.05	280	millivolts	205	uS/cm	3.1			133	mg/L
E320212	C042096	WG-88877-180620-NT-07	06/18/2020	13:30	13.05	deg C	8.20	200	millivolts	65	uS/cm	1.6			42	mg/L
N/A	C042088	TRIP BLANK	06/18/2020	08:00												
N/A	C042088	WL-88877-180620-NT-01	06/18/2020	10:00	18.46	deg C	7.54	224	millivolts	1680	uS/cm	3.9			1070	mg/L
E320216	C042093	W-88877-180620-NT-01	06/18/2020	11:00	16.14	deg C	7.34	270	millivolts	56	uS/cm	2.8	4.50	mg/L	36	mg/L

Facility ID	Lab Report Number	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
1088877000	C042096	WG-88877-180620-NT-01	MW11-19	06/18/2020	09:00	N	WG		46.682	m BTOR		silty, no odour	14.24	deg C	5.32	209	millivolts	206	uS/cm	190			134	mg/L
1088877000	C042096	WG-88877-180620-NT-02	MW10-17	06/18/2020	09:45	N	WG		43.737	m BTOR		clear, no odour	11.78	deg C	7.24	245	millivolts	123	uS/cm	4.3			80	mg/L
1088877000	C042096	WG-88877-180620-NT-03	MW10-17	06/18/2020	09:55	FD	WG	WG-88877-180620-NT-02					11.78	deg C	7.24	245	millivolts	123	uS/cm	4.3			80	mg/L
1088877000	C042096	WG-88877-180620-NT-04	MW3-14	06/18/2020	12:00	N	WG		13.997	m BTOR		slightly silty, no odour	11.10	deg C	7.10	257	millivolts	99	uS/cm	44.3			64	mg/L
1088877000	C042096	WG-88877-180620-NT-05	Field Blank	06/18/2020	12:15	FB	WGQ																	
1088877000	C042096	WG-88877-180620-NT-06	MW2-14	06/18/2020	13:00	N	WG		16.684	m BTOR		clear, no odour	11.43	deg C	7.05	280	millivolts	205	uS/cm	3.1			133	mg/L
1088877000	C042096	WG-88877-180620-NT-07	MW2A-16	06/18/2020	13:30	N	WG		16.630	m BTOR		clear, no odour	13.05	deg C	8.20	200	millivolts	65	uS/cm	1.6			42	mg/L
1088877000	C042088	TRIP BLANK	Trip Blank	06/18/2020	08:00	TB	WLQ																	
1088877000	C042093	W-88877-180620-NT-01	S01-17	06/18/2020	11:00	N	W		7.39	m BTOR		clear, some orange precipitate, odour	16.14	deg C	7.34	270	millivolts	56	uS/cm	2.8	4.50	mg/L	36	mg/L

Your P.O. #: 73506780-7
Your Project #: 88877-07-02
Site#: 88877-07-02
Site Location: LEACHATE WATER UPLAND
Your C.O.C. #: 08484205, 08484201

Attention: 088877 Distribution

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

Report Date: 2020/06/27
Report #: R2896166
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C042088
Received: 2020/06/19, 08:00

Sample Matrix: Water
Samples Received: 2

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity @25C (pp, total), CO3,HCO3,OH	1	N/A	2020/06/22	BBY6SOP-00026	SM 23 2320 B m
Biochemical Oxygen Demand	1	2020/06/20	2020/06/25	BBY6SOP-00045	SM 23 5210 B m
BTEX/MTBE LH, VH, F1 SIM/MS	1	N/A	2020/06/22	BBY8SOP-00010 / BBY8SOP-00011 / BBY8SOP-00012	BCMOE BCLM Jul 2017
BTEX/MTBE LH, VH, F1 SIM/MS	1	N/A	2020/06/23	BBY8SOP-00010 / BBY8SOP-00011 / BBY8SOP-00012	BCMOE BCLM Jul 2017
Chloride/Sulphate by Auto Colourimetry	1	N/A	2020/06/23	BBY6SOP-00011 / BBY6SOP-00017	SM23-4500-Cl/SO4-E m
COD by Colorimeter	1	N/A	2020/06/23	BBY6SOP-00024	SM 23 5220 D m
Conductivity @25C	1	N/A	2020/06/22	BBY6SOP-00026	SM 23 2510 B m
Sulphide (as H2S) (1)	1	N/A	2020/06/25		Auto Calc
Hardness Total (calculated as CaCO3) (2)	1	N/A	2020/06/25	BBY WI-00033	Auto Calc
Hardness (calculated as CaCO3)	1	N/A	2020/06/23	BBY WI-00033	Auto Calc
Mercury (Dissolved) by CV	1	2020/06/22	2020/06/22	AB SOP-00084	BCMOE BCLM Oct2013 m
Mercury (Total) by CV	1	2020/06/22	2020/06/22	AB SOP-00084	BCMOE BCLM Oct2013 m
Na, K, Ca, Mg, S by CRC ICPMS (diss.)	1	N/A	2020/06/23	BBY WI-00033	Auto Calc
Elements by CRC ICPMS (dissolved)	1	N/A	2020/06/23	BBY7SOP-00002	EPA 6020b R2 m
Na, K, Ca, Mg, S by CRC ICPMS (total)	1	2020/06/19	2020/06/25	BBY WI-00033	Auto Calc
Elements by CRC ICPMS (total)	1	2020/06/23	2020/06/24	BBY7SOP-00003 / BBY7SOP-00002	EPA 6020b R2 m
Ammonia-N (Total) (1)	1	N/A	2020/06/26	AB SOP-00007	SM 23 4500 NH3 A G m
Nitrate + Nitrite (N)	1	N/A	2020/06/20	BBY6SOP-00010	SM 23 4500-NO3- I m
Nitrite (N) by CFA	1	N/A	2020/06/20	BBY6SOP-00010	SM 23 4500-NO3- I m
Nitrogen - Nitrate (as N)	1	N/A	2020/06/20	BBY WI-00033	Auto Calc
PAH in Water by GC/MS (SIM)	1	2020/06/23	2020/06/24	BBY8SOP-00021	BCMOE BCLM Jul2017m
Total LMW, HMW, Total PAH Calc (3)	1	N/A	2020/06/25	BBY WI-00033	Auto Calc
Filter and HNO3 Preserve for Metals	1	N/A	2020/06/19	BBY7 WI-00004	SM 23 3030B m
Orthophosphate by Konelab (4)	1	N/A	2020/06/20	BBY6SOP-00013	SM 23 4500-P E m
Total Sulphide (1)	1	N/A	2020/06/25	AB SOP-00080	SM 23 4500 S2-A D Fm
Total Dissolved Solids (Filt. Residue)	1	2020/06/22	2020/06/23	BBY6SOP-00033	SM 23 2540 C m

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

Your P.O. #: 73506780-7
Your Project #: 88877-07-02
Site#: 88877-07-02
Site Location: LEACHATE WATER UPLAND
Your C.O.C. #: 08484205, 08484201

Attention: 088877 Distribution

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

Report Date: 2020/06/27
Report #: R2896166
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C042088
Received: 2020/06/19, 08:00

Sample Matrix: Water
Samples Received: 2

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Total Suspended Solids (NFR)	1	2020/06/23	2020/06/24	BBY6SOP-00034	SM 23 2540 D m
Volatile HC-BTEX (5)	2	N/A	2020/06/23	BBY WI-00033	Auto Calc

Remarks:

Bureau Veritas Laboratories are accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by BV Labs 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 BV Labs profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and BV Labs 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.

BV Labs liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. BV Labs 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 BV Labs, unless otherwise agreed in writing. BV Labs 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 BV Labs, results relate to the supplied samples tested.

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 BV Labs 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) 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) Orthophosphate > Total Phosphorus Imbalance: When applicable, Orthophosphate, Total Phosphorus and dissolved Phosphorus results were reviewed and data quality meets acceptable levels unless otherwise noted.
(5) VPH = VH - (Benzene + Toluene + Ethylbenzene + m & p-Xylene + o-Xylene + Styrene)

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

Your P.O. #: 73506780-7
Your Project #: 88877-07-02
Site#: 88877-07-02
Site Location: LEACHATE WATER UPLAND
Your C.O.C. #: 08484205, 08484201

Attention: 088877 Distribution

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

Report Date: 2020/06/27
Report #: R2896166
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C042088
Received: 2020/06/19, 08:00

Encryption Key

Bureau Veritas Laboratories
27 Jun 2020 06:06:42

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Nahed Amer, Project Manager
Email: Nahed.AMER@bvlabs.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

BV Labs Job #: C042088
Report Date: 2020/06/27

GHD Limited
Client Project #: 88877-07-02
Site Location: LEACHATE WATER UPLAND
Your P.O. #: 73506780-7
Sampler Initials: NT

RESULTS OF CHEMICAL ANALYSES OF WATER

BV Labs ID		XY4651			
Sampling Date		2020/06/18 10:00			
COC Number		08484205			
	UNITS	WL-88877-180620-NT-01	RDL	MDL	QC Batch
ANIONS					
Nitrite (N)	mg/L	<0.0050	0.0050	0.0050	9893925
Calculated Parameters					
Filter and HNO3 Preservation	N/A	FIELD	N/A	N/A	ONSITE
Nitrate (N)	mg/L	<0.020	0.020	N/A	9892745
Sulphide (as H2S)	mg/L	0.029	0.0020	N/A	9892270
Demand Parameters					
Biochemical Oxygen Demand	mg/L	<2.0	2.0	N/A	9893798
Chemical Oxygen Demand	mg/L	110	10	10	9897034
Misc. Inorganics					
Conductivity	uS/cm	1700	2.0	N/A	9895394
Total Dissolved Solids	mg/L	1100	10	N/A	9895609
Total Suspended Solids	mg/L	6.0	1.0	N/A	9896523
Anions					
Alkalinity (PP as CaCO3)	mg/L	<1.0	1.0	N/A	9895393
Alkalinity (Total as CaCO3)	mg/L	400	1.0	N/A	9895393
Bicarbonate (HCO3)	mg/L	480	1.0	N/A	9895393
Carbonate (CO3)	mg/L	<1.0	1.0	N/A	9895393
Hydroxide (OH)	mg/L	<1.0	1.0	N/A	9895393
Total Sulphide	mg/L	0.027	0.0018	N/A	9899935
Dissolved Chloride (Cl)	mg/L	310 (1)	10	N/A	9897412
Dissolved Sulphate (SO4)	mg/L	110	1.0	N/A	9897412
Nutrients					
Total Ammonia (N)	mg/L	0.26	0.015	0.0040	9902565
Orthophosphate (P)	mg/L	0.50	0.0030	0.0030	9893968
Nitrate plus Nitrite (N)	mg/L	<0.020	0.020	0.020	9893924

RDL = Reportable Detection Limit
N/A = Not Applicable
(1) 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 #: C042088
Report Date: 2020/06/27

GHD Limited
Client Project #: 88877-07-02
Site Location: LEACHATE WATER UPLAND
Your P.O. #: 73506780-7
Sampler Initials: NT

CSR BTEX/VPH IN WATER (WATER)

BV Labs ID		XY4651		XY4716			
Sampling Date		2020/06/18 10:00		2020/06/18 08:00			
COC Number		08484205		08484201			
	UNITS	WL-88877-180620-NT-01	QC Batch	TRIP BLANK	RDL	MDL	QC Batch
Calculated Parameters							
VPH (VHW6 to 10 - BTEX)	ug/L	<300	9892208	<300	300	300	9896089
Volatiles							
Methyl-tert-butylether (MTBE)	ug/L	<4.0	9894746	<4.0	4.0	4.0	9896852
Benzene	ug/L	<0.40	9894746	<0.40	0.40	0.40	9896852
Toluene	ug/L	<0.40	9894746	<0.40	0.40	0.40	9896852
Ethylbenzene	ug/L	<0.40	9894746	<0.40	0.40	0.40	9896852
m & p-Xylene	ug/L	<0.40	9894746	<0.40	0.40	0.40	9896852
o-Xylene	ug/L	<0.40	9894746	<0.40	0.40	0.40	9896852
Styrene	ug/L	<0.40	9894746	<0.40	0.40	0.40	9896852
Xylenes (Total)	ug/L	<0.40	9894746	<0.40	0.40	0.40	9896852
VH C6-C10	ug/L	<300	9894746	<300	300	300	9896852
Surrogate Recovery (%)							
1,4-Difluorobenzene (sur.)	%	95	9894746	111	N/A	N/A	9896852
4-Bromofluorobenzene (sur.)	%	99	9894746	96	N/A	N/A	9896852
D4-1,2-Dichloroethane (sur.)	%	93	9894746	110	N/A	N/A	9896852

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 #: C042088
Report Date: 2020/06/27

GHD Limited
Client Project #: 88877-07-02
Site Location: LEACHATE WATER UPLAND
Your P.O. #: 73506780-7
Sampler Initials: NT

CSR/CCME DISS. METALS IN WATER W/ CV HG (WATER)

BV Labs ID		XY4651	XY4651			
Sampling Date		2020/06/18 10:00	2020/06/18 10:00			
COC Number		08484205	08484205			
	UNITS	WL-88877-180620-NT-01	WL-88877-180620-NT-01 Lab-Dup	RDL	MDL	QC Batch
Calculated Parameters						
Dissolved Hardness (CaCO3)	mg/L	570	N/A	0.50	0.50	9892272
Elements						
Dissolved Mercury (Hg)	ug/L	<0.0019	<0.0019	0.0019	0.0019	9894710
Dissolved Metals by ICPMS						
Dissolved Aluminum (Al)	ug/L	5.5	N/A	3.0	0.030	9895375
Dissolved Antimony (Sb)	ug/L	<0.50	N/A	0.50	0.0020	9895375
Dissolved Arsenic (As)	ug/L	3.17	N/A	0.10	0.010	9895375
Dissolved Barium (Ba)	ug/L	10.3	N/A	1.0	0.0020	9895375
Dissolved Beryllium (Be)	ug/L	<0.10	N/A	0.10	0.0030	9895375
Dissolved Bismuth (Bi)	ug/L	<1.0	N/A	1.0	0.0010	9895375
Dissolved Boron (B)	ug/L	<50	N/A	50	50	9895375
Dissolved Cadmium (Cd)	ug/L	<0.010	N/A	0.010	0.0020	9895375
Dissolved Chromium (Cr)	ug/L	<1.0	N/A	1.0	0.020	9895375
Dissolved Cobalt (Co)	ug/L	0.47	N/A	0.20	0.20	9895375
Dissolved Copper (Cu)	ug/L	1.64	N/A	0.20	0.010	9895375
Dissolved Iron (Fe)	ug/L	28.9	N/A	5.0	0.040	9895375
Dissolved Lead (Pb)	ug/L	<0.20	N/A	0.20	0.0010	9895375
Dissolved Lithium (Li)	ug/L	5.1	N/A	2.0	2.0	9895375
Dissolved Manganese (Mn)	ug/L	1980	N/A	1.0	0.030	9895375
Dissolved Molybdenum (Mo)	ug/L	1.7	N/A	1.0	0.0020	9895375
Dissolved Nickel (Ni)	ug/L	1.5	N/A	1.0	0.010	9895375
Dissolved Phosphorus (P)	ug/L	535	N/A	10	1.0	9895375
Dissolved Selenium (Se)	ug/L	0.28	N/A	0.10	0.0060	9895375
Dissolved Silicon (Si)	ug/L	7560	N/A	100	0.30	9895375
Dissolved Silver (Ag)	ug/L	<0.020	N/A	0.020	0.0020	9895375
Dissolved Strontium (Sr)	ug/L	723	N/A	1.0	0.0020	9895375
Dissolved Thallium (Tl)	ug/L	<0.010	N/A	0.010	0.010	9895375
Dissolved Tin (Sn)	ug/L	<5.0	N/A	5.0	0.0050	9895375
Dissolved Titanium (Ti)	ug/L	<5.0	N/A	5.0	0.30	9895375

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

BV Labs Job #: C042088
Report Date: 2020/06/27

GHD Limited
Client Project #: 88877-07-02
Site Location: LEACHATE WATER UPLAND
Your P.O. #: 73506780-7
Sampler Initials: NT

CSR/CCME DISS. METALS IN WATER W/ CV HG (WATER)

BV Labs ID		XY4651	XY4651			
Sampling Date		2020/06/18 10:00	2020/06/18 10:00			
COC Number		08484205	08484205			
	UNITS	WL-88877-180620-NT-01	WL-88877-180620-NT-01 Lab-Dup	RDL	MDL	QC Batch
Dissolved Uranium (U)	ug/L	0.26	N/A	0.10	0.0010	9895375
Dissolved Vanadium (V)	ug/L	<5.0	N/A	5.0	0.020	9895375
Dissolved Zinc (Zn)	ug/L	<5.0	N/A	5.0	0.050	9895375
Dissolved Zirconium (Zr)	ug/L	0.10	N/A	0.10	0.0080	9895375
Dissolved Calcium (Ca)	mg/L	187	N/A	0.050	0.0010	9892165
Dissolved Magnesium (Mg)	mg/L	25.2	N/A	0.050	0.00050	9892165
Dissolved Potassium (K)	mg/L	63.7	N/A	0.050	0.0020	9892165
Dissolved Sodium (Na)	mg/L	102	N/A	0.050	0.0010	9892165
Dissolved Sulphur (S)	mg/L	36.6	N/A	3.0	1.0	9892165

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

BV Labs Job #: C042088
Report Date: 2020/06/27

GHD Limited
Client Project #: 88877-07-02
Site Location: LEACHATE WATER UPLAND
Your P.O. #: 73506780-7
Sampler Initials: NT

CSR/CCME TOT. METALS IN WATER W/ CV HG (WATER)

BV Labs ID		XY4651			
Sampling Date		2020/06/18 10:00			
COC Number		08484205			
	UNITS	WL-88877-180620-NT-01	RDL	MDL	QC Batch
Calculated Parameters					
Total Hardness (CaCO3)	mg/L	569	0.50	0.50	9892271
Elements					
Total Mercury (Hg)	ug/L	<0.0019	0.0019	0.0019	9894686
Total Metals by ICPMS					
Total Aluminum (Al)	ug/L	10.2	3.0	0.030	9896429
Total Antimony (Sb)	ug/L	<0.50	0.50	0.0020	9896429
Total Arsenic (As)	ug/L	3.15	0.10	0.010	9896429
Total Barium (Ba)	ug/L	9.7	1.0	0.0020	9896429
Total Beryllium (Be)	ug/L	<0.10	0.10	0.0030	9896429
Total Bismuth (Bi)	ug/L	<1.0	1.0	0.0010	9896429
Total Boron (B)	ug/L	<50	50	50	9896429
Total Cadmium (Cd)	ug/L	0.014	0.010	0.0020	9896429
Total Chromium (Cr)	ug/L	<1.0	1.0	0.020	9896429
Total Cobalt (Co)	ug/L	0.50	0.20	0.20	9896429
Total Copper (Cu)	ug/L	1.61	0.50	0.030	9896429
Total Iron (Fe)	ug/L	486	10	0.70	9896429
Total Lead (Pb)	ug/L	<0.20	0.20	0.0010	9896429
Total Lithium (Li)	ug/L	4.8	2.0	2.0	9896429
Total Manganese (Mn)	ug/L	1880	1.0	0.030	9896429
Total Molybdenum (Mo)	ug/L	1.7	1.0	0.0020	9896429
Total Nickel (Ni)	ug/L	1.7	1.0	0.010	9896429
Total Phosphorus (P)	ug/L	511	10	1.0	9896429
Total Selenium (Se)	ug/L	0.29	0.10	0.0060	9896429
Total Silicon (Si)	ug/L	6690	100	0.30	9896429
Total Silver (Ag)	ug/L	<0.020	0.020	0.0020	9896429
Total Strontium (Sr)	ug/L	743	1.0	0.0020	9896429
Total Thallium (Tl)	ug/L	<0.010	0.010	0.010	9896429
Total Tin (Sn)	ug/L	<5.0	5.0	0.0050	9896429
Total Titanium (Ti)	ug/L	<5.0	5.0	0.30	9896429
Total Uranium (U)	ug/L	0.25	0.10	0.0010	9896429
Total Vanadium (V)	ug/L	<5.0	5.0	0.020	9896429
RDL = Reportable Detection Limit					

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

BV Labs Job #: C042088
Report Date: 2020/06/27

GHD Limited
Client Project #: 88877-07-02
Site Location: LEACHATE WATER UPLAND
Your P.O. #: 73506780-7
Sampler Initials: NT

CSR/CCME TOT. METALS IN WATER W/ CV HG (WATER)

BV Labs ID		XY4651			
Sampling Date		2020/06/18 10:00			
COC Number		08484205			
	UNITS	WL-88877-180620-NT-01	RDL	MDL	QC Batch
Total Zinc (Zn)	ug/L	<5.0	5.0	0.050	9896429
Total Zirconium (Zr)	ug/L	0.11	0.10	0.0080	9896429
Total Calcium (Ca)	mg/L	184	0.050	0.0010	9892169
Total Magnesium (Mg)	mg/L	26.6	0.050	0.00050	9892169
Total Potassium (K)	mg/L	66.6	0.050	0.0020	9892169
Total Sodium (Na)	mg/L	108	0.050	0.0010	9892169
Total Sulphur (S)	mg/L	35.7	3.0	1.0	9892169
RDL = Reportable Detection Limit					

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

BV Labs Job #: C042088
Report Date: 2020/06/27

GHD Limited
Client Project #: 88877-07-02
Site Location: LEACHATE WATER UPLAND
Your P.O. #: 73506780-7
Sampler Initials: NT

CSR PAH IN WATER BY GC-MS (WATER)

BV Labs ID		XY4651			
Sampling Date		2020/06/18 10:00			
COC Number		08484205			
	UNITS	WL-88877-180620-NT-01	RDL	MDL	QC Batch
Calculated Parameters					
Low Molecular Weight PAH`s	ug/L	<0.10	0.10	0.010	9892297
High Molecular Weight PAH`s	ug/L	<0.050	0.050	0.020	9892297
Total PAH	ug/L	<0.10	0.10	0.010	9892297
Polycyclic Aromatics					
Quinoline	ug/L	<0.020	0.020	0.020	9897523
Naphthalene	ug/L	<0.10	0.10	0.050	9897523
1-Methylnaphthalene	ug/L	<0.050	0.050	0.050	9897523
2-Methylnaphthalene	ug/L	<0.10	0.10	0.050	9897523
Acenaphthylene	ug/L	<0.050	0.050	0.050	9897523
Acenaphthene	ug/L	<0.050	0.050	0.050	9897523
Fluorene	ug/L	<0.050	0.050	0.050	9897523
Phenanthrene	ug/L	<0.050	0.050	0.050	9897523
Anthracene	ug/L	<0.010	0.010	0.010	9897523
Acridine	ug/L	<0.050	0.050	0.050	9897523
Fluoranthene	ug/L	0.030	0.020	0.020	9897523
Pyrene	ug/L	<0.020	0.020	0.020	9897523
Benzo(a)anthracene	ug/L	<0.010	0.010	0.010	9897523
Chrysene	ug/L	<0.020	0.020	0.020	9897523
Benzo(b&j)fluoranthene	ug/L	<0.030	0.030	0.030	9897523
Benzo(k)fluoranthene	ug/L	<0.050	0.050	0.050	9897523
Benzo(a)pyrene	ug/L	<0.0050	0.0050	0.0050	9897523
Indeno(1,2,3-cd)pyrene	ug/L	<0.050	0.050	0.050	9897523
Dibenz(a,h)anthracene	ug/L	<0.0030	0.0030	0.0030	9897523
Benzo(g,h,i)perylene	ug/L	<0.050	0.050	0.050	9897523
Surrogate Recovery (%)					
D10-ANTHRACENE (sur.)	%	76	N/A	N/A	9897523
D8-ACENAPHTHYLENE (sur.)	%	84	N/A	N/A	9897523
D8-NAPHTHALENE (sur.)	%	91	N/A	N/A	9897523
TERPHENYL-D14 (sur.)	%	94	N/A	N/A	9897523

RDL = Reportable Detection Limit
N/A = Not Applicable

BV Labs Job #: C042088
Report Date: 2020/06/27

GHD Limited
Client Project #: 88877-07-02
Site Location: LEACHATE WATER UPLAND
Your P.O. #: 73506780-7
Sampler Initials: NT

GENERAL COMMENTS

Results relate only to the items tested.

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

BV Labs Job #: C042088
Report Date: 2020/06/27

QUALITY ASSURANCE REPORT

GHD Limited
Client Project #: 88877-07-02
Site Location: LEACHATE WATER UPLAND
Your P.O. #: 73506780-7
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
9894746	1,4-Difluorobenzene (sur.)	2020/06/22	100	70 - 130	95	70 - 130	104	%		
9894746	4-Bromofluorobenzene (sur.)	2020/06/22	96	70 - 130	103	70 - 130	98	%		
9894746	D4-1,2-Dichloroethane (sur.)	2020/06/22	95	70 - 130	92	70 - 130	90	%		
9896852	1,4-Difluorobenzene (sur.)	2020/06/23	102	70 - 130	106	70 - 130	96	%		
9896852	4-Bromofluorobenzene (sur.)	2020/06/23	96	70 - 130	98	70 - 130	95	%		
9896852	D4-1,2-Dichloroethane (sur.)	2020/06/23	94	70 - 130	100	70 - 130	93	%		
9897523	D10-ANTHRACENE (sur.)	2020/06/23	96	50 - 140	99	50 - 140	92	%		
9897523	D8-ACENAPHTHYLENE (sur.)	2020/06/23	96	50 - 140	98	50 - 140	90	%		
9897523	D8-NAPHTHALENE (sur.)	2020/06/23	97	50 - 140	98	50 - 140	88	%		
9897523	TERPHENYL-D14 (sur.)	2020/06/23	98	50 - 140	99	50 - 140	92	%		
9893798	Biochemical Oxygen Demand	2020/06/25			92	85 - 115	<2.0	mg/L	4.4 (1)	20
9893924	Nitrate plus Nitrite (N)	2020/06/20	104	80 - 120	108	80 - 120	<0.020	mg/L	NC (1)	25
9893925	Nitrite (N)	2020/06/20	100	80 - 120	100	80 - 120	<0.0050	mg/L	NC (1)	20
9893968	Orthophosphate (P)	2020/06/20	113	80 - 120	101	80 - 120	<0.0030	mg/L	0.91 (1)	20
9894686	Total Mercury (Hg)	2020/06/22	79 (2)	80 - 120	82	80 - 120	<0.0019	ug/L	NC (1)	20
9894710	Dissolved Mercury (Hg)	2020/06/22	94	80 - 120	88	80 - 120	<0.0019	ug/L	NC (3)	20
9894746	Benzene	2020/06/22	106	70 - 130	102	70 - 130	<0.40	ug/L	1.2 (1)	30
9894746	Ethylbenzene	2020/06/22	101	70 - 130	99	70 - 130	<0.40	ug/L	1.6 (1)	30
9894746	m & p-Xylene	2020/06/22	101	70 - 130	99	70 - 130	<0.40	ug/L	NC (1)	30
9894746	Methyl-tert-butylether (MTBE)	2020/06/22	106	70 - 130	100	70 - 130	<4.0	ug/L	1.0 (1)	30
9894746	o-Xylene	2020/06/22	103	70 - 130	100	70 - 130	<0.40	ug/L	NC (1)	30
9894746	Styrene	2020/06/22	96	70 - 130	102	70 - 130	<0.40	ug/L	NC (1)	30
9894746	Toluene	2020/06/22	99	70 - 130	96	70 - 130	<0.40	ug/L	NC (1)	30
9894746	VH C6-C10	2020/06/22			107	70 - 130	<300	ug/L	NC (1)	30
9894746	Xylenes (Total)	2020/06/22					<0.40	ug/L	NC (1)	30
9895375	Dissolved Aluminum (Al)	2020/06/23	100	80 - 120	104	80 - 120	<3.0	ug/L	0.74 (1)	20
9895375	Dissolved Antimony (Sb)	2020/06/23	104	80 - 120	104	80 - 120	<0.50	ug/L	0.21 (1)	20
9895375	Dissolved Arsenic (As)	2020/06/23	104	80 - 120	104	80 - 120	<0.10	ug/L	1.8 (1)	20
9895375	Dissolved Barium (Ba)	2020/06/23	99	80 - 120	103	80 - 120	<1.0	ug/L	1.4 (1)	20
9895375	Dissolved Beryllium (Be)	2020/06/23	103	80 - 120	104	80 - 120	<0.10	ug/L	NC (1)	20
9895375	Dissolved Bismuth (Bi)	2020/06/23	99	80 - 120	103	80 - 120	<1.0	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
9895375	Dissolved Boron (B)	2020/06/23	106	80 - 120	108	80 - 120	<50	ug/L	2.1 (1)	20
9895375	Dissolved Cadmium (Cd)	2020/06/23	100	80 - 120	103	80 - 120	<0.010	ug/L	3.4 (1)	20
9895375	Dissolved Chromium (Cr)	2020/06/23	97	80 - 120	102	80 - 120	<1.0	ug/L	0.73 (1)	20
9895375	Dissolved Cobalt (Co)	2020/06/23	92	80 - 120	97	80 - 120	<0.20	ug/L	NC (1)	20
9895375	Dissolved Copper (Cu)	2020/06/23	89	80 - 120	96	80 - 120	<0.20	ug/L	0.12 (1)	20
9895375	Dissolved Iron (Fe)	2020/06/23	106	80 - 120	107	80 - 120	<5.0	ug/L	NC (1)	20
9895375	Dissolved Lead (Pb)	2020/06/23	103	80 - 120	105	80 - 120	<0.20	ug/L	3.5 (1)	20
9895375	Dissolved Lithium (Li)	2020/06/23	104	80 - 120	107	80 - 120	<2.0	ug/L	NC (1)	20
9895375	Dissolved Manganese (Mn)	2020/06/23	98	80 - 120	102	80 - 120	<1.0	ug/L	0.58 (1)	20
9895375	Dissolved Molybdenum (Mo)	2020/06/23	104	80 - 120	104	80 - 120	<1.0	ug/L	0.77 (1)	20
9895375	Dissolved Nickel (Ni)	2020/06/23	94	80 - 120	101	80 - 120	<1.0	ug/L	2.3 (1)	20
9895375	Dissolved Phosphorus (P)	2020/06/23	103	80 - 120	103	80 - 120	<10	ug/L		
9895375	Dissolved Selenium (Se)	2020/06/23	102	80 - 120	102	80 - 120	<0.10	ug/L	6.4 (1)	20
9895375	Dissolved Silicon (Si)	2020/06/23	101	80 - 120	110	80 - 120	<100	ug/L	1.2 (1)	20
9895375	Dissolved Silver (Ag)	2020/06/23	100	80 - 120	104	80 - 120	<0.020	ug/L	NC (1)	20
9895375	Dissolved Strontium (Sr)	2020/06/23	NC	80 - 120	105	80 - 120	<1.0	ug/L	0.26 (1)	20
9895375	Dissolved Thallium (Tl)	2020/06/23	103	80 - 120	104	80 - 120	<0.010	ug/L	NC (1)	20
9895375	Dissolved Tin (Sn)	2020/06/23	101	80 - 120	104	80 - 120	<5.0	ug/L	NC (1)	20
9895375	Dissolved Titanium (Ti)	2020/06/23	100	80 - 120	106	80 - 120	<5.0	ug/L	NC (1)	20
9895375	Dissolved Uranium (U)	2020/06/23	105	80 - 120	109	80 - 120	<0.10	ug/L	0.019 (1)	20
9895375	Dissolved Vanadium (V)	2020/06/23	100	80 - 120	103	80 - 120	<5.0	ug/L	NC (1)	20
9895375	Dissolved Zinc (Zn)	2020/06/23	NC	80 - 120	104	80 - 120	<5.0	ug/L	0.59 (1)	20
9895375	Dissolved Zirconium (Zr)	2020/06/23	103	80 - 120	104	80 - 120	<0.10	ug/L	NC (1)	20
9895393	Alkalinity (PP as CaCO3)	2020/06/22					<1.0	mg/L		
9895393	Alkalinity (Total as CaCO3)	2020/06/22			94	80 - 120	<1.0	mg/L		
9895393	Bicarbonate (HCO3)	2020/06/22					<1.0	mg/L		
9895393	Carbonate (CO3)	2020/06/22					<1.0	mg/L		
9895393	Hydroxide (OH)	2020/06/22					<1.0	mg/L		
9895394	Conductivity	2020/06/22			100	80 - 120	<2.0	uS/cm		
9895609	Total Dissolved Solids	2020/06/23	98	80 - 120	98	80 - 120	<10	mg/L	7.4 (1)	20
9896429	Total Aluminum (Al)	2020/06/24	103	80 - 120	106	80 - 120	<3.0	ug/L	7.1 (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
9896429	Total Antimony (Sb)	2020/06/24	102	80 - 120	102	80 - 120	<0.50	ug/L	NC (1)	20
9896429	Total Arsenic (As)	2020/06/24	103	80 - 120	100	80 - 120	<0.10	ug/L	0.59 (1)	20
9896429	Total Barium (Ba)	2020/06/24	NC	80 - 120	107	80 - 120	<1.0	ug/L	0.00046 (1)	20
9896429	Total Beryllium (Be)	2020/06/24	92	80 - 120	96	80 - 120	<0.10	ug/L	NC (1)	20
9896429	Total Bismuth (Bi)	2020/06/24	95	80 - 120	100	80 - 120	<1.0	ug/L	NC (1)	20
9896429	Total Boron (B)	2020/06/24	96	80 - 120	106	80 - 120	<50	ug/L	1.8 (1)	20
9896429	Total Cadmium (Cd)	2020/06/24	98	80 - 120	99	80 - 120	<0.010	ug/L	NC (1)	20
9896429	Total Chromium (Cr)	2020/06/24	97	80 - 120	98	80 - 120	<1.0	ug/L	NC (1)	20
9896429	Total Cobalt (Co)	2020/06/24	92	80 - 120	95	80 - 120	<0.20	ug/L	0.035 (1)	20
9896429	Total Copper (Cu)	2020/06/24	86	80 - 120	93	80 - 120	<0.50	ug/L	0.74 (1)	20
9896429	Total Iron (Fe)	2020/06/24	NC	80 - 120	100	80 - 120	<10	ug/L	1.5 (1)	20
9896429	Total Lead (Pb)	2020/06/24	99	80 - 120	102	80 - 120	<0.20	ug/L	0.045 (1)	20
9896429	Total Lithium (Li)	2020/06/24	88	80 - 120	98	80 - 120	<2.0	ug/L	0.22 (1)	20
9896429	Total Manganese (Mn)	2020/06/24	94	80 - 120	97	80 - 120	<1.0	ug/L	0.93 (1)	20
9896429	Total Molybdenum (Mo)	2020/06/24	109	80 - 120	104	80 - 120	<1.0	ug/L	1.9 (1)	20
9896429	Total Nickel (Ni)	2020/06/24	90	80 - 120	94	80 - 120	<1.0	ug/L	2.0 (1)	20
9896429	Total Phosphorus (P)	2020/06/24	101	80 - 120	96	80 - 120	<10	ug/L		
9896429	Total Selenium (Se)	2020/06/24	105	80 - 120	102	80 - 120	<0.10	ug/L	NC (1)	20
9896429	Total Silicon (Si)	2020/06/24	92	80 - 120	98	80 - 120	<100	ug/L	0.54 (1)	20
9896429	Total Silver (Ag)	2020/06/24	98	80 - 120	99	80 - 120	<0.020	ug/L	NC (1)	20
9896429	Total Strontium (Sr)	2020/06/24	NC	80 - 120	102	80 - 120	<1.0	ug/L	0.33 (1)	20
9896429	Total Thallium (Tl)	2020/06/24	99	80 - 120	100	80 - 120	<0.010	ug/L	NC (1)	20
9896429	Total Tin (Sn)	2020/06/24	99	80 - 120	100	80 - 120	<5.0	ug/L	NC (1)	20
9896429	Total Titanium (Ti)	2020/06/24	99	80 - 120	100	80 - 120	<5.0	ug/L	NC (1)	20
9896429	Total Uranium (U)	2020/06/24	100	80 - 120	99	80 - 120	<0.10	ug/L	2.2 (1)	20
9896429	Total Vanadium (V)	2020/06/24	100	80 - 120	98	80 - 120	<5.0	ug/L	NC (1)	20
9896429	Total Zinc (Zn)	2020/06/24	90	80 - 120	95	80 - 120	<5.0	ug/L	0.92 (1)	20
9896429	Total Zirconium (Zr)	2020/06/24	110	80 - 120	102	80 - 120	<0.10	ug/L	NC (1)	20
9896523	Total Suspended Solids	2020/06/24	106	80 - 120	102	80 - 120	<1.0	mg/L	NC (1)	20
9896852	Benzene	2020/06/23	105	70 - 130	106	70 - 130	<0.40	ug/L	NC (1)	30
9896852	Ethylbenzene	2020/06/23	101	70 - 130	103	70 - 130	<0.40	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
9896852	m & p-Xylene	2020/06/23	101	70 - 130	102	70 - 130	<0.40	ug/L	NC (1)	30
9896852	Methyl-tert-butylether (MTBE)	2020/06/23	103	70 - 130	103	70 - 130	<4.0	ug/L		
9896852	o-Xylene	2020/06/23	103	70 - 130	104	70 - 130	<0.40	ug/L	NC (1)	30
9896852	Styrene	2020/06/23	93	70 - 130	96	70 - 130	<0.40	ug/L	NC (1)	30
9896852	Toluene	2020/06/23	99	70 - 130	100	70 - 130	<0.40	ug/L	NC (1)	30
9896852	VH C6-C10	2020/06/23			95	70 - 130	<300	ug/L	NC (1)	30
9896852	Xylenes (Total)	2020/06/23					<0.40	ug/L	NC (1)	30
9897034	Chemical Oxygen Demand	2020/06/23	91	80 - 120	105	80 - 120	<10	mg/L	2.2 (1)	20
9897412	Dissolved Chloride (Cl)	2020/06/23	103	80 - 120	104	80 - 120	<1.0	mg/L	NC (1)	20
9897412	Dissolved Sulphate (SO4)	2020/06/23	94	80 - 120	97	80 - 120	<1.0	mg/L	7.6 (1)	20
9897523	1-Methylnaphthalene	2020/06/23	100	50 - 140	96	50 - 140	<0.050	ug/L	1.9 (1)	40
9897523	2-Methylnaphthalene	2020/06/23	99	50 - 140	95	50 - 140	<0.10	ug/L	1.6 (1)	40
9897523	Acenaphthene	2020/06/23	98	50 - 140	99	50 - 140	<0.050	ug/L	NC (1)	40
9897523	Acenaphthylene	2020/06/23	99	50 - 140	96	50 - 140	<0.050	ug/L	NC (1)	40
9897523	Acridine	2020/06/23	108	50 - 140	102	50 - 140	<0.050	ug/L	NC (1)	40
9897523	Anthracene	2020/06/23	87	50 - 140	100	50 - 140	<0.010	ug/L	NC (1)	40
9897523	Benzo(a)anthracene	2020/06/23	83	50 - 140	88	50 - 140	<0.010	ug/L	NC (1)	40
9897523	Benzo(a)pyrene	2020/06/23	17 (2)	50 - 140	90	50 - 140	<0.0050	ug/L	NC (1)	40
9897523	Benzo(b&j)fluoranthene	2020/06/23	18 (2)	50 - 140	90	50 - 140	<0.030	ug/L	NC (1)	40
9897523	Benzo(g,h,i)perylene	2020/06/23	3.0 (2)	50 - 140	89	50 - 140	<0.050	ug/L	NC (1)	40
9897523	Benzo(k)fluoranthene	2020/06/23	19 (2)	50 - 140	93	50 - 140	<0.050	ug/L	NC (1)	40
9897523	Chrysene	2020/06/23	86	50 - 140	90	50 - 140	<0.020	ug/L	NC (1)	40
9897523	Dibenz(a,h)anthracene	2020/06/23	2.7 (2)	50 - 140	91	50 - 140	<0.0030	ug/L	NC (1)	40
9897523	Fluoranthene	2020/06/23	99	50 - 140	98	50 - 140	<0.020	ug/L	NC (1)	40
9897523	Fluorene	2020/06/23	99	50 - 140	97	50 - 140	<0.050	ug/L	NC (1)	40
9897523	Indeno(1,2,3-cd)pyrene	2020/06/23	3.2 (2)	50 - 140	94	50 - 140	<0.050	ug/L	NC (1)	40
9897523	Naphthalene	2020/06/23	94	50 - 140	95	50 - 140	<0.10	ug/L	0.87 (1)	40
9897523	Phenanthrene	2020/06/23	104	50 - 140	100	50 - 140	<0.050	ug/L	NC (1)	40
9897523	Pyrene	2020/06/23	98	50 - 140	96	50 - 140	<0.020	ug/L	NC (1)	40
9897523	Quinoline	2020/06/23	113	50 - 140	107	50 - 140	<0.020	ug/L	NC (1)	40
9899935	Total Sulphide	2020/06/25	NC	80 - 120	113	80 - 120	<0.0018	mg/L	126 (2,1)	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
9902565	Total Ammonia (N)	2020/06/26	105	80 - 120	104	80 - 120	<0.015	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.

(3) Duplicate Parent ID [XY4651-08]

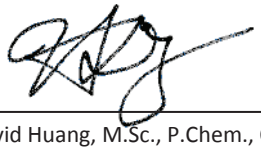
Bureau Veritas Laboratories Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

BV Labs Job #: C042088
Report Date: 2020/06/27

GHD Limited
Client Project #: 88877-07-02
Site Location: LEACHATE WATER UPLAND
Your P.O. #: 73506780-7
Sampler Initials: NT

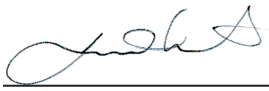
VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).



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

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



Jas Khatkar, AScT, PChem, Manager, Trace Organics

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

08484205

Burnaby: 4606 Canada Way, Burnaby, BC V5G 1K5 Toll Free (800) 665 8566
Victoria: 460 Tennyson Place, Unit 1, Victoria, BC V8Z 6S8 Toll Free (866) 385-6112
bvlabs.com

CHAIN OF CUSTODY RECORD

Invoice Information		Report Information (if differs from invoice)		Project Information		Turnaround Time (TAT) Required
Company :	#163 GHD Limited	Company:	#28639 GHD Limited	Quotation	MSA	☑ 5 - 7 Days Regular (Most analyses)
Contact Name:	Airesse MacPhee	Contact Name:	Airesse MacPhee	P.O. #/AFE#:	73506780-7	PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS
Address:	455 Pillip Street	Address:	10271 Shellbridge Way		(Leachate Water)	Rush TAT (Surcharges will be applied)
	Waterloo, ON PC: N2L 3X2		Richmond, BC PC: V6X 2W8	Project #:	088877-07-02	☐ Same Day ☐ 2 Days
Phone/Fax:	(519) 884-0510	Phone/Fax:	(604) 248-3661	Site Location:	Upland	☐ 1 Day ☐ 3-4 Days
Email:	airesse.macphee@ghd.com	Email:	airesse.macphee@ghd.com	Site #:		Date Required:
Copies:	Reference PO	Copies:	Reference PO	Sampled By:	N. Turl	Rush Confirmation #:

Laboratory Use Only

	YES	NO	Cooler ID	Temp
Seal Present	X		1	6
Seal Intact	X			7
Cooling Media	X			7
	YES	NO	Cooler ID	Temp
Seal Present	X		2	7
Seal Intact	X			5
Cooling Media	X			2
	YES	NO	Cooler ID	Temp
Seal Present				
Seal Intact				
Cooling Media				

Depot Reception

Analysis Requested

Sample Identification	Date Sampled (yyyy/mm/dd)	Time Sampled (hh:mm)	Matrix	# of Containers	Speciated Alkalinity, Ec	BOD, COD	Cl, SO4 (dissolved), NO2, NO3, N+N	NH3, Orthophosphate	TDS, TSS	Sulphide (as S), Low Level Sulphide (as H2S)	Dissolved CSR Metals (+Hg)	Dissolved Hardness	Total CSR Metals (+Hg)	PAHs	BTEX/VPH	HOLD - DO NOT ANALYZE
1 WL-88877-180620-NT-01	2020/06/18	1000	WATER		X	X	X	X	X	X	X	X	X	X	X	
2																
3																
4																
5																
6																
7																
8																
9																
10																

Regulatory Criteria

- ☐ BC CSR
- ☐ YK CSR
- ☐ CCME
- ☐ Drinking Water
- ☐ BC Water Quality
- ☐ Other

Special Instructions

Short holding times!
All bottles were field filtered and preserved as required.

Relinquished by: (Signature/ Print)	Date (yyyy/mm/dd):	Time (hh:mm):	Received by: (Signature/ Print)	Date (yyyy/mm/dd):	Time (hh:mm):
N. Turl / N. Turl	2020/06/18	1600	J. PEDRO TADE	2020/06/19	08:00

C042088_COC

GHD Limited

BV Labs Job Number: C042088
Report Date: 2020/06/27

Client Project #: 88877-07-02
Site Location: LEACHATE WATER UPLAND
Your P.O. #: 73506780-7
Sampler Initials: NT

RESULTS OF CHEMICAL ANALYSES OF WATER

BV Labs ID		XY4651			
Sampling Date		2020/06/18 10:00			
COC Number		08484205			
	UNITS	**WL-88877-180620-NT-01**	**RDL**	**MDL**	**QC Batch**
ANIONS					
Nitrite (N)	mg/L	<0.0050	0.0050	0.0050	9893925
Calculated Parameters					
Filter and HNO3 Preservation	N/A	FIELD	N/A	N/A	ONSITE
Nitrate (N)	mg/L	<0.020	0.020	N/A	9892745
Sulphide (as H2S)	mg/L	0.029	0.0020	N/A	9892270
Demand Parameters					
Biochemical Oxygen Demand	mg/L	<2.0	2.0	N/A	9893798
Chemical Oxygen Demand	mg/L	110	10	10	9897034
Misc. Inorganics					
Conductivity	uS/cm	1700	2.0	N/A	9895394
Total Dissolved Solids	mg/L	1100	10	N/A	9895609
Total Suspended Solids	mg/L	6.0	1.0	N/A	9896523
Anions					
Alkalinity (PP as CaCO3)	mg/L	<1.0	1.0	N/A	9895393
Alkalinity (Total as CaCO3)	mg/L	400	1.0	N/A	9895393
Bicarbonate (HCO3)	mg/L	480	1.0	N/A	9895393
Carbonate (CO3)	mg/L	<1.0	1.0	N/A	9895393
Hydroxide (OH)	mg/L	<1.0	1.0	N/A	9895393
Total Sulphide	mg/L	0.027	0.0018	N/A	9899935
Dissolved Chloride (Cl)	mg/L	310 (1)	10	N/A	9897412
Dissolved Sulphate (SO4)	mg/L	110	1.0	N/A	9897412
Nutrients					
Total Ammonia (N)	mg/L	0.26	0.015	0.0040	9902565
Orthophosphate (P)	mg/L	0.50	0.0030	0.0030	9893968
Nitrate plus Nitrite (N)	mg/L	<0.020	0.020	0.020	9893924

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

Results relate only to the items tested.

GHD Limited

BV Labs Job Number: C042088
Report Date: 2020/06/27

Client Project #: 88877-07-02
Site Location: LEACHATE WATER UPLAND
Your P.O. #: 73506780-7
Sampler Initials: NT

CSR BTEX/VPH IN WATER (WATER)

BV Labs ID		XY4651		XY4716			
Sampling Date		2020/06/18 10:00		2020/06/18 08:00			
COC Number		08484205		08484201			
	UNITS	**WL-88877-180620-NT-01**	**QC Batch**	**TRIP BLANK**	**RDL**	**MDL**	**QC Batch**
Calculated Parameters							
VPH (VHW6 to 10 - BTEX)	ug/L	<300	9892208	<300	300	300	9896089
Volatiles							
Methyl-tert-butylether (MTBE)	ug/L	<4.0	9894746	<4.0	4.0	4.0	9896852
Benzene	ug/L	<0.40	9894746	<0.40	0.40	0.40	9896852
Toluene	ug/L	<0.40	9894746	<0.40	0.40	0.40	9896852
Ethylbenzene	ug/L	<0.40	9894746	<0.40	0.40	0.40	9896852
m & p-Xylene	ug/L	<0.40	9894746	<0.40	0.40	0.40	9896852
o-Xylene	ug/L	<0.40	9894746	<0.40	0.40	0.40	9896852
Styrene	ug/L	<0.40	9894746	<0.40	0.40	0.40	9896852
Xylenes (Total)	ug/L	<0.40	9894746	<0.40	0.40	0.40	9896852
VH C6-C10	ug/L	<300	9894746	<300	300	300	9896852
Surrogate Recovery (%)							
1,4-Difluorobenzene (sur.)	%	95	9894746	111	N/A	N/A	9896852
4-Bromofluorobenzene (sur.)	%	99	9894746	96	N/A	N/A	9896852
D4-1,2-Dichloroethane (sur.)	%	93	9894746	110	N/A	N/A	9896852

RDL = Reportable Detection Limit
N/A = Not Applicable

Results relate only to the items tested.

BV Labs Job Number: C042088
Report Date: 2020/06/27

GHD Limited
Client Project #: 88877-07-02
Site Location: LEACHATE WATER UPLAND
Your P.O. #: 73506780-7
Sampler Initials: NT

CSR/CCME DISS. METALS IN WATER W/ CV HG (WATER)

BV Labs ID		XY4651	XY4651			
Sampling Date		2020/06/18 10:00	2020/06/18 10:00			
COC Number		08484205	08484205			
	UNITS	**WL-88877-180620-NT-01**	**WL-88877-180620-NT-01 Lab-Dup**	**RDL**	**MDL**	**QC Batch**
Calculated Parameters						
Dissolved Hardness (CaCO3)	mg/L	570	N/A	0.50	0.50	9892272
Elements						
Dissolved Mercury (Hg)	ug/L	<0.0019	<0.0019	0.0019	0.0019	9894710
Dissolved Metals by ICPMS						
Dissolved Aluminum (Al)	ug/L	5.5	N/A	3.0	0.030	9895375
Dissolved Antimony (Sb)	ug/L	<0.50	N/A	0.50	0.0020	9895375
Dissolved Arsenic (As)	ug/L	3.17	N/A	0.10	0.010	9895375
Dissolved Barium (Ba)	ug/L	10.3	N/A	1.0	0.0020	9895375
Dissolved Beryllium (Be)	ug/L	<0.10	N/A	0.10	0.0030	9895375
Dissolved Bismuth (Bi)	ug/L	<1.0	N/A	1.0	0.0010	9895375
Dissolved Boron (B)	ug/L	<50	N/A	50	50	9895375
Dissolved Cadmium (Cd)	ug/L	<0.010	N/A	0.010	0.0020	9895375
Dissolved Chromium (Cr)	ug/L	<1.0	N/A	1.0	0.020	9895375
Dissolved Cobalt (Co)	ug/L	0.47	N/A	0.20	0.20	9895375
Dissolved Copper (Cu)	ug/L	1.64	N/A	0.20	0.010	9895375
Dissolved Iron (Fe)	ug/L	28.9	N/A	5.0	0.040	9895375
Dissolved Lead (Pb)	ug/L	<0.20	N/A	0.20	0.0010	9895375
Dissolved Lithium (Li)	ug/L	5.1	N/A	2.0	2.0	9895375
Dissolved Manganese (Mn)	ug/L	1980	N/A	1.0	0.030	9895375
Dissolved Molybdenum (Mo)	ug/L	1.7	N/A	1.0	0.0020	9895375
Dissolved Nickel (Ni)	ug/L	1.5	N/A	1.0	0.010	9895375
Dissolved Phosphorus (P)	ug/L	535	N/A	10	1.0	9895375
Dissolved Selenium (Se)	ug/L	0.28	N/A	0.10	0.0060	9895375
Dissolved Silicon (Si)	ug/L	7560	N/A	100	0.30	9895375
Dissolved Silver (Ag)	ug/L	<0.020	N/A	0.020	0.0020	9895375
Dissolved Strontium (Sr)	ug/L	723	N/A	1.0	0.0020	9895375
Dissolved Thallium (Tl)	ug/L	<0.010	N/A	0.010	0.010	9895375
Dissolved Tin (Sn)	ug/L	<5.0	N/A	5.0	0.0050	9895375
Dissolved Titanium (Ti)	ug/L	<5.0	N/A	5.0	0.30	9895375
Dissolved Uranium (U)	ug/L	0.26	N/A	0.10	0.0010	9895375
Dissolved Vanadium (V)	ug/L	<5.0	N/A	5.0	0.020	9895375
Dissolved Zinc (Zn)	ug/L	<5.0	N/A	5.0	0.050	9895375
Dissolved Zirconium (Zr)	ug/L	0.10	N/A	0.10	0.0080	9895375
Dissolved Calcium (Ca)	mg/L	187	N/A	0.050	0.0010	9892165
Dissolved Magnesium (Mg)	mg/L	25.2	N/A	0.050	0.00050	9892165
Dissolved Potassium (K)	mg/L	63.7	N/A	0.050	0.0020	9892165
Dissolved Sodium (Na)	mg/L	102	N/A	0.050	0.0010	9892165
Dissolved Sulphur (S)	mg/L	36.6	N/A	3.0	1.0	9892165

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

Results relate only to the items tested.

GHD Limited

BV Labs Job Number: C042088
Report Date: 2020/06/27

Client Project #: 88877-07-02
Site Location: LEACHATE WATER UPLAND
Your P.O. #: 73506780-7
Sampler Initials: NT

CSR/CCME TOT. METALS IN WATER W/ CV HG (WATER)

BV Labs ID		XY4651			
Sampling Date		2020/06/18 10:00			
COC Number		08484205			
	UNITS	**WL-88877-180620-NT-01**	**RDL**	**MDL**	**QC Batch**
Calculated Parameters					
Total Hardness (CaCO3)	mg/L	569	0.50	0.50	9892271
Elements					
Total Mercury (Hg)	ug/L	<0.0019	0.0019	0.0019	9894686
Total Metals by ICPMS					
Total Aluminum (Al)	ug/L	10.2	3.0	0.030	9896429
Total Antimony (Sb)	ug/L	<0.50	0.50	0.0020	9896429
Total Arsenic (As)	ug/L	3.15	0.10	0.010	9896429
Total Barium (Ba)	ug/L	9.7	1.0	0.0020	9896429
Total Beryllium (Be)	ug/L	<0.10	0.10	0.0030	9896429
Total Bismuth (Bi)	ug/L	<1.0	1.0	0.0010	9896429
Total Boron (B)	ug/L	<50	50	50	9896429
Total Cadmium (Cd)	ug/L	0.014	0.010	0.0020	9896429
Total Chromium (Cr)	ug/L	<1.0	1.0	0.020	9896429
Total Cobalt (Co)	ug/L	0.50	0.20	0.20	9896429
Total Copper (Cu)	ug/L	1.61	0.50	0.030	9896429
Total Iron (Fe)	ug/L	486	10	0.70	9896429
Total Lead (Pb)	ug/L	<0.20	0.20	0.0010	9896429
Total Lithium (Li)	ug/L	4.8	2.0	2.0	9896429
Total Manganese (Mn)	ug/L	1880	1.0	0.030	9896429
Total Molybdenum (Mo)	ug/L	1.7	1.0	0.0020	9896429
Total Nickel (Ni)	ug/L	1.7	1.0	0.010	9896429
Total Phosphorus (P)	ug/L	511	10	1.0	9896429
Total Selenium (Se)	ug/L	0.29	0.10	0.0060	9896429
Total Silicon (Si)	ug/L	6690	100	0.30	9896429
Total Silver (Ag)	ug/L	<0.020	0.020	0.0020	9896429
Total Strontium (Sr)	ug/L	743	1.0	0.0020	9896429
Total Thallium (Tl)	ug/L	<0.010	0.010	0.010	9896429
Total Tin (Sn)	ug/L	<5.0	5.0	0.0050	9896429
Total Titanium (Ti)	ug/L	<5.0	5.0	0.30	9896429
Total Uranium (U)	ug/L	0.25	0.10	0.0010	9896429
Total Vanadium (V)	ug/L	<5.0	5.0	0.020	9896429
Total Zinc (Zn)	ug/L	<5.0	5.0	0.050	9896429
Total Zirconium (Zr)	ug/L	0.11	0.10	0.0080	9896429
Total Calcium (Ca)	mg/L	184	0.050	0.0010	9892169
Total Magnesium (Mg)	mg/L	26.6	0.050	0.00050	9892169
Total Potassium (K)	mg/L	66.6	0.050	0.0020	9892169
Total Sodium (Na)	mg/L	108	0.050	0.0010	9892169
Total Sulphur (S)	mg/L	35.7	3.0	1.0	9892169

RDL = Reportable Detection Limit
N/A = Not Applicable

Results relate only to the items tested.

GHD Limited

BV Labs Job Number: C042088
Report Date: 2020/06/27

Client Project #: 88877-07-02
Site Location: LEACHATE WATER UPLAND
Your P.O. #: 73506780-7
Sampler Initials: NT

CSR PAH IN WATER BY GC-MS (WATER)

BV Labs ID		XY4651			
Sampling Date		2020/06/18 10:00			
COC Number		08484205			
	UNITS	**WL-88877-180620-NT-01**	**RDL**	**MDL**	**QC Batch**
Calculated Parameters					
Low Molecular Weight PAH`s	ug/L	<0.10	0.10	0.010	9892297
High Molecular Weight PAH`s	ug/L	<0.050	0.050	0.020	9892297
Total PAH	ug/L	<0.10	0.10	0.010	9892297
Polycyclic Aromatics					
Quinoline	ug/L	<0.020	0.020	0.020	9897523
Naphthalene	ug/L	<0.10	0.10	0.050	9897523
1-Methylnaphthalene	ug/L	<0.050	0.050	0.050	9897523
2-Methylnaphthalene	ug/L	<0.10	0.10	0.050	9897523
Acenaphthylene	ug/L	<0.050	0.050	0.050	9897523
Acenaphthene	ug/L	<0.050	0.050	0.050	9897523
Fluorene	ug/L	<0.050	0.050	0.050	9897523
Phenanthrene	ug/L	<0.050	0.050	0.050	9897523
Anthracene	ug/L	<0.010	0.010	0.010	9897523
Acridine	ug/L	<0.050	0.050	0.050	9897523
Fluoranthene	ug/L	0.030	0.020	0.020	9897523
Pyrene	ug/L	<0.020	0.020	0.020	9897523
Benzo(a)anthracene	ug/L	<0.010	0.010	0.010	9897523
Chrysene	ug/L	<0.020	0.020	0.020	9897523
Benzo(b&j)fluoranthene	ug/L	<0.030	0.030	0.030	9897523
Benzo(k)fluoranthene	ug/L	<0.050	0.050	0.050	9897523
Benzo(a)pyrene	ug/L	<0.0050	0.0050	0.0050	9897523
Indeno(1,2,3-cd)pyrene	ug/L	<0.050	0.050	0.050	9897523
Dibenz(a,h)anthracene	ug/L	<0.0030	0.0030	0.0030	9897523
Benzo(g,h,i)perylene	ug/L	<0.050	0.050	0.050	9897523
Surrogate Recovery (%)					
D10-ANTHRACENE (sur.)	%	76	N/A	N/A	9897523
D8-ACENAPHTHYLENE (sur.)	%	84	N/A	N/A	9897523
D8-NAPHTHALENE (sur.)	%	91	N/A	N/A	9897523
TERPHENYL-D14 (sur.)	%	94	N/A	N/A	9897523

RDL = Reportable Detection Limit
N/A = Not Applicable

Results relate only to the items tested.

GENERAL COMMENTS

Results relate only to the items tested.

Report Date: 2020/06/27

GHD Limited
Attention: 088877 Distribution
Client Project #: 88877-07-02
Your P.O. #:73506780-7
Site Location: LEACHATE WATER UPLAND

Quality Assurance Report
BV Labs Job Number: C042088

QA/QC Bat	Init	QC Type	Parameter	Date Analy	Value	Recovery	UNITS	QC Limits
9893798	PSA	Spiked Blank	Biochemical Oxygen Demand	6/25/2020		92	%	85 - 115
9893798	PSA	Method Blank	Biochemical Oxygen Demand	6/25/2020	<2.0		mg/L	
9893798	PSA	RPD	Biochemical Oxygen Demand	6/25/2020	4.4 (1)		%	20
9893924	MOS	Matrix Spike	Nitrate plus Nitrite (N)	6/20/2020		104	%	80 - 120
9893924	MOS	Spiked Blank	Nitrate plus Nitrite (N)	6/20/2020		108	%	80 - 120
9893924	MOS	Method Blank	Nitrate plus Nitrite (N)	6/20/2020	<0.020		mg/L	
9893924	MOS	RPD	Nitrate plus Nitrite (N)	6/20/2020	NC (1)		%	25
9893925	MOS	Matrix Spike	Nitrite (N)	6/20/2020		100	%	80 - 120
9893925	MOS	Spiked Blank	Nitrite (N)	6/20/2020		100	%	80 - 120
9893925	MOS	Method Blank	Nitrite (N)	6/20/2020	<0.0050		mg/L	
9893925	MOS	RPD	Nitrite (N)	6/20/2020	NC (1)		%	20
9893968	MOS	Matrix Spike	Orthophosphate (P)	6/20/2020		113	%	80 - 120
9893968	MOS	Spiked Blank	Orthophosphate (P)	6/20/2020		101	%	80 - 120
9893968	MOS	Method Blank	Orthophosphate (P)	6/20/2020	<0.0030		mg/L	
9893968	MOS	RPD	Orthophosphate (P)	6/20/2020	0.91 (1)		%	20
9894686	CJY	Matrix Spike	Total Mercury (Hg)	6/22/2020		79 (2)	%	80 - 120
9894686	CJY	Spiked Blank	Total Mercury (Hg)	6/22/2020		82	%	80 - 120
9894686	CJY	Method Blank	Total Mercury (Hg)	6/22/2020	<0.0019		ug/L	
9894686	CJY	RPD	Total Mercury (Hg)	6/22/2020	NC (1)		%	20
9894710	CJY	Matrix Spike	Dissolved Mercury (Hg)	6/22/2020		94	%	80 - 120
9894710	CJY	Spiked Blank	Dissolved Mercury (Hg)	6/22/2020		88	%	80 - 120
9894710	CJY	Method Blank	Dissolved Mercury (Hg)	6/22/2020	<0.0019		ug/L	
9894710	CJY	RPD [XY4651-08]	Dissolved Mercury (Hg)	6/22/2020	NC (3)		%	20
9894746	JL4	Matrix Spike	1,4-Difluorobenzene (sur.)	6/22/2020		100	%	70 - 130
			4-Bromofluorobenzene (sur.)	6/22/2020		96	%	70 - 130
			D4-1,2-Dichloroethane (sur.)	6/22/2020		95	%	70 - 130
			Methyl-tert-butylether (MTBE)	6/22/2020		106	%	70 - 130
			Benzene	6/22/2020		106	%	70 - 130
			Toluene	6/22/2020		99	%	70 - 130
			Ethylbenzene	6/22/2020		101	%	70 - 130
			m & p-Xylene	6/22/2020		101	%	70 - 130
			o-Xylene	6/22/2020		103	%	70 - 130
			Styrene	6/22/2020		96	%	70 - 130
9894746	JL4	Spiked Blank	1,4-Difluorobenzene (sur.)	6/22/2020		95	%	70 - 130
			4-Bromofluorobenzene (sur.)	6/22/2020		103	%	70 - 130
			D4-1,2-Dichloroethane (sur.)	6/22/2020		92	%	70 - 130
			Methyl-tert-butylether (MTBE)	6/22/2020		100	%	70 - 130
			Benzene	6/22/2020		102	%	70 - 130
			Toluene	6/22/2020		96	%	70 - 130
			Ethylbenzene	6/22/2020		99	%	70 - 130
			m & p-Xylene	6/22/2020		99	%	70 - 130
			o-Xylene	6/22/2020		100	%	70 - 130
			Styrene	6/22/2020		102	%	70 - 130
			VH C6-C10	6/22/2020		107	%	70 - 130
9894746	JL4	Method Blank	1,4-Difluorobenzene (sur.)	6/22/2020		104	%	70 - 130
			4-Bromofluorobenzene (sur.)	6/22/2020		98	%	70 - 130
			D4-1,2-Dichloroethane (sur.)	6/22/2020		90	%	70 - 130
			Methyl-tert-butylether (MTBE)	6/22/2020	<4.0		ug/L	
			Benzene	6/22/2020	<0.40		ug/L	
			Toluene	6/22/2020	<0.40		ug/L	
			Ethylbenzene	6/22/2020	<0.40		ug/L	
			m & p-Xylene	6/22/2020	<0.40		ug/L	
			o-Xylene	6/22/2020	<0.40		ug/L	
			Styrene	6/22/2020	<0.40		ug/L	
			Xylenes (Total)	6/22/2020	<0.40		ug/L	
			VH C6-C10	6/22/2020	<300		ug/L	
9894746	JL4	RPD	Methyl-tert-butylether (MTBE)	6/22/2020	1.0 (1)		%	30
			Benzene	6/22/2020	1.2 (1)		%	30
			Toluene	6/22/2020	NC (1)		%	30
			Ethylbenzene	6/22/2020	1.6 (1)		%	30
			m & p-Xylene	6/22/2020	NC (1)		%	30
			o-Xylene	6/22/2020	NC (1)		%	30
			Styrene	6/22/2020	NC (1)		%	30
			Xylenes (Total)	6/22/2020	NC (1)		%	30
			VH C6-C10	6/22/2020	NC (1)		%	30
9895375	AA1	Matrix Spike	Dissolved Aluminum (Al)	6/23/2020		100	%	80 - 120
			Dissolved Antimony (Sb)	6/23/2020		104	%	80 - 120
			Dissolved Arsenic (As)	6/23/2020		104	%	80 - 120
			Dissolved Barium (Ba)	6/23/2020		99	%	80 - 120
			Dissolved Beryllium (Be)	6/23/2020		103	%	80 - 120
			Dissolved Bismuth (Bi)	6/23/2020		99	%	80 - 120
			Dissolved Boron (B)	6/23/2020		106	%	80 - 120
			Dissolved Cadmium (Cd)	6/23/2020		100	%	80 - 120
			Dissolved Chromium (Cr)	6/23/2020		97	%	80 - 120
			Dissolved Cobalt (Co)	6/23/2020		92	%	80 - 120
			Dissolved Copper (Cu)	6/23/2020		89	%	80 - 120
			Dissolved Iron (Fe)	6/23/2020		106	%	80 - 120
			Dissolved Lead (Pb)	6/23/2020		103	%	80 - 120
			Dissolved Lithium (Li)	6/23/2020		104	%	80 - 120
			Dissolved Manganese (Mn)	6/23/2020		98	%	80 - 120
			Dissolved Molybdenum (Mo)	6/23/2020		104	%	80 - 120
			Dissolved Nickel (Ni)	6/23/2020		94	%	80 - 120
			Dissolved Phosphorus (P)	6/23/2020		103	%	80 - 120
			Dissolved Selenium (Se)	6/23/2020		102	%	80 - 120
			Dissolved Silicon (Si)	6/23/2020		101	%	80 - 120
			Dissolved Silver (Ag)	6/23/2020		100	%	80 - 120
			Dissolved Strontium (Sr)	6/23/2020		NC	%	80 - 120
			Dissolved Thallium (Tl)	6/23/2020		103	%	80 - 120
			Dissolved Tin (Sn)	6/23/2020		101	%	80 - 120
			Dissolved Titanium (Ti)	6/23/2020		100	%	80 - 120
			Dissolved Uranium (U)	6/23/2020		105	%	80 - 120
			Dissolved Vanadium (V)	6/23/2020		100	%	80 - 120
			Dissolved Zinc (Zn)	6/23/2020		NC	%	80 - 120
			Dissolved Zirconium (Zr)	6/23/2020		103	%	80 - 120
9895375	AA1	Spiked Blank	Dissolved Aluminum (Al)	6/23/2020		104	%	80 - 120
			Dissolved Antimony (Sb)	6/23/2020		104	%	80 - 120
			Dissolved Arsenic (As)	6/23/2020		104	%	80 - 120
			Dissolved Barium (Ba)	6/23/2020		103	%	80 - 120
			Dissolved Beryllium (Be)	6/23/2020		104	%	80 - 120
			Dissolved Bismuth (Bi)	6/23/2020		103	%	80 - 120
			Dissolved Boron (B)	6/23/2020		108	%	80 - 120
			Dissolved Cadmium (Cd)	6/23/2020		103	%	80 - 120
			Dissolved Chromium (Cr)	6/23/2020		102	%	80 - 120
			Dissolved Cobalt (Co)	6/23/2020		97	%	80 - 120
			Dissolved Copper (Cu)	6/23/2020		96	%	80 - 120
			Dissolved Iron (Fe)	6/23/2020		107	%	80 - 120
			Dissolved Lead (Pb)	6/23/2020		105	%	80 - 120
			Dissolved Lithium (Li)	6/23/2020		107	%	80 - 120
			Dissolved Manganese (Mn)	6/23/2020		102	%	80 - 120
			Dissolved Molybdenum (Mo)	6/23/2020		104	%	80 - 120
			Dissolved Nickel (Ni)	6/23/2020		101	%	80 - 120
			Dissolved Phosphorus (P)	6/23/2020		103	%	80 - 120
			Dissolved Selenium (Se)	6/23/2020		102	%	80 - 120
			Dissolved Silicon (Si)	6/23/2020		110	%	80 - 120
			Dissolved Silver (Ag)	6/23/2020		104	%	80 - 120
			Dissolved Strontium (Sr)	6/23/2020		105	%	80 - 120
			Dissolved Thallium (Tl)	6/23/2020		104	%	80 - 120
			Dissolved Tin (Sn)	6/23/2020		104	%	80 - 120
			Dissolved Titanium (Ti)	6/23/2020		106	%	80 - 120
			Dissolved Uranium (U)	6/23/2020		109	%	80 - 120
			Dissolved Vanadium (V)	6/23/2020		103	%	80 - 120
			Dissolved Zinc (Zn)	6/23/2020		104	%	80 - 120
			Dissolved Zirconium (Zr)	6/23/2020		104	%	80 - 120
9895375	AA1	Method Blank	Dissolved Aluminum (Al)	6/23/2020	<3.0		ug/L	
			Dissolved Antimony (Sb)	6/23/2020	<0.50		ug/L	
			Dissolved Arsenic (As)	6/23/2020	<0.10		ug/L	
			Dissolved Barium (Ba)	6/23/2020	<1.0		ug/L	
			Dissolved Beryllium (Be)	6/23/2020	<0.10		ug/L	
			Dissolved Bismuth (Bi)	6/23/2020	<1.0		ug/L	
			Dissolved Boron (B)	6/23/2020	<50		ug/L	
			Dissolved Cadmium (Cd)	6/23/2020	<0.010		ug/L	
			Dissolved Chromium (Cr)	6/23/2020	<1.0		ug/L	
			Dissolved Cobalt (Co)	6/23/2020	<0.20		ug/L	
			Dissolved Copper (Cu)	6/23/2020	<0.20		ug/L	
			Dissolved Iron (Fe)	6/23/2020	<5.0		ug/L	
			Dissolved Lead (Pb)	6/23/2020	<0.20		ug/L	
			Dissolved Lithium (Li)	6/23/2020	<2.0		ug/L	
			Dissolved Manganese (Mn)	6/23/2020	<1.0		ug/L	
			Dissolved Molybdenum (Mo)	6/23/2020	<1.0		ug/L	
			Dissolved Nickel (Ni)	6/23/2020	<1.0		ug/L	
			Dissolved Phosphorus (P)	6/23/2020	<10		ug/L	
			Dissolved Selenium (Se)	6/23/2020	<0.10		ug/L	
			Dissolved Silicon (Si)	6/23/2020	<100		ug/L	
			Dissolved Silver (Ag)	6/23/2020	<0.020		ug/L	
			Dissolved Strontium (Sr)	6/23/2020	<1.0		ug/L	
			Dissolved Thallium (Tl)	6/23/2020	<0.010		ug/L	
			Dissolved Tin (Sn)	6/23/2020	<5.0		ug/L	
			Dissolved Titanium (Ti)	6/23/2020	<5.0		ug/L	
			Dissolved Uranium (U)	6/23/2020	<0.10		ug/L	
			Dissolved Vanadium (V)	6/23/2020	<5.0		ug/L	
			Dissolved Zinc (Zn)	6/23/2020	<5.0		ug/L	
			Dissolved Zirconium (Zr)	6/23/2020	<0.10		ug/L	
9895375	AA1	RPD	Dissolved Aluminum (Al)	6/23/2020	0.74 (1)		%	20
			Dissolved Antimony (Sb)	6/23/2020	0.21 (1)		%	20
			Dissolved Arsenic (As)	6/23/2020	1.8 (1)		%	20
			Dissolved Barium (Ba)	6/23/2020	1.4 (1)		%	20
			Dissolved Beryllium (Be)	6/23/2020	NC (1)		%	20
			Dissolved Bismuth (Bi)	6/23/2020	NC (1)		%	20
			Dissolved Boron (B)	6/23/2020	2.1 (1)		%	20
			Dissolved Cadmium (Cd)	6/23/2020	3.4 (1)		%	20
			Dissolved Chromium (Cr)	6/23/2020	0.73 (1)		%	20
			Dissolved Cobalt (Co)	6/23/2020	NC (1)		%	20
			Dissolved Copper (Cu)	6/23/2020	0.12 (1)		%	20
			Dissolved Iron (Fe)	6/23/2020	NC (1)		%	20
			Dissolved Lead (Pb)	6/23/2020	3.5 (1)		%	20
			Dissolved Lithium (Li)	6/23/2020	NC (1)		%	20
			Dissolved Manganese (Mn)	6/23/2020	0.58 (1)		%	20
			Dissolved Molybdenum (Mo)	6/23/2020	0.77 (1)		%	20
			Dissolved Nickel (Ni)	6/23/2020	2.3 (1)		%	20
			Dissolved Selenium (Se)	6/23/2020	6.4 (1)		%	20
			Dissolved Silicon (Si)	6/23/2020	1.2 (1)		%	20
			Dissolved Silver (Ag)	6/23/2020	NC (1)		%	20
			Dissolved Strontium (Sr)	6/23/2020	0.26 (1)		%	20
			Dissolved Thallium (Tl)	6/23/2020	NC (1)		%	20
			Dissolved Tin (Sn)	6/23/2020	NC (1)		%	20
			Dissolved Titanium (Ti)	6/23/2020	NC (1)		%	20
			Dissolved Uranium (U)	6/23/2020	0.019 (1)		%	20
			Dissolved Vanadium (V)	6/23/2020	NC (1)		%	20
			Dissolved Zinc (Zn)	6/23/2020	0.59 (1)		%	20
			Dissolved Zirconium (Zr)	6/23/2020	NC (1)		%	20
9895393	WAY	Spiked Blank	Alkalinity (Total as CaCO3)	6/22/2020		94	%	80 - 120

Report Date: 2020/06/27

GHD Limited
Attention: 088877 Distribution
Client Project #: 88877-07-02
Your P.O. #:73506780-7
Site Location: LEACHATE WATER UPLAND

Quality Assurance Report
BV Labs Job Number: C042088

QA/QC Bat	Init	QC Type	Parameter	Date Analy	Value	Recovery	UNITS	QC Limits
9895393	WAY	Method Blank	Alkalinity (PP as CaCO3)	6/22/2020	<1.0		mg/L	
			Alkalinity (Total as CaCO3)	6/22/2020	<1.0		mg/L	
			Bicarbonate (HCO3)	6/22/2020	<1.0		mg/L	
			Carbonate (CO3)	6/22/2020	<1.0		mg/L	
			Hydroxide (OH)	6/22/2020	<1.0		mg/L	
9895394	WAY	Spiked Blank	Conductivity	6/22/2020		100	%	80 - 120
9895394	WAY	Method Blank	Conductivity	6/22/2020	<2.0		uS/cm	
9895609	CGP	Matrix Spike	Total Dissolved Solids	6/23/2020		98	%	80 - 120
9895609	CGP	Spiked Blank	Total Dissolved Solids	6/23/2020		98	%	80 - 120
9895609	CGP	Method Blank	Total Dissolved Solids	6/23/2020	<10		mg/L	
9895609	CGP	RPD	Total Dissolved Solids	6/23/2020	7.4 (1)		%	20
9896429	VBA	Matrix Spike	Total Aluminum (Al)	6/24/2020		103	%	80 - 120
			Total Antimony (Sb)	6/24/2020		102	%	80 - 120
			Total Arsenic (As)	6/24/2020		103	%	80 - 120
			Total Barium (Ba)	6/24/2020		NC	%	80 - 120
			Total Beryllium (Be)	6/24/2020		92	%	80 - 120
			Total Bismuth (Bi)	6/24/2020		95	%	80 - 120
			Total Boron (B)	6/24/2020		96	%	80 - 120
			Total Cadmium (Cd)	6/24/2020		98	%	80 - 120
			Total Chromium (Cr)	6/24/2020		97	%	80 - 120
			Total Cobalt (Co)	6/24/2020		92	%	80 - 120
			Total Copper (Cu)	6/24/2020		86	%	80 - 120
			Total Iron (Fe)	6/24/2020		NC	%	80 - 120
			Total Lead (Pb)	6/24/2020		99	%	80 - 120
			Total Lithium (Li)	6/24/2020		88	%	80 - 120
			Total Manganese (Mn)	6/24/2020		94	%	80 - 120
			Total Molybdenum (Mo)	6/24/2020		109	%	80 - 120
			Total Nickel (Ni)	6/24/2020		90	%	80 - 120
			Total Phosphorus (P)	6/24/2020		101	%	80 - 120
			Total Selenium (Se)	6/24/2020		105	%	80 - 120
			Total Silicon (Si)	6/24/2020		92	%	80 - 120
			Total Silver (Ag)	6/24/2020		98	%	80 - 120
			Total Strontium (Sr)	6/24/2020		NC	%	80 - 120
			Total Thallium (Tl)	6/24/2020		99	%	80 - 120
			Total Tin (Sn)	6/24/2020		99	%	80 - 120
			Total Titanium (Ti)	6/24/2020		99	%	80 - 120
			Total Uranium (U)	6/24/2020		100	%	80 - 120
			Total Vanadium (V)	6/24/2020		100	%	80 - 120
			Total Zinc (Zn)	6/24/2020		90	%	80 - 120
			Total Zirconium (Zr)	6/24/2020		110	%	80 - 120
9896429	VBA	Spiked Blank	Total Aluminum (Al)	6/24/2020		106	%	80 - 120
			Total Antimony (Sb)	6/24/2020		102	%	80 - 120
			Total Arsenic (As)	6/24/2020		100	%	80 - 120
			Total Barium (Ba)	6/24/2020		107	%	80 - 120
			Total Beryllium (Be)	6/24/2020		96	%	80 - 120
			Total Bismuth (Bi)	6/24/2020		100	%	80 - 120
			Total Boron (B)	6/24/2020		106	%	80 - 120
			Total Cadmium (Cd)	6/24/2020		99	%	80 - 120
			Total Chromium (Cr)	6/24/2020		98	%	80 - 120
			Total Cobalt (Co)	6/24/2020		95	%	80 - 120
			Total Copper (Cu)	6/24/2020		93	%	80 - 120
			Total Iron (Fe)	6/24/2020		100	%	80 - 120
			Total Lead (Pb)	6/24/2020		102	%	80 - 120
			Total Lithium (Li)	6/24/2020		98	%	80 - 120
			Total Manganese (Mn)	6/24/2020		97	%	80 - 120
			Total Molybdenum (Mo)	6/24/2020		104	%	80 - 120
			Total Nickel (Ni)	6/24/2020		94	%	80 - 120
			Total Phosphorus (P)	6/24/2020		96	%	80 - 120
			Total Selenium (Se)	6/24/2020		102	%	80 - 120
			Total Silicon (Si)	6/24/2020		98	%	80 - 120
			Total Silver (Ag)	6/24/2020		99	%	80 - 120
			Total Strontium (Sr)	6/24/2020		102	%	80 - 120
			Total Thallium (Tl)	6/24/2020		100	%	80 - 120
			Total Tin (Sn)	6/24/2020		100	%	80 - 120
			Total Titanium (Ti)	6/24/2020		100	%	80 - 120
			Total Uranium (U)	6/24/2020		99	%	80 - 120
			Total Vanadium (V)	6/24/2020		98	%	80 - 120
			Total Zinc (Zn)	6/24/2020		95	%	80 - 120
			Total Zirconium (Zr)	6/24/2020		102	%	80 - 120
9896429	VBA	Method Blank	Total Aluminum (Al)	6/24/2020	<3.0		ug/L	
			Total Antimony (Sb)	6/24/2020	<0.50		ug/L	
			Total Arsenic (As)	6/24/2020	<0.10		ug/L	
			Total Barium (Ba)	6/24/2020	<1.0		ug/L	
			Total Beryllium (Be)	6/24/2020	<0.10		ug/L	
			Total Bismuth (Bi)	6/24/2020	<1.0		ug/L	
			Total Boron (B)	6/24/2020	<50		ug/L	
			Total Cadmium (Cd)	6/24/2020	<0.010		ug/L	
			Total Chromium (Cr)	6/24/2020	<1.0		ug/L	
			Total Cobalt (Co)	6/24/2020	<0.20		ug/L	
			Total Copper (Cu)	6/24/2020	<0.50		ug/L	
			Total Iron (Fe)	6/24/2020	<10		ug/L	
			Total Lead (Pb)	6/24/2020	<0.20		ug/L	
			Total Lithium (Li)	6/24/2020	<2.0		ug/L	
			Total Manganese (Mn)	6/24/2020	<1.0		ug/L	
			Total Molybdenum (Mo)	6/24/2020	<1.0		ug/L	
			Total Nickel (Ni)	6/24/2020	<1.0		ug/L	
			Total Phosphorus (P)	6/24/2020	<10		ug/L	
			Total Selenium (Se)	6/24/2020	<0.10		ug/L	
			Total Silicon (Si)	6/24/2020	<100		ug/L	
			Total Silver (Ag)	6/24/2020	<0.020		ug/L	
			Total Strontium (Sr)	6/24/2020	<1.0		ug/L	
			Total Thallium (Tl)	6/24/2020	<0.010		ug/L	
			Total Tin (Sn)	6/24/2020	<5.0		ug/L	
			Total Titanium (Ti)	6/24/2020	<5.0		ug/L	
			Total Uranium (U)	6/24/2020	<0.10		ug/L	
			Total Vanadium (V)	6/24/2020	<5.0		ug/L	
			Total Zinc (Zn)	6/24/2020	<5.0		ug/L	
			Total Zirconium (Zr)	6/24/2020	<0.10		ug/L	
9896429	VBA	RPD	Total Aluminum (Al)	6/24/2020	7.1 (1)		%	20
			Total Antimony (Sb)	6/24/2020	NC (1)		%	20
			Total Arsenic (As)	6/24/2020	0.59 (1)		%	20
			Total Barium (Ba)	6/24/2020	0.00046 (1)		%	20
			Total Beryllium (Be)	6/24/2020	NC (1)		%	20
			Total Bismuth (Bi)	6/24/2020	NC (1)		%	20
			Total Boron (B)	6/24/2020	1.8 (1)		%	20
			Total Cadmium (Cd)	6/24/2020	NC (1)		%	20
			Total Chromium (Cr)	6/24/2020	NC (1)		%	20
			Total Cobalt (Co)	6/24/2020	0.035 (1)		%	20
			Total Copper (Cu)	6/24/2020	0.74 (1)		%	20
			Total Iron (Fe)	6/24/2020	1.5 (1)		%	20
			Total Lead (Pb)	6/24/2020	0.045 (1)		%	20
			Total Lithium (Li)	6/24/2020	0.22 (1)		%	20
			Total Manganese (Mn)	6/24/2020	0.93 (1)		%	20
			Total Molybdenum (Mo)	6/24/2020	1.9 (1)		%	20
			Total Nickel (Ni)	6/24/2020	2.0 (1)		%	20
			Total Selenium (Se)	6/24/2020	NC (1)		%	20
			Total Silicon (Si)	6/24/2020	0.54 (1)		%	20
			Total Silver (Ag)	6/24/2020	NC (1)		%	20
			Total Strontium (Sr)	6/24/2020	0.33 (1)		%	20
			Total Thallium (Tl)	6/24/2020	NC (1)		%	20
			Total Tin (Sn)	6/24/2020	NC (1)		%	20
			Total Titanium (Ti)	6/24/2020	NC (1)		%	20
			Total Uranium (U)	6/24/2020	2.2 (1)		%	20
			Total Vanadium (V)	6/24/2020	NC (1)		%	20
			Total Zinc (Zn)	6/24/2020	0.92 (1)		%	20
			Total Zirconium (Zr)	6/24/2020	NC (1)		%	20
9896523	CGP	Matrix Spike	Total Suspended Solids	6/24/2020		106	%	80 - 120
9896523	CGP	Spiked Blank	Total Suspended Solids	6/24/2020		102	%	80 - 120
9896523	CGP	Method Blank	Total Suspended Solids	6/24/2020	<1.0		mg/L	
9896523	CGP	RPD	Total Suspended Solids	6/24/2020	NC (1)		%	20
9896852	JL4	Matrix Spike	1,4-Difluorobenzene (sur.)	6/23/2020		102	%	70 - 130
			4-Bromofluorobenzene (sur.)	6/23/2020		96	%	70 - 130
			D4-1,2-Dichloroethane (sur.)	6/23/2020		94	%	70 - 130
			Methyl-tert-butylether (MTBE)	6/23/2020		103	%	70 - 130
			Benzene	6/23/2020		105	%	70 - 130
			Toluene	6/23/2020		99	%	70 - 130
			Ethylbenzene	6/23/2020		101	%	70 - 130
			m & p-Xylene	6/23/2020		101	%	70 - 130
			o-Xylene	6/23/2020		103	%	70 - 130
			Styrene	6/23/2020		93	%	70 - 130
9896852	JL4	Spiked Blank	1,4-Difluorobenzene (sur.)	6/23/2020		106	%	70 - 130
			4-Bromofluorobenzene (sur.)	6/23/2020		98	%	70 - 130
			D4-1,2-Dichloroethane (sur.)	6/23/2020		100	%	70 - 130
			Methyl-tert-butylether (MTBE)	6/23/2020		103	%	70 - 130
			Benzene	6/23/2020		106	%	70 - 130
			Toluene	6/23/2020		100	%	70 - 130
			Ethylbenzene	6/23/2020		103	%	70 - 130
			m & p-Xylene	6/23/2020		102	%	70 - 130
			o-Xylene	6/23/2020		104	%	70 - 130
			Styrene	6/23/2020		96	%	70 - 130
			VH C6-C10	6/23/2020		95	%	70 - 130
9896852	JL4	Method Blank	1,4-Difluorobenzene (sur.)	6/23/2020		96	%	70 - 130
			4-Bromofluorobenzene (sur.)	6/23/2020		95	%	70 - 130
			D4-1,2-Dichloroethane (sur.)	6/23/2020		93	%	70 - 130
			Methyl-tert-butylether (MTBE)	6/23/2020	<4.0		ug/L	
			Benzene	6/23/2020	<0.40		ug/L	
			Toluene	6/23/2020	<0.40		ug/L	
			Ethylbenzene	6/23/2020	<0.40		ug/L	
			m & p-Xylene	6/23/2020	<0.40		ug/L	
			o-Xylene	6/23/2020	<0.40		ug/L	
			Styrene	6/23/2020	<0.40		ug/L	
			Xylenes (Total)	6/23/2020	<0.40		ug/L	
			VH C6-C10	6/23/2020	<300		ug/L	
9896852	JL4	RPD	Benzene	6/23/2020	NC (1)		%	30
			Toluene	6/23/2020	NC (1)		%	30
			Ethylbenzene	6/23/2020	NC (1)		%	30
			m & p-Xylene	6/23/2020	NC (1)		%	30
			o-Xylene	6/23/2020	NC (1)		%	30
			Styrene	6/23/2020	NC (1)		%	30
			Xylenes (Total)	6/23/2020	NC (1)		%	30
			VH C6-C10	6/23/2020	NC (1)		%	30
9897034	PSA	Matrix Spike	Chemical Oxygen Demand	6/23/2020		91	%	80 - 120
9897034	PSA	Spiked Blank	Chemical Oxygen Demand	6/23/2020		105	%	80 - 120
9897034	PSA	Method Blank	Chemical Oxygen Demand	6/23/2020	<10		mg/L	
9897034	PSA	RPD	Chemical Oxygen Demand	6/23/2020	2.2 (1)		%	20
9897412	BB3	Matrix Spike	Dissolved Chloride (Cl)	6/23/2020		103	%	80 - 120
			Dissolved Sulphate (SO4)	6/23/2020		94	%	80 - 120
9897412	BB3	Spiked Blank	Dissolved Chloride (Cl)	6/23/2020		104	%	80 - 120
			Dissolved Sulphate (SO4)	6/23/2020		97	%	80 - 120
9897412	BB3	Method Blank	Dissolved Chloride (Cl)	6/23/2020	<1.0		mg/L	
			Dissolved Sulphate (SO4)	6/23/2020	<1.0		mg/L	
9897412	BB3	RPD	Dissolved Chloride (Cl)	6/23/2020	NC (1)		%	20

Report Date: 2020/06/27

GHD Limited
Attention: 088877 Distribution
Client Project #: 88877-07-02
Your P.O. #:73506780-7
Site Location: LEACHATE WATER UPLAND

Quality Assurance Report
BV Labs Job Number: C042088

QA/QC Bat	Init	QC Type	Parameter	Date Analy	Value	Recovery	UNITS	QC Limits
			Dissolved Sulphate (SO4)	6/23/2020	7.6 (1)		%	20
9897523	JP1	Matrix Spike	D10-ANTHRACENE (sur.)	6/23/2020		96	%	50 - 140
			D8-ACENAPHTHYLENE (sur.)	6/23/2020		96	%	50 - 140
			D8-NAPHTHALENE (sur.)	6/23/2020		97	%	50 - 140
			TERPHENYL-D14 (sur.)	6/23/2020		98	%	50 - 140
			Quinoline	6/23/2020		113	%	50 - 140
			Naphthalene	6/23/2020		94	%	50 - 140
			1-Methylnaphthalene	6/23/2020		100	%	50 - 140
			2-Methylnaphthalene	6/23/2020		99	%	50 - 140
			Acenaphthylene	6/23/2020		99	%	50 - 140
			Acenaphthene	6/23/2020		98	%	50 - 140
			Fluorene	6/23/2020		99	%	50 - 140
			Phenanthrene	6/23/2020		104	%	50 - 140
			Anthracene	6/23/2020		87	%	50 - 140
			Acridine	6/23/2020		108	%	50 - 140
			Fluoranthene	6/23/2020		99	%	50 - 140
			Pyrene	6/23/2020		98	%	50 - 140
			Benzo(a)anthracene	6/23/2020		83	%	50 - 140
			Chrysene	6/23/2020		86	%	50 - 140
			Benzo(b&j)fluoranthene	6/23/2020		18 (2)	%	50 - 140
			Benzo(k)fluoranthene	6/23/2020		19 (2)	%	50 - 140
			Benzo(a)pyrene	6/23/2020		17 (2)	%	50 - 140
			Indeno(1,2,3-cd)pyrene	6/23/2020		3.2 (2)	%	50 - 140
			Dibenz(a,h)anthracene	6/23/2020		2.7 (2)	%	50 - 140
			Benzo(g,h,i)perylene	6/23/2020		3.0 (2)	%	50 - 140
9897523	JP1	Spiked Blank	D10-ANTHRACENE (sur.)	6/23/2020		99	%	50 - 140
			D8-ACENAPHTHYLENE (sur.)	6/23/2020		98	%	50 - 140
			D8-NAPHTHALENE (sur.)	6/23/2020		98	%	50 - 140
			TERPHENYL-D14 (sur.)	6/23/2020		99	%	50 - 140
			Quinoline	6/23/2020		107	%	50 - 140
			Naphthalene	6/23/2020		95	%	50 - 140
			1-Methylnaphthalene	6/23/2020		96	%	50 - 140
			2-Methylnaphthalene	6/23/2020		95	%	50 - 140
			Acenaphthylene	6/23/2020		96	%	50 - 140
			Acenaphthene	6/23/2020		99	%	50 - 140
			Fluorene	6/23/2020		97	%	50 - 140
			Phenanthrene	6/23/2020		100	%	50 - 140
			Anthracene	6/23/2020		100	%	50 - 140
			Acridine	6/23/2020		102	%	50 - 140
			Fluoranthene	6/23/2020		98	%	50 - 140
			Pyrene	6/23/2020		96	%	50 - 140
			Benzo(a)anthracene	6/23/2020		88	%	50 - 140
			Chrysene	6/23/2020		90	%	50 - 140
			Benzo(b&j)fluoranthene	6/23/2020		90	%	50 - 140
			Benzo(k)fluoranthene	6/23/2020		93	%	50 - 140
			Benzo(a)pyrene	6/23/2020		90	%	50 - 140
			Indeno(1,2,3-cd)pyrene	6/23/2020		94	%	50 - 140
			Dibenz(a,h)anthracene	6/23/2020		91	%	50 - 140
			Benzo(g,h,i)perylene	6/23/2020		89	%	50 - 140
9897523	JP1	Method Blank	D10-ANTHRACENE (sur.)	6/23/2020		92	%	50 - 140
			D8-ACENAPHTHYLENE (sur.)	6/23/2020		90	%	50 - 140
			D8-NAPHTHALENE (sur.)	6/23/2020		88	%	50 - 140
			TERPHENYL-D14 (sur.)	6/23/2020		92	%	50 - 140
			Quinoline	6/23/2020	<0.020		ug/L	
			Naphthalene	6/23/2020	<0.10		ug/L	
			1-Methylnaphthalene	6/23/2020	<0.050		ug/L	
			2-Methylnaphthalene	6/23/2020	<0.10		ug/L	
			Acenaphthylene	6/23/2020	<0.050		ug/L	
			Acenaphthene	6/23/2020	<0.050		ug/L	
			Fluorene	6/23/2020	<0.050		ug/L	
			Phenanthrene	6/23/2020	<0.050		ug/L	
			Anthracene	6/23/2020	<0.010		ug/L	
			Acridine	6/23/2020	<0.050		ug/L	
			Fluoranthene	6/23/2020	<0.020		ug/L	
			Pyrene	6/23/2020	<0.020		ug/L	
			Benzo(a)anthracene	6/23/2020	<0.010		ug/L	
			Chrysene	6/23/2020	<0.020		ug/L	
			Benzo(b&j)fluoranthene	6/23/2020	<0.030		ug/L	
			Benzo(k)fluoranthene	6/23/2020	<0.050		ug/L	
			Benzo(a)pyrene	6/23/2020	<0.0050		ug/L	
			Indeno(1,2,3-cd)pyrene	6/23/2020	<0.050		ug/L	
			Dibenz(a,h)anthracene	6/23/2020	<0.0030		ug/L	
			Benzo(g,h,i)perylene	6/23/2020	<0.050		ug/L	
9897523	JP1	RPD	Quinoline	6/23/2020	NC (1)		%	40
			Naphthalene	6/23/2020	0.87 (1)		%	40
			1-Methylnaphthalene	6/23/2020	1.9 (1)		%	40
			2-Methylnaphthalene	6/23/2020	1.6 (1)		%	40
			Acenaphthylene	6/23/2020	NC (1)		%	40
			Acenaphthene	6/23/2020	NC (1)		%	40
			Fluorene	6/23/2020	NC (1)		%	40
			Phenanthrene	6/23/2020	NC (1)		%	40
			Anthracene	6/23/2020	NC (1)		%	40
			Acridine	6/23/2020	NC (1)		%	40
			Fluoranthene	6/23/2020	NC (1)		%	40
			Pyrene	6/23/2020	NC (1)		%	40
			Benzo(a)anthracene	6/23/2020	NC (1)		%	40
			Chrysene	6/23/2020	NC (1)		%	40
			Benzo(b&j)fluoranthene	6/23/2020	NC (1)		%	40
			Benzo(k)fluoranthene	6/23/2020	NC (1)		%	40
			Benzo(a)pyrene	6/23/2020	NC (1)		%	40
			Indeno(1,2,3-cd)pyrene	6/23/2020	NC (1)		%	40
			Dibenz(a,h)anthracene	6/23/2020	NC (1)		%	40
			Benzo(g,h,i)perylene	6/23/2020	NC (1)		%	40
9899935	SLL	Matrix Spike	Total Sulphide	6/25/2020		NC	%	80 - 120
9899935	SLL	Spiked Blank	Total Sulphide	6/25/2020		113	%	80 - 120
9899935	SLL	Method Blank	Total Sulphide	6/25/2020	<0.0018		mg/L	
9899935	SLL	RPD	Total Sulphide	6/25/2020	126 (2,1)		%	20
9902565	HG	Matrix Spike	Total Ammonia (N)	6/26/2020		105	%	80 - 120
9902565	HG	Spiked Blank	Total Ammonia (N)	6/26/2020		104	%	80 - 120
9902565	HG	Method Blank	Total Ammonia (N)	6/26/2020	<0.015		mg/L	
9902565	HG	RPD	Total Ammonia (N)	6/26/2020	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.
(3) Duplicate Parent ID [XY4651-08]

Appendix D
Data Validation and Assessment Memorandum

Memorandum

July 2, 2020

To: Rose Marie Rocca, Chris Thorne; Airesse MacPhee Ref. No.: 088877

From: Stephanie Berton/kf/4

Subject: Data Quality Assessment and Validation

Laboratory:	Bureau Veritas Laboratories (BV)	**Date(s) Sampled:**	June 18, 2020
Lab Job No.:	C042088/C042093/C042096		
Media Sampled:	Groundwater, Leachate, and Water		

QA/QC	Criteria	Pass	Qualifiers	Fail	N/A
Holding Times	Analyte specific	☐	☒	☐	☐
Field Duplicate (blind)	Matrix specific	☒	☐	☐	☐
Field Blank (blind)	Non-detect	☒	☐	☐	☐
Trip Blank	Non-detect	☐	☐	☐	☒
Temperature	Analyte specific	☒	☐	☐	☐
Lab QA/QC	Within standard recoveries	☐	☒	☐	☐

Data OK for Use Yes ☐ With Qualifiers ☒ No ☐ Initial: SB

The following results are qualified based on laboratory duplicate variances.

Lab Report #	Sample Date (mm/dd/yyyy)	Sample ID	Analyte	Result	Qualifier	Units
C042096	06/18/2020	WG-88877-180620-NT-02	Chloride, dissolved	3.2	J	mg/L
C042096	06/18/2020	WG-88877-180620-NT-03	Chloride, dissolved	4.5	J	mg/L

Notes:

J - Estimated concentration

GHD
10271 Shellbridge Way Suite 165 Richmond British Columbia V6X 2W8 Canada
T 604 214 0510 F 604 214 0525 W www.ghd.com

Memorandum

December 16, 2020

To:	Rose Marie Rocca, Chris Thorne, David R. Barton	Ref. No.:	088877
From:	Airesse MacPhee/an/7	Tel:	604-248-3661

Subject: **Data Quality Assessment and Validation**

Laboratory:	Bureau Veritas Laboratories	**Date(s) Sampled:**	November 26-27, 2020
Lab Job No.:	C087842, C087847		
Sampled By:	GHD Ltd.		
Media Sampled:	Groundwater, Leachate Water		

QA/QC	Criteria	Pass	Qualifiers	Fail	N/A
Holding Times	Analyte specific	☐	☒	☐	☐
Field Duplicate (blind)	Matrix specific	☐	☒	☐	☐
Field Blank (blind)	Non-detect	☐	☐	☐	☒
Trip Blank	Non-detect	☒	☐	☐	☐
Temperature	Analyte specific	☒	☐	☐	☐
Lab QA/QC	Within standard recoveries	☐	☒	☐	☐
Data OK for Use	Yes ☐ With Qualifiers ☒ No ☐	Initial: AM			

The following results are qualified due to holding time exceedances (lab had quality issues with original run, reanalysis outside of holding time was deemed necessary):

Lab Report #	Sample Date (mm/dd/yyyy)	Sample ID	Analyte	Result	Qualifier	Units
C087842	11/26/2020	WG-088877-261120-RP-01	Hydrogen sulfide	0.0020	UJ	mg/L
C087842	11/26/2020	WG-088877-261120-RP-02	Hydrogen sulfide	0.0020	UJ	mg/L
C087842	11/26/2020	WG-088877-261120-RP-03	Hydrogen sulfide	0.0020	UJ	mg/L
C087842	11/26/2020	WG-088877-261120-RP-04	Hydrogen sulfide	0.0020	UJ	mg/L
C087842	11/27/2020	WG-088877-271120-RP-05	Hydrogen sulfide	0.0020	UJ	mg/L
C087842	11/26/2020	WG-088877-261120-RP-01	Sulfide	0.0018	UJ	mg/L
C087842	11/26/2020	WG-088877-261120-RP-02	Sulfide	0.0018	UJ	mg/L
C087842	11/26/2020	WG-088877-261120-RP-03	Sulfide	0.0018	UJ	mg/L
C087842	11/26/2020	WG-088877-261120-RP-04	Sulfide	0.0018	UJ	mg/L
C087842	11/27/2020	WG-088877-271120-RP-05	Sulfide	0.0018	UJ	mg/L
C087847	11/27/2020	WL-088877-271120-RP-06	Hydrogen sulfide	0.0020	UJ	mg/L
C087847	11/27/2020	WL-088877-271120-RP-07	Hydrogen sulfide	0.0020	UJ	mg/L
C087847	11/27/2020	WL-088877-271120-RP-08	Hydrogen sulfide	0.0020	UJ	mg/L
C087847	11/27/2020	WL-088877-271120-RP-09	Hydrogen sulfide	0.0020	J	mg/L
C087847	11/27/2020	WL-088877-271120-RP-06	Sulfide	0.0018	UJ	mg/L
C087847	11/27/2020	WL-088877-271120-RP-07	Sulfide	0.0018	UJ	mg/L

GHD
138 East 7th Avenue Suite 100 Vancouver British Columbia V5T 1M6 Canada
T 604 214 0510 **F** 604 214 0525 **W** www.ghd.com

Lab Report #	Sample Date (mm/dd/yyyy)	Sample ID	Analyte	Result	Qualifier	Units
C087847	11/27/2020	WL-088877-271120-RP-08	Sulfide	0.0018	UJ	mg/L
C087847	11/27/2020	WL-088877-271120-RP-09	Sulfide	0.0018	J	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
C087847	11/27/2020	WL-088877-271120-RP-07	Sodium	0.050	J	mg/L
C087847	11/27/2020	WL-088877-271120-RP-07	Sodium (dissolved)	0.050	J	mg/L
C087847	11/27/2020	WL-088877-271120-RP-07	Sulfur	3.0	J	mg/L
C087847	11/27/2020	WL-088877-271120-RP-07	Sulfur (dissolved)	3.0	J	mg/L
C087847	11/27/2020	WL-088877-271120-RP-07	Uranium	0.10	J	ug/L
C087847	11/27/2020	WL-088877-271120-RP-07	Uranium (dissolved)	0.10	J	ug/L

The following results are qualified due to field duplicate variability:

Lab Report #	Sample Date (mm/dd/yyyy)	Sample ID	Analyte	Result	Qualifier	Units
C087847	11/27/2020	WL-088877-271120-RP-06	Aluminum	92.4	J	ug/L
C087847	11/27/2020	WL-088877-271120-RP-07	Aluminum	367	J	ug/L
C087847	11/27/2020	WL-088877-271120-RP-06	Arsenic	1.75	J	ug/L
C087847	11/27/2020	WL-088877-271120-RP-07	Arsenic	1.37	J	ug/L
C087847	11/27/2020	WL-088877-271120-RP-06	Barium	65.6	J	ug/L
C087847	11/27/2020	WL-088877-271120-RP-07	Barium	46.8	J	ug/L
C087847	11/27/2020	WL-088877-271120-RP-06	Boron	1390	J	ug/L
C087847	11/27/2020	WL-088877-271120-RP-07	Boron	698	J	ug/L
C087847	11/27/2020	WL-088877-271120-RP-06	Cadmium	0.250	J	ug/L
C087847	11/27/2020	WL-088877-271120-RP-07	Cadmium	0.130	J	ug/L
C087847	11/27/2020	WL-088877-271120-RP-06	Calcium	319	J	mg/L
C087847	11/27/2020	WL-088877-271120-RP-07	Calcium	226	J	mg/L
C087847	11/27/2020	WL-088877-271120-RP-06	Copper	48.9	J	ug/L
C087847	11/27/2020	WL-088877-271120-RP-07	Copper	81.3	J	ug/L
C087847	11/27/2020	WL-088877-271120-RP-06	Copper (dissolved)	26.6	J	ug/L
C087847	11/27/2020	WL-088877-271120-RP-07	Copper (dissolved)	33.4	J	ug/L
C087847	11/27/2020	WL-088877-271120-RP-06	Iron (dissolved)	784	J	ug/L
C087847	11/27/2020	WL-088877-271120-RP-07	Iron (dissolved)	371	J	ug/L
C087847	11/27/2020	WL-088877-271120-RP-06	Lead	2.12	J	ug/L
C087847	11/27/2020	WL-088877-271120-RP-07	Lead	6.50	J	ug/L
C087847	11/27/2020	WL-088877-271120-RP-06	Magnesium	55.9	J	mg/L
C087847	11/27/2020	WL-088877-271120-RP-07	Magnesium	37.1	J	mg/L
C087847	11/27/2020	WL-088877-271120-RP-06	Mercury	0.0152	J	ug/L
C087847	11/27/2020	WL-088877-271120-RP-07	Mercury	0.0123	J	ug/L
C087847	11/27/2020	WL-088877-271120-RP-06	Molybdenum	2.8	J	ug/L
C087847	11/27/2020	WL-088877-271120-RP-07	Molybdenum	1.7	J	ug/L
C087847	11/27/2020	WL-088877-271120-RP-06	Nickel	5.2	J	ug/L

Lab Report #	Sample Date (mm/dd/yyyy)	Sample ID	Analyte	Result	Qualifier	Units
C087847	11/27/2020	WL-088877-271120-RP-07	Nickel	3.9	J	ug/L
C087847	11/27/2020	WL-088877-271120-RP-06	Sodium	120	J	mg/L
C087847	11/27/2020	WL-088877-271120-RP-07	Sodium	66.7	J	mg/L
C087847	11/27/2020	WL-088877-271120-RP-06	Strontium	1110	J	ug/L
C087847	11/27/2020	WL-088877-271120-RP-07	Strontium	770	J	ug/L
C087847	11/27/2020	WL-088877-271120-RP-06	Sulfur	224	J	mg/L
C087847	11/27/2020	WL-088877-271120-RP-07	Sulfur	127	J	mg/L
C087847	11/27/2020	WL-088877-271120-RP-06	Titanium	10	UJ	ug/L
C087847	11/27/2020	WL-088877-271120-RP-07	Titanium	29.5	J	ug/L
C087847	11/27/2020	WL-088877-271120-RP-06	Uranium	10.0	J	ug/L
C087847	11/27/2020	WL-088877-271120-RP-07	Uranium	4.62	J	ug/L
C087847	11/27/2020	WL-088877-271120-RP-06	Zinc	19	J	ug/L
C087847	11/27/2020	WL-088877-271120-RP-07	Zinc	31.4	J	ug/L
C087847	11/27/2020	WL-088877-271120-RP-06	2-Methylnaphthalene	0.78	J	ug/L
C087847	11/27/2020	WL-088877-271120-RP-07	2-Methylnaphthalene	0.60	J	ug/L
C087847	11/27/2020	WL-088877-271120-RP-06	Naphthalene	15	J	ug/L
C087847	11/27/2020	WL-088877-271120-RP-07	Naphthalene	12	J	ug/L
C087847	11/27/2020	WL-088877-271120-RP-06	Total PAH	26	J	ug/L
C087847	11/27/2020	WL-088877-271120-RP-07	Total PAH	21	J	ug/L
C087847	11/27/2020	WL-088877-271120-RP-06	Biochemical oxygen demand (BOD)	9.7	J	mg/L
C087847	11/27/2020	WL-088877-271120-RP-07	Biochemical oxygen demand (BOD)	7.6	J	mg/L
C087847	11/27/2020	WL-088877-271120-RP-06	Chloride (dissolved)	49	J	mg/L
C087847	11/27/2020	WL-088877-271120-RP-07	Chloride (dissolved)	97	J	mg/L
C087847	11/27/2020	WL-088877-271120-RP-06	Conductivity	1100	J	uS/cm
C087847	11/27/2020	WL-088877-271120-RP-07	Conductivity	1600	J	uS/cm
C087847	11/27/2020	WL-088877-271120-RP-06	Hardness	1030	J	mg/L
C087847	11/27/2020	WL-088877-271120-RP-07	Hardness	717	J	mg/L
C087847	11/27/2020	WL-088877-271120-RP-06	Sulfate (dissolved)	200	J	mg/L
C087847	11/27/2020	WL-088877-271120-RP-07	Sulfate (dissolved)	350	J	mg/L
C087847	11/27/2020	WL-088877-271120-RP-06	Total dissolved solids (TDS)	810	J	mg/L
C087847	11/27/2020	WL-088877-271120-RP-07	Total dissolved solids (TDS)	1100	J	mg/L

Notes:

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.

Your P.O. #: 73506780-7
Your Project #: 88877-07-02
Site#: 88877-07-02
Site Location: WATER UPLAND
Your C.O.C. #: 08484193

Attention: 088877 Distribution

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

Report Date: 2020/06/27
Report #: R2896167
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C042093
Received: 2020/06/19, 08:00

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	2020/06/22	BBY6SOP-00026	SM 23 2320 B m
Biochemical Oxygen Demand	1	2020/06/20	2020/06/25	BBY6SOP-00045	SM 23 5210 B m
BTEX/MTBE LH, VH, F1 SIM/MS	1	N/A	2020/06/22	BBY8SOP-00010 / BBY8SOP-00011 / BBY8SOP-00012	BCMOE BCLM Jul 2017
Chloride/Sulphate by Auto Colourimetry	1	N/A	2020/06/23	BBY6SOP-00011 / BBY6SOP-00017	SM23-4500-Cl/SO4-E m
COD by Colorimeter	1	N/A	2020/06/23	BBY6SOP-00024	SM 23 5220 D m
Conductivity @25C	1	N/A	2020/06/22	BBY6SOP-00026	SM 23 2510 B m
Sulphide (as H2S) (1)	1	N/A	2020/06/25		Auto Calc
Hardness Total (calculated as CaCO3) (2)	1	N/A	2020/06/25	BBY WI-00033	Auto Calc
Hardness (calculated as CaCO3)	1	N/A	2020/06/23	BBY WI-00033	Auto Calc
Mercury (Dissolved) by CV	1	2020/06/22	2020/06/22	AB SOP-00084	BCMOE BCLM Oct2013 m
Mercury (Total) by CV	1	2020/06/22	2020/06/22	AB SOP-00084	BCMOE BCLM Oct2013 m
Na, K, Ca, Mg, S by CRC ICPMS (diss.)	1	N/A	2020/06/23	BBY WI-00033	Auto Calc
Elements by CRC ICPMS (dissolved)	1	N/A	2020/06/23	BBY7SOP-00002	EPA 6020b R2 m
Na, K, Ca, Mg, S by CRC ICPMS (total)	1	2020/06/19	2020/06/25	BBY WI-00033	Auto Calc
Elements by CRC ICPMS (total)	1	2020/06/23	2020/06/24	BBY7SOP-00003 / BBY7SOP-00002	EPA 6020b R2 m
Ammonia-N (Total) (1)	1	N/A	2020/06/26	AB SOP-00007	SM 23 4500 NH3 A G m
Nitrate + Nitrite (N)	1	N/A	2020/06/20	BBY6SOP-00010	SM 23 4500-NO3- I m
Nitrite (N) by CFA	1	N/A	2020/06/20	BBY6SOP-00010	SM 23 4500-NO3- I m
Nitrogen - Nitrate (as N)	1	N/A	2020/06/20	BBY WI-00033	Auto Calc
PAH in Water by GC/MS (SIM)	1	2020/06/24	2020/06/24	BBY8SOP-00021	BCMOE BCLM Jul2017m
Total LMW, HMW, Total PAH Calc (3)	1	N/A	2020/06/25	BBY WI-00033	Auto Calc
Filter and HNO3 Preserve for Metals	1	N/A	2020/06/19	BBY7 WI-00004	SM 23 3030B m
Orthophosphate by Konelab (4)	1	N/A	2020/06/20	BBY6SOP-00013	SM 23 4500-P E m
Total Sulphide (1)	1	N/A	2020/06/25	AB SOP-00080	SM 23 4500 S2-A D Fm
Total Dissolved Solids (Filt. Residue)	1	2020/06/22	2020/06/23	BBY6SOP-00033	SM 23 2540 C m
Total Suspended Solids (NFR)	1	2020/06/23	2020/06/24	BBY6SOP-00034	SM 23 2540 D m
Volatile HC-BTEX (5)	1	N/A	2020/06/23	BBY WI-00033	Auto Calc

Remarks:

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

Your P.O. #: 73506780-7
Your Project #: 88877-07-02
Site#: 88877-07-02
Site Location: WATER UPLAND
Your C.O.C. #: 08484193

Attention: 088877 Distribution

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

Report Date: 2020/06/27
Report #: R2896167
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C042093
Received: 2020/06/19, 08:00

Bureau Veritas Laboratories are accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by BV Labs 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 BV Labs profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and BV Labs 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.

BV Labs liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. BV Labs 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 BV Labs, unless otherwise agreed in writing. BV Labs 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 BV Labs, results relate to the supplied samples tested.

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 BV Labs 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) 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) Orthophosphate > Total Phosphorus Imbalance: When applicable, Orthophosphate, Total Phosphorus and dissolved Phosphorus results were reviewed and data quality meets acceptable levels unless otherwise noted.

(5) VPH = VH - (Benzene + Toluene + Ethylbenzene + m & p-Xylene + o-Xylene + Styrene)

Encryption Key

AUTHORIZED REPORT
RAPPORT AUTORISÉ

Bureau Veritas Laboratories
27 Jun 2020 06:06:46

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

==========

This report has been generated and distributed using a secure automated process.
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 #: C042093
Report Date: 2020/06/27

GHD Limited
Client Project #: 88877-07-02
Site Location: WATER UPLAND
Your P.O. #: 73506780-7
Sampler Initials: NT

RESULTS OF CHEMICAL ANALYSES OF WATER

BV Labs ID		XY4670			
Sampling Date		2020/06/18 11:00			
COC Number		08484193			
	UNITS	W-88877-180620-NT-01	RDL	MDL	QC Batch
ANIONS					
Nitrite (N)	mg/L	<0.0050	0.0050	0.0050	9893925
Calculated Parameters					
Filter and HNO3 Preservation	N/A	FIELD	N/A	N/A	ONSITE
Nitrate (N)	mg/L	<0.020	0.020	N/A	9892745
Sulphide (as H2S)	mg/L	<0.0020	0.0020	N/A	9892270
Demand Parameters					
Biochemical Oxygen Demand	mg/L	<2.0	2.0	N/A	9893798
Chemical Oxygen Demand	mg/L	19	10	10	9897034
Misc. Inorganics					
Conductivity	uS/cm	59	2.0	N/A	9895394
Total Dissolved Solids	mg/L	50	10	N/A	9895609
Total Suspended Solids	mg/L	8.8	1.0	N/A	9896523
Anions					
Alkalinity (PP as CaCO3)	mg/L	<1.0	1.0	N/A	9895393
Alkalinity (Total as CaCO3)	mg/L	15	1.0	N/A	9895393
Bicarbonate (HCO3)	mg/L	19	1.0	N/A	9895393
Carbonate (CO3)	mg/L	<1.0	1.0	N/A	9895393
Hydroxide (OH)	mg/L	<1.0	1.0	N/A	9895393
Total Sulphide	mg/L	<0.0018	0.0018	N/A	9899935
Dissolved Chloride (Cl)	mg/L	6.4	1.0	N/A	9897412
Dissolved Sulphate (SO4)	mg/L	1.9	1.0	N/A	9897412
Nutrients					
Total Ammonia (N)	mg/L	<0.015	0.015	0.0040	9902565
Orthophosphate (P)	mg/L	<0.0030	0.0030	0.0030	9893968
Nitrate plus Nitrite (N)	mg/L	<0.020	0.020	0.020	9893924

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 #: C042093
Report Date: 2020/06/27

GHD Limited
Client Project #: 88877-07-02
Site Location: WATER UPLAND
Your P.O. #: 73506780-7
Sampler Initials: NT

CSR BTEX/VPH IN WATER (WATER)

BV Labs ID		XY4670			
Sampling Date		2020/06/18 11:00			
COC Number		08484193			
	UNITS	W-88877-180620-NT-01	RDL	MDL	QC Batch
Calculated Parameters					
VPH (VHW6 to 10 - BTEX)	ug/L	<300	300	300	9892208
Volatiles					
Methyl-tert-butylether (MTBE)	ug/L	<4.0	4.0	4.0	9894746
Benzene	ug/L	<0.40	0.40	0.40	9894746
Toluene	ug/L	<0.40	0.40	0.40	9894746
Ethylbenzene	ug/L	<0.40	0.40	0.40	9894746
m & p-Xylene	ug/L	<0.40	0.40	0.40	9894746
o-Xylene	ug/L	<0.40	0.40	0.40	9894746
Styrene	ug/L	<0.40	0.40	0.40	9894746
Xylenes (Total)	ug/L	<0.40	0.40	0.40	9894746
VH C6-C10	ug/L	<300	300	300	9894746
Surrogate Recovery (%)					
1,4-Difluorobenzene (sur.)	%	96	N/A	N/A	9894746
4-Bromofluorobenzene (sur.)	%	100	N/A	N/A	9894746
D4-1,2-Dichloroethane (sur.)	%	95	N/A	N/A	9894746

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 #: C042093
Report Date: 2020/06/27

GHD Limited
Client Project #: 88877-07-02
Site Location: WATER UPLAND
Your P.O. #: 73506780-7
Sampler Initials: NT

CSR/CCME DISS. METALS IN WATER W/ CV HG (WATER)

BV Labs ID		XY4670			
Sampling Date		2020/06/18 11:00			
COC Number		08484193			
	UNITS	W-88877-180620-NT-01	RDL	MDL	QC Batch
Calculated Parameters					
Dissolved Hardness (CaCO3)	mg/L	18.5	0.50	0.50	9892272
Elements					
Dissolved Mercury (Hg)	ug/L	<0.0019	0.0019	0.0019	9894710
Dissolved Metals by ICPMS					
Dissolved Aluminum (Al)	ug/L	4.5	3.0	0.030	9895375
Dissolved Antimony (Sb)	ug/L	<0.50	0.50	0.0020	9895375
Dissolved Arsenic (As)	ug/L	0.11	0.10	0.010	9895375
Dissolved Barium (Ba)	ug/L	2.6	1.0	0.0020	9895375
Dissolved Beryllium (Be)	ug/L	<0.10	0.10	0.0030	9895375
Dissolved Bismuth (Bi)	ug/L	<1.0	1.0	0.0010	9895375
Dissolved Boron (B)	ug/L	<50	50	50	9895375
Dissolved Cadmium (Cd)	ug/L	<0.010	0.010	0.0020	9895375
Dissolved Chromium (Cr)	ug/L	<1.0	1.0	0.020	9895375
Dissolved Cobalt (Co)	ug/L	0.26	0.20	0.20	9895375
Dissolved Copper (Cu)	ug/L	0.66	0.20	0.010	9895375
Dissolved Iron (Fe)	ug/L	172	5.0	0.040	9895375
Dissolved Lead (Pb)	ug/L	<0.20	0.20	0.0010	9895375
Dissolved Lithium (Li)	ug/L	<2.0	2.0	2.0	9895375
Dissolved Manganese (Mn)	ug/L	89.8	1.0	0.030	9895375
Dissolved Molybdenum (Mo)	ug/L	<1.0	1.0	0.0020	9895375
Dissolved Nickel (Ni)	ug/L	<1.0	1.0	0.010	9895375
Dissolved Phosphorus (P)	ug/L	<10	10	1.0	9895375
Dissolved Selenium (Se)	ug/L	<0.10	0.10	0.0060	9895375
Dissolved Silicon (Si)	ug/L	1300	100	0.30	9895375
Dissolved Silver (Ag)	ug/L	<0.020	0.020	0.0020	9895375
Dissolved Strontium (Sr)	ug/L	18.0	1.0	0.0020	9895375
Dissolved Thallium (Tl)	ug/L	<0.010	0.010	0.010	9895375
Dissolved Tin (Sn)	ug/L	<5.0	5.0	0.0050	9895375
Dissolved Titanium (Ti)	ug/L	<5.0	5.0	0.30	9895375
Dissolved Uranium (U)	ug/L	<0.10	0.10	0.0010	9895375
Dissolved Vanadium (V)	ug/L	<5.0	5.0	0.020	9895375
RDL = Reportable Detection Limit					

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

BV Labs Job #: C042093
Report Date: 2020/06/27

GHD Limited
Client Project #: 88877-07-02
Site Location: WATER UPLAND
Your P.O. #: 73506780-7
Sampler Initials: NT

CSR/CCME DISS. METALS IN WATER W/ CV HG (WATER)

BV Labs ID		XY4670			
Sampling Date		2020/06/18 11:00			
COC Number		08484193			
	UNITS	W-88877-180620-NT-01	RDL	MDL	QC Batch
Dissolved Zinc (Zn)	ug/L	<5.0	5.0	0.050	9895375
Dissolved Zirconium (Zr)	ug/L	<0.10	0.10	0.0080	9895375
Dissolved Calcium (Ca)	mg/L	5.48	0.050	0.0010	9892165
Dissolved Magnesium (Mg)	mg/L	1.17	0.050	0.00050	9892165
Dissolved Potassium (K)	mg/L	0.174	0.050	0.0020	9892165
Dissolved Sodium (Na)	mg/L	4.03	0.050	0.0010	9892165
Dissolved Sulphur (S)	mg/L	<3.0	3.0	1.0	9892165
RDL = Reportable Detection Limit					

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

BV Labs Job #: C042093
Report Date: 2020/06/27

GHD Limited
Client Project #: 88877-07-02
Site Location: WATER UPLAND
Your P.O. #: 73506780-7
Sampler Initials: NT

CSR/CCME TOT. METALS IN WATER W/ CV HG (WATER)

BV Labs ID		XY4670			
Sampling Date		2020/06/18 11:00			
COC Number		08484193			
	UNITS	W-88877-180620-NT-01	RDL	MDL	QC Batch
Calculated Parameters					
Total Hardness (CaCO3)	mg/L	19.4	0.50	0.50	9892271
Elements					
Total Mercury (Hg)	ug/L	<0.0019	0.0019	0.0019	9894686
Total Metals by ICPMS					
Total Aluminum (Al)	ug/L	202	3.0	0.030	9896429
Total Antimony (Sb)	ug/L	<0.50	0.50	0.0020	9896429
Total Arsenic (As)	ug/L	0.37	0.10	0.010	9896429
Total Barium (Ba)	ug/L	5.2	1.0	0.0020	9896429
Total Beryllium (Be)	ug/L	<0.10	0.10	0.0030	9896429
Total Bismuth (Bi)	ug/L	<1.0	1.0	0.0010	9896429
Total Boron (B)	ug/L	<50	50	50	9896429
Total Cadmium (Cd)	ug/L	0.020	0.010	0.0020	9896429
Total Chromium (Cr)	ug/L	<1.0	1.0	0.020	9896429
Total Cobalt (Co)	ug/L	0.72	0.20	0.20	9896429
Total Copper (Cu)	ug/L	2.18	0.50	0.030	9896429
Total Iron (Fe)	ug/L	5480	10	0.70	9896429
Total Lead (Pb)	ug/L	2.43	0.20	0.0010	9896429
Total Lithium (Li)	ug/L	<2.0	2.0	2.0	9896429
Total Manganese (Mn)	ug/L	122	1.0	0.030	9896429
Total Molybdenum (Mo)	ug/L	<1.0	1.0	0.0020	9896429
Total Nickel (Ni)	ug/L	<1.0	1.0	0.010	9896429
Total Phosphorus (P)	ug/L	18	10	1.0	9896429
Total Selenium (Se)	ug/L	<0.10	0.10	0.0060	9896429
Total Silicon (Si)	ug/L	1640	100	0.30	9896429
Total Silver (Ag)	ug/L	<0.020	0.020	0.0020	9896429
Total Strontium (Sr)	ug/L	19.4	1.0	0.0020	9896429
Total Thallium (Tl)	ug/L	<0.010	0.010	0.010	9896429
Total Tin (Sn)	ug/L	<5.0	5.0	0.0050	9896429
Total Titanium (Ti)	ug/L	13.0	5.0	0.30	9896429
Total Uranium (U)	ug/L	<0.10	0.10	0.0010	9896429
Total Vanadium (V)	ug/L	<5.0	5.0	0.020	9896429
RDL = Reportable Detection Limit					

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

BV Labs Job #: C042093
Report Date: 2020/06/27

GHD Limited
Client Project #: 88877-07-02
Site Location: WATER UPLAND
Your P.O. #: 73506780-7
Sampler Initials: NT

CSR/CCME TOT. METALS IN WATER W/ CV HG (WATER)

BV Labs ID		XY4670			
Sampling Date		2020/06/18 11:00			
COC Number		08484193			
	UNITS	W-88877-180620-NT-01	RDL	MDL	QC Batch
Total Zinc (Zn)	ug/L	12.4	5.0	0.050	9896429
Total Zirconium (Zr)	ug/L	0.10	0.10	0.0080	9896429
Total Calcium (Ca)	mg/L	5.79	0.050	0.0010	9892169
Total Magnesium (Mg)	mg/L	1.20	0.050	0.00050	9892169
Total Potassium (K)	mg/L	0.179	0.050	0.0020	9892169
Total Sodium (Na)	mg/L	4.17	0.050	0.0010	9892169
Total Sulphur (S)	mg/L	<3.0	3.0	1.0	9892169
RDL = Reportable Detection Limit					

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

BV Labs Job #: C042093
Report Date: 2020/06/27

GHD Limited
Client Project #: 88877-07-02
Site Location: WATER UPLAND
Your P.O. #: 73506780-7
Sampler Initials: NT

CSR PAH IN WATER BY GC-MS (WATER)

BV Labs ID		XY4670			
Sampling Date		2020/06/18 11:00			
COC Number		08484193			
	UNITS	W-88877-180620-NT-01	RDL	MDL	QC Batch
Calculated Parameters					
Low Molecular Weight PAH`s	ug/L	<0.10	0.10	0.010	9892297
High Molecular Weight PAH`s	ug/L	<0.050	0.050	0.020	9892297
Total PAH	ug/L	<0.10	0.10	0.010	9892297
Polycyclic Aromatics					
Quinoline	ug/L	<0.020	0.020	0.020	9898109
Naphthalene	ug/L	<0.10	0.10	0.050	9898109
1-Methylnaphthalene	ug/L	<0.050	0.050	0.050	9898109
2-Methylnaphthalene	ug/L	<0.10	0.10	0.050	9898109
Acenaphthylene	ug/L	<0.050	0.050	0.050	9898109
Acenaphthene	ug/L	<0.050	0.050	0.050	9898109
Fluorene	ug/L	<0.050	0.050	0.050	9898109
Phenanthrene	ug/L	<0.050	0.050	0.050	9898109
Anthracene	ug/L	<0.010	0.010	0.010	9898109
Acridine	ug/L	<0.050	0.050	0.050	9898109
Fluoranthene	ug/L	<0.020	0.020	0.020	9898109
Pyrene	ug/L	<0.020	0.020	0.020	9898109
Benzo(a)anthracene	ug/L	<0.010	0.010	0.010	9898109
Chrysene	ug/L	<0.020	0.020	0.020	9898109
Benzo(b&j)fluoranthene	ug/L	<0.030	0.030	0.030	9898109
Benzo(k)fluoranthene	ug/L	<0.050	0.050	0.050	9898109
Benzo(a)pyrene	ug/L	<0.0050	0.0050	0.0050	9898109
Indeno(1,2,3-cd)pyrene	ug/L	<0.050	0.050	0.050	9898109
Dibenz(a,h)anthracene	ug/L	<0.0030	0.0030	0.0030	9898109
Benzo(g,h,i)perylene	ug/L	<0.050	0.050	0.050	9898109
Surrogate Recovery (%)					
D10-ANTHRACENE (sur.)	%	95	N/A	N/A	9898109
D8-ACENAPHTHYLENE (sur.)	%	95	N/A	N/A	9898109
D8-NAPHTHALENE (sur.)	%	99	N/A	N/A	9898109
TERPHENYL-D14 (sur.)	%	94	N/A	N/A	9898109

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

Results relate only to the items tested.

BV Labs Job #: C042093
Report Date: 2020/06/27

QUALITY ASSURANCE REPORT

GHD Limited
Client Project #: 88877-07-02
Site Location: WATER UPLAND
Your P.O. #: 73506780-7
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
9894746	1,4-Difluorobenzene (sur.)	2020/06/22	100	70 - 130	95	70 - 130	104	%		
9894746	4-Bromofluorobenzene (sur.)	2020/06/22	96	70 - 130	103	70 - 130	98	%		
9894746	D4-1,2-Dichloroethane (sur.)	2020/06/22	95	70 - 130	92	70 - 130	90	%		
9898109	D10-ANTHRACENE (sur.)	2020/06/24	93 (4)	50 - 140	91	50 - 140	90	%		
9898109	D8-ACENAPHTHYLENE (sur.)	2020/06/24	94 (4)	50 - 140	91	50 - 140	89	%		
9898109	D8-NAPHTHALENE (sur.)	2020/06/24	94 (4)	50 - 140	90	50 - 140	94	%		
9898109	TERPHENYL-D14 (sur.)	2020/06/24	92 (4)	50 - 140	89	50 - 140	89	%		
9893798	Biochemical Oxygen Demand	2020/06/25			92	85 - 115	<2.0	mg/L	4.4 (1)	20
9893924	Nitrate plus Nitrite (N)	2020/06/20	104	80 - 120	108	80 - 120	<0.020	mg/L	NC (1)	25
9893925	Nitrite (N)	2020/06/20	100	80 - 120	100	80 - 120	<0.0050	mg/L	NC (1)	20
9893968	Orthophosphate (P)	2020/06/20	113	80 - 120	101	80 - 120	<0.0030	mg/L	0.91 (1)	20
9894686	Total Mercury (Hg)	2020/06/22	79 (2)	80 - 120	82	80 - 120	<0.0019	ug/L	NC (1)	20
9894710	Dissolved Mercury (Hg)	2020/06/22	94 (3)	80 - 120	88	80 - 120	<0.0019	ug/L	NC (1)	20
9894746	Benzene	2020/06/22	106	70 - 130	102	70 - 130	<0.40	ug/L	1.2 (1)	30
9894746	Ethylbenzene	2020/06/22	101	70 - 130	99	70 - 130	<0.40	ug/L	1.6 (1)	30
9894746	m & p-Xylene	2020/06/22	101	70 - 130	99	70 - 130	<0.40	ug/L	NC (1)	30
9894746	Methyl-tert-butylether (MTBE)	2020/06/22	106	70 - 130	100	70 - 130	<4.0	ug/L	1.0 (1)	30
9894746	o-Xylene	2020/06/22	103	70 - 130	100	70 - 130	<0.40	ug/L	NC (1)	30
9894746	Styrene	2020/06/22	96	70 - 130	102	70 - 130	<0.40	ug/L	NC (1)	30
9894746	Toluene	2020/06/22	99	70 - 130	96	70 - 130	<0.40	ug/L	NC (1)	30
9894746	VH C6-C10	2020/06/22			107	70 - 130	<300	ug/L	NC (1)	30
9894746	Xylenes (Total)	2020/06/22					<0.40	ug/L	NC (1)	30
9895375	Dissolved Aluminum (Al)	2020/06/23	100	80 - 120	104	80 - 120	<3.0	ug/L	0.74 (1)	20
9895375	Dissolved Antimony (Sb)	2020/06/23	104	80 - 120	104	80 - 120	<0.50	ug/L	0.21 (1)	20
9895375	Dissolved Arsenic (As)	2020/06/23	104	80 - 120	104	80 - 120	<0.10	ug/L	1.8 (1)	20
9895375	Dissolved Barium (Ba)	2020/06/23	99	80 - 120	103	80 - 120	<1.0	ug/L	1.4 (1)	20
9895375	Dissolved Beryllium (Be)	2020/06/23	103	80 - 120	104	80 - 120	<0.10	ug/L	NC (1)	20
9895375	Dissolved Bismuth (Bi)	2020/06/23	99	80 - 120	103	80 - 120	<1.0	ug/L	NC (1)	20
9895375	Dissolved Boron (B)	2020/06/23	106	80 - 120	108	80 - 120	<50	ug/L	2.1 (1)	20
9895375	Dissolved Cadmium (Cd)	2020/06/23	100	80 - 120	103	80 - 120	<0.010	ug/L	3.4 (1)	20
9895375	Dissolved Chromium (Cr)	2020/06/23	97	80 - 120	102	80 - 120	<1.0	ug/L	0.73 (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
9895375	Dissolved Cobalt (Co)	2020/06/23	92	80 - 120	97	80 - 120	<0.20	ug/L	NC (1)	20
9895375	Dissolved Copper (Cu)	2020/06/23	89	80 - 120	96	80 - 120	<0.20	ug/L	0.12 (1)	20
9895375	Dissolved Iron (Fe)	2020/06/23	106	80 - 120	107	80 - 120	<5.0	ug/L	NC (1)	20
9895375	Dissolved Lead (Pb)	2020/06/23	103	80 - 120	105	80 - 120	<0.20	ug/L	3.5 (1)	20
9895375	Dissolved Lithium (Li)	2020/06/23	104	80 - 120	107	80 - 120	<2.0	ug/L	NC (1)	20
9895375	Dissolved Manganese (Mn)	2020/06/23	98	80 - 120	102	80 - 120	<1.0	ug/L	0.58 (1)	20
9895375	Dissolved Molybdenum (Mo)	2020/06/23	104	80 - 120	104	80 - 120	<1.0	ug/L	0.77 (1)	20
9895375	Dissolved Nickel (Ni)	2020/06/23	94	80 - 120	101	80 - 120	<1.0	ug/L	2.3 (1)	20
9895375	Dissolved Phosphorus (P)	2020/06/23	103	80 - 120	103	80 - 120	<10	ug/L		
9895375	Dissolved Selenium (Se)	2020/06/23	102	80 - 120	102	80 - 120	<0.10	ug/L	6.4 (1)	20
9895375	Dissolved Silicon (Si)	2020/06/23	101	80 - 120	110	80 - 120	<100	ug/L	1.2 (1)	20
9895375	Dissolved Silver (Ag)	2020/06/23	100	80 - 120	104	80 - 120	<0.020	ug/L	NC (1)	20
9895375	Dissolved Strontium (Sr)	2020/06/23	NC	80 - 120	105	80 - 120	<1.0	ug/L	0.26 (1)	20
9895375	Dissolved Thallium (Tl)	2020/06/23	103	80 - 120	104	80 - 120	<0.010	ug/L	NC (1)	20
9895375	Dissolved Tin (Sn)	2020/06/23	101	80 - 120	104	80 - 120	<5.0	ug/L	NC (1)	20
9895375	Dissolved Titanium (Ti)	2020/06/23	100	80 - 120	106	80 - 120	<5.0	ug/L	NC (1)	20
9895375	Dissolved Uranium (U)	2020/06/23	105	80 - 120	109	80 - 120	<0.10	ug/L	0.019 (1)	20
9895375	Dissolved Vanadium (V)	2020/06/23	100	80 - 120	103	80 - 120	<5.0	ug/L	NC (1)	20
9895375	Dissolved Zinc (Zn)	2020/06/23	NC	80 - 120	104	80 - 120	<5.0	ug/L	0.59 (1)	20
9895375	Dissolved Zirconium (Zr)	2020/06/23	103	80 - 120	104	80 - 120	<0.10	ug/L	NC (1)	20
9895393	Alkalinity (PP as CaCO3)	2020/06/22					<1.0	mg/L		
9895393	Alkalinity (Total as CaCO3)	2020/06/22			94	80 - 120	<1.0	mg/L		
9895393	Bicarbonate (HCO3)	2020/06/22					<1.0	mg/L		
9895393	Carbonate (CO3)	2020/06/22					<1.0	mg/L		
9895393	Hydroxide (OH)	2020/06/22					<1.0	mg/L		
9895394	Conductivity	2020/06/22			100	80 - 120	<2.0	uS/cm		
9895609	Total Dissolved Solids	2020/06/23	98	80 - 120	98	80 - 120	<10	mg/L	7.4 (1)	20
9896429	Total Aluminum (Al)	2020/06/24	103	80 - 120	106	80 - 120	<3.0	ug/L	7.1 (1)	20
9896429	Total Antimony (Sb)	2020/06/24	102	80 - 120	102	80 - 120	<0.50	ug/L	NC (1)	20
9896429	Total Arsenic (As)	2020/06/24	103	80 - 120	100	80 - 120	<0.10	ug/L	0.59 (1)	20
9896429	Total Barium (Ba)	2020/06/24	NC	80 - 120	107	80 - 120	<1.0	ug/L	0.00046 (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
9896429	Total Beryllium (Be)	2020/06/24	92	80 - 120	96	80 - 120	<0.10	ug/L	NC (1)	20
9896429	Total Bismuth (Bi)	2020/06/24	95	80 - 120	100	80 - 120	<1.0	ug/L	NC (1)	20
9896429	Total Boron (B)	2020/06/24	96	80 - 120	106	80 - 120	<50	ug/L	1.8 (1)	20
9896429	Total Cadmium (Cd)	2020/06/24	98	80 - 120	99	80 - 120	<0.010	ug/L	NC (1)	20
9896429	Total Chromium (Cr)	2020/06/24	97	80 - 120	98	80 - 120	<1.0	ug/L	NC (1)	20
9896429	Total Cobalt (Co)	2020/06/24	92	80 - 120	95	80 - 120	<0.20	ug/L	0.035 (1)	20
9896429	Total Copper (Cu)	2020/06/24	86	80 - 120	93	80 - 120	<0.50	ug/L	0.74 (1)	20
9896429	Total Iron (Fe)	2020/06/24	NC	80 - 120	100	80 - 120	<10	ug/L	1.5 (1)	20
9896429	Total Lead (Pb)	2020/06/24	99	80 - 120	102	80 - 120	<0.20	ug/L	0.045 (1)	20
9896429	Total Lithium (Li)	2020/06/24	88	80 - 120	98	80 - 120	<2.0	ug/L	0.22 (1)	20
9896429	Total Manganese (Mn)	2020/06/24	94	80 - 120	97	80 - 120	<1.0	ug/L	0.93 (1)	20
9896429	Total Molybdenum (Mo)	2020/06/24	109	80 - 120	104	80 - 120	<1.0	ug/L	1.9 (1)	20
9896429	Total Nickel (Ni)	2020/06/24	90	80 - 120	94	80 - 120	<1.0	ug/L	2.0 (1)	20
9896429	Total Phosphorus (P)	2020/06/24	101	80 - 120	96	80 - 120	<10	ug/L		
9896429	Total Selenium (Se)	2020/06/24	105	80 - 120	102	80 - 120	<0.10	ug/L	NC (1)	20
9896429	Total Silicon (Si)	2020/06/24	92	80 - 120	98	80 - 120	<100	ug/L	0.54 (1)	20
9896429	Total Silver (Ag)	2020/06/24	98	80 - 120	99	80 - 120	<0.020	ug/L	NC (1)	20
9896429	Total Strontium (Sr)	2020/06/24	NC	80 - 120	102	80 - 120	<1.0	ug/L	0.33 (1)	20
9896429	Total Thallium (Tl)	2020/06/24	99	80 - 120	100	80 - 120	<0.010	ug/L	NC (1)	20
9896429	Total Tin (Sn)	2020/06/24	99	80 - 120	100	80 - 120	<5.0	ug/L	NC (1)	20
9896429	Total Titanium (Ti)	2020/06/24	99	80 - 120	100	80 - 120	<5.0	ug/L	NC (1)	20
9896429	Total Uranium (U)	2020/06/24	100	80 - 120	99	80 - 120	<0.10	ug/L	2.2 (1)	20
9896429	Total Vanadium (V)	2020/06/24	100	80 - 120	98	80 - 120	<5.0	ug/L	NC (1)	20
9896429	Total Zinc (Zn)	2020/06/24	90	80 - 120	95	80 - 120	<5.0	ug/L	0.92 (1)	20
9896429	Total Zirconium (Zr)	2020/06/24	110	80 - 120	102	80 - 120	<0.10	ug/L	NC (1)	20
9896523	Total Suspended Solids	2020/06/24	106	80 - 120	102	80 - 120	<1.0	mg/L	NC (1)	20
9897034	Chemical Oxygen Demand	2020/06/23	91	80 - 120	105	80 - 120	<10	mg/L	2.2 (1)	20
9897412	Dissolved Chloride (Cl)	2020/06/23	103	80 - 120	104	80 - 120	<1.0	mg/L	NC (1)	20
9897412	Dissolved Sulphate (SO4)	2020/06/23	94	80 - 120	97	80 - 120	<1.0	mg/L	7.6 (1)	20
9898109	1-Methylnaphthalene	2020/06/24	86 (4)	50 - 140	85	50 - 140	<0.050	ug/L	3.9 (1)	40
9898109	2-Methylnaphthalene	2020/06/24	84 (4)	50 - 140	83	50 - 140	<0.10	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
9898109	Acenaphthene	2020/06/24	91 (4)	50 - 140	91	50 - 140	<0.050	ug/L	6.1 (1)	40
9898109	Acenaphthylene	2020/06/24	90 (4)	50 - 140	90	50 - 140	<0.050	ug/L	NC (1)	40
9898109	Acridine	2020/06/24	100 (4)	50 - 140	104	50 - 140	<0.050	ug/L	NC (1)	40
9898109	Anthracene	2020/06/24	90 (4)	50 - 140	92	50 - 140	<0.010	ug/L	NC (1)	40
9898109	Benzo(a)anthracene	2020/06/24	85 (4)	50 - 140	83	50 - 140	<0.010	ug/L	NC (1)	40
9898109	Benzo(a)pyrene	2020/06/24	85 (4)	50 - 140	85	50 - 140	<0.0050	ug/L	NC (1)	40
9898109	Benzo(b&j)fluoranthene	2020/06/24	81 (4)	50 - 140	82	50 - 140	<0.030	ug/L	NC (1)	40
9898109	Benzo(g,h,i)perylene	2020/06/24	79 (4)	50 - 140	85	50 - 140	<0.050	ug/L	NC (1)	40
9898109	Benzo(k)fluoranthene	2020/06/24	91 (4)	50 - 140	91	50 - 140	<0.050	ug/L	NC (1)	40
9898109	Chrysene	2020/06/24	85 (4)	50 - 140	84	50 - 140	<0.020	ug/L	NC (1)	40
9898109	Dibenz(a,h)anthracene	2020/06/24	82 (4)	50 - 140	87	50 - 140	<0.0030	ug/L	NC (1)	40
9898109	Fluoranthene	2020/06/24	92 (4)	50 - 140	92	50 - 140	<0.020	ug/L	NC (1)	40
9898109	Fluorene	2020/06/24	92 (4)	50 - 140	91	50 - 140	<0.050	ug/L	6.4 (1)	40
9898109	Indeno(1,2,3-cd)pyrene	2020/06/24	84 (4)	50 - 140	91	50 - 140	<0.050	ug/L	NC (1)	40
9898109	Naphthalene	2020/06/24	84 (4)	50 - 140	84	50 - 140	<0.10	ug/L	2.3 (1)	40
9898109	Phenanthrene	2020/06/24	91 (4)	50 - 140	91	50 - 140	<0.050	ug/L	7.2 (1)	40
9898109	Pyrene	2020/06/24	91 (4)	50 - 140	91	50 - 140	<0.020	ug/L	NC (1)	40
9898109	Quinoline	2020/06/24	107 (4)	50 - 140	109	50 - 140	<0.020	ug/L	NC (1)	40
9899935	Total Sulphide	2020/06/25	NC	80 - 120	113	80 - 120	<0.0018	mg/L	126 (2,1)	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
9902565	Total Ammonia (N)	2020/06/26	105	80 - 120	104	80 - 120	<0.015	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.

(3) Matrix Spike Parent ID [XY4670-08]

(4) Matrix Spike Parent ID [XY4670-12]

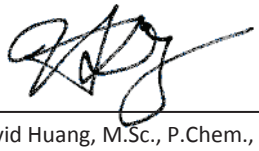
Bureau Veritas Laboratories Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

BV Labs Job #: C042093
Report Date: 2020/06/27

GHD Limited
Client Project #: 88877-07-02
Site Location: WATER UPLAND
Your P.O. #: 73506780-7
Sampler Initials: NT

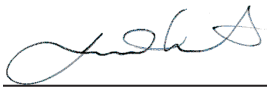
VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).



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

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



Jas Khatkar, AScT, PChem, Manager, Trace Organics

Maria Magdalena Florescu, Ph.D., P.Chem., QP, Inorganics 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

08484193

Burnaby: 4606 Canada Way, Burnaby, BC V5G 1K5 Toll Free (800) 665 8566
Victoria: 460 Tennyson Place, Unit 1, Victoria, BC V8Z 6S8 Toll Free (866) 385-6112
bvlabs.com

CHAIN OF CUSTODY RECORD

Page 1 of 1

Invoice Information		Report Information (if differs from invoice)		Project Information	
Company:	#163 GHD Limited	Company:	#28639 GHD Limited	Quotation	MSA
Contact Name:	Airesse MacPhee	Contact Name:	Airesse MacPhee	P.O. #/AFE#:	73506780-7
Address:	455 Pillip Street	Address:	10271 Shellbridge Way		(Water)
	Waterloo, ON PC: N2L 3X2		Richmond, BC PC: V6X 2W8	Project #:	088877-07-02
Phone/Fax:	(519) 884-0510	Phone/Fax:	(604) 248-3661	Site Location:	Upland
Email:	airesse.macphee@ghd.com	Email:	airesse.macphee@ghd.com	Site #:	—
Copies:	Reference PO	Copies:	Reference PO	Sampled By:	N. Turl

Turnaround Time (TAT) Required

☑ 5 - 7 Days Regular (Most analyses)

PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS

Rush TAT (Surcharges will be applied)

☐ Same Day ☐ 2 Days
☐ 1 Day ☐ 3-4 Days

Date Required:

Rush Confirmation #:

Laboratory Use Only

	YES	NO	Cooler ID	1
Seal Present	X		Temp	6 7 7
Seal Intact	X			
Cooling Media	X			

	YES	NO	Cooler ID	2
Seal Present	X		Temp	7 5 4
Seal Intact	X			
Cooling Media	X			

	YES	NO	Cooler ID	
Seal Present			Temp	
Seal Intact				
Cooling Media				

Depot Reception

Analysis Requested

#	Sample Identification	Date Sampled (yyyy/mm/dd)	Time Sampled (hh:mm)	Matrix	# of Containers	Speciated Alkalinity, Ec	BOD, COD	Cl, SO4 (dissolved), NO2, NO3, N+N	NH3, Orthophosphate	TDS, TSS	Sulphide (as S), Low Level Sulphide (as H2S)	Dissolved CSR Metals (+Hg)	Dissolved Hardness	Total CSR Metals (+Hg)	PAHs	BTEX/VPH	HOLD - DO NOT ANALYZE	Special Instructions
1	W-88877-180620-NT-01	2020/06/18	1100	WATER		X	X	X	X	X	X	X	X	X	X	X		Short holding times!
2																		All bottles were field filtered and
3																		preserved as required.
4																		
5																		
6																		
7																		
8																		
9																		
10																		

Regulatory Criteria

☐ BC CSR
☐ YK CSR
☐ CCME
☐ Drinking Water
☐ BC Water Quality
☐ Other

Relinquished by: (Signature/ Print)	Date (yyyy/mm/dd):	Time (hh:mm):	Received by: (Signature/ Print)	Date (yyyy/mm/dd):	Time (hh:mm):
N. Turl / N. Turl	2020/06/18	1600	Pedro Taoc	2020/06/19	08:00

C042093_COC

GHD Limited

BV Labs Job Number: C042093
Report Date: 2020/06/27

Client Project #: 88877-07-02
Site Location: WATER UPLAND
Your P.O. #: 73506780-7
Sampler Initials: NT

RESULTS OF CHEMICAL ANALYSES OF WATER

BV Labs ID		XY4670			
Sampling Date		2020/06/18 11:00			
COC Number		08484193			
	UNITS	**W-88877-180620-NT-01**	**RDL**	**MDL**	**QC Batch**
ANIONS					
Nitrite (N)	mg/L	<0.0050	0.0050	0.0050	9893925
Calculated Parameters					
Filter and HNO3 Preservation	N/A	FIELD	N/A	N/A	ONSITE
Nitrate (N)	mg/L	<0.020	0.020	N/A	9892745
Sulphide (as H2S)	mg/L	<0.0020	0.0020	N/A	9892270
Demand Parameters					
Biochemical Oxygen Demand	mg/L	<2.0	2.0	N/A	9893798
Chemical Oxygen Demand	mg/L	19	10	10	9897034
Misc. Inorganics					
Conductivity	uS/cm	59	2.0	N/A	9895394
Total Dissolved Solids	mg/L	50	10	N/A	9895609
Total Suspended Solids	mg/L	8.8	1.0	N/A	9896523
Anions					
Alkalinity (PP as CaCO3)	mg/L	<1.0	1.0	N/A	9895393
Alkalinity (Total as CaCO3)	mg/L	15	1.0	N/A	9895393
Bicarbonate (HCO3)	mg/L	19	1.0	N/A	9895393
Carbonate (CO3)	mg/L	<1.0	1.0	N/A	9895393
Hydroxide (OH)	mg/L	<1.0	1.0	N/A	9895393
Total Sulphide	mg/L	<0.0018	0.0018	N/A	9899935
Dissolved Chloride (Cl)	mg/L	6.4	1.0	N/A	9897412
Dissolved Sulphate (SO4)	mg/L	1.9	1.0	N/A	9897412
Nutrients					
Total Ammonia (N)	mg/L	<0.015	0.015	0.0040	9902565
Orthophosphate (P)	mg/L	<0.0030	0.0030	0.0030	9893968
Nitrate plus Nitrite (N)	mg/L	<0.020	0.020	0.020	9893924

RDL = Reportable Detection Limit
N/A = Not Applicable

Results relate only to the items tested.

GHD Limited

BV Labs Job Number: C042093
Report Date: 2020/06/27

Client Project #: 88877-07-02
Site Location: WATER UPLAND
Your P.O. #: 73506780-7
Sampler Initials: NT

CSR BTEX/VPH IN WATER (WATER)

BV Labs ID		XY4670			
Sampling Date		2020/06/18 11:00			
COC Number		08484193			
	UNITS	**W-88877-180620-NT-01**	**RDL**	**MDL**	**QC Batch**
Calculated Parameters					
VPH (VHW6 to 10 - BTEX)	ug/L	<300	300	300	9892208
Volatiles					
Methyl-tert-butylether (MTBE)	ug/L	<4.0	4.0	4.0	9894746
Benzene	ug/L	<0.40	0.40	0.40	9894746
Toluene	ug/L	<0.40	0.40	0.40	9894746
Ethylbenzene	ug/L	<0.40	0.40	0.40	9894746
m & p-Xylene	ug/L	<0.40	0.40	0.40	9894746
o-Xylene	ug/L	<0.40	0.40	0.40	9894746
Styrene	ug/L	<0.40	0.40	0.40	9894746
Xylenes (Total)	ug/L	<0.40	0.40	0.40	9894746
VH C6-C10	ug/L	<300	300	300	9894746
Surrogate Recovery (%)					
1,4-Difluorobenzene (sur.)	%	96	N/A	N/A	9894746
4-Bromofluorobenzene (sur.)	%	100	N/A	N/A	9894746
D4-1,2-Dichloroethane (sur.)	%	95	N/A	N/A	9894746

RDL = Reportable Detection Limit
N/A = Not Applicable

Results relate only to the items tested.

GHD Limited

BV Labs Job Number: C042093
Report Date: 2020/06/27

Client Project #: 88877-07-02
Site Location: WATER UPLAND
Your P.O. #: 73506780-7
Sampler Initials: NT

CSR/CCME DISS. METALS IN WATER W/ CV HG (WATER)

BV Labs ID		XY4670			
Sampling Date		2020/06/18 11:00			
COC Number		08484193			
	UNITS	**W-88877-180620-NT-01**	**RDL**	**MDL**	**QC Batch**
Calculated Parameters					
Dissolved Hardness (CaCO3)	mg/L	18.5	0.50	0.50	9892272
Elements					
Dissolved Mercury (Hg)	ug/L	<0.0019	0.0019	0.0019	9894710
Dissolved Metals by ICPMS					
Dissolved Aluminum (Al)	ug/L	4.5	3.0	0.030	9895375
Dissolved Antimony (Sb)	ug/L	<0.50	0.50	0.0020	9895375
Dissolved Arsenic (As)	ug/L	0.11	0.10	0.010	9895375
Dissolved Barium (Ba)	ug/L	2.6	1.0	0.0020	9895375
Dissolved Beryllium (Be)	ug/L	<0.10	0.10	0.0030	9895375
Dissolved Bismuth (Bi)	ug/L	<1.0	1.0	0.0010	9895375
Dissolved Boron (B)	ug/L	<50	50	50	9895375
Dissolved Cadmium (Cd)	ug/L	<0.010	0.010	0.0020	9895375
Dissolved Chromium (Cr)	ug/L	<1.0	1.0	0.020	9895375
Dissolved Cobalt (Co)	ug/L	0.26	0.20	0.20	9895375
Dissolved Copper (Cu)	ug/L	0.66	0.20	0.010	9895375
Dissolved Iron (Fe)	ug/L	172	5.0	0.040	9895375
Dissolved Lead (Pb)	ug/L	<0.20	0.20	0.0010	9895375
Dissolved Lithium (Li)	ug/L	<2.0	2.0	2.0	9895375
Dissolved Manganese (Mn)	ug/L	89.8	1.0	0.030	9895375
Dissolved Molybdenum (Mo)	ug/L	<1.0	1.0	0.0020	9895375
Dissolved Nickel (Ni)	ug/L	<1.0	1.0	0.010	9895375
Dissolved Phosphorus (P)	ug/L	<10	10	1.0	9895375
Dissolved Selenium (Se)	ug/L	<0.10	0.10	0.0060	9895375
Dissolved Silicon (Si)	ug/L	1300	100	0.30	9895375
Dissolved Silver (Ag)	ug/L	<0.020	0.020	0.0020	9895375
Dissolved Strontium (Sr)	ug/L	18.0	1.0	0.0020	9895375
Dissolved Thallium (Tl)	ug/L	<0.010	0.010	0.010	9895375
Dissolved Tin (Sn)	ug/L	<5.0	5.0	0.0050	9895375
Dissolved Titanium (Ti)	ug/L	<5.0	5.0	0.30	9895375
Dissolved Uranium (U)	ug/L	<0.10	0.10	0.0010	9895375
Dissolved Vanadium (V)	ug/L	<5.0	5.0	0.020	9895375
Dissolved Zinc (Zn)	ug/L	<5.0	5.0	0.050	9895375
Dissolved Zirconium (Zr)	ug/L	<0.10	0.10	0.0080	9895375
Dissolved Calcium (Ca)	mg/L	5.48	0.050	0.0010	9892165
Dissolved Magnesium (Mg)	mg/L	1.17	0.050	0.00050	9892165
Dissolved Potassium (K)	mg/L	0.174	0.050	0.0020	9892165
Dissolved Sodium (Na)	mg/L	4.03	0.050	0.0010	9892165
Dissolved Sulphur (S)	mg/L	<3.0	3.0	1.0	9892165

RDL = Reportable Detection Limit
N/A = Not Applicable

Results relate only to the items tested.

GHD Limited

BV Labs Job Number: C042093
Report Date: 2020/06/27

Client Project #: 88877-07-02
Site Location: WATER UPLAND
Your P.O. #: 73506780-7
Sampler Initials: NT

CSR/CCME TOT. METALS IN WATER W/ CV HG (WATER)

BV Labs ID		XY4670			
Sampling Date		2020/06/18 11:00			
COC Number		08484193			
	UNITS	**W-88877-180620-NT-01**	**RDL**	**MDL**	**QC Batch**
Calculated Parameters					
Total Hardness (CaCO3)	mg/L	19.4	0.50	0.50	9892271
Elements					
Total Mercury (Hg)	ug/L	<0.0019	0.0019	0.0019	9894686
Total Metals by ICPMS					
Total Aluminum (Al)	ug/L	202	3.0	0.030	9896429
Total Antimony (Sb)	ug/L	<0.50	0.50	0.0020	9896429
Total Arsenic (As)	ug/L	0.37	0.10	0.010	9896429
Total Barium (Ba)	ug/L	5.2	1.0	0.0020	9896429
Total Beryllium (Be)	ug/L	<0.10	0.10	0.0030	9896429
Total Bismuth (Bi)	ug/L	<1.0	1.0	0.0010	9896429
Total Boron (B)	ug/L	<50	50	50	9896429
Total Cadmium (Cd)	ug/L	0.020	0.010	0.0020	9896429
Total Chromium (Cr)	ug/L	<1.0	1.0	0.020	9896429
Total Cobalt (Co)	ug/L	0.72	0.20	0.20	9896429
Total Copper (Cu)	ug/L	2.18	0.50	0.030	9896429
Total Iron (Fe)	ug/L	5480	10	0.70	9896429
Total Lead (Pb)	ug/L	2.43	0.20	0.0010	9896429
Total Lithium (Li)	ug/L	<2.0	2.0	2.0	9896429
Total Manganese (Mn)	ug/L	122	1.0	0.030	9896429
Total Molybdenum (Mo)	ug/L	<1.0	1.0	0.0020	9896429
Total Nickel (Ni)	ug/L	<1.0	1.0	0.010	9896429
Total Phosphorus (P)	ug/L	18	10	1.0	9896429
Total Selenium (Se)	ug/L	<0.10	0.10	0.0060	9896429
Total Silicon (Si)	ug/L	1640	100	0.30	9896429
Total Silver (Ag)	ug/L	<0.020	0.020	0.0020	9896429
Total Strontium (Sr)	ug/L	19.4	1.0	0.0020	9896429
Total Thallium (Tl)	ug/L	<0.010	0.010	0.010	9896429
Total Tin (Sn)	ug/L	<5.0	5.0	0.0050	9896429
Total Titanium (Ti)	ug/L	13.0	5.0	0.30	9896429
Total Uranium (U)	ug/L	<0.10	0.10	0.0010	9896429
Total Vanadium (V)	ug/L	<5.0	5.0	0.020	9896429
Total Zinc (Zn)	ug/L	12.4	5.0	0.050	9896429
Total Zirconium (Zr)	ug/L	0.10	0.10	0.0080	9896429
Total Calcium (Ca)	mg/L	5.79	0.050	0.0010	9892169
Total Magnesium (Mg)	mg/L	1.20	0.050	0.00050	9892169
Total Potassium (K)	mg/L	0.179	0.050	0.0020	9892169
Total Sodium (Na)	mg/L	4.17	0.050	0.0010	9892169
Total Sulphur (S)	mg/L	<3.0	3.0	1.0	9892169

RDL = Reportable Detection Limit
N/A = Not Applicable

Results relate only to the items tested.

GHD Limited

BV Labs Job Number: C042093
Report Date: 2020/06/27

Client Project #: 88877-07-02
Site Location: WATER UPLAND
Your P.O. #: 73506780-7
Sampler Initials: NT

CSR PAH IN WATER BY GC-MS (WATER)

BV Labs ID		XY4670			
Sampling Date		2020/06/18 11:00			
COC Number		08484193			
	UNITS	**W-88877-180620-NT-01**	**RDL**	**MDL**	**QC Batch**
Calculated Parameters					
Low Molecular Weight PAH`s	ug/L	<0.10	0.10	0.010	9892297
High Molecular Weight PAH`s	ug/L	<0.050	0.050	0.020	9892297
Total PAH	ug/L	<0.10	0.10	0.010	9892297
Polycyclic Aromatics					
Quinoline	ug/L	<0.020	0.020	0.020	9898109
Naphthalene	ug/L	<0.10	0.10	0.050	9898109
1-Methylnaphthalene	ug/L	<0.050	0.050	0.050	9898109
2-Methylnaphthalene	ug/L	<0.10	0.10	0.050	9898109
Acenaphthylene	ug/L	<0.050	0.050	0.050	9898109
Acenaphthene	ug/L	<0.050	0.050	0.050	9898109
Fluorene	ug/L	<0.050	0.050	0.050	9898109
Phenanthrene	ug/L	<0.050	0.050	0.050	9898109
Anthracene	ug/L	<0.010	0.010	0.010	9898109
Acridine	ug/L	<0.050	0.050	0.050	9898109
Fluoranthene	ug/L	<0.020	0.020	0.020	9898109
Pyrene	ug/L	<0.020	0.020	0.020	9898109
Benzo(a)anthracene	ug/L	<0.010	0.010	0.010	9898109
Chrysene	ug/L	<0.020	0.020	0.020	9898109
Benzo(b&j)fluoranthene	ug/L	<0.030	0.030	0.030	9898109
Benzo(k)fluoranthene	ug/L	<0.050	0.050	0.050	9898109
Benzo(a)pyrene	ug/L	<0.0050	0.0050	0.0050	9898109
Indeno(1,2,3-cd)pyrene	ug/L	<0.050	0.050	0.050	9898109
Dibenz(a,h)anthracene	ug/L	<0.0030	0.0030	0.0030	9898109
Benzo(g,h,i)perylene	ug/L	<0.050	0.050	0.050	9898109
Surrogate Recovery (%)					
D10-ANTHRACENE (sur.)	%	95	N/A	N/A	9898109
D8-ACENAPHTHYLENE (sur.)	%	95	N/A	N/A	9898109
D8-NAPHTHALENE (sur.)	%	99	N/A	N/A	9898109
TERPHENYL-D14 (sur.)	%	94	N/A	N/A	9898109

RDL = Reportable Detection Limit
N/A = Not Applicable

Results relate only to the items tested.

GENERAL COMMENTS

Results relate only to the items tested.

Report Date: 2020/06/27

GHD Limited
Attention: 088877 Distribution
Client Project #: 88877-07-02
Your P.O. #:73506780-7
Site Location: WATER UPLAND

Quality Assurance Report
BV Labs Job Number: C042093

QA/QC Bat	Init	QC Type	Parameter	Date Analy	Value	Recovery	UNITS	QC Limits
9893798	PSA	Spiked Blank	Biochemical Oxygen Demand	6/25/2020		92	%	85 - 115
9893798	PSA	Method Blank	Biochemical Oxygen Demand	6/25/2020	<2.0		mg/L	
9893798	PSA	RPD	Biochemical Oxygen Demand	6/25/2020	4.4 (1)		%	20
9893924	MOS	Matrix Spike	Nitrate plus Nitrite (N)	6/20/2020		104	%	80 - 120
9893924	MOS	Spiked Blank	Nitrate plus Nitrite (N)	6/20/2020		108	%	80 - 120
9893924	MOS	Method Blank	Nitrate plus Nitrite (N)	6/20/2020	<0.020		mg/L	
9893924	MOS	RPD	Nitrate plus Nitrite (N)	6/20/2020	NC (1)		%	25
9893925	MOS	Matrix Spike	Nitrite (N)	6/20/2020		100	%	80 - 120
9893925	MOS	Spiked Blank	Nitrite (N)	6/20/2020		100	%	80 - 120
9893925	MOS	Method Blank	Nitrite (N)	6/20/2020	<0.0050		mg/L	
9893925	MOS	RPD	Nitrite (N)	6/20/2020	NC (1)		%	20
9893968	MOS	Matrix Spike	Orthophosphate (P)	6/20/2020		113	%	80 - 120
9893968	MOS	Spiked Blank	Orthophosphate (P)	6/20/2020		101	%	80 - 120
9893968	MOS	Method Blank	Orthophosphate (P)	6/20/2020	<0.0030		mg/L	
9893968	MOS	RPD	Orthophosphate (P)	6/20/2020	0.91 (1)		%	20
9894686	CJY	Matrix Spike	Total Mercury (Hg)	6/22/2020		79 (2)	%	80 - 120
9894686	CJY	Spiked Blank	Total Mercury (Hg)	6/22/2020		82	%	80 - 120
9894686	CJY	Method Blank	Total Mercury (Hg)	6/22/2020	<0.0019		ug/L	
9894686	CJY	RPD	Total Mercury (Hg)	6/22/2020	NC (1)		%	20
9894710	CJY	Matrix Spike [XY4670-08]	Dissolved Mercury (Hg)	6/22/2020		94 (3)	%	80 - 120
9894710	CJY	Spiked Blank	Dissolved Mercury (Hg)	6/22/2020		88	%	80 - 120
9894710	CJY	Method Blank	Dissolved Mercury (Hg)	6/22/2020	<0.0019		ug/L	
9894710	CJY	RPD	Dissolved Mercury (Hg)	6/22/2020	NC (1)		%	20
9894746	JL4	Matrix Spike	1,4-Difluorobenzene (sur.)	6/22/2020		100	%	70 - 130
			4-Bromofluorobenzene (sur.)	6/22/2020		96	%	70 - 130
			D4-1,2-Dichloroethane (sur.)	6/22/2020		95	%	70 - 130
			Methyl-tert-butylether (MTBE)	6/22/2020		106	%	70 - 130
			Benzene	6/22/2020		106	%	70 - 130
			Toluene	6/22/2020		99	%	70 - 130
			Ethylbenzene	6/22/2020		101	%	70 - 130
			m & p-Xylene	6/22/2020		101	%	70 - 130
			o-Xylene	6/22/2020		103	%	70 - 130
			Styrene	6/22/2020		96	%	70 - 130
9894746	JL4	Spiked Blank	1,4-Difluorobenzene (sur.)	6/22/2020		95	%	70 - 130
			4-Bromofluorobenzene (sur.)	6/22/2020		103	%	70 - 130
			D4-1,2-Dichloroethane (sur.)	6/22/2020		92	%	70 - 130
			Methyl-tert-butylether (MTBE)	6/22/2020		100	%	70 - 130
			Benzene	6/22/2020		102	%	70 - 130
			Toluene	6/22/2020		96	%	70 - 130
			Ethylbenzene	6/22/2020		99	%	70 - 130
			m & p-Xylene	6/22/2020		99	%	70 - 130
			o-Xylene	6/22/2020		100	%	70 - 130
			Styrene	6/22/2020		102	%	70 - 130
			VH C6-C10	6/22/2020		107	%	70 - 130
9894746	JL4	Method Blank	1,4-Difluorobenzene (sur.)	6/22/2020		104	%	70 - 130
			4-Bromofluorobenzene (sur.)	6/22/2020		98	%	70 - 130
			D4-1,2-Dichloroethane (sur.)	6/22/2020		90	%	70 - 130
			Methyl-tert-butylether (MTBE)	6/22/2020	<4.0		ug/L	
			Benzene	6/22/2020	<0.40		ug/L	
			Toluene	6/22/2020	<0.40		ug/L	
			Ethylbenzene	6/22/2020	<0.40		ug/L	
			m & p-Xylene	6/22/2020	<0.40		ug/L	
			o-Xylene	6/22/2020	<0.40		ug/L	
			Styrene	6/22/2020	<0.40		ug/L	
			Xylenes (Total)	6/22/2020	<0.40		ug/L	
			VH C6-C10	6/22/2020	<300		ug/L	
9894746	JL4	RPD	Methyl-tert-butylether (MTBE)	6/22/2020	1.0 (1)		%	30
			Benzene	6/22/2020	1.2 (1)		%	30
			Toluene	6/22/2020	NC (1)		%	30
			Ethylbenzene	6/22/2020	1.6 (1)		%	30
			m & p-Xylene	6/22/2020	NC (1)		%	30
			o-Xylene	6/22/2020	NC (1)		%	30
			Styrene	6/22/2020	NC (1)		%	30
			Xylenes (Total)	6/22/2020	NC (1)		%	30
			VH C6-C10	6/22/2020	NC (1)		%	30
9895375	AA1	Matrix Spike	Dissolved Aluminum (Al)	6/23/2020		100	%	80 - 120
			Dissolved Antimony (Sb)	6/23/2020		104	%	80 - 120
			Dissolved Arsenic (As)	6/23/2020		104	%	80 - 120
			Dissolved Barium (Ba)	6/23/2020		99	%	80 - 120
			Dissolved Beryllium (Be)	6/23/2020		103	%	80 - 120
			Dissolved Bismuth (Bi)	6/23/2020		99	%	80 - 120
			Dissolved Boron (B)	6/23/2020		106	%	80 - 120
			Dissolved Cadmium (Cd)	6/23/2020		100	%	80 - 120
			Dissolved Chromium (Cr)	6/23/2020		97	%	80 - 120
			Dissolved Cobalt (Co)	6/23/2020		92	%	80 - 120
			Dissolved Copper (Cu)	6/23/2020		89	%	80 - 120
			Dissolved Iron (Fe)	6/23/2020		106	%	80 - 120
			Dissolved Lead (Pb)	6/23/2020		103	%	80 - 120
			Dissolved Lithium (Li)	6/23/2020		104	%	80 - 120
			Dissolved Manganese (Mn)	6/23/2020		98	%	80 - 120
			Dissolved Molybdenum (Mo)	6/23/2020		104	%	80 - 120
			Dissolved Nickel (Ni)	6/23/2020		94	%	80 - 120
			Dissolved Phosphorus (P)	6/23/2020		103	%	80 - 120
			Dissolved Selenium (Se)	6/23/2020		102	%	80 - 120
			Dissolved Silicon (Si)	6/23/2020		101	%	80 - 120
			Dissolved Silver (Ag)	6/23/2020		100	%	80 - 120
			Dissolved Strontium (Sr)	6/23/2020		NC	%	80 - 120
			Dissolved Thallium (Tl)	6/23/2020		103	%	80 - 120
			Dissolved Tin (Sn)	6/23/2020		101	%	80 - 120
			Dissolved Titanium (Ti)	6/23/2020		100	%	80 - 120
			Dissolved Uranium (U)	6/23/2020		105	%	80 - 120
			Dissolved Vanadium (V)	6/23/2020		100	%	80 - 120
			Dissolved Zinc (Zn)	6/23/2020		NC	%	80 - 120
			Dissolved Zirconium (Zr)	6/23/2020		103	%	80 - 120
9895375	AA1	Spiked Blank	Dissolved Aluminum (Al)	6/23/2020		104	%	80 - 120
			Dissolved Antimony (Sb)	6/23/2020		104	%	80 - 120
			Dissolved Arsenic (As)	6/23/2020		104	%	80 - 120
			Dissolved Barium (Ba)	6/23/2020		103	%	80 - 120
			Dissolved Beryllium (Be)	6/23/2020		104	%	80 - 120
			Dissolved Bismuth (Bi)	6/23/2020		103	%	80 - 120
			Dissolved Boron (B)	6/23/2020		108	%	80 - 120
			Dissolved Cadmium (Cd)	6/23/2020		103	%	80 - 120
			Dissolved Chromium (Cr)	6/23/2020		102	%	80 - 120
			Dissolved Cobalt (Co)	6/23/2020		97	%	80 - 120
			Dissolved Copper (Cu)	6/23/2020		96	%	80 - 120
			Dissolved Iron (Fe)	6/23/2020		107	%	80 - 120
			Dissolved Lead (Pb)	6/23/2020		105	%	80 - 120
			Dissolved Lithium (Li)	6/23/2020		107	%	80 - 120
			Dissolved Manganese (Mn)	6/23/2020		102	%	80 - 120
			Dissolved Molybdenum (Mo)	6/23/2020		104	%	80 - 120
			Dissolved Nickel (Ni)	6/23/2020		101	%	80 - 120
			Dissolved Phosphorus (P)	6/23/2020		103	%	80 - 120
			Dissolved Selenium (Se)	6/23/2020		102	%	80 - 120
			Dissolved Silicon (Si)	6/23/2020		110	%	80 - 120
			Dissolved Silver (Ag)	6/23/2020		104	%	80 - 120
			Dissolved Strontium (Sr)	6/23/2020		105	%	80 - 120
			Dissolved Thallium (Tl)	6/23/2020		104	%	80 - 120
			Dissolved Tin (Sn)	6/23/2020		104	%	80 - 120
			Dissolved Titanium (Ti)	6/23/2020		106	%	80 - 120
			Dissolved Uranium (U)	6/23/2020		109	%	80 - 120
			Dissolved Vanadium (V)	6/23/2020		103	%	80 - 120
			Dissolved Zinc (Zn)	6/23/2020		104	%	80 - 120
			Dissolved Zirconium (Zr)	6/23/2020		104	%	80 - 120
9895375	AA1	Method Blank	Dissolved Aluminum (Al)	6/23/2020	<3.0		ug/L	
			Dissolved Antimony (Sb)	6/23/2020	<0.50		ug/L	
			Dissolved Arsenic (As)	6/23/2020	<0.10		ug/L	
			Dissolved Barium (Ba)	6/23/2020	<1.0		ug/L	
			Dissolved Beryllium (Be)	6/23/2020	<0.10		ug/L	
			Dissolved Bismuth (Bi)	6/23/2020	<1.0		ug/L	
			Dissolved Boron (B)	6/23/2020	<50		ug/L	
			Dissolved Cadmium (Cd)	6/23/2020	<0.010		ug/L	
			Dissolved Chromium (Cr)	6/23/2020	<1.0		ug/L	
			Dissolved Cobalt (Co)	6/23/2020	<0.20		ug/L	
			Dissolved Copper (Cu)	6/23/2020	<0.20		ug/L	
			Dissolved Iron (Fe)	6/23/2020	<5.0		ug/L	
			Dissolved Lead (Pb)	6/23/2020	<0.20		ug/L	
			Dissolved Lithium (Li)	6/23/2020	<2.0		ug/L	
			Dissolved Manganese (Mn)	6/23/2020	<1.0		ug/L	
			Dissolved Molybdenum (Mo)	6/23/2020	<1.0		ug/L	
			Dissolved Nickel (Ni)	6/23/2020	<1.0		ug/L	
			Dissolved Phosphorus (P)	6/23/2020	<10		ug/L	
			Dissolved Selenium (Se)	6/23/2020	<0.10		ug/L	
			Dissolved Silicon (Si)	6/23/2020	<100		ug/L	
			Dissolved Silver (Ag)	6/23/2020	<0.020		ug/L	
			Dissolved Strontium (Sr)	6/23/2020	<1.0		ug/L	
			Dissolved Thallium (Tl)	6/23/2020	<0.010		ug/L	
			Dissolved Tin (Sn)	6/23/2020	<5.0		ug/L	
			Dissolved Titanium (Ti)	6/23/2020	<5.0		ug/L	
			Dissolved Uranium (U)	6/23/2020	<0.10		ug/L	
			Dissolved Vanadium (V)	6/23/2020	<5.0		ug/L	
			Dissolved Zinc (Zn)	6/23/2020	<5.0		ug/L	
			Dissolved Zirconium (Zr)	6/23/2020	<0.10		ug/L	
9895375	AA1	RPD	Dissolved Aluminum (Al)	6/23/2020	0.74 (1)		%	20
			Dissolved Antimony (Sb)	6/23/2020	0.21 (1)		%	20
			Dissolved Arsenic (As)	6/23/2020	1.8 (1)		%	20
			Dissolved Barium (Ba)	6/23/2020	1.4 (1)		%	20
			Dissolved Beryllium (Be)	6/23/2020	NC (1)		%	20
			Dissolved Bismuth (Bi)	6/23/2020	NC (1)		%	20
			Dissolved Boron (B)	6/23/2020	2.1 (1)		%	20
			Dissolved Cadmium (Cd)	6/23/2020	3.4 (1)		%	20
			Dissolved Chromium (Cr)	6/23/2020	0.73 (1)		%	20
			Dissolved Cobalt (Co)	6/23/2020	NC (1)		%	20
			Dissolved Copper (Cu)	6/23/2020	0.12 (1)		%	20
			Dissolved Iron (Fe)	6/23/2020	NC (1)		%	20
			Dissolved Lead (Pb)	6/23/2020	3.5 (1)		%	20
			Dissolved Lithium (Li)	6/23/2020	NC (1)		%	20
			Dissolved Manganese (Mn)	6/23/2020	0.58 (1)		%	20
			Dissolved Molybdenum (Mo)	6/23/2020	0.77 (1)		%	20
			Dissolved Nickel (Ni)	6/23/2020	2.3 (1)		%	20
			Dissolved Selenium (Se)	6/23/2020	6.4 (1)		%	20
			Dissolved Silicon (Si)	6/23/2020	1.2 (1)		%	20
			Dissolved Silver (Ag)	6/23/2020	NC (1)		%	20
			Dissolved Strontium (Sr)	6/23/2020	0.26 (1)		%	20
			Dissolved Thallium (Tl)	6/23/2020	NC (1)		%	20
			Dissolved Tin (Sn)	6/23/2020	NC (1)		%	20
			Dissolved Titanium (Ti)	6/23/2020	NC (1)		%	20
			Dissolved Uranium (U)	6/23/2020	0.019 (1)		%	20

Report Date: 2020/06/27

GHD Limited
Attention: 088877 Distribution
Client Project #: 88877-07-02
Your P.O. #:73506780-7
Site Location: WATER UPLAND

Quality Assurance Report
BV Labs Job Number: C042093

QA/QC Bat	Init	QC Type	Parameter	Date Analy	Value	Recovery	UNITS	QC Limits
			Dissolved Vanadium (V)	6/23/2020	NC (1)		%	20
			Dissolved Zinc (Zn)	6/23/2020	0.59 (1)		%	20
			Dissolved Zirconium (Zr)	6/23/2020	NC (1)		%	20
9895393	WAY	Spiked Blank	Alkalinity (Total as CaCO3)	6/22/2020		94	%	80 - 120
9895393	WAY	Method Blank	Alkalinity (PP as CaCO3)	6/22/2020	<1.0		mg/L	
			Alkalinity (Total as CaCO3)	6/22/2020	<1.0		mg/L	
			Bicarbonate (HCO3)	6/22/2020	<1.0		mg/L	
			Carbonate (CO3)	6/22/2020	<1.0		mg/L	
			Hydroxide (OH)	6/22/2020	<1.0		mg/L	
9895394	WAY	Spiked Blank	Conductivity	6/22/2020		100	%	80 - 120
9895394	WAY	Method Blank	Conductivity	6/22/2020	<2.0		uS/cm	
9895609	CGP	Matrix Spike	Total Dissolved Solids	6/23/2020		98	%	80 - 120
9895609	CGP	Spiked Blank	Total Dissolved Solids	6/23/2020		98	%	80 - 120
9895609	CGP	Method Blank	Total Dissolved Solids	6/23/2020	<10		mg/L	
9895609	CGP	RPD	Total Dissolved Solids	6/23/2020	7.4 (1)		%	20
9896429	VBA	Matrix Spike	Total Aluminum (Al)	6/24/2020		103	%	80 - 120
			Total Antimony (Sb)	6/24/2020		102	%	80 - 120
			Total Arsenic (As)	6/24/2020		103	%	80 - 120
			Total Barium (Ba)	6/24/2020		NC	%	80 - 120
			Total Beryllium (Be)	6/24/2020		92	%	80 - 120
			Total Bismuth (Bi)	6/24/2020		95	%	80 - 120
			Total Boron (B)	6/24/2020		96	%	80 - 120
			Total Cadmium (Cd)	6/24/2020		98	%	80 - 120
			Total Chromium (Cr)	6/24/2020		97	%	80 - 120
			Total Cobalt (Co)	6/24/2020		92	%	80 - 120
			Total Copper (Cu)	6/24/2020		86	%	80 - 120
			Total Iron (Fe)	6/24/2020		NC	%	80 - 120
			Total Lead (Pb)	6/24/2020		99	%	80 - 120
			Total Lithium (Li)	6/24/2020		88	%	80 - 120
			Total Manganese (Mn)	6/24/2020		94	%	80 - 120
			Total Molybdenum (Mo)	6/24/2020		109	%	80 - 120
			Total Nickel (Ni)	6/24/2020		90	%	80 - 120
			Total Phosphorus (P)	6/24/2020		101	%	80 - 120
			Total Selenium (Se)	6/24/2020		105	%	80 - 120
			Total Silicon (Si)	6/24/2020		92	%	80 - 120
			Total Silver (Ag)	6/24/2020		98	%	80 - 120
			Total Strontium (Sr)	6/24/2020		NC	%	80 - 120
			Total Thallium (Tl)	6/24/2020		99	%	80 - 120
			Total Tin (Sn)	6/24/2020		99	%	80 - 120
			Total Titanium (Ti)	6/24/2020		99	%	80 - 120
			Total Uranium (U)	6/24/2020		100	%	80 - 120
			Total Vanadium (V)	6/24/2020		100	%	80 - 120
			Total Zinc (Zn)	6/24/2020		90	%	80 - 120
			Total Zirconium (Zr)	6/24/2020		110	%	80 - 120
9896429	VBA	Spiked Blank	Total Aluminum (Al)	6/24/2020		106	%	80 - 120
			Total Antimony (Sb)	6/24/2020		102	%	80 - 120
			Total Arsenic (As)	6/24/2020		100	%	80 - 120
			Total Barium (Ba)	6/24/2020		107	%	80 - 120
			Total Beryllium (Be)	6/24/2020		96	%	80 - 120
			Total Bismuth (Bi)	6/24/2020		100	%	80 - 120
			Total Boron (B)	6/24/2020		106	%	80 - 120
			Total Cadmium (Cd)	6/24/2020		99	%	80 - 120
			Total Chromium (Cr)	6/24/2020		98	%	80 - 120
			Total Cobalt (Co)	6/24/2020		95	%	80 - 120
			Total Copper (Cu)	6/24/2020		93	%	80 - 120
			Total Iron (Fe)	6/24/2020		100	%	80 - 120
			Total Lead (Pb)	6/24/2020		102	%	80 - 120
			Total Lithium (Li)	6/24/2020		98	%	80 - 120
			Total Manganese (Mn)	6/24/2020		97	%	80 - 120
			Total Molybdenum (Mo)	6/24/2020		104	%	80 - 120
			Total Nickel (Ni)	6/24/2020		94	%	80 - 120
			Total Phosphorus (P)	6/24/2020		96	%	80 - 120
			Total Selenium (Se)	6/24/2020		102	%	80 - 120
			Total Silicon (Si)	6/24/2020		98	%	80 - 120
			Total Silver (Ag)	6/24/2020		99	%	80 - 120
			Total Strontium (Sr)	6/24/2020		102	%	80 - 120
			Total Thallium (Tl)	6/24/2020		100	%	80 - 120
			Total Tin (Sn)	6/24/2020		100	%	80 - 120
			Total Titanium (Ti)	6/24/2020		100	%	80 - 120
			Total Uranium (U)	6/24/2020		99	%	80 - 120
			Total Vanadium (V)	6/24/2020		98	%	80 - 120
			Total Zinc (Zn)	6/24/2020		95	%	80 - 120
			Total Zirconium (Zr)	6/24/2020		102	%	80 - 120
9896429	VBA	Method Blank	Total Aluminum (Al)	6/24/2020	<3.0		ug/L	
			Total Antimony (Sb)	6/24/2020	<0.50		ug/L	
			Total Arsenic (As)	6/24/2020	<0.10		ug/L	
			Total Barium (Ba)	6/24/2020	<1.0		ug/L	
			Total Beryllium (Be)	6/24/2020	<0.10		ug/L	
			Total Bismuth (Bi)	6/24/2020	<1.0		ug/L	
			Total Boron (B)	6/24/2020	<50		ug/L	
			Total Cadmium (Cd)	6/24/2020	<0.010		ug/L	
			Total Chromium (Cr)	6/24/2020	<1.0		ug/L	
			Total Cobalt (Co)	6/24/2020	<0.20		ug/L	
			Total Copper (Cu)	6/24/2020	<0.50		ug/L	
			Total Iron (Fe)	6/24/2020	<10		ug/L	
			Total Lead (Pb)	6/24/2020	<0.20		ug/L	
			Total Lithium (Li)	6/24/2020	<2.0		ug/L	
			Total Manganese (Mn)	6/24/2020	<1.0		ug/L	
			Total Molybdenum (Mo)	6/24/2020	<1.0		ug/L	
			Total Nickel (Ni)	6/24/2020	<1.0		ug/L	
			Total Phosphorus (P)	6/24/2020	<10		ug/L	
			Total Selenium (Se)	6/24/2020	<0.10		ug/L	
			Total Silicon (Si)	6/24/2020	<100		ug/L	
			Total Silver (Ag)	6/24/2020	<0.020		ug/L	
			Total Strontium (Sr)	6/24/2020	<1.0		ug/L	
			Total Thallium (Tl)	6/24/2020	<0.010		ug/L	
			Total Tin (Sn)	6/24/2020	<5.0		ug/L	
			Total Titanium (Ti)	6/24/2020	<5.0		ug/L	
			Total Uranium (U)	6/24/2020	<0.10		ug/L	
			Total Vanadium (V)	6/24/2020	<5.0		ug/L	
			Total Zinc (Zn)	6/24/2020	<5.0		ug/L	
			Total Zirconium (Zr)	6/24/2020	<0.10		ug/L	
9896429	VBA	RPD	Total Aluminum (Al)	6/24/2020	7.1 (1)		%	20
			Total Antimony (Sb)	6/24/2020	NC (1)		%	20
			Total Arsenic (As)	6/24/2020	0.59 (1)		%	20

Report Date: 2020/06/27

GHD Limited
Attention: 088877 Distribution
Client Project #: 88877-07-02
Your P.O. #:73506780-7
Site Location: WATER UPLAND

Quality Assurance Report
BV Labs Job Number: C042093

QA/QC Batch	Init	QC Type	Parameter	Date Analy	Value	Recovery	UNITS	QC Limits
			Total Barium (Ba)	6/24/2020	0.00046 (1)		%	20
			Total Beryllium (Be)	6/24/2020	NC (1)		%	20
			Total Bismuth (Bi)	6/24/2020	NC (1)		%	20
			Total Boron (B)	6/24/2020	1.8 (1)		%	20
			Total Cadmium (Cd)	6/24/2020	NC (1)		%	20
			Total Chromium (Cr)	6/24/2020	NC (1)		%	20
			Total Cobalt (Co)	6/24/2020	0.035 (1)		%	20
			Total Copper (Cu)	6/24/2020	0.74 (1)		%	20
			Total Iron (Fe)	6/24/2020	1.5 (1)		%	20
			Total Lead (Pb)	6/24/2020	0.045 (1)		%	20
			Total Lithium (Li)	6/24/2020	0.22 (1)		%	20
			Total Manganese (Mn)	6/24/2020	0.93 (1)		%	20
			Total Molybdenum (Mo)	6/24/2020	1.9 (1)		%	20
			Total Nickel (Ni)	6/24/2020	2.0 (1)		%	20
			Total Selenium (Se)	6/24/2020	NC (1)		%	20
			Total Silicon (Si)	6/24/2020	0.54 (1)		%	20
			Total Silver (Ag)	6/24/2020	NC (1)		%	20
			Total Strontium (Sr)	6/24/2020	0.33 (1)		%	20
			Total Thallium (Tl)	6/24/2020	NC (1)		%	20
			Total Tin (Sn)	6/24/2020	NC (1)		%	20
			Total Titanium (Ti)	6/24/2020	NC (1)		%	20
			Total Uranium (U)	6/24/2020	2.2 (1)		%	20
			Total Vanadium (V)	6/24/2020	NC (1)		%	20
			Total Zinc (Zn)	6/24/2020	0.92 (1)		%	20
			Total Zirconium (Zr)	6/24/2020	NC (1)		%	20
9896523	CGP	Matrix Spike	Total Suspended Solids	6/24/2020		106	%	80 - 120
9896523	CGP	Spiked Blank	Total Suspended Solids	6/24/2020		102	%	80 - 120
9896523	CGP	Method Blank	Total Suspended Solids	6/24/2020	<1.0		mg/L	
9896523	CGP	RPD	Total Suspended Solids	6/24/2020	NC (1)		%	20
9897034	PSA	Matrix Spike	Chemical Oxygen Demand	6/23/2020		91	%	80 - 120
9897034	PSA	Spiked Blank	Chemical Oxygen Demand	6/23/2020		105	%	80 - 120
9897034	PSA	Method Blank	Chemical Oxygen Demand	6/23/2020	<10		mg/L	
9897034	PSA	RPD	Chemical Oxygen Demand	6/23/2020	2.2 (1)		%	20
9897412	BB3	Matrix Spike	Dissolved Chloride (Cl)	6/23/2020		103	%	80 - 120
			Dissolved Sulphate (SO4)	6/23/2020		94	%	80 - 120
9897412	BB3	Spiked Blank	Dissolved Chloride (Cl)	6/23/2020		104	%	80 - 120
			Dissolved Sulphate (SO4)	6/23/2020		97	%	80 - 120
9897412	BB3	Method Blank	Dissolved Chloride (Cl)	6/23/2020	<1.0		mg/L	
			Dissolved Sulphate (SO4)	6/23/2020	<1.0		mg/L	
9897412	BB3	RPD	Dissolved Chloride (Cl)	6/23/2020	NC (1)		%	20
			Dissolved Sulphate (SO4)	6/23/2020	7.6 (1)		%	20
9898109	JP1	Matrix Spike [XY4670-12]	D10-ANTHRACENE (sur.)	6/24/2020		93 (4)	%	50 - 140
			D8-ACENAPHTHYLENE (sur.)	6/24/2020		94 (4)	%	50 - 140
			D8-NAPHTHALENE (sur.)	6/24/2020		94 (4)	%	50 - 140
			TERPHENYL-D14 (sur.)	6/24/2020		92 (4)	%	50 - 140
			Quinoline	6/24/2020		107 (4)	%	50 - 140
			Naphthalene	6/24/2020		84 (4)	%	50 - 140
			1-Methylnaphthalene	6/24/2020		86 (4)	%	50 - 140
			2-Methylnaphthalene	6/24/2020		84 (4)	%	50 - 140
			Acenaphthylene	6/24/2020		90 (4)	%	50 - 140
			Acenaphthene	6/24/2020		91 (4)	%	50 - 140
			Fluorene	6/24/2020		92 (4)	%	50 - 140
			Phenanthrene	6/24/2020		91 (4)	%	50 - 140
			Anthracene	6/24/2020		90 (4)	%	50 - 140
			Acridine	6/24/2020		100 (4)	%	50 - 140
			Fluoranthene	6/24/2020		92 (4)	%	50 - 140
			Pyrene	6/24/2020		91 (4)	%	50 - 140
			Benzo(a)anthracene	6/24/2020		85 (4)	%	50 - 140
			Chrysene	6/24/2020		85 (4)	%	50 - 140
			Benzo(b&j)fluoranthene	6/24/2020		81 (4)	%	50 - 140
			Benzo(k)fluoranthene	6/24/2020		91 (4)	%	50 - 140
			Benzo(a)pyrene	6/24/2020		85 (4)	%	50 - 140
			Indeno(1,2,3-cd)pyrene	6/24/2020		84 (4)	%	50 - 140
			Dibenz(a,h)anthracene	6/24/2020		82 (4)	%	50 - 140
			Benzo(g,h,i)perylene	6/24/2020		79 (4)	%	50 - 140
9898109	JP1	Spiked Blank	D10-ANTHRACENE (sur.)	6/24/2020		91	%	50 - 140
			D8-ACENAPHTHYLENE (sur.)	6/24/2020		91	%	50 - 140
			D8-NAPHTHALENE (sur.)	6/24/2020		90	%	50 - 140
			TERPHENYL-D14 (sur.)	6/24/2020		89	%	50 - 140
			Quinoline	6/24/2020		109	%	50 - 140
			Naphthalene	6/24/2020		84	%	50 - 140
			1-Methylnaphthalene	6/24/2020		85	%	50 - 140
			2-Methylnaphthalene	6/24/2020		83	%	50 - 140
			Acenaphthylene	6/24/2020		90	%	50 - 140
			Acenaphthene	6/24/2020		91	%	50 - 140
			Fluorene	6/24/2020		91	%	50 - 140
			Phenanthrene	6/24/2020		91	%	50 - 140
			Anthracene	6/24/2020		92	%	50 - 140
			Acridine	6/24/2020		104	%	50 - 140
			Fluoranthene	6/24/2020		92	%	50 - 140
			Pyrene	6/24/2020		91	%	50 - 140
			Benzo(a)anthracene	6/24/2020		83	%	50 - 140
			Chrysene	6/24/2020		84	%	50 - 140
			Benzo(b&j)fluoranthene	6/24/2020		82	%	50 - 140
			Benzo(k)fluoranthene	6/24/2020		91	%	50 - 140
			Benzo(a)pyrene	6/24/2020		85	%	50 - 140
			Indeno(1,2,3-cd)pyrene	6/24/2020		91	%	50 - 140
			Dibenz(a,h)anthracene	6/24/2020		87	%	50 - 140
			Benzo(g,h,i)perylene	6/24/2020		85	%	50 - 140
9898109	JP1	Method Blank	D10-ANTHRACENE (sur.)	6/24/2020		90	%	50 - 140
			D8-ACENAPHTHYLENE (sur.)	6/24/2020		89	%	50 - 140
			D8-NAPHTHALENE (sur.)	6/24/2020		94	%	50 - 140
			TERPHENYL-D14 (sur.)	6/24/2020		89	%	50 - 140
			Quinoline	6/24/2020	<0.020		ug/L	
			Naphthalene	6/24/2020	<0.10		ug/L	
			1-Methylnaphthalene	6/24/2020	<0.050		ug/L	
			2-Methylnaphthalene	6/24/2020	<0.10		ug/L	
			Acenaphthylene	6/24/2020	<0.050		ug/L	
			Acenaphthene	6/24/2020	<0.050		ug/L	
			Fluorene	6/24/2020	<0.050		ug/L	
			Phenanthrene	6/24/2020	<0.050		ug/L	
			Anthracene	6/24/2020	<0.010		ug/L	
			Acridine	6/24/2020	<0.050		ug/L	
			Fluoranthene	6/24/2020	<0.020		ug/L	
			Pyrene	6/24/2020	<0.020		ug/L	
			Benzo(a)anthracene	6/24/2020	<0.010		ug/L	
			Chrysene	6/24/2020	<0.020		ug/L	
			Benzo(b&j)fluoranthene	6/24/2020	<0.030		ug/L	
			Benzo(k)fluoranthene	6/24/2020	<0.050		ug/L	
			Benzo(a)pyrene	6/24/2020	<0.0050		ug/L	
			Indeno(1,2,3-cd)pyrene	6/24/2020	<0.050		ug/L	
			Dibenz(a,h)anthracene	6/24/2020	<0.0030		ug/L	
			Benzo(g,h,i)perylene	6/24/2020	<0.050		ug/L	
9898109	JP1	RPD	Quinoline	6/24/2020	NC (1)		%	40
			Naphthalene	6/24/2020	2.3 (1)		%	40
			1-Methylnaphthalene	6/24/2020	3.9 (1)		%	40
			2-Methylnaphthalene	6/24/2020	NC (1)		%	40
			Acenaphthylene	6/24/2020	NC (1)		%	40
			Acenaphthene	6/24/2020	6.1 (1)		%	40
			Fluorene	6/24/2020	6.4 (1)		%	40
			Phenanthrene	6/24/2020	7.2 (1)		%	40
			Anthracene	6/24/2020	NC (1)		%	40
			Acridine	6/24/2020	NC (1)		%	40
			Fluoranthene	6/24/2020	NC (1)		%	40
			Pyrene	6/24/2020	NC (1)		%	40
			Benzo(a)anthracene	6/24/2020	NC (1)		%	40
			Chrysene	6/24/2020	NC (1)		%	40
			Benzo(b&j)fluoranthene	6/24/2020	NC (1)		%	40
			Benzo(k)fluoranthene	6/24/2020	NC (1)		%	40
			Benzo(a)pyrene	6/24/2020	NC (1)		%	40
			Indeno(1,2,3-cd)pyrene	6/24/2020	NC (1)		%	40
			Dibenz(a,h)anthracene	6/24/2020	NC (1)		%	40
			Benzo(g,h,i)perylene	6/24/2020	NC (1)		%	40
9899935	SLL	Matrix Spike	Total Sulphide	6/25/2020		NC	%	80 - 120
9899935	SLL	Spiked Blank	Total Sulphide	6/25/2020		113	%	80 - 120
9899935	SLL	Method Blank	Total Sulphide	6/25/2020	<0.0018		mg/L	
9899935	SLL	RPD	Total Sulphide	6/25/2020	126 (2,1)		%	20
9902565	HG	Matrix Spike	Total Ammonia (N)	6/26/2020		105	%	80 - 120
9902565	HG	Spiked Blank	Total Ammonia (N)	6/26/2020		104	%	80 - 120
9902565	HG	Method Blank	Total Ammonia (N)	6/26/2020	<0.015		mg/L	
9902565	HG	RPD	Total Ammonia (N)	6/26/2020	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.
(3) Matrix Spike Parent ID [XY4670-08]
(4) Matrix Spike Parent ID [XY4670-12]

Your P.O. #: 73506780-7
Your Project #: 88877-07-02
Site#: 088877-07-02
Site Location: UPLAND
Your C.O.C. #: 08484201

Attention: 088877 Distribution

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

Report Date: 2020/06/27
Report #: R2896168
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C042096
Received: 2020/06/19, 08:00

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	2020/06/22	BBY6SOP-00026	SM 23 2320 B m
Chloride/Sulphate by Auto Colourimetry	7	N/A	2020/06/23	BBY6SOP-00011 / BBY6SOP-00017	SM23-4500-Cl/SO4-E m
Conductivity @25C	7	N/A	2020/06/22	BBY6SOP-00026	SM 23 2510 B m
Sulphide (as H2S) Calculation - total	7	N/A	2020/06/25	BBY WI-00033	Auto Calc
Hardness (calculated as CaCO3)	7	N/A	2020/06/24	BBY WI-00033	Auto Calc
Mercury (Dissolved) by CV	7	2020/06/22	2020/06/22	AB SOP-00084	BCMOE BCLM Oct2013 m
Na, K, Ca, Mg, S by CRC ICPMS (diss.)	7	N/A	2020/06/24	BBY WI-00033	Auto Calc
Elements by CRC ICPMS (dissolved)	7	N/A	2020/06/24	BBY7SOP-00002	EPA 6020b R2 m
Ammonia-N (Total) (1)	7	N/A	2020/06/26	AB SOP-00007	SM 23 4500 NH3 A G m
Nitrate + Nitrite (N)	7	N/A	2020/06/20	BBY6SOP-00010	SM 23 4500-NO3- I m
Nitrite (N) by CFA	7	N/A	2020/06/20	BBY6SOP-00010	SM 23 4500-NO3- I m
Nitrogen - Nitrate (as N)	7	N/A	2020/06/20	BBY WI-00033	Auto Calc
Filter and HNO3 Preserve for Metals	7	N/A	2020/06/19	BBY7 WI-00004	SM 23 3030B m
Orthophosphate by Konelab (2)	7	N/A	2020/06/20	BBY6SOP-00013	SM 23 4500-P E m
Total Sulphide (1)	7	N/A	2020/06/25	AB SOP-00080	SM 23 4500 S2-A D Fm
Total Dissolved Solids (Filt. Residue)	2	2020/06/22	2020/06/23	BBY6SOP-00033	SM 23 2540 C m
Total Dissolved Solids (Filt. Residue)	5	2020/06/23	2020/06/24	BBY6SOP-00033	SM 23 2540 C m

Remarks:

Bureau Veritas Laboratories are accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by BV Labs 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 BV Labs profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and BV Labs 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.

BV Labs liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. BV Labs 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 BV Labs, unless otherwise agreed in writing. BV Labs is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Your P.O. #: 73506780-7
Your Project #: 88877-07-02
Site#: 088877-07-02
Site Location: UPLAND
Your C.O.C. #: 08484201

Attention: 088877 Distribution

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

Report Date: 2020/06/27
Report #: R2896168
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C042096
Received: 2020/06/19, 08:00

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 BV Labs, 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 BV Labs Calgary Environmental
(2) 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

AUTHORIZED REPORT
RAPPORT AUTORISÉ

Bureau Veritas Laboratories
27 Jun 2020 06:06:44

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

==========

This report has been generated and distributed using a secure automated process.
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 #: C042096
Report Date: 2020/06/27

GHD Limited
Client Project #: 88877-07-02
Site Location: UPLAND
Your P.O. #: 73506780-7
Sampler Initials: NT

RESULTS OF CHEMICAL ANALYSES OF WATER

BV Labs ID		XY4709	XY4709	XY4710			
Sampling Date		2020/06/18 09:00	2020/06/18 09:00	2020/06/18 09:45			
COC Number		08484201	08484201	08484201			
	UNITS	WG-88877-180620-NT-01	WG-88877-180620-NT-01 Lab-Dup	WG-88877-180620-NT-02	RDL	MDL	QC Batch
ANIONS							
Nitrite (N)	mg/L	<0.0050	N/A	<0.0050	0.0050	0.0050	9893925
Calculated Parameters							
Filter and HNO3 Preservation	N/A	FIELD	N/A	FIELD	N/A	N/A	ONSITE
Nitrate (N)	mg/L	1.89	N/A	0.338	0.020	N/A	9892745
Misc. Inorganics							
Conductivity	uS/cm	190	N/A	130	2.0	N/A	9895394
Total Dissolved Solids	mg/L	140	N/A	94	10	N/A	9895609
Anions							
Alkalinity (PP as CaCO3)	mg/L	<1.0	N/A	<1.0	1.0	N/A	9895393
Alkalinity (Total as CaCO3)	mg/L	62	N/A	56	1.0	N/A	9895393
Bicarbonate (HCO3)	mg/L	76	N/A	69	1.0	N/A	9895393
Carbonate (CO3)	mg/L	<1.0	N/A	<1.0	1.0	N/A	9895393
Hydroxide (OH)	mg/L	<1.0	N/A	<1.0	1.0	N/A	9895393
Total Sulphide	mg/L	<0.0018	N/A	<0.0018	0.0018	N/A	9899935
Dissolved Chloride (Cl)	mg/L	12	N/A	3.2	1.0	N/A	9897412
Dissolved Sulphate (SO4)	mg/L	9.1	N/A	4.9	1.0	N/A	9897412
Nutrients							
Total Ammonia (N)	mg/L	0.022	<0.015	<0.015	0.015	0.0040	9902565
Orthophosphate (P)	mg/L	0.010	N/A	0.012	0.0030	0.0030	9893968
Nitrate plus Nitrite (N)	mg/L	1.89	N/A	0.338	0.020	0.020	9893924

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

BV Labs Job #: C042096
Report Date: 2020/06/27

GHD Limited
Client Project #: 88877-07-02
Site Location: UPLAND
Your P.O. #: 73506780-7
Sampler Initials: NT

RESULTS OF CHEMICAL ANALYSES OF WATER

BV Labs ID		XY4711	XY4712	XY4713			
Sampling Date		2020/06/18 09:55	2020/06/18 12:00	2020/06/18 12:15			
COC Number		08484201	08484201	08484201			
	UNITS	WG-88877-180620-NT-03	WG-88877-180620-NT-04	WG-88877-180620-NT-05	RDL	MDL	QC Batch
ANIONS							
Nitrite (N)	mg/L	<0.0050	<0.0050	<0.0050	0.0050	0.0050	9893925
Calculated Parameters							
Filter and HNO3 Preservation	N/A	FIELD	FIELD	FIELD	N/A	N/A	ONSITE
Nitrate (N)	mg/L	0.345	0.417	<0.020	0.020	N/A	9892745
Misc. Inorganics							
Conductivity	uS/cm	140	110	<2.0	2.0	N/A	9895394
Total Dissolved Solids	mg/L	70	66	<10	10	N/A	9895658
Anions							
Alkalinity (PP as CaCO3)	mg/L	<1.0	<1.0	<1.0	1.0	N/A	9895393
Alkalinity (Total as CaCO3)	mg/L	58	41	<1.0	1.0	N/A	9895393
Bicarbonate (HCO3)	mg/L	71	49	<1.0	1.0	N/A	9895393
Carbonate (CO3)	mg/L	<1.0	<1.0	<1.0	1.0	N/A	9895393
Hydroxide (OH)	mg/L	<1.0	<1.0	<1.0	1.0	N/A	9895393
Total Sulphide	mg/L	<0.0018	<0.0018	<0.0018	0.0018	N/A	9899935
Dissolved Chloride (Cl)	mg/L	4.5	3.7	<1.0	1.0	N/A	9897412
Dissolved Sulphate (SO4)	mg/L	4.8	6.5	<1.0	1.0	N/A	9897412
Nutrients							
Total Ammonia (N)	mg/L	<0.015	<0.015	<0.015	0.015	0.0040	9902565
Orthophosphate (P)	mg/L	0.013	0.0053	<0.0030	0.0030	0.0030	9893968
Nitrate plus Nitrite (N)	mg/L	0.345	0.417	<0.020	0.020	0.020	9893924

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 #: C042096
Report Date: 2020/06/27

GHD Limited
Client Project #: 88877-07-02
Site Location: UPLAND
Your P.O. #: 73506780-7
Sampler Initials: NT

RESULTS OF CHEMICAL ANALYSES OF WATER

BV Labs ID		XY4714	XY4715	XY4715			
Sampling Date		2020/06/18 13:00	2020/06/18 13:30	2020/06/18 13:30			
COC Number		08484201	08484201	08484201			
	UNITS	WG-88877-180620-NT-06	WG-88877-180620-NT-07	WG-88877-180620-NT-07 Lab-Dup	RDL	MDL	QC Batch
ANIONS							
Nitrite (N)	mg/L	<0.0050	<0.0050	N/A	0.0050	0.0050	9893925
Calculated Parameters							
Filter and HNO3 Preservation	N/A	FIELD	FIELD	N/A	N/A	N/A	ONSITE
Nitrate (N)	mg/L	1.06	0.041	N/A	0.020	N/A	9892745
Misc. Inorganics							
Conductivity	uS/cm	230	85	N/A	2.0	N/A	9895394
Total Dissolved Solids	mg/L	130	42	N/A	10	N/A	9895658
Anions							
Alkalinity (PP as CaCO3)	mg/L	<1.0	<1.0	N/A	1.0	N/A	9895393
Alkalinity (Total as CaCO3)	mg/L	72	28	N/A	1.0	N/A	9895393
Bicarbonate (HCO3)	mg/L	88	34	N/A	1.0	N/A	9895393
Carbonate (CO3)	mg/L	<1.0	<1.0	N/A	1.0	N/A	9895393
Hydroxide (OH)	mg/L	<1.0	<1.0	N/A	1.0	N/A	9895393
Total Sulphide	mg/L	<0.0018	0.0026	N/A	0.0018	N/A	9899935
Dissolved Chloride (Cl)	mg/L	12	<1.0	<1.0	1.0	N/A	9897412
Dissolved Sulphate (SO4)	mg/L	23	3.1	2.9	1.0	N/A	9897412
Nutrients							
Total Ammonia (N)	mg/L	<0.015	<0.015	N/A	0.015	0.0040	9902565
Orthophosphate (P)	mg/L	0.0049	0.024	0.024	0.0030	0.0030	9893968
Nitrate plus Nitrite (N)	mg/L	1.06	0.041	N/A	0.020	0.020	9893924

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

BV Labs Job #: C042096
Report Date: 2020/06/27

GHD Limited
Client Project #: 88877-07-02
Site Location: UPLAND
Your P.O. #: 73506780-7
Sampler Initials: NT

MISCELLANEOUS (WATER)

BV Labs ID		XY4709	XY4710	XY4711			
Sampling Date		2020/06/18 09:00	2020/06/18 09:45	2020/06/18 09:55			
COC Number		08484201	08484201	08484201			
	UNITS	WG-88877-180620-NT-01	WG-88877-180620-NT-02	WG-88877-180620-NT-03	RDL	MDL	QC Batch
Calculated Parameters							
Total Sulphide (as H2S)	mg/L	<0.0019	<0.0019	<0.0019	0.0019	0.0019	9893031
RDL = Reportable Detection Limit							

BV Labs ID		XY4712	XY4713	XY4714			
Sampling Date		2020/06/18 12:00	2020/06/18 12:15	2020/06/18 13:00			
COC Number		08484201	08484201	08484201			
	UNITS	WG-88877-180620-NT-04	WG-88877-180620-NT-05	WG-88877-180620-NT-06	RDL	MDL	QC Batch
Calculated Parameters							
Total Sulphide (as H2S)	mg/L	<0.0019	<0.0019	<0.0019	0.0019	0.0019	9893031
RDL = Reportable Detection Limit							

BV Labs ID		XY4715			
Sampling Date		2020/06/18 13:30			
COC Number		08484201			
	UNITS	WG-88877-180620-NT-07	RDL	MDL	QC Batch
Calculated Parameters					
Total Sulphide (as H2S)	mg/L	0.0027	0.0019	0.0019	9893031
RDL = Reportable Detection Limit					

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

BV Labs Job #: C042096
Report Date: 2020/06/27

GHD Limited
Client Project #: 88877-07-02
Site Location: UPLAND
Your P.O. #: 73506780-7
Sampler Initials: NT

CSR/CCME DISS. METALS IN WATER W/ CV HG (WATER)

BV Labs ID		XY4709	XY4710	XY4711			
Sampling Date		2020/06/18 09:00	2020/06/18 09:45	2020/06/18 09:55			
COC Number		08484201	08484201	08484201			
	UNITS	WG-88877-180620-NT-01	WG-88877-180620-NT-02	WG-88877-180620-NT-03	RDL	MDL	QC Batch
Calculated Parameters							
Dissolved Hardness (CaCO3)	mg/L	84.8	57.4	57.0	0.50	0.50	9892272
Elements							
Dissolved Mercury (Hg)	ug/L	<0.0019	<0.0019	<0.0019	0.0019	0.0019	9894710
Dissolved Metals by ICPMS							
Dissolved Aluminum (Al)	ug/L	<3.0	<3.0	<3.0	3.0	0.030	9895383
Dissolved Antimony (Sb)	ug/L	<0.50	<0.50	<0.50	0.50	0.0020	9895383
Dissolved Arsenic (As)	ug/L	0.27	0.44	0.43	0.10	0.010	9895383
Dissolved Barium (Ba)	ug/L	6.7	2.9	3.0	1.0	0.0020	9895383
Dissolved Beryllium (Be)	ug/L	<0.10	<0.10	<0.10	0.10	0.0030	9895383
Dissolved Bismuth (Bi)	ug/L	<1.0	<1.0	<1.0	1.0	0.0010	9895383
Dissolved Boron (B)	ug/L	<50	<50	<50	50	50	9895383
Dissolved Cadmium (Cd)	ug/L	<0.010	<0.010	<0.010	0.010	0.0020	9895383
Dissolved Chromium (Cr)	ug/L	1.3	<1.0	<1.0	1.0	0.020	9895383
Dissolved Cobalt (Co)	ug/L	<0.20	<0.20	<0.20	0.20	0.20	9895383
Dissolved Copper (Cu)	ug/L	0.20	0.20	<0.20	0.20	0.010	9895383
Dissolved Iron (Fe)	ug/L	<5.0	<5.0	<5.0	5.0	0.040	9895383
Dissolved Lead (Pb)	ug/L	<0.20	<0.20	<0.20	0.20	0.0010	9895383
Dissolved Lithium (Li)	ug/L	<2.0	<2.0	<2.0	2.0	2.0	9895383
Dissolved Manganese (Mn)	ug/L	<1.0	<1.0	<1.0	1.0	0.030	9895383
Dissolved Molybdenum (Mo)	ug/L	<1.0	<1.0	<1.0	1.0	0.0020	9895383
Dissolved Nickel (Ni)	ug/L	<1.0	<1.0	<1.0	1.0	0.010	9895383
Dissolved Phosphorus (P)	ug/L	12	17	15	10	1.0	9895383
Dissolved Selenium (Se)	ug/L	0.20	0.18	0.17	0.10	0.0060	9895383
Dissolved Silicon (Si)	ug/L	8880	5910	5870	100	0.30	9895383
Dissolved Silver (Ag)	ug/L	<0.020	<0.020	<0.020	0.020	0.0020	9895383
Dissolved Strontium (Sr)	ug/L	44.3	25.4	25.6	1.0	0.0020	9895383
Dissolved Thallium (Tl)	ug/L	<0.010	<0.010	<0.010	0.010	0.010	9895383
Dissolved Tin (Sn)	ug/L	<5.0	<5.0	<5.0	5.0	0.0050	9895383
Dissolved Titanium (Ti)	ug/L	<5.0	<5.0	<5.0	5.0	0.30	9895383
Dissolved Uranium (U)	ug/L	<0.10	<0.10	<0.10	0.10	0.0010	9895383
Dissolved Vanadium (V)	ug/L	<5.0	<5.0	<5.0	5.0	0.020	9895383

RDL = Reportable Detection Limit

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

BV Labs Job #: C042096
Report Date: 2020/06/27

GHD Limited
Client Project #: 88877-07-02
Site Location: UPLAND
Your P.O. #: 73506780-7
Sampler Initials: NT

CSR/CCME DISS. METALS IN WATER W/ CV HG (WATER)

BV Labs ID		XY4709	XY4710	XY4711			
Sampling Date		2020/06/18 09:00	2020/06/18 09:45	2020/06/18 09:55			
COC Number		08484201	08484201	08484201			
	UNITS	WG-88877-180620-NT-01	WG-88877-180620-NT-02	WG-88877-180620-NT-03	RDL	MDL	QC Batch
Dissolved Zinc (Zn)	ug/L	<5.0	<5.0	<5.0	5.0	0.050	9895383
Dissolved Zirconium (Zr)	ug/L	<0.10	<0.10	<0.10	0.10	0.0080	9895383
Dissolved Calcium (Ca)	mg/L	26.9	18.3	18.2	0.050	0.0010	9892165
Dissolved Magnesium (Mg)	mg/L	4.26	2.85	2.83	0.050	0.00050	9892165
Dissolved Potassium (K)	mg/L	0.382	0.337	0.334	0.050	0.0020	9892165
Dissolved Sodium (Na)	mg/L	5.16	6.56	6.43	0.050	0.0010	9892165
Dissolved Sulphur (S)	mg/L	3.1	<3.0	<3.0	3.0	1.0	9892165
RDL = Reportable Detection Limit							

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

BV Labs Job #: C042096
Report Date: 2020/06/27

GHD Limited
Client Project #: 88877-07-02
Site Location: UPLAND
Your P.O. #: 73506780-7
Sampler Initials: NT

CSR/CCME DISS. METALS IN WATER W/ CV HG (WATER)

BV Labs ID		XY4712	XY4713	XY4714			
Sampling Date		2020/06/18 12:00	2020/06/18 12:15	2020/06/18 13:00			
COC Number		08484201	08484201	08484201			
	UNITS	WG-88877-180620-NT-04	WG-88877-180620-NT-05	WG-88877-180620-NT-06	RDL	MDL	QC Batch
Calculated Parameters							
Dissolved Hardness (CaCO3)	mg/L	32.6	<0.50	102	0.50	0.50	9892272
Elements							
Dissolved Mercury (Hg)	ug/L	<0.0019	<0.0019	<0.0019	0.0019	0.0019	9894710
Dissolved Metals by ICPMS							
Dissolved Aluminum (Al)	ug/L	<3.0	<3.0	<3.0	3.0	0.030	9895383
Dissolved Antimony (Sb)	ug/L	<0.50	<0.50	<0.50	0.50	0.0020	9895383
Dissolved Arsenic (As)	ug/L	<0.10	<0.10	<0.10	0.10	0.010	9895383
Dissolved Barium (Ba)	ug/L	1.1	<1.0	2.6	1.0	0.0020	9895383
Dissolved Beryllium (Be)	ug/L	<0.10	<0.10	<0.10	0.10	0.0030	9895383
Dissolved Bismuth (Bi)	ug/L	<1.0	<1.0	<1.0	1.0	0.0010	9895383
Dissolved Boron (B)	ug/L	<50	<50	<50	50	50	9895383
Dissolved Cadmium (Cd)	ug/L	<0.010	<0.010	<0.010	0.010	0.0020	9895383
Dissolved Chromium (Cr)	ug/L	<1.0	<1.0	<1.0	1.0	0.020	9895383
Dissolved Cobalt (Co)	ug/L	<0.20	<0.20	<0.20	0.20	0.20	9895383
Dissolved Copper (Cu)	ug/L	0.20	<0.20	1.77	0.20	0.010	9895383
Dissolved Iron (Fe)	ug/L	<5.0	<5.0	7.0	5.0	0.040	9895383
Dissolved Lead (Pb)	ug/L	<0.20	<0.20	<0.20	0.20	0.0010	9895383
Dissolved Lithium (Li)	ug/L	<2.0	<2.0	<2.0	2.0	2.0	9895383
Dissolved Manganese (Mn)	ug/L	<1.0	<1.0	<1.0	1.0	0.030	9895383
Dissolved Molybdenum (Mo)	ug/L	<1.0	<1.0	<1.0	1.0	0.0020	9895383
Dissolved Nickel (Ni)	ug/L	<1.0	<1.0	<1.0	1.0	0.010	9895383
Dissolved Phosphorus (P)	ug/L	<10	<10	<10	10	1.0	9895383
Dissolved Selenium (Se)	ug/L	0.28	<0.10	0.19	0.10	0.0060	9895383
Dissolved Silicon (Si)	ug/L	5610	<100	6590	100	0.30	9895383
Dissolved Silver (Ag)	ug/L	<0.020	<0.020	<0.020	0.020	0.0020	9895383
Dissolved Strontium (Sr)	ug/L	20.0	<1.0	51.7	1.0	0.0020	9895383
Dissolved Thallium (Tl)	ug/L	<0.010	<0.010	<0.010	0.010	0.010	9895383
Dissolved Tin (Sn)	ug/L	<5.0	<5.0	<5.0	5.0	0.0050	9895383
Dissolved Titanium (Ti)	ug/L	<5.0	<5.0	<5.0	5.0	0.30	9895383
Dissolved Uranium (U)	ug/L	<0.10	<0.10	<0.10	0.10	0.0010	9895383
Dissolved Vanadium (V)	ug/L	<5.0	<5.0	<5.0	5.0	0.020	9895383

RDL = Reportable Detection Limit

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

BV Labs Job #: C042096
Report Date: 2020/06/27

GHD Limited
Client Project #: 88877-07-02
Site Location: UPLAND
Your P.O. #: 73506780-7
Sampler Initials: NT

CSR/CCME DISS. METALS IN WATER W/ CV HG (WATER)

BV Labs ID		XY4712	XY4713	XY4714			
Sampling Date		2020/06/18 12:00	2020/06/18 12:15	2020/06/18 13:00			
COC Number		08484201	08484201	08484201			
	UNITS	WG-88877-180620-NT-04	WG-88877-180620-NT-05	WG-88877-180620-NT-06	RDL	MDL	QC Batch
Dissolved Zinc (Zn)	ug/L	<5.0	<5.0	<5.0	5.0	0.050	9895383
Dissolved Zirconium (Zr)	ug/L	<0.10	<0.10	<0.10	0.10	0.0080	9895383
Dissolved Calcium (Ca)	mg/L	9.44	<0.050	32.1	0.050	0.0010	9892165
Dissolved Magnesium (Mg)	mg/L	2.19	<0.050	5.29	0.050	0.00050	9892165
Dissolved Potassium (K)	mg/L	0.200	<0.050	0.286	0.050	0.0020	9892165
Dissolved Sodium (Na)	mg/L	9.43	<0.050	4.89	0.050	0.0010	9892165
Dissolved Sulphur (S)	mg/L	<3.0	<3.0	7.7	3.0	1.0	9892165
RDL = Reportable Detection Limit							

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

BV Labs Job #: C042096
Report Date: 2020/06/27

GHD Limited
Client Project #: 88877-07-02
Site Location: UPLAND
Your P.O. #: 73506780-7
Sampler Initials: NT

CSR/CCME DISS. METALS IN WATER W/ CV HG (WATER)

BV Labs ID		XY4715	XY4715			
Sampling Date		2020/06/18 13:30	2020/06/18 13:30			
COC Number		08484201	08484201			
	UNITS	WG-88877-180620-NT-07	WG-88877-180620-NT-07 Lab-Dup	RDL	MDL	QC Batch
Calculated Parameters						
Dissolved Hardness (CaCO3)	mg/L	33.7	N/A	0.50	0.50	9892272
Elements						
Dissolved Mercury (Hg)	ug/L	<0.0019	N/A	0.0019	0.0019	9894710
Dissolved Metals by ICPMS						
Dissolved Aluminum (Al)	ug/L	5.1	5.2	3.0	0.030	9895383
Dissolved Antimony (Sb)	ug/L	<0.50	<0.50	0.50	0.0020	9895383
Dissolved Arsenic (As)	ug/L	0.78	0.78	0.10	0.010	9895383
Dissolved Barium (Ba)	ug/L	2.9	2.9	1.0	0.0020	9895383
Dissolved Beryllium (Be)	ug/L	<0.10	<0.10	0.10	0.0030	9895383
Dissolved Bismuth (Bi)	ug/L	<1.0	<1.0	1.0	0.0010	9895383
Dissolved Boron (B)	ug/L	<50	<50	50	50	9895383
Dissolved Cadmium (Cd)	ug/L	<0.010	<0.010	0.010	0.0020	9895383
Dissolved Chromium (Cr)	ug/L	<1.0	<1.0	1.0	0.020	9895383
Dissolved Cobalt (Co)	ug/L	<0.20	<0.20	0.20	0.20	9895383
Dissolved Copper (Cu)	ug/L	0.37	0.39	0.20	0.010	9895383
Dissolved Iron (Fe)	ug/L	<5.0	<5.0	5.0	0.040	9895383
Dissolved Lead (Pb)	ug/L	<0.20	<0.20	0.20	0.0010	9895383
Dissolved Lithium (Li)	ug/L	<2.0	<2.0	2.0	2.0	9895383
Dissolved Manganese (Mn)	ug/L	<1.0	<1.0	1.0	0.030	9895383
Dissolved Molybdenum (Mo)	ug/L	<1.0	<1.0	1.0	0.0020	9895383
Dissolved Nickel (Ni)	ug/L	<1.0	<1.0	1.0	0.010	9895383
Dissolved Phosphorus (P)	ug/L	27	27	10	1.0	9895383
Dissolved Selenium (Se)	ug/L	<0.10	<0.10	0.10	0.0060	9895383
Dissolved Silicon (Si)	ug/L	3840	3810	100	0.30	9895383
Dissolved Silver (Ag)	ug/L	<0.020	<0.020	0.020	0.0020	9895383
Dissolved Strontium (Sr)	ug/L	14.0	14.0	1.0	0.0020	9895383
Dissolved Thallium (Tl)	ug/L	<0.010	<0.010	0.010	0.010	9895383
Dissolved Tin (Sn)	ug/L	<5.0	<5.0	5.0	0.0050	9895383
Dissolved Titanium (Ti)	ug/L	<5.0	<5.0	5.0	0.30	9895383

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

BV Labs Job #: C042096
Report Date: 2020/06/27

GHD Limited
Client Project #: 88877-07-02
Site Location: UPLAND
Your P.O. #: 73506780-7
Sampler Initials: NT

CSR/CCME DISS. METALS IN WATER W/ CV HG (WATER)

BV Labs ID		XY4715	XY4715			
Sampling Date		2020/06/18 13:30	2020/06/18 13:30			
COC Number		08484201	08484201			
	UNITS	WG-88877-180620-NT-07	WG-88877-180620-NT-07 Lab-Dup	RDL	MDL	QC Batch
Dissolved Uranium (U)	ug/L	<0.10	<0.10	0.10	0.0010	9895383
Dissolved Vanadium (V)	ug/L	6.1	6.0	5.0	0.020	9895383
Dissolved Zinc (Zn)	ug/L	<5.0	<5.0	5.0	0.050	9895383
Dissolved Zirconium (Zr)	ug/L	<0.10	<0.10	0.10	0.0080	9895383
Dissolved Calcium (Ca)	mg/L	10.8	N/A	0.050	0.0010	9892165
Dissolved Magnesium (Mg)	mg/L	1.60	N/A	0.050	0.00050	9892165
Dissolved Potassium (K)	mg/L	0.163	N/A	0.050	0.0020	9892165
Dissolved Sodium (Na)	mg/L	0.977	N/A	0.050	0.0010	9892165
Dissolved Sulphur (S)	mg/L	<3.0	N/A	3.0	1.0	9892165

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

GENERAL COMMENTS

Results relate only to the items tested.

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
9893924	Nitrate plus Nitrite (N)	2020/06/20	104	80 - 120	108	80 - 120	<0.020	mg/L	NC (1)	25
9893925	Nitrite (N)	2020/06/20	100	80 - 120	100	80 - 120	<0.0050	mg/L	NC (1)	20
9893968	Orthophosphate (P)	2020/06/20	113 (2)	80 - 120	101	80 - 120	<0.0030	mg/L	0.91 (3)	20
9894710	Dissolved Mercury (Hg)	2020/06/22	94	80 - 120	88	80 - 120	<0.0019	ug/L	NC (1)	20
9895383	Dissolved Aluminum (Al)	2020/06/24	102 (4)	80 - 120	103	80 - 120	<3.0	ug/L	0.36 (5)	20
9895383	Dissolved Antimony (Sb)	2020/06/24	102 (4)	80 - 120	103	80 - 120	<0.50	ug/L	NC (5)	20
9895383	Dissolved Arsenic (As)	2020/06/24	103 (4)	80 - 120	102	80 - 120	<0.10	ug/L	0.36 (5)	20
9895383	Dissolved Barium (Ba)	2020/06/24	100 (4)	80 - 120	101	80 - 120	<1.0	ug/L	1.2 (5)	20
9895383	Dissolved Beryllium (Be)	2020/06/24	101 (4)	80 - 120	100	80 - 120	<0.10	ug/L	NC (5)	20
9895383	Dissolved Bismuth (Bi)	2020/06/24	100 (4)	80 - 120	101	80 - 120	<1.0	ug/L	NC (5)	20
9895383	Dissolved Boron (B)	2020/06/24	107 (4)	80 - 120	106	80 - 120	<50	ug/L	NC (5)	20
9895383	Dissolved Cadmium (Cd)	2020/06/24	103 (4)	80 - 120	104	80 - 120	<0.010	ug/L	NC (5)	20
9895383	Dissolved Chromium (Cr)	2020/06/24	101 (4)	80 - 120	102	80 - 120	<1.0	ug/L	NC (5)	20
9895383	Dissolved Cobalt (Co)	2020/06/24	98 (4)	80 - 120	98	80 - 120	<0.20	ug/L	NC (5)	20
9895383	Dissolved Copper (Cu)	2020/06/24	100 (4)	80 - 120	101	80 - 120	<0.20	ug/L	4.5 (5)	20
9895383	Dissolved Iron (Fe)	2020/06/24	103 (4)	80 - 120	103	80 - 120	<5.0	ug/L	NC (5)	20
9895383	Dissolved Lead (Pb)	2020/06/24	102 (4)	80 - 120	103	80 - 120	<0.20	ug/L	NC (5)	20
9895383	Dissolved Lithium (Li)	2020/06/24	99 (4)	80 - 120	98	80 - 120	<2.0	ug/L	NC (5)	20
9895383	Dissolved Manganese (Mn)	2020/06/24	100 (4)	80 - 120	101	80 - 120	<1.0	ug/L	NC (5)	20
9895383	Dissolved Molybdenum (Mo)	2020/06/24	103 (4)	80 - 120	104	80 - 120	<1.0	ug/L	NC (5)	20
9895383	Dissolved Nickel (Ni)	2020/06/24	101 (4)	80 - 120	103	80 - 120	<1.0	ug/L	NC (5)	20
9895383	Dissolved Phosphorus (P)	2020/06/24	103 (4)	80 - 120	102	80 - 120	<10	ug/L	2.1 (5)	20
9895383	Dissolved Selenium (Se)	2020/06/24	105 (4)	80 - 120	103	80 - 120	<0.10	ug/L	NC (5)	20
9895383	Dissolved Silicon (Si)	2020/06/24	97 (4)	80 - 120	103	80 - 120	<100	ug/L	0.86 (5)	20
9895383	Dissolved Silver (Ag)	2020/06/24	100 (4)	80 - 120	100	80 - 120	<0.020	ug/L	NC (5)	20
9895383	Dissolved Strontium (Sr)	2020/06/24	99 (4)	80 - 120	102	80 - 120	<1.0	ug/L	0.089 (5)	20
9895383	Dissolved Thallium (Tl)	2020/06/24	103 (4)	80 - 120	102	80 - 120	<0.010	ug/L	NC (5)	20
9895383	Dissolved Tin (Sn)	2020/06/24	101 (4)	80 - 120	102	80 - 120	<5.0	ug/L	NC (5)	20
9895383	Dissolved Titanium (Ti)	2020/06/24	102 (4)	80 - 120	104	80 - 120	<5.0	ug/L	NC (5)	20
9895383	Dissolved Uranium (U)	2020/06/24	106 (4)	80 - 120	104	80 - 120	<0.10	ug/L	NC (5)	20
9895383	Dissolved Vanadium (V)	2020/06/24	102 (4)	80 - 120	102	80 - 120	<5.0	ug/L	0.44 (5)	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
9895383	Dissolved Zinc (Zn)	2020/06/24	103 (4)	80 - 120	102	80 - 120	<5.0	ug/L	NC (5)	20
9895383	Dissolved Zirconium (Zr)	2020/06/24	103 (4)	80 - 120	103	80 - 120	<0.10	ug/L	NC (5)	20
9895393	Alkalinity (PP as CaCO3)	2020/06/22					<1.0	mg/L		
9895393	Alkalinity (Total as CaCO3)	2020/06/22			94	80 - 120	<1.0	mg/L		
9895393	Bicarbonate (HCO3)	2020/06/22					<1.0	mg/L		
9895393	Carbonate (CO3)	2020/06/22					<1.0	mg/L		
9895393	Hydroxide (OH)	2020/06/22					<1.0	mg/L		
9895394	Conductivity	2020/06/22			100	80 - 120	<2.0	uS/cm		
9895609	Total Dissolved Solids	2020/06/23	98	80 - 120	98	80 - 120	<10	mg/L	7.4 (1)	20
9895658	Total Dissolved Solids	2020/06/24	103	80 - 120	92	80 - 120	<10	mg/L	1.1 (1)	20
9897412	Dissolved Chloride (Cl)	2020/06/23	103 (2)	80 - 120	104	80 - 120	<1.0	mg/L	NC (3)	20
9897412	Dissolved Sulphate (SO4)	2020/06/23	94 (2)	80 - 120	97	80 - 120	<1.0	mg/L	7.6 (3)	20
9899935	Total Sulphide	2020/06/25	NC	80 - 120	113	80 - 120	<0.0018	mg/L	126 (6,1)	20
9902565	Total Ammonia (N)	2020/06/26	105 (7)	80 - 120	104	80 - 120	<0.015	mg/L	NC (8)	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 [XY4715-01]

(3) Duplicate Parent ID [XY4715-01]

(4) Matrix Spike Parent ID [XY4715-03]

(5) Duplicate Parent ID [XY4715-03]

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

(7) Matrix Spike Parent ID [XY4709-06]

(8) Duplicate Parent ID [XY4709-06]

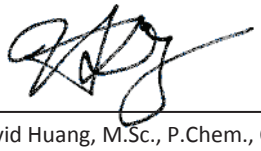
Bureau Veritas Laboratories Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

BV Labs Job #: C042096
Report Date: 2020/06/27

GHD Limited
Client Project #: 88877-07-02
Site Location: UPLAND
Your P.O. #: 73506780-7
Sampler Initials: NT

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).



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

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

Maria Magdalena Florescu, Ph.D., P.Chem., QP, Inorganics 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

08484201

Burnaby: 4606 Canada Way, Burnaby, BC V5G 1K5 Toll Free (800) 665 8566
Victoria: 460 Tennyson Place, Unit 1, Victoria, BC V8Z 6S8 Toll Free (866) 385-6112
bvlabs.com

CHAIN OF CUSTODY RECORD

Invoice Information		Report Information (if differs from invoice)		Project Information		Turnaround Time (TAT) Required
Company :	#163 GHD Limited	Company:	#28639 GHD Limited	Quotation	MSA	☑ 5 - 7 Days Regular (Most analyses)
Contact Name:	Airesse MacPhee	Contact Name:	Airesse MacPhee	P.O. #/AFE#:	73506780-7	PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS
Address:	455 Pillip Street	Address:	10271 Shellbridge Way		(Groundwater)	Rush TAT (Surcharges will be applied)
	Waterloo, ON PC: N2L 3X2		Richmond, BC PC: V6X 2W8	Project #:	088877-07-02	☐ Same Day ☐ 2 Days
Phone/Fax:	(519) 884-0510	Phone/Fax:	(604) 248-3661	Site Location:	Upland	☐ 1 Day ☐ 3-4 Days
Email:	airesse.macphee@ghd.com	Email:	airesse.macphee@ghd.com	Site #:		Date Required:
Copies:	Reference PO	Copies:	Reference PO	Sampled By:	N. Turl	Rush Confirmation #:

Laboratory Use Only

	YES	NO	Cooler ID			
Seal Present	X					
Seal Intact	X		Temp	6	7	7
Cooling Media	X					
	YES	NO	Cooler ID	2		
Seal Present	X					
Seal Intact	X		Temp	7	5	4
Cooling Media	X					
	YES	NO	Cooler ID			
Seal Present						
Seal Intact			Temp			
Cooling Media						

Depot Reception

Analysis Requested

Regulatory Criteria

☐ BC CSR
☐ YK CSR
☐ CCME
☐ Drinking Water
☐ BC Water Quality
☐ Other

Special Instructions

	Sample Identification	Date Sampled (yyyy/mm/dd)	Time Sampled (hh:mm)	Matrix	# of Containers	Speciated Alkalinity, Ec, TDS	Cl, SO4 (dissolved), NO2, NO3, N+N	Orthophosphate	NH3	Sulphide (as S), Low Level Sulphide (as H2S)	Dissolved CSR Metals (+Hg)	Dissolved Hardness	HOLD - DO NOT ANALYZE
1	WG-88877-180620-NT-01	2020/06/18	900	WATER	5	X	X	X	X	X	X	X	
2	-02		945		1								
3	-03		955										
4	-04		1200										
5	-05		1215										
6	-06		1300										
7	-07		1330										
8													
9													
10													

Short holding times!
All bottles were field filtered and preserved as required.

Relinquished by: (Signature/ Print)	Date (yyyy/mm/dd):	Time (hh:mm):	Received by: (Signature/ Print)	Date (yyyy/mm/dd):	Time (hh:mm):
N. Turl / N. Turl	2020/06/18	1600	[illegible]	2020/06/19	08:00

C042096_COC

BV Labs Job Number: C042096
Report Date: 2020/06/27

GHD Limited
Client Project #: 88877-07-02
Site Location: UPLAND
Your P.O. #: 73506780-7
Sampler Initials: NT

RESULTS OF CHEMICAL ANALYSES OF WATER

BV Labs ID		XY4709	XY4709	XY4710		XY4711	XY4712	XY4713	XY4714	XY4715	XY4715			
Sampling Date		2020/06/18 09:00	2020/06/18 09:00	2020/06/18 09:45		2020/06/18 09:55	2020/06/18 12:00	2020/06/18 12:15	2020/06/18 13:00	2020/06/18 13:30	2020/06/18 13:30			
COC Number		08484201	08484201	08484201		08484201	08484201	08484201	08484201	08484201	08484201			
	UNITS	**WG-88877-180620-NT-01**	**WG-88877-180620-NT-01 Lab-Dup**	**WG-88877-180620-NT-02**	**QC Batch**	**WG-88877-180620-NT-03**	**WG-88877-180620-NT-04**	**WG-88877-180620-NT-05**	**WG-88877-180620-NT-06**	**WG-88877-180620-NT-07**	**WG-88877-180620-NT-07 Lab-Dup**	**RDL**	**MDL**	**QC Batch**
ANIONS														
Nitrite (N)	mg/L	<0.0050	N/A	<0.0050	9893925	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	N/A	0.0050	0.0050	9893925
Calculated Parameters														
Filter and HNO3 Preservation	N/A	FIELD	N/A	FIELD	ONSITE	FIELD	FIELD	FIELD	FIELD	FIELD	N/A	N/A	N/A	ONSITE
Nitrate (N)	mg/L	1.89	N/A	0.338	9892745	0.345	0.417	<0.020	1.06	0.041	N/A	0.020	N/A	9892745
Misc. Inorganics														
Conductivity	uS/cm	190	N/A	130	9895394	140	110	<2.0	230	85	N/A	2.0	N/A	9895394
Total Dissolved Solids	mg/L	140	N/A	94	9895609	70	66	<10	130	42	N/A	10	N/A	9895658
Anions														
Alkalinity (PP as CaCO3)	mg/L	<1.0	N/A	<1.0	9895393	<1.0	<1.0	<1.0	<1.0	<1.0	N/A	1.0	N/A	9895393
Alkalinity (Total as CaCO3)	mg/L	62	N/A	56	9895393	58	41	<1.0	72	28	N/A	1.0	N/A	9895393
Bicarbonate (HCO3)	mg/L	76	N/A	69	9895393	71	49	<1.0	88	34	N/A	1.0	N/A	9895393
Carbonate (CO3)	mg/L	<1.0	N/A	<1.0	9895393	<1.0	<1.0	<1.0	<1.0	<1.0	N/A	1.0	N/A	9895393
Hydroxide (OH)	mg/L	<1.0	N/A	<1.0	9895393	<1.0	<1.0	<1.0	<1.0	<1.0	N/A	1.0	N/A	9895393
Total Sulphide	mg/L	<0.0018	N/A	<0.0018	9899935	<0.0018	<0.0018	<0.0018	<0.0018	0.0026	N/A	0.0018	N/A	9899935
Dissolved Chloride (Cl)	mg/L	12	N/A	3.2	9897412	4.5	3.7	<1.0	12	<1.0	<1.0	1.0	N/A	9897412
Dissolved Sulphate (SO4)	mg/L	9.1	N/A	4.9	9897412	4.8	6.5	<1.0	23	3.1	2.9	1.0	N/A	9897412
Nutrients														
Total Ammonia (N)	mg/L	0.022	<0.015	<0.015	9902565	<0.015	<0.015	<0.015	<0.015	<0.015	N/A	0.015	0.0040	9902565
Orthophosphate (P)	mg/L	0.010	N/A	0.012	9893968	0.013	0.0053	<0.0030	0.0049	0.024	0.024	0.0030	0.0030	9893968
Nitrate plus Nitrite (N)	mg/L	1.89	N/A	0.338	9893924	0.345	0.417	<0.020	1.06	0.041	N/A	0.020	0.020	9893924

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

Results relate only to the items tested.

GHD Limited
BV Labs Job Number: C042096
Client Project #: 88877-07-02
Report Date: 2020/06/27
Site Location: UPLAND
Your P.O. #: 73506780-7
Sampler Initials: NT

MISCELLANEOUS (WATER)

BV Labs ID		XY4709	XY4710	XY4711	XY4712	XY4713	XY4714	XY4715			
Sampling Date		2020/06/18 09:00	2020/06/18 09:45	2020/06/18 09:55	2020/06/18 12:00	2020/06/18 12:15	2020/06/18 13:00	2020/06/18 13:30			
COC Number		08484201	08484201	08484201	08484201	08484201	08484201	08484201			
	UNITS	**WG-88877-180620-NT-01**	**WG-88877-180620-NT-02**	**WG-88877-180620-NT-03**	**WG-88877-180620-NT-04**	**WG-88877-180620-NT-05**	**WG-88877-180620-NT-06**	**WG-88877-180620-NT-07**	**RDL**	**MDL**	**QC Batch**
Calculated Parameters											
Total Sulphide (as H2S)	mg/L	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	0.0027	0.0019	0.0019	9893031

RDL = Reportable Detection Limit
N/A = Not Applicable

Results relate only to the items tested.

BV Labs Job Number: C042096
Report Date: 2020/06/27

GHD Limited
Client Project #: 88877-07-02
Site Location: UPLAND
Your P.O. #: 73506780-7
Sampler Initials: NT

CSR/CCME DISS. METALS IN WATER W/ CV HG (WATER)

BV Labs ID		XY4709	XY4710	XY4711	XY4712	XY4713	XY4714	XY4715	XY4715			
Sampling Date		2020/06/18 09:00	2020/06/18 09:45	2020/06/18 09:55	2020/06/18 12:00	2020/06/18 12:15	2020/06/18 13:00	2020/06/18 13:30	2020/06/18 13:30			
COC Number		08484201	08484201	08484201	08484201	08484201	08484201	08484201	08484201			
	UNITS	**WG-88877-180620-NT-01**	**WG-88877-180620-NT-02**	**WG-88877-180620-NT-03**	**WG-88877-180620-NT-04**	**WG-88877-180620-NT-05**	**WG-88877-180620-NT-06**	**WG-88877-180620-NT-07**	**WG-88877-180620-NT-07 Lab-Dup**	**RDL**	**MDL**	**QC Batch**
Calculated Parameters												
Dissolved Hardness (CaCO3)	mg/L	84.8	57.4	57.0	32.6	<0.50	102	33.7	N/A	0.50	0.50	9892272
Elements												
Dissolved Mercury (Hg)	ug/L	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	N/A	0.0019	0.0019	9894710
Dissolved Metals by ICPMS												
Dissolved Aluminum (Al)	ug/L	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	5.1	5.2	3.0	0.030	9895383
Dissolved Antimony (Sb)	ug/L	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.50	0.0020	9895383
Dissolved Arsenic (As)	ug/L	0.27	0.44	0.43	<0.10	<0.10	<0.10	0.78	0.78	0.10	0.010	9895383
Dissolved Barium (Ba)	ug/L	6.7	2.9	3.0	1.1	<1.0	2.6	2.9	2.9	1.0	0.0020	9895383
Dissolved Beryllium (Be)	ug/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	0.0030	9895383
Dissolved Bismuth (Bi)	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.0	0.0010	9895383
Dissolved Boron (B)	ug/L	<50	<50	<50	<50	<50	<50	<50	<50	50	50	9895383
Dissolved Cadmium (Cd)	ug/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	0.0020	9895383
Dissolved Chromium (Cr)	ug/L	1.3	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.0	0.020	9895383
Dissolved Cobalt (Co)	ug/L	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	0.20	0.20	9895383
Dissolved Copper (Cu)	ug/L	0.20	0.20	<0.20	0.20	<0.20	1.77	0.37	0.39	0.20	0.010	9895383
Dissolved Iron (Fe)	ug/L	<5.0	<5.0	<5.0	<5.0	<5.0	7.0	<5.0	<5.0	5.0	0.040	9895383
Dissolved Lead (Pb)	ug/L	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	0.20	0.0010	9895383
Dissolved Lithium (Li)	ug/L	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	2.0	2.0	9895383
Dissolved Manganese (Mn)	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.0	0.030	9895383
Dissolved Molybdenum (Mo)	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.0	0.0020	9895383
Dissolved Nickel (Ni)	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.0	0.010	9895383
Dissolved Phosphorus (P)	ug/L	12	17	15	<10	<10	<10	27	27	10	1.0	9895383
Dissolved Selenium (Se)	ug/L	0.20	0.18	0.17	0.28	<0.10	0.19	<0.10	<0.10	0.10	0.0060	9895383
Dissolved Silicon (Si)	ug/L	8880	5910	5870	5610	<100	6590	3840	3810	100	0.30	9895383
Dissolved Silver (Ag)	ug/L	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	0.0020	9895383
Dissolved Strontium (Sr)	ug/L	44.3	25.4	25.6	20.0	<1.0	51.7	14.0	14.0	1.0	0.0020	9895383
Dissolved Thallium (Tl)	ug/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	0.010	9895383
Dissolved Tin (Sn)	ug/L	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	5.0	0.0050	9895383
Dissolved Titanium (Ti)	ug/L	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	5.0	0.30	9895383
Dissolved Uranium (U)	ug/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	0.0010	9895383
Dissolved Vanadium (V)	ug/L	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	6.1	6.0	5.0	0.020	9895383
Dissolved Zinc (Zn)	ug/L	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	5.0	0.050	9895383
Dissolved Zirconium (Zr)	ug/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	0.0080	9895383
Dissolved Calcium (Ca)	mg/L	26.9	18.3	18.2	9.44	<0.050	32.1	10.8	N/A	0.050	0.0010	9892165
Dissolved Magnesium (Mg)	mg/L	4.26	2.85	2.83	2.19	<0.050	5.29	1.60	N/A	0.050	0.00050	9892165
Dissolved Potassium (K)	mg/L	0.382	0.337	0.334	0.200	<0.050	0.286	0.163	N/A	0.050	0.0020	9892165
Dissolved Sodium (Na)	mg/L	5.16	6.56	6.43	9.43	<0.050	4.89	0.977	N/A	0.050	0.0010	9892165
Dissolved Sulphur (S)	mg/L	3.1	<3.0	<3.0	<3.0	<3.0	7.7	<3.0	N/A	3.0	1.0	9892165

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

Results relate only to the items tested.

GENERAL COMMENTS

Results relate only to the items tested.

Report Date: 2020/06/27

GHD Limited
Attention: 088877 Distribution
Client Project #: 88877-07-02
Your P.O. #:73506780-7
Site Location: UPLAND

Quality Assurance Report
BV Labs Job Number: C042096

QA/QC Bat	Init	QC Type	Parameter	Date Analy	Value	Recovery	UNITS	QC Limits
9893924	MO5	Matrix Spike	Nitrate plus Nitrite (N)	6/20/2020		104	%	80 - 120
9893924	MO5	Spiked Blank	Nitrate plus Nitrite (N)	6/20/2020		108	%	80 - 120
9893924	MO5	Method Blank	Nitrate plus Nitrite (N)	6/20/2020	<0.020		mg/L	
9893924	MO5	RPD	Nitrate plus Nitrite (N)	6/20/2020	NC (1)		%	25
9893925	MO5	Matrix Spike	Nitrite (N)	6/20/2020		100	%	80 - 120
9893925	MO5	Spiked Blank	Nitrite (N)	6/20/2020		100	%	80 - 120
9893925	MO5	Method Blank	Nitrite (N)	6/20/2020	<0.0050		mg/L	
9893925	MO5	RPD	Nitrite (N)	6/20/2020	NC (1)		%	20
9893968	MO5	Matrix Spike [XY4715-01]	Orthophosphate (P)	6/20/2020		113 (2)	%	80 - 120
9893968	MO5	Spiked Blank	Orthophosphate (P)	6/20/2020		101	%	80 - 120
9893968	MO5	Method Blank	Orthophosphate (P)	6/20/2020	<0.0030		mg/L	
9893968	MO5	RPD [XY4715-01]	Orthophosphate (P)	6/20/2020	0.91 (3)		%	20
9894710	CJY	Matrix Spike	Dissolved Mercury (Hg)	6/22/2020		94	%	80 - 120
9894710	CJY	Spiked Blank	Dissolved Mercury (Hg)	6/22/2020		88	%	80 - 120
9894710	CJY	Method Blank	Dissolved Mercury (Hg)	6/22/2020	<0.0019		ug/L	
9894710	CJY	RPD	Dissolved Mercury (Hg)	6/22/2020	NC (1)		%	20
9895383	AA1	Matrix Spike [XY4715-03]	Dissolved Aluminum (Al)	6/24/2020		102 (4)	%	80 - 120
			Dissolved Antimony (Sb)	6/24/2020		102 (4)	%	80 - 120
			Dissolved Arsenic (As)	6/24/2020		103 (4)	%	80 - 120
			Dissolved Barium (Ba)	6/24/2020		100 (4)	%	80 - 120
			Dissolved Beryllium (Be)	6/24/2020		101 (4)	%	80 - 120
			Dissolved Bismuth (Bi)	6/24/2020		100 (4)	%	80 - 120
			Dissolved Boron (B)	6/24/2020		107 (4)	%	80 - 120
			Dissolved Cadmium (Cd)	6/24/2020		103 (4)	%	80 - 120
			Dissolved Chromium (Cr)	6/24/2020		101 (4)	%	80 - 120
			Dissolved Cobalt (Co)	6/24/2020		98 (4)	%	80 - 120
			Dissolved Copper (Cu)	6/24/2020		100 (4)	%	80 - 120
			Dissolved Iron (Fe)	6/24/2020		103 (4)	%	80 - 120
			Dissolved Lead (Pb)	6/24/2020		102 (4)	%	80 - 120
			Dissolved Lithium (Li)	6/24/2020		99 (4)	%	80 - 120
			Dissolved Manganese (Mn)	6/24/2020		100 (4)	%	80 - 120
			Dissolved Molybdenum (Mo)	6/24/2020		103 (4)	%	80 - 120
			Dissolved Nickel (Ni)	6/24/2020		101 (4)	%	80 - 120
			Dissolved Phosphorus (P)	6/24/2020		103 (4)	%	80 - 120
			Dissolved Selenium (Se)	6/24/2020		105 (4)	%	80 - 120
			Dissolved Silicon (Si)	6/24/2020		97 (4)	%	80 - 120
			Dissolved Silver (Ag)	6/24/2020		100 (4)	%	80 - 120
			Dissolved Strontium (Sr)	6/24/2020		99 (4)	%	80 - 120
			Dissolved Thallium (Tl)	6/24/2020		103 (4)	%	80 - 120
			Dissolved Tin (Sn)	6/24/2020		101 (4)	%	80 - 120
			Dissolved Titanium (Ti)	6/24/2020		102 (4)	%	80 - 120
			Dissolved Uranium (U)	6/24/2020		106 (4)	%	80 - 120
			Dissolved Vanadium (V)	6/24/2020		102 (4)	%	80 - 120
			Dissolved Zinc (Zn)	6/24/2020		103 (4)	%	80 - 120
			Dissolved Zirconium (Zr)	6/24/2020		103 (4)	%	80 - 120
9895383	AA1	Spiked Blank	Dissolved Aluminum (Al)	6/24/2020		103	%	80 - 120
			Dissolved Antimony (Sb)	6/24/2020		103	%	80 - 120
			Dissolved Arsenic (As)	6/24/2020		102	%	80 - 120
			Dissolved Barium (Ba)	6/24/2020		101	%	80 - 120
			Dissolved Beryllium (Be)	6/24/2020		100	%	80 - 120
			Dissolved Bismuth (Bi)	6/24/2020		101	%	80 - 120
			Dissolved Boron (B)	6/24/2020		106	%	80 - 120
			Dissolved Cadmium (Cd)	6/24/2020		104	%	80 - 120
			Dissolved Chromium (Cr)	6/24/2020		102	%	80 - 120
			Dissolved Cobalt (Co)	6/24/2020		98	%	80 - 120
			Dissolved Copper (Cu)	6/24/2020		101	%	80 - 120
			Dissolved Iron (Fe)	6/24/2020		103	%	80 - 120
			Dissolved Lead (Pb)	6/24/2020		103	%	80 - 120
			Dissolved Lithium (Li)	6/24/2020		98	%	80 - 120
			Dissolved Manganese (Mn)	6/24/2020		101	%	80 - 120
			Dissolved Molybdenum (Mo)	6/24/2020		104	%	80 - 120
			Dissolved Nickel (Ni)	6/24/2020		103	%	80 - 120
			Dissolved Phosphorus (P)	6/24/2020		102	%	80 - 120
			Dissolved Selenium (Se)	6/24/2020		103	%	80 - 120
			Dissolved Silicon (Si)	6/24/2020		103	%	80 - 120
			Dissolved Silver (Ag)	6/24/2020		100	%	80 - 120
			Dissolved Strontium (Sr)	6/24/2020		102	%	80 - 120
			Dissolved Thallium (Tl)	6/24/2020		102	%	80 - 120
			Dissolved Tin (Sn)	6/24/2020		102	%	80 - 120
			Dissolved Titanium (Ti)	6/24/2020		104	%	80 - 120
			Dissolved Uranium (U)	6/24/2020		104	%	80 - 120
			Dissolved Vanadium (V)	6/24/2020		102	%	80 - 120
			Dissolved Zinc (Zn)	6/24/2020		102	%	80 - 120
			Dissolved Zirconium (Zr)	6/24/2020		103	%	80 - 120
9895383	AA1	Method Blank	Dissolved Aluminum (Al)	6/24/2020	<3.0		ug/L	
			Dissolved Antimony (Sb)	6/24/2020	<0.50		ug/L	
			Dissolved Arsenic (As)	6/24/2020	<0.10		ug/L	
			Dissolved Barium (Ba)	6/24/2020	<1.0		ug/L	
			Dissolved Beryllium (Be)	6/24/2020	<0.10		ug/L	
			Dissolved Bismuth (Bi)	6/24/2020	<1.0		ug/L	
			Dissolved Boron (B)	6/24/2020	<50		ug/L	
			Dissolved Cadmium (Cd)	6/24/2020	<0.010		ug/L	
			Dissolved Chromium (Cr)	6/24/2020	<1.0		ug/L	
			Dissolved Cobalt (Co)	6/24/2020	<0.20		ug/L	
			Dissolved Copper (Cu)	6/24/2020	<0.20		ug/L	
			Dissolved Iron (Fe)	6/24/2020	<5.0		ug/L	
			Dissolved Lead (Pb)	6/24/2020	<0.20		ug/L	
			Dissolved Lithium (Li)	6/24/2020	<2.0		ug/L	
			Dissolved Manganese (Mn)	6/24/2020	<1.0		ug/L	
			Dissolved Molybdenum (Mo)	6/24/2020	<1.0		ug/L	
			Dissolved Nickel (Ni)	6/24/2020	<1.0		ug/L	
			Dissolved Phosphorus (P)	6/24/2020	<10		ug/L	
			Dissolved Selenium (Se)	6/24/2020	<0.10		ug/L	
			Dissolved Silicon (Si)	6/24/2020	<100		ug/L	
			Dissolved Silver (Ag)	6/24/2020	<0.020		ug/L	
			Dissolved Strontium (Sr)	6/24/2020	<1.0		ug/L	
			Dissolved Thallium (Tl)	6/24/2020	<0.010		ug/L	
			Dissolved Tin (Sn)	6/24/2020	<5.0		ug/L	
			Dissolved Titanium (Ti)	6/24/2020	<5.0		ug/L	
			Dissolved Uranium (U)	6/24/2020	<0.10		ug/L	
			Dissolved Vanadium (V)	6/24/2020	<5.0		ug/L	
			Dissolved Zinc (Zn)	6/24/2020	<5.0		ug/L	
			Dissolved Zirconium (Zr)	6/24/2020	<0.10		ug/L	
9895383	AA1	RPD [XY4715-03]	Dissolved Aluminum (Al)	6/24/2020	0.36 (5)		%	20
			Dissolved Antimony (Sb)	6/24/2020	NC (5)		%	20
			Dissolved Arsenic (As)	6/24/2020	0.36 (5)		%	20
			Dissolved Barium (Ba)	6/24/2020	1.2 (5)		%	20

Report Date: 2020/06/27

GHD Limited
Attention: 088877 Distribution
Client Project #: 88877-07-02
Your P.O. #:73506780-7
Site Location: UPLAND

Quality Assurance Report
BV Labs Job Number: C042096

QA/QC Bat	Init	QC Type	Parameter	Date Analy	Value	Recovery	UNITS	QC Limits
			Dissolved Beryllium (Be)	6/24/2020	NC (5)		%	20
			Dissolved Bismuth (Bi)	6/24/2020	NC (5)		%	20
			Dissolved Boron (B)	6/24/2020	NC (5)		%	20
			Dissolved Cadmium (Cd)	6/24/2020	NC (5)		%	20
			Dissolved Chromium (Cr)	6/24/2020	NC (5)		%	20
			Dissolved Cobalt (Co)	6/24/2020	NC (5)		%	20
			Dissolved Copper (Cu)	6/24/2020	4.5 (5)		%	20
			Dissolved Iron (Fe)	6/24/2020	NC (5)		%	20
			Dissolved Lead (Pb)	6/24/2020	NC (5)		%	20
			Dissolved Lithium (Li)	6/24/2020	NC (5)		%	20
			Dissolved Manganese (Mn)	6/24/2020	NC (5)		%	20
			Dissolved Molybdenum (Mo)	6/24/2020	NC (5)		%	20
			Dissolved Nickel (Ni)	6/24/2020	NC (5)		%	20
			Dissolved Phosphorus (P)	6/24/2020	2.1 (5)		%	20
			Dissolved Selenium (Se)	6/24/2020	NC (5)		%	20
			Dissolved Silicon (Si)	6/24/2020	0.86 (5)		%	20
			Dissolved Silver (Ag)	6/24/2020	NC (5)		%	20
			Dissolved Strontium (Sr)	6/24/2020	0.089 (5)		%	20
			Dissolved Thallium (Tl)	6/24/2020	NC (5)		%	20
			Dissolved Tin (Sn)	6/24/2020	NC (5)		%	20
			Dissolved Titanium (Ti)	6/24/2020	NC (5)		%	20
			Dissolved Uranium (U)	6/24/2020	NC (5)		%	20
			Dissolved Vanadium (V)	6/24/2020	0.44 (5)		%	20
			Dissolved Zinc (Zn)	6/24/2020	NC (5)		%	20
			Dissolved Zirconium (Zr)	6/24/2020	NC (5)		%	20
9895393	WAY	Spiked Blank	Alkalinity (Total as CaCO3)	6/22/2020		94	%	80 - 120
9895393	WAY	Method Blank	Alkalinity (PP as CaCO3)	6/22/2020	<1.0		mg/L	
			Alkalinity (Total as CaCO3)	6/22/2020	<1.0		mg/L	
			Bicarbonate (HCO3)	6/22/2020	<1.0		mg/L	
			Carbonate (CO3)	6/22/2020	<1.0		mg/L	
			Hydroxide (OH)	6/22/2020	<1.0		mg/L	
9895394	WAY	Spiked Blank	Conductivity	6/22/2020		100	%	80 - 120
9895394	WAY	Method Blank	Conductivity	6/22/2020	<2.0		uS/cm	
9895609	CGP	Matrix Spike	Total Dissolved Solids	6/23/2020		98	%	80 - 120
9895609	CGP	Spiked Blank	Total Dissolved Solids	6/23/2020		98	%	80 - 120
9895609	CGP	Method Blank	Total Dissolved Solids	6/23/2020	<10		mg/L	
9895609	CGP	RPD	Total Dissolved Solids	6/23/2020	7.4 (1)		%	20
9895658	CGP	Matrix Spike	Total Dissolved Solids	6/24/2020		103	%	80 - 120
9895658	CGP	Spiked Blank	Total Dissolved Solids	6/24/2020		92	%	80 - 120
9895658	CGP	Method Blank	Total Dissolved Solids	6/24/2020	<10		mg/L	
9895658	CGP	RPD	Total Dissolved Solids	6/24/2020	1.1 (1)		%	20
9897412	BB3	Matrix Spike [XY4715-01]	Dissolved Chloride (Cl)	6/23/2020		103 (2)	%	80 - 120
			Dissolved Sulphate (SO4)	6/23/2020		94 (2)	%	80 - 120
9897412	BB3	Spiked Blank	Dissolved Chloride (Cl)	6/23/2020		104	%	80 - 120
			Dissolved Sulphate (SO4)	6/23/2020		97	%	80 - 120
9897412	BB3	Method Blank	Dissolved Chloride (Cl)	6/23/2020	<1.0		mg/L	
			Dissolved Sulphate (SO4)	6/23/2020	<1.0		mg/L	
9897412	BB3	RPD [XY4715-01]	Dissolved Chloride (Cl)	6/23/2020	NC (3)		%	20
			Dissolved Sulphate (SO4)	6/23/2020	7.6 (3)		%	20
9899935	SLL	Matrix Spike	Total Sulphide	6/25/2020		NC	%	80 - 120
9899935	SLL	Spiked Blank	Total Sulphide	6/25/2020		113	%	80 - 120
9899935	SLL	Method Blank	Total Sulphide	6/25/2020	<0.0018		mg/L	
9899935	SLL	RPD	Total Sulphide	6/25/2020	126 (6,1)		%	20
9902565	HG	Matrix Spike [XY4709-06]	Total Ammonia (N)	6/26/2020		105 (7)	%	80 - 120
9902565	HG	Spiked Blank	Total Ammonia (N)	6/26/2020		104	%	80 - 120
9902565	HG	Method Blank	Total Ammonia (N)	6/26/2020	<0.015		mg/L	
9902565	HG	RPD [XY4709-06]	Total Ammonia (N)	6/26/2020	NC (8)		%	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 [XY4715-01]
(3) Duplicate Parent ID [XY4715-01]
(4) Matrix Spike Parent ID [XY4715-03]
(5) Duplicate Parent ID [XY4715-03]
(6) Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.
(7) Matrix Spike Parent ID [XY4709-06]
(8) Duplicate Parent ID [XY4709-06]

Facility ID	Lab Report Number	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)	TDS	TDS Units
1088877000		WG-088877-261120-RP-01	MW11-19	11/26/2020	13:15	N	WG		48.8	m BTOR		Clear	11.61	deg C	6.6	247	millivolts	220	uS/cm	82.1	142	mg/L
1088877000		WG-088877-261120-RP-02	MW3-14	11/26/2020	15:00	N	WG		13.14	m BTOR		Clear	6.10	deg C	7.42	221	millivolts	72	uS/cm	4.8	47	mg/L
1088877000		WG-088877-261120-RP-03	MW2A-16	11/26/2020	15:45	N	WG		17.24	m BTOR		Clear	11.50	deg C	8.19	212	millivolts	73	uS/cm	7.0	48	mg/L
1088877000		WG-088877-261120-RP-04	MW2-14	11/26/2020	16:45	N	WG		16.66	m BTOR		Clear	10.77	deg C	7.52	234	millivolts	109	uS/cm	13.1	71	mg/L
1088877000		WG-088877-271120-RP-05	MW10-17	11/27/2020	12:30	N	WG		44.0	m BTOR		Clear	10.74	deg C	7.44	259	millivolts	153	uS/cm	5.8	99	mg/L
1088877000		WL-088877-271120-RP-06	S03-19	11/27/2020	13:30	N	WL		5.245	m BTOR		Yellowish, warm, clear with ye	11.93	deg C	6.58	62	millivolts	2040	uS/cm	41.2	1300	mg/L
1088877000		WL-088877-271120-RP-07	S03-19	11/27/2020	13:35	FD	WLQ	WL-088877-271120-RP-06	5.245	m BTOR		Yellowish, warm, clear with ye	11.93	deg C	6.58	62	millivolts	2040	uS/cm	41.2	1300	mg/L
1088877000		WL-088877-271120-RP-08	S01-17	11/27/2020	15:00	N	W		7.86	m BTOR		Cear, yellow tinge, slight H2S o	11.44	deg C	6.87	-61	millivolts	1130	uS/cm	29.5	7180	mg/L
1088877000		WL-088877-271120-RP-09	S05-19	11/27/2020	16:00	N	WL		4.415	m BTOR		Clear, warm, H2S odour, slight	14.48	deg C	6.41	56	millivolts	311	uS/cm	49.0	240	mg/L
1088877000		TRIPBLANK-271120-RP-10	Trip Blank	11/27/2020	08:00	TB	WLQ															

Your P.O. #: 73506780-08
Your Project #: 088877-07-02
Site#: 088877-07-02
Site Location: UPLAND
Your C.O.C. #: 08488005

Attention: 088877 Distribution

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

Report Date: 2020/12/07
Report #: R2963844
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C087842
Received: 2020/11/28, 09:00

Sample Matrix: Water
Samples Received: 5

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity @25C (pp, total), CO3,HCO3,OH	5	N/A	2020/11/30	BBY6SOP-00026	SM 23 2320 B m
Chloride/Sulphate by Auto Colourimetry	5	N/A	2020/11/30	BBY6SOP-00011 / BBY6SOP-00017	SM23-4500-Cl/SO4-E m
Conductivity @25C	5	N/A	2020/11/30	BBY6SOP-00026	SM 23 2510 B m
Sulphide (as H2S) (1)	5	N/A	2020/12/05		Auto Calc
Hardness (calculated as CaCO3)	5	N/A	2020/12/02	BBY WI-00033	Auto Calc
Mercury (Dissolved) by CV	5	2020/12/01	2020/12/01	AB SOP-00084	BCMOE BCLM Oct2013 m
Na, K, Ca, Mg, S by CRC ICPMS (diss.)	5	N/A	2020/12/02	BBY WI-00033	Auto Calc
Elements by CRC ICPMS (dissolved)	5	N/A	2020/12/01	BBY7SOP-00002	EPA 6020b R2 m
Ammonia-N (Total)	5	N/A	2020/12/02	AB SOP-00007	SM 23 4500 NH3 A G m
Nitrate + Nitrite (N) (highlevel)	5	N/A	2020/11/28	BBY6SOP-00010	SM 23 4500-NO3- I m
Nitrite (N) by CFA (highlevel)	5	N/A	2020/11/28	BBY6SOP-00010	SM 23 4500-NO3- I m
Nitrogen - Nitrate (as N)	5	N/A	2020/11/28	BBY WI-00033	Auto Calc
Filter and HNO3 Preserve for Metals	5	N/A	2020/11/28	BBY7 WI-00004	SM 23 3030B m
Orthophosphate by Konelab (2)	5	N/A	2020/11/28	BBY6SOP-00013	SM 23 4500-P E m
Total Sulphide (1)	5	N/A	2020/12/05	AB SOP-00080	SM 23 4500 S2-A D Fm
Total Dissolved Solids (Filt. Residue)	5	2020/12/02	2020/12/03	BBY6SOP-00033	SM 23 2540 C m

Remarks:

Bureau Veritas Laboratories are accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by BV Labs 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 BV Labs profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and BV Labs 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.

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

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

Your P.O. #: 73506780-08
Your Project #: 088877-07-02
Site#: 088877-07-02
Site Location: UPLAND
Your C.O.C. #: 08488005

Attention: 088877 Distribution

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

Report Date: 2020/12/07
Report #: R2963844
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C087842
Received: 2020/11/28, 09:00

dilution methods.
Results relate to samples tested. When sampling is not conducted by BV Labs, results relate to the supplied samples tested.

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 BV Labs Calgary Environmental
(2) 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

AUTHORIZED REPORT
RAPPORT AUTORISÉ

Bureau Veritas Laboratories
07 Dec 2020 08:56:27

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

==========

This report has been generated and distributed using a secure automated process.
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 #: C087842
Report Date: 2020/12/07

GHD Limited
Client Project #: 088877-07-02
Site Location: UPLAND
Your P.O. #: 73506780-08
Sampler Initials: RP

RESULTS OF CHEMICAL ANALYSES OF WATER

BV Labs ID		YY2173	YY2173	YY2174			
Sampling Date		2020/11/26 13:15	2020/11/26 13:15	2020/11/26 15:00			
COC Number		08488005	08488005	08488005			
	UNITS	WG-088877-261120-RP-01	WG-088877-261120-RP-01 Lab-Dup	WG-088877-261120-RP-02	RDL	MDL	QC Batch
ANIONS							
Nitrite (N)	mg/L	<0.10	N/A	<0.10	0.10	0.10	A098776
Calculated Parameters							
Filter and HNO3 Preservation	N/A	FIELD	N/A	FIELD	N/A	N/A	ONSITE
Nitrate (N)	mg/L	0.37	N/A	0.52	0.10	N/A	A098725
Sulphide (as H2S)	mg/L	<0.0020	N/A	<0.0020	0.0020	N/A	A098721
Misc. Inorganics							
Conductivity	uS/cm	250	N/A	83	2.0	N/A	A100073
Total Dissolved Solids	mg/L	140	N/A	50	10	N/A	A102280
Anions							
Alkalinity (Total as CaCO3)	mg/L	120	N/A	27	1.0	N/A	A100070
Total Sulphide	mg/L	<0.0018	<0.0018	<0.0018	0.0018	N/A	A105265
Dissolved Chloride (Cl)	mg/L	5.7	N/A	3.5	1.0	N/A	A099884
Dissolved Sulphate (SO4)	mg/L	6.6	N/A	6.2	1.0	N/A	A099884
Nutrients							
Total Ammonia (N)	mg/L	<0.015	N/A	0.016	0.015	0.0040	A102060
Orthophosphate (P)	mg/L	0.011	N/A	0.0050	0.0030	0.0030	A098783
Nitrate plus Nitrite (N)	mg/L	0.37	N/A	0.52	0.10	0.10	A098773

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

BV Labs Job #: C087842
Report Date: 2020/12/07

GHD Limited
Client Project #: 088877-07-02
Site Location: UPLAND
Your P.O. #: 73506780-08
Sampler Initials: RP

RESULTS OF CHEMICAL ANALYSES OF WATER

BV Labs ID		YY2175	YY2176			
Sampling Date		2020/11/26 15:45	2020/11/26 16:45			
COC Number		08488005	08488005			
	UNITS	WG-088877-261120-RP-03	WG-088877-261120-RP-04	RDL	MDL	QC Batch
ANIONS						
Nitrite (N)	mg/L	<0.10	<0.10	0.10	0.10	A098776
Calculated Parameters						
Filter and HNO3 Preservation	N/A	FIELD	FIELD	N/A	N/A	ONSITE
Nitrate (N)	mg/L	<0.10	0.24	0.10	N/A	A098725
Sulphide (as H2S)	mg/L	<0.0020	<0.0020	0.0020	N/A	A098721
Misc. Inorganics						
Conductivity	uS/cm	85	130	2.0	N/A	A100073
Total Dissolved Solids	mg/L	42	60	10	N/A	A102280
Anions						
Alkalinity (Total as CaCO3)	mg/L	39	54	1.0	N/A	A100070
Total Sulphide	mg/L	<0.0018	<0.0018	0.0018	N/A	A105265
Dissolved Chloride (Cl)	mg/L	<1.0	2.3	1.0	N/A	A099884
Dissolved Sulphate (SO4)	mg/L	3.1	5.4	1.0	N/A	A099884
Nutrients						
Total Ammonia (N)	mg/L	<0.015	0.017	0.015	0.0040	A102060
Orthophosphate (P)	mg/L	0.023	0.0077	0.0030	0.0030	A098783
Nitrate plus Nitrite (N)	mg/L	<0.10	0.24	0.10	0.10	A098773

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 #: C087842
Report Date: 2020/12/07

GHD Limited
Client Project #: 088877-07-02
Site Location: UPLAND
Your P.O. #: 73506780-08
Sampler Initials: RP

RESULTS OF CHEMICAL ANALYSES OF WATER

BV Labs ID		YY2177			
Sampling Date		2020/11/27 12:30			
COC Number		08488005			
	UNITS	WG-088877-271120-RP-05	RDL	MDL	QC Batch
ANIONS					
Nitrite (N)	mg/L	<0.10	0.10	0.10	A098776
Calculated Parameters					
Filter and HNO3 Preservation	N/A	FIELD	N/A	N/A	ONSITE
Nitrate (N)	mg/L	0.34	0.10	N/A	A098725
Sulphide (as H2S)	mg/L	<0.0020	0.0020	N/A	A098721
Misc. Inorganics					
Conductivity	uS/cm	170	2.0	N/A	A100073
Total Dissolved Solids	mg/L	94	10	N/A	A102280
Anions					
Alkalinity (Total as CaCO3)	mg/L	68	1.0	N/A	A100070
Total Sulphide	mg/L	<0.0018	0.0018	N/A	A105265
Dissolved Chloride (Cl)	mg/L	6.5	1.0	N/A	A099884
Dissolved Sulphate (SO4)	mg/L	7.5	1.0	N/A	A099884
Nutrients					
Total Ammonia (N)	mg/L	0.019	0.015	0.0040	A102059
Orthophosphate (P)	mg/L	0.012	0.0030	0.0030	A098783
Nitrate plus Nitrite (N)	mg/L	0.34	0.10	0.10	A098773

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 #: C087842
Report Date: 2020/12/07

GHD Limited
Client Project #: 088877-07-02
Site Location: UPLAND
Your P.O. #: 73506780-08
Sampler Initials: RP

CSR/CCME DISS. METALS IN WATER W/ CV HG (WATER)

BV Labs ID		YY2173	YY2174	YY2175			
Sampling Date		2020/11/26 13:15	2020/11/26 15:00	2020/11/26 15:45			
COC Number		08488005	08488005	08488005			
	UNITS	WG-088877-261120-RP-01	WG-088877-261120-RP-02	WG-088877-261120-RP-03	RDL	MDL	QC Batch
Calculated Parameters							
Dissolved Hardness (CaCO3)	mg/L	110	26.8	38.9	0.50	0.50	A098641
Elements							
Dissolved Mercury (Hg)	ug/L	<0.0019	0.0022	<0.0019	0.0019	0.0019	A100673
Dissolved Metals by ICPMS							
Dissolved Aluminum (Al)	ug/L	134	<3.0	5.6	3.0	0.030	A099845
Dissolved Antimony (Sb)	ug/L	<0.50	<0.50	<0.50	0.50	0.0020	A099845
Dissolved Arsenic (As)	ug/L	0.25	<0.10	0.81	0.10	0.010	A099845
Dissolved Barium (Ba)	ug/L	8.2	<1.0	2.8	1.0	0.0020	A099845
Dissolved Beryllium (Be)	ug/L	<0.10	<0.10	<0.10	0.10	0.0030	A099845
Dissolved Bismuth (Bi)	ug/L	<1.0	<1.0	<1.0	1.0	0.0010	A099845
Dissolved Boron (B)	ug/L	<50	<50	<50	50	50	A099845
Dissolved Cadmium (Cd)	ug/L	<0.010	<0.010	<0.010	0.010	0.0020	A099845
Dissolved Chromium (Cr)	ug/L	1.3	<1.0	<1.0	1.0	0.020	A099845
Dissolved Cobalt (Co)	ug/L	<0.20	<0.20	<0.20	0.20	0.20	A099845
Dissolved Copper (Cu)	ug/L	1.54	1.18	0.59	0.20	0.010	A099845
Dissolved Iron (Fe)	ug/L	104	<5.0	<5.0	5.0	0.040	A099845
Dissolved Lead (Pb)	ug/L	<0.20	<0.20	<0.20	0.20	0.0010	A099845
Dissolved Lithium (Li)	ug/L	<2.0	<2.0	<2.0	2.0	2.0	A099845
Dissolved Manganese (Mn)	ug/L	1.9	<1.0	<1.0	1.0	0.030	A099845
Dissolved Molybdenum (Mo)	ug/L	<1.0	<1.0	<1.0	1.0	0.0020	A099845
Dissolved Nickel (Ni)	ug/L	<1.0	<1.0	<1.0	1.0	0.010	A099845
Dissolved Selenium (Se)	ug/L	0.20	0.22	<0.10	0.10	0.0060	A099845
Dissolved Silicon (Si)	ug/L	8800	3340	3930	100	0.30	A099845
Dissolved Silver (Ag)	ug/L	<0.020	<0.020	<0.020	0.020	0.0020	A099845
Dissolved Strontium (Sr)	ug/L	56.9	14.7	16.4	1.0	0.0020	A099845
Dissolved Thallium (Tl)	ug/L	<0.010	<0.010	<0.010	0.010	0.010	A099845
Dissolved Tin (Sn)	ug/L	<5.0	<5.0	<5.0	5.0	0.0050	A099845
Dissolved Titanium (Ti)	ug/L	<5.0	<5.0	<5.0	5.0	0.30	A099845
Dissolved Uranium (U)	ug/L	<0.10	<0.10	<0.10	0.10	0.0010	A099845
Dissolved Vanadium (V)	ug/L	5.1	<5.0	6.7	5.0	0.020	A099845
Dissolved Zinc (Zn)	ug/L	<5.0	<5.0	<5.0	5.0	0.050	A099845

RDL = Reportable Detection Limit

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

BV Labs Job #: C087842
Report Date: 2020/12/07

GHD Limited
Client Project #: 088877-07-02
Site Location: UPLAND
Your P.O. #: 73506780-08
Sampler Initials: RP

CSR/CCME DISS. METALS IN WATER W/ CV HG (WATER)

BV Labs ID		YY2173	YY2174	YY2175			
Sampling Date		2020/11/26 13:15	2020/11/26 15:00	2020/11/26 15:45			
COC Number		08488005	08488005	08488005			
	UNITS	WG-088877-261120-RP-01	WG-088877-261120-RP-02	WG-088877-261120-RP-03	RDL	MDL	QC Batch
Dissolved Zirconium (Zr)	ug/L	<0.10	<0.10	<0.10	0.10	0.0080	A099845
Dissolved Calcium (Ca)	mg/L	35.0	7.78	12.5	0.050	0.0010	A098642
Dissolved Magnesium (Mg)	mg/L	5.61	1.79	1.83	0.050	0.00050	A098642
Dissolved Potassium (K)	mg/L	0.486	0.159	0.197	0.050	0.0020	A098642
Dissolved Sodium (Na)	mg/L	7.73	5.17	1.13	0.050	0.0010	A098642
Dissolved Sulphur (S)	mg/L	<3.0	<3.0	<3.0	3.0	1.0	A098642

RDL = Reportable Detection Limit

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

BV Labs Job #: C087842
Report Date: 2020/12/07

GHD Limited
Client Project #: 088877-07-02
Site Location: UPLAND
Your P.O. #: 73506780-08
Sampler Initials: RP

CSR/CCME DISS. METALS IN WATER W/ CV HG (WATER)

BV Labs ID		YY2176	YY2177			
Sampling Date		2020/11/26 16:45	2020/11/27 12:30			
COC Number		08488005	08488005			
	UNITS	WG-088877-261120-RP-04	WG-088877-271120-RP-05	RDL	MDL	QC Batch
Calculated Parameters						
Dissolved Hardness (CaCO3)	mg/L	52.7	69.4	0.50	0.50	A098641
Elements						
Dissolved Mercury (Hg)	ug/L	<0.0019	0.0032	0.0019	0.0019	A100673
Dissolved Metals by ICPMS						
Dissolved Aluminum (Al)	ug/L	<3.0	3.6	3.0	0.030	A099845
Dissolved Antimony (Sb)	ug/L	<0.50	<0.50	0.50	0.0020	A099845
Dissolved Arsenic (As)	ug/L	0.12	0.39	0.10	0.010	A099845
Dissolved Barium (Ba)	ug/L	1.4	3.6	1.0	0.0020	A099845
Dissolved Beryllium (Be)	ug/L	<0.10	<0.10	0.10	0.0030	A099845
Dissolved Bismuth (Bi)	ug/L	<1.0	<1.0	1.0	0.0010	A099845
Dissolved Boron (B)	ug/L	<50	<50	50	50	A099845
Dissolved Cadmium (Cd)	ug/L	<0.010	<0.010	0.010	0.0020	A099845
Dissolved Chromium (Cr)	ug/L	<1.0	<1.0	1.0	0.020	A099845
Dissolved Cobalt (Co)	ug/L	<0.20	<0.20	0.20	0.20	A099845
Dissolved Copper (Cu)	ug/L	1.08	0.76	0.20	0.010	A099845
Dissolved Iron (Fe)	ug/L	<5.0	<5.0	5.0	0.040	A099845
Dissolved Lead (Pb)	ug/L	<0.20	<0.20	0.20	0.0010	A099845
Dissolved Lithium (Li)	ug/L	<2.0	<2.0	2.0	2.0	A099845
Dissolved Manganese (Mn)	ug/L	<1.0	<1.0	1.0	0.030	A099845
Dissolved Molybdenum (Mo)	ug/L	<1.0	<1.0	1.0	0.0020	A099845
Dissolved Nickel (Ni)	ug/L	<1.0	<1.0	1.0	0.010	A099845
Dissolved Selenium (Se)	ug/L	0.10	0.15	0.10	0.0060	A099845
Dissolved Silicon (Si)	ug/L	6020	5880	100	0.30	A099845
Dissolved Silver (Ag)	ug/L	<0.020	<0.020	0.020	0.0020	A099845
Dissolved Strontium (Sr)	ug/L	26.4	31.5	1.0	0.0020	A099845
Dissolved Thallium (Tl)	ug/L	<0.010	<0.010	0.010	0.010	A099845
Dissolved Tin (Sn)	ug/L	<5.0	<5.0	5.0	0.0050	A099845
Dissolved Titanium (Ti)	ug/L	<5.0	<5.0	5.0	0.30	A099845
Dissolved Uranium (U)	ug/L	<0.10	<0.10	0.10	0.0010	A099845
Dissolved Vanadium (V)	ug/L	<5.0	<5.0	5.0	0.020	A099845
Dissolved Zinc (Zn)	ug/L	<5.0	<5.0	5.0	0.050	A099845

RDL = Reportable Detection Limit

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

BV Labs Job #: C087842
Report Date: 2020/12/07

GHD Limited
Client Project #: 088877-07-02
Site Location: UPLAND
Your P.O. #: 73506780-08
Sampler Initials: RP

CSR/CCME DISS. METALS IN WATER W/ CV HG (WATER)

BV Labs ID		YY2176	YY2177			
Sampling Date		2020/11/26 16:45	2020/11/27 12:30			
COC Number		08488005	08488005			
	UNITS	WG-088877-261120-RP-04	WG-088877-271120-RP-05	RDL	MDL	QC Batch
Dissolved Zirconium (Zr)	ug/L	<0.10	<0.10	0.10	0.0080	A099845
Dissolved Calcium (Ca)	mg/L	16.4	22.1	0.050	0.0010	A098642
Dissolved Magnesium (Mg)	mg/L	2.84	3.42	0.050	0.00050	A098642
Dissolved Potassium (K)	mg/L	0.226	0.375	0.050	0.0020	A098642
Dissolved Sodium (Na)	mg/L	3.92	6.54	0.050	0.0010	A098642
Dissolved Sulphur (S)	mg/L	<3.0	<3.0	3.0	1.0	A098642
RDL = Reportable Detection Limit						

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

BV Labs Job #: C087842
Report Date: 2020/12/07

GHD Limited
Client Project #: 088877-07-02
Site Location: UPLAND
Your P.O. #: 73506780-08
Sampler Initials: RP

GENERAL COMMENTS

Sample YY2173 [WG-088877-261120-RP-01] : Sample was analyzed past method specified hold time for Total Sulphide. Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised.

Sample YY2174 [WG-088877-261120-RP-02] : Sample was analyzed past method specified hold time for Total Sulphide. Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised.

Sample YY2175 [WG-088877-261120-RP-03] : Sample was analyzed past method specified hold time for Total Sulphide. Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised.

Sample YY2176 [WG-088877-261120-RP-04] : Sample was analyzed past method specified hold time for Total Sulphide. Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised.

Sample YY2177 [WG-088877-271120-RP-05] : Sample was analyzed past method specified hold time for Total Sulphide. Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised.

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
A098773	Nitrate plus Nitrite (N)	2020/11/28			105	80 - 120	<0.10	mg/L		
A098776	Nitrite (N)	2020/11/28			100	80 - 120	<0.10	mg/L		
A098783	Orthophosphate (P)	2020/11/28			98	80 - 120	<0.0030	mg/L		
A099845	Dissolved Aluminum (Al)	2020/12/01	105	80 - 120	101	80 - 120	<3.0	ug/L	0.87 (1)	20
A099845	Dissolved Antimony (Sb)	2020/12/01	103	80 - 120	100	80 - 120	<0.50	ug/L	NC (1)	20
A099845	Dissolved Arsenic (As)	2020/12/01	101	80 - 120	99	80 - 120	<0.10	ug/L	0.35 (1)	20
A099845	Dissolved Barium (Ba)	2020/12/01	NC	80 - 120	100	80 - 120	<1.0	ug/L	0.98 (1)	20
A099845	Dissolved Beryllium (Be)	2020/12/01	102	80 - 120	104	80 - 120	<0.10	ug/L	NC (1)	20
A099845	Dissolved Bismuth (Bi)	2020/12/01	97	80 - 120	100	80 - 120	<1.0	ug/L	NC (1)	20
A099845	Dissolved Boron (B)	2020/12/01	103	80 - 120	107	80 - 120	<50	ug/L	NC (1)	20
A099845	Dissolved Cadmium (Cd)	2020/12/01	103	80 - 120	101	80 - 120	<0.010	ug/L	6.6 (1)	20
A099845	Dissolved Chromium (Cr)	2020/12/01	101	80 - 120	101	80 - 120	<1.0	ug/L	NC (1)	20
A099845	Dissolved Cobalt (Co)	2020/12/01	97	80 - 120	98	80 - 120	<0.20	ug/L	NC (1)	20
A099845	Dissolved Copper (Cu)	2020/12/01	97	80 - 120	99	80 - 120	<0.20	ug/L	1.3 (1)	20
A099845	Dissolved Iron (Fe)	2020/12/01	113	80 - 120	103	80 - 120	<5.0	ug/L	12 (1)	20
A099845	Dissolved Lead (Pb)	2020/12/01	101	80 - 120	101	80 - 120	<0.20	ug/L	NC (1)	20
A099845	Dissolved Lithium (Li)	2020/12/01	99	80 - 120	97	80 - 120	<2.0	ug/L	NC (1)	20
A099845	Dissolved Manganese (Mn)	2020/12/01	101	80 - 120	100	80 - 120	<1.0	ug/L	2.1 (1)	20
A099845	Dissolved Molybdenum (Mo)	2020/12/01	105	80 - 120	104	80 - 120	<1.0	ug/L	2.7 (1)	20
A099845	Dissolved Nickel (Ni)	2020/12/01	98	80 - 120	101	80 - 120	<1.0	ug/L	1.2 (1)	20
A099845	Dissolved Selenium (Se)	2020/12/01	104	80 - 120	101	80 - 120	<0.10	ug/L	5.2 (1)	20
A099845	Dissolved Silicon (Si)	2020/12/01	102	80 - 120	99	80 - 120	<100	ug/L	1.4 (1)	20
A099845	Dissolved Silver (Ag)	2020/12/01	102	80 - 120	100	80 - 120	<0.020	ug/L	NC (1)	20
A099845	Dissolved Strontium (Sr)	2020/12/01	NC	80 - 120	100	80 - 120	<1.0	ug/L	1.4 (1)	20
A099845	Dissolved Thallium (Tl)	2020/12/01	102	80 - 120	101	80 - 120	<0.010	ug/L	NC (1)	20
A099845	Dissolved Tin (Sn)	2020/12/01	103	80 - 120	101	80 - 120	<5.0	ug/L	NC (1)	20
A099845	Dissolved Titanium (Ti)	2020/12/01	104	80 - 120	102	80 - 120	<5.0	ug/L	NC (1)	20
A099845	Dissolved Uranium (U)	2020/12/01	104	80 - 120	101	80 - 120	<0.10	ug/L	NC (1)	20
A099845	Dissolved Vanadium (V)	2020/12/01	103	80 - 120	101	80 - 120	<5.0	ug/L	NC (1)	20
A099845	Dissolved Zinc (Zn)	2020/12/01	104	80 - 120	105	80 - 120	<5.0	ug/L	0.14 (1)	20
A099845	Dissolved Zirconium (Zr)	2020/12/01	107	80 - 120	101	80 - 120	<0.10	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
A099884	Dissolved Chloride (Cl)	2020/11/30	102	80 - 120	104	80 - 120	<1.0	mg/L	4.4 (1)	20
A099884	Dissolved Sulphate (SO4)	2020/11/30	100	80 - 120	99	80 - 120	<1.0	mg/L	0.34 (1)	20
A100070	Alkalinity (Total as CaCO3)	2020/11/30	NC	80 - 120	93	80 - 120	<1.0	mg/L	2.7 (1)	20
A100073	Conductivity	2020/11/30			98	80 - 120	<2.0	uS/cm	1.8 (1)	10
A100673	Dissolved Mercury (Hg)	2020/12/01	89	80 - 120	85	80 - 120	<0.0019	ug/L	NC (1)	20
A102059	Total Ammonia (N)	2020/12/02	84	80 - 120	98	80 - 120	<0.015	mg/L	11 (1)	20
A102060	Total Ammonia (N)	2020/12/02	99	80 - 120	101	80 - 120	<0.015	mg/L	4.7 (1)	20
A102280	Total Dissolved Solids	2020/12/03	101	80 - 120	97	80 - 120	<10	mg/L	4.2 (1)	20
A105265	Total Sulphide	2020/12/05	97 (2)	80 - 120	106	80 - 120	<0.0018	mg/L	NC (3)	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 [YY2174-06]

(3) Duplicate Parent ID [YY2173-06]

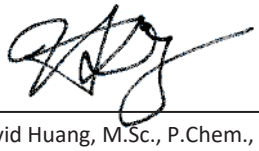
Bureau Veritas Laboratories Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

BV Labs Job #: C087842
Report Date: 2020/12/07

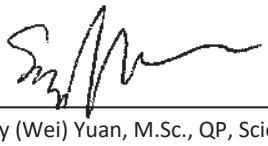
GHD Limited
Client Project #: 088877-07-02
Site Location: UPLAND
Your P.O. #: 73506780-08
Sampler Initials: RP

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).



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



Sandy (Wei) Yuan, M.Sc., QP, Scientific Specialist

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

08488005

Burnaby: 4606 Canada Way, Burnaby, BC V5G 1K5 Toll Free (800) 665 8566
Victoria: 460 Tennyson Place, Unit 1, Victoria, BC V8Z 6S8 Toll Free (866) 385-6113
bvlabs.com

CHAIN OF CUSTODY RECORD

Page 1 of 1

Invoice Information		Report Information (if differs from invoice)		Project Information		Turnaround Time (TAT) Required
Company:	#163 GHD Limited	Company:	#28639 GHD Limited	Quotation		☑ 5 - 7 Days Regular (Most analyses)
Contact Name:	Airesse MacPhee	Contact Name:	Airesse MacPhee	P.O. #/AFE#:	7350678[illegible] -- 8	PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS
Address:	455 Pillip Street	Address:	10271 Shellbridge Way		(Groundwater)	Rush TAT (Surcharges will be applied)
	Waterloo, ON PC: N2L 3X2		Richmond, BC PC: V6X 2W8	Project #:	088877-07-02	☐ Same Day ☐ 2 Days
Phone/Fax:	(519) 884-0510	Phone/Fax:	(604) 248-3661	Site Location:	Upland	☐ 1 Day ☐ 3-4 Days
Email:	airesse.macphee@ghd.com	Email:	airesse.macphee@ghd.com	Site #:		Date Required:
Copies:	Reference PO	Copies:	Reference PO	Sampled By:	R.Plaha	Rush Confirmation #:

Laboratory Use Only

	YES	NO	Cooler ID	Temp
Seal Present		X	1	8 7 7
Seal Intact	—			
Cooling Media	X			
	YES	NO	Cooler ID	Temp
Seal Present		X	2	10 8 9
Seal Intact	—			
Cooling Media	X			
	YES	NO	Cooler ID	Temp
Seal Present				
Seal Intact				
Cooling Media				

Depot Reception

Analysis Requested

	Sample Identification	Date Sampled (yyyy/mm/dd)	Time Sampled (hh:mm)	Matrix	# of Containers	Speciated Alkalinity, Ec, TDS	Cl, SO4 (dissolved), NO2, NO3, N+N	Orthophosphate	NH3	Sulphide (as S), Low Level Sulphide (as H2S)	Dissolved CSR Metals (+Hg)	Dissolved Hardness	HOLD - DO NOT ANALYZE
1	WG-088877-26120-RP-01	2020/11/26	13:15	GW	6	X	X	X	X	X	X	X	
2	WG-088877-26120-RP-02		15:00			X	X	X	X	X	X	X	
3	-03		15:45			X	X	X	X	X	X	X	
4	-04		16:45			X	X	X	X	X	X	X	
5	WG-088877-27120-RP-05	2020/11/27	12:30			X	X	X	X	X	X	X	
6													
7													
8													
9													
10													

Regulatory Criteria

☐ BC CSR
☐ YK CSR
☐ CCME
☐ Drinking Water
☐ BC Water Quality
☐ Other

Special Instructions

Short holding times!
All bottles were field filtered and preserved as required.

Relinquished by: (Signature/ Print)	Date (yyyy/mm/dd):	Time (hh:mm):	Received by: (Signature/ Print)	Date (yyyy/mm/dd):	Time (hh:mm):
RPlaha / Rumi Plaha	2020/11/27	23:15	MPEDRO TACK	2020/11/28	09:00

C087842_COC

BV Labs Job Number: C087842
Report Date: 2020/12/07

GHD Limited
Client Project #: 088877-07-02
Site Location: UPLAND
Your P.O. #: 73506780-08
Sampler Initials: RP

RESULTS OF CHEMICAL ANALYSES OF WATER

BV Labs ID		YY2173	YY2173	YY2174	YY2175	YY2176		YY2177			
Sampling Date		2020/11/26 13:15	2020/11/26 13:15	2020/11/26 15:00	2020/11/26 15:45	2020/11/26 16:45		2020/11/27 12:30			
COC Number		08488005	08488005	08488005	08488005	08488005		08488005			
	UNITS	**WG-088877-261120-RP-01**	**WG-088877-261120-RP-01 Lab-Dup**	**WG-088877-261120-RP-02**	**WG-088877-261120-RP-03**	**WG-088877-261120-RP-04**	**QC Batch**	**WG-088877-271120-RP-05**	**RDL**	**MDL**	**QC Batch**
ANIONS											
Nitrite (N)	mg/L	<0.10	N/A	<0.10	<0.10	<0.10	A098776	<0.10	0.10	0.10	A098776
Calculated Parameters											
Filter and HNO3 Preservation	N/A	FIELD	N/A	FIELD	FIELD	FIELD	ONSITE	FIELD	N/A	N/A	ONSITE
Nitrate (N)	mg/L	0.37	N/A	0.52	<0.10	0.24	A098725	0.34	0.10	N/A	A098725
Sulphide (as H2S)	mg/L	<0.0020	N/A	<0.0020	<0.0020	<0.0020	A098721	<0.0020	0.0020	N/A	A098721
Misc. Inorganics											
Conductivity	uS/cm	250	N/A	83	85	130	A100073	170	2.0	N/A	A100073
Total Dissolved Solids	mg/L	140	N/A	50	42	60	A102280	94	10	N/A	A102280
Anions											
Alkalinity (Total as CaCO3)	mg/L	120	N/A	27	39	54	A100070	68	1.0	N/A	A100070
Total Sulphide	mg/L	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	A105265	<0.0018	0.0018	N/A	A105265
Dissolved Chloride (Cl)	mg/L	5.7	N/A	3.5	<1.0	2.3	A099884	6.5	1.0	N/A	A099884
Dissolved Sulphate (SO4)	mg/L	6.6	N/A	6.2	3.1	5.4	A099884	7.5	1.0	N/A	A099884
Nutrients											
Total Ammonia (N)	mg/L	<0.015	N/A	0.016	<0.015	0.017	A102060	0.019	0.015	0.0040	A102059
Orthophosphate (P)	mg/L	0.011	N/A	0.0050	0.023	0.0077	A098783	0.012	0.0030	0.0030	A098783
Nitrate plus Nitrite (N)	mg/L	0.37	N/A	0.52	<0.10	0.24	A098773	0.34	0.10	0.10	A098773

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

Results relate only to the items tested.

BV Labs Job Number: C087842
Report Date: 2020/12/07

GHD Limited
Client Project #: 088877-07-02
Site Location: UPLAND
Your P.O. #: 73506780-08
Sampler Initials: RP

CSR/CCME DISS. METALS IN WATER W/ CV HG (WATER)

BV Labs ID		YY2173	YY2174	YY2175	YY2176	YY2177			
Sampling Date		2020/11/26 13:15	2020/11/26 15:00	2020/11/26 15:45	2020/11/26 16:45	2020/11/27 12:30			
COC Number		08488005	08488005	08488005	08488005	08488005			
	UNITS	**WG-088877-261120-RP-01**	**WG-088877-261120-RP-02**	**WG-088877-261120-RP-03**	**WG-088877-261120-RP-04**	**WG-088877-271120-RP-05**	**RDL**	**MDL**	**QC Batch**
Calculated Parameters									
Dissolved Hardness (CaCO3)	mg/L	110	26.8	38.9	52.7	69.4	0.50	0.50	A098641
Elements									
Dissolved Mercury (Hg)	ug/L	<0.0019	0.0022	<0.0019	<0.0019	0.0032	0.0019	0.0019	A100673
Dissolved Metals by ICPMS									
Dissolved Aluminum (Al)	ug/L	134	<3.0	5.6	<3.0	3.6	3.0	0.030	A099845
Dissolved Antimony (Sb)	ug/L	<0.50	<0.50	<0.50	<0.50	<0.50	0.50	0.0020	A099845
Dissolved Arsenic (As)	ug/L	0.25	<0.10	0.81	0.12	0.39	0.10	0.010	A099845
Dissolved Barium (Ba)	ug/L	8.2	<1.0	2.8	1.4	3.6	1.0	0.0020	A099845
Dissolved Beryllium (Be)	ug/L	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	0.0030	A099845
Dissolved Bismuth (Bi)	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	1.0	0.0010	A099845
Dissolved Boron (B)	ug/L	<50	<50	<50	<50	<50	50	50	A099845
Dissolved Cadmium (Cd)	ug/L	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	0.0020	A099845
Dissolved Chromium (Cr)	ug/L	1.3	<1.0	<1.0	<1.0	<1.0	1.0	0.020	A099845
Dissolved Cobalt (Co)	ug/L	<0.20	<0.20	<0.20	<0.20	<0.20	0.20	0.20	A099845
Dissolved Copper (Cu)	ug/L	1.54	1.18	0.59	1.08	0.76	0.20	0.010	A099845
Dissolved Iron (Fe)	ug/L	104	<5.0	<5.0	<5.0	<5.0	5.0	0.040	A099845
Dissolved Lead (Pb)	ug/L	<0.20	<0.20	<0.20	<0.20	<0.20	0.20	0.0010	A099845
Dissolved Lithium (Li)	ug/L	<2.0	<2.0	<2.0	<2.0	<2.0	2.0	2.0	A099845
Dissolved Manganese (Mn)	ug/L	1.9	<1.0	<1.0	<1.0	<1.0	1.0	0.030	A099845
Dissolved Molybdenum (Mo)	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	1.0	0.0020	A099845
Dissolved Nickel (Ni)	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	1.0	0.010	A099845
Dissolved Selenium (Se)	ug/L	0.20	0.22	<0.10	0.10	0.15	0.10	0.0060	A099845
Dissolved Silicon (Si)	ug/L	8800	3340	3930	6020	5880	100	0.30	A099845
Dissolved Silver (Ag)	ug/L	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	0.0020	A099845
Dissolved Strontium (Sr)	ug/L	56.9	14.7	16.4	26.4	31.5	1.0	0.0020	A099845
Dissolved Thallium (Tl)	ug/L	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	0.010	A099845
Dissolved Tin (Sn)	ug/L	<5.0	<5.0	<5.0	<5.0	<5.0	5.0	0.0050	A099845
Dissolved Titanium (Ti)	ug/L	<5.0	<5.0	<5.0	<5.0	<5.0	5.0	0.30	A099845
Dissolved Uranium (U)	ug/L	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	0.0010	A099845
Dissolved Vanadium (V)	ug/L	5.1	<5.0	6.7	<5.0	<5.0	5.0	0.020	A099845
Dissolved Zinc (Zn)	ug/L	<5.0	<5.0	<5.0	<5.0	<5.0	5.0	0.050	A099845
Dissolved Zirconium (Zr)	ug/L	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	0.0080	A099845
Dissolved Calcium (Ca)	mg/L	35.0	7.78	12.5	16.4	22.1	0.050	0.0010	A098642
Dissolved Magnesium (Mg)	mg/L	5.61	1.79	1.83	2.84	3.42	0.050	0.00050	A098642
Dissolved Potassium (K)	mg/L	0.486	0.159	0.197	0.226	0.375	0.050	0.0020	A098642
Dissolved Sodium (Na)	mg/L	7.73	5.17	1.13	3.92	6.54	0.050	0.0010	A098642
Dissolved Sulphur (S)	mg/L	<3.0	<3.0	<3.0	<3.0	<3.0	3.0	1.0	A098642

RDL = Reportable Detection Limit
N/A = Not Applicable

Results relate only to the items tested.

GENERAL COMMENTS

Sample YY2173 [WG-088877-261120-RP-01] : Sample was analyzed past method specified hold time for Total Sulphide. Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised.

Sample YY2174 [WG-088877-261120-RP-02] : Sample was analyzed past method specified hold time for Total Sulphide. Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised.

Sample YY2175 [WG-088877-261120-RP-03] : Sample was analyzed past method specified hold time for Total Sulphide. Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised.

Sample YY2176 [WG-088877-261120-RP-04] : Sample was analyzed past method specified hold time for Total Sulphide. Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised.

Sample YY2177 [WG-088877-271120-RP-05] : Sample was analyzed past method specified hold time for Total Sulphide. Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised.

Results relate only to the items tested.

Report Date: 2020/12/07

GHD Limited
Attention: 088877 Distribution
Client Project #: 088877-07-02
Your P.O. #:73506780-08
Site Location: UPLAND

Quality Assurance Report
BV Labs Job Number: C087842

QA/QC Bat	Init	QC Type	Parameter	Date Analy	Value	Recovery	UNITS	QC Limits
A098773	MO5	Spiked Blank	Nitrate plus Nitrite (N)	11/28/2020		105	%	80 - 120
A098773	MO5	Method Blank	Nitrate plus Nitrite (N)	11/28/2020	<0.10		mg/L	
A098776	MO5	Spiked Blank	Nitrite (N)	11/28/2020		100	%	80 - 120
A098776	MO5	Method Blank	Nitrite (N)	11/28/2020	<0.10		mg/L	
A098783	MO5	Spiked Blank	Orthophosphate (P)	11/28/2020		98	%	80 - 120
A098783	MO5	Method Blank	Orthophosphate (P)	11/28/2020	<0.0030		mg/L	
A099845	AA1	Matrix Spike	Dissolved Aluminum (Al)	12/1/2020		105	%	80 - 120
			Dissolved Antimony (Sb)	12/1/2020		103	%	80 - 120
			Dissolved Arsenic (As)	12/1/2020		101	%	80 - 120
			Dissolved Barium (Ba)	12/1/2020		NC	%	80 - 120
			Dissolved Beryllium (Be)	12/1/2020		102	%	80 - 120
			Dissolved Bismuth (Bi)	12/1/2020		97	%	80 - 120
			Dissolved Boron (B)	12/1/2020		103	%	80 - 120
			Dissolved Cadmium (Cd)	12/1/2020		103	%	80 - 120
			Dissolved Chromium (Cr)	12/1/2020		101	%	80 - 120
			Dissolved Cobalt (Co)	12/1/2020		97	%	80 - 120
			Dissolved Copper (Cu)	12/1/2020		97	%	80 - 120
			Dissolved Iron (Fe)	12/1/2020		113	%	80 - 120
			Dissolved Lead (Pb)	12/1/2020		101	%	80 - 120
			Dissolved Lithium (Li)	12/1/2020		99	%	80 - 120
			Dissolved Manganese (Mn)	12/1/2020		101	%	80 - 120
			Dissolved Molybdenum (Mo)	12/1/2020		105	%	80 - 120
			Dissolved Nickel (Ni)	12/1/2020		98	%	80 - 120
			Dissolved Selenium (Se)	12/1/2020		104	%	80 - 120
			Dissolved Silicon (Si)	12/1/2020		102	%	80 - 120
			Dissolved Silver (Ag)	12/1/2020		102	%	80 - 120
			Dissolved Strontium (Sr)	12/1/2020		NC	%	80 - 120
			Dissolved Thallium (Tl)	12/1/2020		102	%	80 - 120
			Dissolved Tin (Sn)	12/1/2020		103	%	80 - 120
			Dissolved Titanium (Ti)	12/1/2020		104	%	80 - 120
			Dissolved Uranium (U)	12/1/2020		104	%	80 - 120
			Dissolved Vanadium (V)	12/1/2020		103	%	80 - 120
			Dissolved Zinc (Zn)	12/1/2020		104	%	80 - 120
			Dissolved Zirconium (Zr)	12/1/2020		107	%	80 - 120
A099845	AA1	Spiked Blank	Dissolved Aluminum (Al)	12/1/2020		101	%	80 - 120
			Dissolved Antimony (Sb)	12/1/2020		100	%	80 - 120
			Dissolved Arsenic (As)	12/1/2020		99	%	80 - 120
			Dissolved Barium (Ba)	12/1/2020		100	%	80 - 120
			Dissolved Beryllium (Be)	12/1/2020		104	%	80 - 120
			Dissolved Bismuth (Bi)	12/1/2020		100	%	80 - 120
			Dissolved Boron (B)	12/1/2020		107	%	80 - 120
			Dissolved Cadmium (Cd)	12/1/2020		101	%	80 - 120
			Dissolved Chromium (Cr)	12/1/2020		101	%	80 - 120
			Dissolved Cobalt (Co)	12/1/2020		98	%	80 - 120
			Dissolved Copper (Cu)	12/1/2020		99	%	80 - 120
			Dissolved Iron (Fe)	12/1/2020		103	%	80 - 120
			Dissolved Lead (Pb)	12/1/2020		101	%	80 - 120
			Dissolved Lithium (Li)	12/1/2020		97	%	80 - 120
			Dissolved Manganese (Mn)	12/1/2020		100	%	80 - 120
			Dissolved Molybdenum (Mo)	12/1/2020		104	%	80 - 120
			Dissolved Nickel (Ni)	12/1/2020		101	%	80 - 120
			Dissolved Selenium (Se)	12/1/2020		101	%	80 - 120
			Dissolved Silicon (Si)	12/1/2020		99	%	80 - 120
			Dissolved Silver (Ag)	12/1/2020		100	%	80 - 120
			Dissolved Strontium (Sr)	12/1/2020		100	%	80 - 120
			Dissolved Thallium (Tl)	12/1/2020		101	%	80 - 120
			Dissolved Tin (Sn)	12/1/2020		101	%	80 - 120
			Dissolved Titanium (Ti)	12/1/2020		102	%	80 - 120
			Dissolved Uranium (U)	12/1/2020		101	%	80 - 120
			Dissolved Vanadium (V)	12/1/2020		101	%	80 - 120
			Dissolved Zinc (Zn)	12/1/2020		105	%	80 - 120
			Dissolved Zirconium (Zr)	12/1/2020		101	%	80 - 120
A099845	AA1	Method Blank	Dissolved Aluminum (Al)	12/1/2020	<3.0		ug/L	
			Dissolved Antimony (Sb)	12/1/2020	<0.50		ug/L	
			Dissolved Arsenic (As)	12/1/2020	<0.10		ug/L	
			Dissolved Barium (Ba)	12/1/2020	<1.0		ug/L	
			Dissolved Beryllium (Be)	12/1/2020	<0.10		ug/L	
			Dissolved Bismuth (Bi)	12/1/2020	<1.0		ug/L	
			Dissolved Boron (B)	12/1/2020	<50		ug/L	
			Dissolved Cadmium (Cd)	12/1/2020	<0.010		ug/L	
			Dissolved Chromium (Cr)	12/1/2020	<1.0		ug/L	
			Dissolved Cobalt (Co)	12/1/2020	<0.20		ug/L	
			Dissolved Copper (Cu)	12/1/2020	<0.20		ug/L	
			Dissolved Iron (Fe)	12/1/2020	<5.0		ug/L	
			Dissolved Lead (Pb)	12/1/2020	<0.20		ug/L	
			Dissolved Lithium (Li)	12/1/2020	<2.0		ug/L	
			Dissolved Manganese (Mn)	12/1/2020	<1.0		ug/L	
			Dissolved Molybdenum (Mo)	12/1/2020	<1.0		ug/L	
			Dissolved Nickel (Ni)	12/1/2020	<1.0		ug/L	
			Dissolved Selenium (Se)	12/1/2020	<0.10		ug/L	
			Dissolved Silicon (Si)	12/1/2020	<100		ug/L	
			Dissolved Silver (Ag)	12/1/2020	<0.020		ug/L	
			Dissolved Strontium (Sr)	12/1/2020	<1.0		ug/L	
			Dissolved Thallium (Tl)	12/1/2020	<0.010		ug/L	
			Dissolved Tin (Sn)	12/1/2020	<5.0		ug/L	
			Dissolved Titanium (Ti)	12/1/2020	<5.0		ug/L	
			Dissolved Uranium (U)	12/1/2020	<0.10		ug/L	
			Dissolved Vanadium (V)	12/1/2020	<5.0		ug/L	
			Dissolved Zinc (Zn)	12/1/2020	<5.0		ug/L	
			Dissolved Zirconium (Zr)	12/1/2020	<0.10		ug/L	
A099845	AA1	RPD	Dissolved Aluminum (Al)	12/1/2020	0.87 (1)		%	20
			Dissolved Antimony (Sb)	12/1/2020	NC (1)		%	20
			Dissolved Arsenic (As)	12/1/2020	0.35 (1)		%	20
			Dissolved Barium (Ba)	12/1/2020	0.98 (1)		%	20
			Dissolved Beryllium (Be)	12/1/2020	NC (1)		%	20
			Dissolved Bismuth (Bi)	12/1/2020	NC (1)		%	20
			Dissolved Boron (B)	12/1/2020	NC (1)		%	20
			Dissolved Cadmium (Cd)	12/1/2020	6.6 (1)		%	20
			Dissolved Chromium (Cr)	12/1/2020	NC (1)		%	20
			Dissolved Cobalt (Co)	12/1/2020	NC (1)		%	20
			Dissolved Copper (Cu)	12/1/2020	1.3 (1)		%	20
			Dissolved Iron (Fe)	12/1/2020	12 (1)		%	20
			Dissolved Lead (Pb)	12/1/2020	NC (1)		%	20
			Dissolved Lithium (Li)	12/1/2020	NC (1)		%	20
			Dissolved Manganese (Mn)	12/1/2020	2.1 (1)		%	20
			Dissolved Molybdenum (Mo)	12/1/2020	2.7 (1)		%	20
			Dissolved Nickel (Ni)	12/1/2020	1.2 (1)		%	20

Report Date: 2020/12/07

GHD Limited
Attention: 088877 Distribution
Client Project #: 088877-07-02
Your P.O. #:73506780-08
Site Location: UPLAND

Quality Assurance Report
BV Labs Job Number: C087842

QA/QC Bat	Init	QC Type	Parameter	Date Analy	Value	Recovery	UNITS	QC Limits
			Dissolved Selenium (Se)	12/1/2020	5.2 (1)		%	20
			Dissolved Silicon (Si)	12/1/2020	1.4 (1)		%	20
			Dissolved Silver (Ag)	12/1/2020	NC (1)		%	20
			Dissolved Strontium (Sr)	12/1/2020	1.4 (1)		%	20
			Dissolved Thallium (Tl)	12/1/2020	NC (1)		%	20
			Dissolved Tin (Sn)	12/1/2020	NC (1)		%	20
			Dissolved Titanium (Ti)	12/1/2020	NC (1)		%	20
			Dissolved Uranium (U)	12/1/2020	NC (1)		%	20
			Dissolved Vanadium (V)	12/1/2020	NC (1)		%	20
			Dissolved Zinc (Zn)	12/1/2020	0.14 (1)		%	20
			Dissolved Zirconium (Zr)	12/1/2020	NC (1)		%	20
A099884	BB3	Matrix Spike	Dissolved Chloride (Cl)	11/30/2020		102	%	80 - 120
			Dissolved Sulphate (SO4)	11/30/2020		100	%	80 - 120
A099884	BB3	Spiked Blank	Dissolved Chloride (Cl)	11/30/2020		104	%	80 - 120
			Dissolved Sulphate (SO4)	11/30/2020		99	%	80 - 120
A099884	BB3	Method Blank	Dissolved Chloride (Cl)	11/30/2020	<1.0		mg/L	
			Dissolved Sulphate (SO4)	11/30/2020	<1.0		mg/L	
A099884	BB3	RPD	Dissolved Chloride (Cl)	11/30/2020	NC (1)		%	20
			Dissolved Sulphate (SO4)	11/30/2020	NC (1)		%	20
			Dissolved Chloride (Cl)	11/30/2020	4.4 (1)		%	20
			Dissolved Sulphate (SO4)	11/30/2020	0.34 (1)		%	20
A100070	WAY	Matrix Spike	Alkalinity (Total as CaCO3)	11/30/2020		NC	%	80 - 120
A100070	WAY	Spiked Blank	Alkalinity (Total as CaCO3)	11/30/2020		93	%	80 - 120
A100070	WAY	Method Blank	Alkalinity (Total as CaCO3)	11/30/2020	<1.0		mg/L	
A100070	WAY	RPD	Alkalinity (Total as CaCO3)	11/30/2020	2.7 (1)		%	20
A100073	WAY	Spiked Blank	Conductivity	11/30/2020		98	%	80 - 120
A100073	WAY	Method Blank	Conductivity	11/30/2020	<2.0		uS/cm	
A100073	WAY	RPD	Conductivity	11/30/2020	1.8 (1)		%	10
A100673	JC8	Matrix Spike	Dissolved Mercury (Hg)	12/1/2020		89	%	80 - 120
A100673	JC8	Spiked Blank	Dissolved Mercury (Hg)	12/1/2020		85	%	80 - 120
A100673	JC8	Method Blank	Dissolved Mercury (Hg)	12/1/2020	<0.0019		ug/L	
A100673	JC8	RPD	Dissolved Mercury (Hg)	12/1/2020	NC (1)		%	20
A102059	MO5	Matrix Spike	Total Ammonia (N)	12/2/2020		84	%	80 - 120
A102059	MO5	Spiked Blank	Total Ammonia (N)	12/2/2020		98	%	80 - 120
A102059	MO5	Method Blank	Total Ammonia (N)	12/2/2020	<0.015		mg/L	
A102059	MO5	RPD	Total Ammonia (N)	12/2/2020	11 (1)		%	20
A102060	MO5	Matrix Spike	Total Ammonia (N)	12/2/2020		99	%	80 - 120
A102060	MO5	Spiked Blank	Total Ammonia (N)	12/2/2020		101	%	80 - 120
A102060	MO5	Method Blank	Total Ammonia (N)	12/2/2020	<0.015		mg/L	
A102060	MO5	RPD	Total Ammonia (N)	12/2/2020	4.7 (1)		%	20
A102280	WZ1	Matrix Spike	Total Dissolved Solids	12/3/2020		101	%	80 - 120
A102280	WZ1	Spiked Blank	Total Dissolved Solids	12/3/2020		97	%	80 - 120
A102280	WZ1	Method Blank	Total Dissolved Solids	12/3/2020	<10		mg/L	
A102280	WZ1	RPD	Total Dissolved Solids	12/3/2020	4.2 (1)		%	20
A105265	PK8	Matrix Spike [YY2174-06]	Total Sulphide	12/5/2020		97 (2)	%	80 - 120
A105265	PK8	Spiked Blank	Total Sulphide	12/5/2020		106	%	80 - 120
A105265	PK8	Method Blank	Total Sulphide	12/5/2020	<0.0018		mg/L	
A105265	PK8	RPD [YY2173-06]	Total Sulphide	12/5/2020	NC (3)		%	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 [YY2174-06]
(3) Duplicate Parent ID [YY2173-06]

Your P.O. #: 73506780-08
Your Project #: 088877-07-02
Site#: 088877-07-02
Site Location: UPLAND
Your C.O.C. #: 08488005

Attention: 088877 Distribution

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

Report Date: 2020/12/07
Report #: R2964173
Version: 2 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

BV LABS JOB #: C087842
Received: 2020/11/28, 09:00

Sample Matrix: Water
Samples Received: 5

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity @25C (pp, total), CO3,HCO3,OH	5	N/A	2020/11/30	BBY6SOP-00026	SM 23 2320 B m
Chloride/Sulphate by Auto Colourimetry	5	N/A	2020/11/30	BBY6SOP-00011 / BBY6SOP-00017	SM23-4500-Cl/SO4-E m
Conductivity @25C	5	N/A	2020/11/30	BBY6SOP-00026	SM 23 2510 B m
Sulphide (as H2S) (1)	5	N/A	2020/12/05		Auto Calc
Hardness (calculated as CaCO3)	5	N/A	2020/12/02	BBY WI-00033	Auto Calc
Mercury (Dissolved) by CV	5	2020/12/01	2020/12/01	AB SOP-00084	BCMOE BCLM Oct2013 m
Na, K, Ca, Mg, S by CRC ICPMS (diss.)	5	N/A	2020/12/02	BBY WI-00033	Auto Calc
Elements by CRC ICPMS (dissolved)	5	N/A	2020/12/01	BBY7SOP-00002	EPA 6020b R2 m
Ammonia-N (Total)	5	N/A	2020/12/02	AB SOP-00007	SM 23 4500 NH3 A G m
Nitrate + Nitrite (N) (highlevel)	5	N/A	2020/11/28	BBY6SOP-00010	SM 23 4500-NO3- I m
Nitrite (N) by CFA (highlevel)	5	N/A	2020/11/28	BBY6SOP-00010	SM 23 4500-NO3- I m
Nitrogen - Nitrate (as N)	5	N/A	2020/11/28	BBY WI-00033	Auto Calc
Filter and HNO3 Preserve for Metals	5	N/A	2020/11/28	BBY7 WI-00004	SM 23 3030B m
Orthophosphate by Konelab (2)	5	N/A	2020/11/28	BBY6SOP-00013	SM 23 4500-P E m
Total Sulphide (1)	5	N/A	2020/12/05	AB SOP-00080	SM 23 4500 S2-A D Fm
Total Dissolved Solids (Filt. Residue)	5	2020/12/02	2020/12/03	BBY6SOP-00033	SM 23 2540 C m

Remarks:

Bureau Veritas Laboratories are accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by BV Labs 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 BV Labs profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and BV Labs 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.

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

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

Your P.O. #: 73506780-08
Your Project #: 088877-07-02
Site#: 088877-07-02
Site Location: UPLAND
Your C.O.C. #: 08488005

Attention: 088877 Distribution

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

Report Date: 2020/12/07
Report #: R2964173
Version: 2 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

BV LABS JOB #: C087842
Received: 2020/11/28, 09:00

dilution methods.
Results relate to samples tested. When sampling is not conducted by BV Labs, results relate to the supplied samples tested.

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 BV Labs Calgary Environmental
(2) 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

Nahed Amer
Customer Solutions Representative
07 Dec 2020 15:41:41

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Nahed Amer, Customer Solutions Representative
Email: Nahed.AMER@bvlabs.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.

BV Labs Job #: C087842
Report Date: 2020/12/07

GHD Limited
Client Project #: 088877-07-02
Site Location: UPLAND
Your P.O. #: 73506780-08
Sampler Initials: RP

RESULTS OF CHEMICAL ANALYSES OF WATER

BV Labs ID		YY2173	YY2173	YY2174			
Sampling Date		2020/11/26 13:15	2020/11/26 13:15	2020/11/26 15:00			
COC Number		08488005	08488005	08488005			
	UNITS	WG-088877-261120-RP-01	WG-088877-261120-RP-01 Lab-Dup	WG-088877-261120-RP-02	RDL	MDL	QC Batch
ANIONS							
Nitrite (N)	mg/L	<0.10	N/A	<0.10	0.10	0.10	A098776
Calculated Parameters							
Filter and HNO3 Preservation	N/A	FIELD	N/A	FIELD	N/A	N/A	ONSITE
Nitrate (N)	mg/L	0.37	N/A	0.52	0.10	N/A	A098725
Sulphide (as H2S)	mg/L	<0.0020	N/A	<0.0020	0.0020	N/A	A098721
Misc. Inorganics							
Conductivity	uS/cm	250	N/A	83	2.0	N/A	A100073
Total Dissolved Solids	mg/L	140	N/A	50	10	N/A	A102280
Anions							
Alkalinity (PP as CaCO3)	mg/L	<1.0	N/A	<1.0	1.0	N/A	A100070
Alkalinity (Total as CaCO3)	mg/L	120	N/A	27	1.0	N/A	A100070
Bicarbonate (HCO3)	mg/L	140	N/A	33	1.0	N/A	A100070
Carbonate (CO3)	mg/L	<1.0	N/A	<1.0	1.0	N/A	A100070
Hydroxide (OH)	mg/L	<1.0	N/A	<1.0	1.0	N/A	A100070
Total Sulphide	mg/L	<0.0018	<0.0018	<0.0018	0.0018	N/A	A105265
Dissolved Chloride (Cl)	mg/L	5.7	N/A	3.5	1.0	N/A	A099884
Dissolved Sulphate (SO4)	mg/L	6.6	N/A	6.2	1.0	N/A	A099884
Nutrients							
Total Ammonia (N)	mg/L	<0.015	N/A	0.016	0.015	0.0040	A102060
Orthophosphate (P)	mg/L	0.011	N/A	0.0050	0.0030	0.0030	A098783
Nitrate plus Nitrite (N)	mg/L	0.37	N/A	0.52	0.10	0.10	A098773

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

BV Labs Job #: C087842
Report Date: 2020/12/07

GHD Limited
Client Project #: 088877-07-02
Site Location: UPLAND
Your P.O. #: 73506780-08
Sampler Initials: RP

RESULTS OF CHEMICAL ANALYSES OF WATER

BV Labs ID		YY2175	YY2176			
Sampling Date		2020/11/26 15:45	2020/11/26 16:45			
COC Number		08488005	08488005			
	UNITS	WG-088877-261120-RP-03	WG-088877-261120-RP-04	RDL	MDL	QC Batch
ANIONS						
Nitrite (N)	mg/L	<0.10	<0.10	0.10	0.10	A098776
Calculated Parameters						
Filter and HNO3 Preservation	N/A	FIELD	FIELD	N/A	N/A	ONSITE
Nitrate (N)	mg/L	<0.10	0.24	0.10	N/A	A098725
Sulphide (as H2S)	mg/L	<0.0020	<0.0020	0.0020	N/A	A098721
Misc. Inorganics						
Conductivity	uS/cm	85	130	2.0	N/A	A100073
Total Dissolved Solids	mg/L	42	60	10	N/A	A102280
Anions						
Alkalinity (PP as CaCO3)	mg/L	<1.0	<1.0	1.0	N/A	A100070
Alkalinity (Total as CaCO3)	mg/L	39	54	1.0	N/A	A100070
Bicarbonate (HCO3)	mg/L	47	66	1.0	N/A	A100070
Carbonate (CO3)	mg/L	<1.0	<1.0	1.0	N/A	A100070
Hydroxide (OH)	mg/L	<1.0	<1.0	1.0	N/A	A100070
Total Sulphide	mg/L	<0.0018	<0.0018	0.0018	N/A	A105265
Dissolved Chloride (Cl)	mg/L	<1.0	2.3	1.0	N/A	A099884
Dissolved Sulphate (SO4)	mg/L	3.1	5.4	1.0	N/A	A099884
Nutrients						
Total Ammonia (N)	mg/L	<0.015	0.017	0.015	0.0040	A102060
Orthophosphate (P)	mg/L	0.023	0.0077	0.0030	0.0030	A098783
Nitrate plus Nitrite (N)	mg/L	<0.10	0.24	0.10	0.10	A098773

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 #: C087842
Report Date: 2020/12/07

GHD Limited
Client Project #: 088877-07-02
Site Location: UPLAND
Your P.O. #: 73506780-08
Sampler Initials: RP

RESULTS OF CHEMICAL ANALYSES OF WATER

BV Labs ID		YY2177			
Sampling Date		2020/11/27 12:30			
COC Number		08488005			
	UNITS	WG-088877-271120-RP-05	RDL	MDL	QC Batch
ANIONS					
Nitrite (N)	mg/L	<0.10	0.10	0.10	A098776
Calculated Parameters					
Filter and HNO3 Preservation	N/A	FIELD	N/A	N/A	ONSITE
Nitrate (N)	mg/L	0.34	0.10	N/A	A098725
Sulphide (as H2S)	mg/L	<0.0020	0.0020	N/A	A098721
Misc. Inorganics					
Conductivity	uS/cm	170	2.0	N/A	A100073
Total Dissolved Solids	mg/L	94	10	N/A	A102280
Anions					
Alkalinity (PP as CaCO3)	mg/L	<1.0	1.0	N/A	A100070
Alkalinity (Total as CaCO3)	mg/L	68	1.0	N/A	A100070
Bicarbonate (HCO3)	mg/L	83	1.0	N/A	A100070
Carbonate (CO3)	mg/L	<1.0	1.0	N/A	A100070
Hydroxide (OH)	mg/L	<1.0	1.0	N/A	A100070
Total Sulphide	mg/L	<0.0018	0.0018	N/A	A105265
Dissolved Chloride (Cl)	mg/L	6.5	1.0	N/A	A099884
Dissolved Sulphate (SO4)	mg/L	7.5	1.0	N/A	A099884
Nutrients					
Total Ammonia (N)	mg/L	0.019	0.015	0.0040	A102059
Orthophosphate (P)	mg/L	0.012	0.0030	0.0030	A098783
Nitrate plus Nitrite (N)	mg/L	0.34	0.10	0.10	A098773

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 #: C087842
Report Date: 2020/12/07

GHD Limited
Client Project #: 088877-07-02
Site Location: UPLAND
Your P.O. #: 73506780-08
Sampler Initials: RP

CSR/CCME DISS. METALS IN WATER W/ CV HG (WATER)

BV Labs ID		YY2173	YY2174	YY2175			
Sampling Date		2020/11/26 13:15	2020/11/26 15:00	2020/11/26 15:45			
COC Number		08488005	08488005	08488005			
	UNITS	WG-088877-261120-RP-01	WG-088877-261120-RP-02	WG-088877-261120-RP-03	RDL	MDL	QC Batch
Calculated Parameters							
Dissolved Hardness (CaCO3)	mg/L	110	26.8	38.9	0.50	0.50	A098641
Elements							
Dissolved Mercury (Hg)	ug/L	<0.0019	0.0022	<0.0019	0.0019	0.0019	A100673
Dissolved Metals by ICPMS							
Dissolved Aluminum (Al)	ug/L	134	<3.0	5.6	3.0	0.030	A099845
Dissolved Antimony (Sb)	ug/L	<0.50	<0.50	<0.50	0.50	0.0020	A099845
Dissolved Arsenic (As)	ug/L	0.25	<0.10	0.81	0.10	0.010	A099845
Dissolved Barium (Ba)	ug/L	8.2	<1.0	2.8	1.0	0.0020	A099845
Dissolved Beryllium (Be)	ug/L	<0.10	<0.10	<0.10	0.10	0.0030	A099845
Dissolved Bismuth (Bi)	ug/L	<1.0	<1.0	<1.0	1.0	0.0010	A099845
Dissolved Boron (B)	ug/L	<50	<50	<50	50	50	A099845
Dissolved Cadmium (Cd)	ug/L	<0.010	<0.010	<0.010	0.010	0.0020	A099845
Dissolved Chromium (Cr)	ug/L	1.3	<1.0	<1.0	1.0	0.020	A099845
Dissolved Cobalt (Co)	ug/L	<0.20	<0.20	<0.20	0.20	0.20	A099845
Dissolved Copper (Cu)	ug/L	1.54	1.18	0.59	0.20	0.010	A099845
Dissolved Iron (Fe)	ug/L	104	<5.0	<5.0	5.0	0.040	A099845
Dissolved Lead (Pb)	ug/L	<0.20	<0.20	<0.20	0.20	0.0010	A099845
Dissolved Lithium (Li)	ug/L	<2.0	<2.0	<2.0	2.0	2.0	A099845
Dissolved Manganese (Mn)	ug/L	1.9	<1.0	<1.0	1.0	0.030	A099845
Dissolved Molybdenum (Mo)	ug/L	<1.0	<1.0	<1.0	1.0	0.0020	A099845
Dissolved Nickel (Ni)	ug/L	<1.0	<1.0	<1.0	1.0	0.010	A099845
Dissolved Selenium (Se)	ug/L	0.20	0.22	<0.10	0.10	0.0060	A099845
Dissolved Silicon (Si)	ug/L	8800	3340	3930	100	0.30	A099845
Dissolved Silver (Ag)	ug/L	<0.020	<0.020	<0.020	0.020	0.0020	A099845
Dissolved Strontium (Sr)	ug/L	56.9	14.7	16.4	1.0	0.0020	A099845
Dissolved Thallium (Tl)	ug/L	<0.010	<0.010	<0.010	0.010	0.010	A099845
Dissolved Tin (Sn)	ug/L	<5.0	<5.0	<5.0	5.0	0.0050	A099845
Dissolved Titanium (Ti)	ug/L	<5.0	<5.0	<5.0	5.0	0.30	A099845
Dissolved Uranium (U)	ug/L	<0.10	<0.10	<0.10	0.10	0.0010	A099845
Dissolved Vanadium (V)	ug/L	5.1	<5.0	6.7	5.0	0.020	A099845
Dissolved Zinc (Zn)	ug/L	<5.0	<5.0	<5.0	5.0	0.050	A099845

RDL = Reportable Detection Limit

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

BV Labs Job #: C087842
Report Date: 2020/12/07

GHD Limited
Client Project #: 088877-07-02
Site Location: UPLAND
Your P.O. #: 73506780-08
Sampler Initials: RP

CSR/CCME DISS. METALS IN WATER W/ CV HG (WATER)

BV Labs ID		YY2173	YY2174	YY2175			
Sampling Date		2020/11/26 13:15	2020/11/26 15:00	2020/11/26 15:45			
COC Number		08488005	08488005	08488005			
	UNITS	WG-088877-261120-RP-01	WG-088877-261120-RP-02	WG-088877-261120-RP-03	RDL	MDL	QC Batch
Dissolved Zirconium (Zr)	ug/L	<0.10	<0.10	<0.10	0.10	0.0080	A099845
Dissolved Calcium (Ca)	mg/L	35.0	7.78	12.5	0.050	0.0010	A098642
Dissolved Magnesium (Mg)	mg/L	5.61	1.79	1.83	0.050	0.00050	A098642
Dissolved Potassium (K)	mg/L	0.486	0.159	0.197	0.050	0.0020	A098642
Dissolved Sodium (Na)	mg/L	7.73	5.17	1.13	0.050	0.0010	A098642
Dissolved Sulphur (S)	mg/L	<3.0	<3.0	<3.0	3.0	1.0	A098642

RDL = Reportable Detection Limit

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

BV Labs Job #: C087842
Report Date: 2020/12/07

GHD Limited
Client Project #: 088877-07-02
Site Location: UPLAND
Your P.O. #: 73506780-08
Sampler Initials: RP

CSR/CCME DISS. METALS IN WATER W/ CV HG (WATER)

BV Labs ID		YY2176	YY2177			
Sampling Date		2020/11/26 16:45	2020/11/27 12:30			
COC Number		08488005	08488005			
	UNITS	WG-088877-261120-RP-04	WG-088877-271120-RP-05	RDL	MDL	QC Batch
Calculated Parameters						
Dissolved Hardness (CaCO3)	mg/L	52.7	69.4	0.50	0.50	A098641
Elements						
Dissolved Mercury (Hg)	ug/L	<0.0019	0.0032	0.0019	0.0019	A100673
Dissolved Metals by ICPMS						
Dissolved Aluminum (Al)	ug/L	<3.0	3.6	3.0	0.030	A099845
Dissolved Antimony (Sb)	ug/L	<0.50	<0.50	0.50	0.0020	A099845
Dissolved Arsenic (As)	ug/L	0.12	0.39	0.10	0.010	A099845
Dissolved Barium (Ba)	ug/L	1.4	3.6	1.0	0.0020	A099845
Dissolved Beryllium (Be)	ug/L	<0.10	<0.10	0.10	0.0030	A099845
Dissolved Bismuth (Bi)	ug/L	<1.0	<1.0	1.0	0.0010	A099845
Dissolved Boron (B)	ug/L	<50	<50	50	50	A099845
Dissolved Cadmium (Cd)	ug/L	<0.010	<0.010	0.010	0.0020	A099845
Dissolved Chromium (Cr)	ug/L	<1.0	<1.0	1.0	0.020	A099845
Dissolved Cobalt (Co)	ug/L	<0.20	<0.20	0.20	0.20	A099845
Dissolved Copper (Cu)	ug/L	1.08	0.76	0.20	0.010	A099845
Dissolved Iron (Fe)	ug/L	<5.0	<5.0	5.0	0.040	A099845
Dissolved Lead (Pb)	ug/L	<0.20	<0.20	0.20	0.0010	A099845
Dissolved Lithium (Li)	ug/L	<2.0	<2.0	2.0	2.0	A099845
Dissolved Manganese (Mn)	ug/L	<1.0	<1.0	1.0	0.030	A099845
Dissolved Molybdenum (Mo)	ug/L	<1.0	<1.0	1.0	0.0020	A099845
Dissolved Nickel (Ni)	ug/L	<1.0	<1.0	1.0	0.010	A099845
Dissolved Selenium (Se)	ug/L	0.10	0.15	0.10	0.0060	A099845
Dissolved Silicon (Si)	ug/L	6020	5880	100	0.30	A099845
Dissolved Silver (Ag)	ug/L	<0.020	<0.020	0.020	0.0020	A099845
Dissolved Strontium (Sr)	ug/L	26.4	31.5	1.0	0.0020	A099845
Dissolved Thallium (Tl)	ug/L	<0.010	<0.010	0.010	0.010	A099845
Dissolved Tin (Sn)	ug/L	<5.0	<5.0	5.0	0.0050	A099845
Dissolved Titanium (Ti)	ug/L	<5.0	<5.0	5.0	0.30	A099845
Dissolved Uranium (U)	ug/L	<0.10	<0.10	0.10	0.0010	A099845
Dissolved Vanadium (V)	ug/L	<5.0	<5.0	5.0	0.020	A099845
Dissolved Zinc (Zn)	ug/L	<5.0	<5.0	5.0	0.050	A099845

RDL = Reportable Detection Limit

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

BV Labs Job #: C087842
Report Date: 2020/12/07

GHD Limited
Client Project #: 088877-07-02
Site Location: UPLAND
Your P.O. #: 73506780-08
Sampler Initials: RP

CSR/CCME DISS. METALS IN WATER W/ CV HG (WATER)

BV Labs ID		YY2176	YY2177			
Sampling Date		2020/11/26 16:45	2020/11/27 12:30			
COC Number		08488005	08488005			
	UNITS	WG-088877-261120-RP-04	WG-088877-271120-RP-05	RDL	MDL	QC Batch
Dissolved Zirconium (Zr)	ug/L	<0.10	<0.10	0.10	0.0080	A099845
Dissolved Calcium (Ca)	mg/L	16.4	22.1	0.050	0.0010	A098642
Dissolved Magnesium (Mg)	mg/L	2.84	3.42	0.050	0.00050	A098642
Dissolved Potassium (K)	mg/L	0.226	0.375	0.050	0.0020	A098642
Dissolved Sodium (Na)	mg/L	3.92	6.54	0.050	0.0010	A098642
Dissolved Sulphur (S)	mg/L	<3.0	<3.0	3.0	1.0	A098642
RDL = Reportable Detection Limit						

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

BV Labs Job #: C087842
Report Date: 2020/12/07

GHD Limited
Client Project #: 088877-07-02
Site Location: UPLAND
Your P.O. #: 73506780-08
Sampler Initials: RP

GENERAL COMMENTS

V2: Report reissued to include speciated alkalinity results on all samples as per COC.

Sample YY2173 [WG-088877-261120-RP-01] : Sample was analyzed past method specified hold time for Total Sulphide. Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised.

Sample YY2174 [WG-088877-261120-RP-02] : Sample was analyzed past method specified hold time for Total Sulphide. Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised.

Sample YY2175 [WG-088877-261120-RP-03] : Sample was analyzed past method specified hold time for Total Sulphide. Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised.

Sample YY2176 [WG-088877-261120-RP-04] : Sample was analyzed past method specified hold time for Total Sulphide. Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised.

Sample YY2177 [WG-088877-271120-RP-05] : Sample was analyzed past method specified hold time for Total Sulphide. Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised.

Results relate only to the items tested.

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
A098773	Nitrate plus Nitrite (N)	2020/11/28			105	80 - 120	<0.10	mg/L		
A098776	Nitrite (N)	2020/11/28			100	80 - 120	<0.10	mg/L		
A098783	Orthophosphate (P)	2020/11/28			98	80 - 120	<0.0030	mg/L		
A099845	Dissolved Aluminum (Al)	2020/12/01	105	80 - 120	101	80 - 120	<3.0	ug/L	0.87 (1)	20
A099845	Dissolved Antimony (Sb)	2020/12/01	103	80 - 120	100	80 - 120	<0.50	ug/L	NC (1)	20
A099845	Dissolved Arsenic (As)	2020/12/01	101	80 - 120	99	80 - 120	<0.10	ug/L	0.35 (1)	20
A099845	Dissolved Barium (Ba)	2020/12/01	NC	80 - 120	100	80 - 120	<1.0	ug/L	0.98 (1)	20
A099845	Dissolved Beryllium (Be)	2020/12/01	102	80 - 120	104	80 - 120	<0.10	ug/L	NC (1)	20
A099845	Dissolved Bismuth (Bi)	2020/12/01	97	80 - 120	100	80 - 120	<1.0	ug/L	NC (1)	20
A099845	Dissolved Boron (B)	2020/12/01	103	80 - 120	107	80 - 120	<50	ug/L	NC (1)	20
A099845	Dissolved Cadmium (Cd)	2020/12/01	103	80 - 120	101	80 - 120	<0.010	ug/L	6.6 (1)	20
A099845	Dissolved Chromium (Cr)	2020/12/01	101	80 - 120	101	80 - 120	<1.0	ug/L	NC (1)	20
A099845	Dissolved Cobalt (Co)	2020/12/01	97	80 - 120	98	80 - 120	<0.20	ug/L	NC (1)	20
A099845	Dissolved Copper (Cu)	2020/12/01	97	80 - 120	99	80 - 120	<0.20	ug/L	1.3 (1)	20
A099845	Dissolved Iron (Fe)	2020/12/01	113	80 - 120	103	80 - 120	<5.0	ug/L	12 (1)	20
A099845	Dissolved Lead (Pb)	2020/12/01	101	80 - 120	101	80 - 120	<0.20	ug/L	NC (1)	20
A099845	Dissolved Lithium (Li)	2020/12/01	99	80 - 120	97	80 - 120	<2.0	ug/L	NC (1)	20
A099845	Dissolved Manganese (Mn)	2020/12/01	101	80 - 120	100	80 - 120	<1.0	ug/L	2.1 (1)	20
A099845	Dissolved Molybdenum (Mo)	2020/12/01	105	80 - 120	104	80 - 120	<1.0	ug/L	2.7 (1)	20
A099845	Dissolved Nickel (Ni)	2020/12/01	98	80 - 120	101	80 - 120	<1.0	ug/L	1.2 (1)	20
A099845	Dissolved Selenium (Se)	2020/12/01	104	80 - 120	101	80 - 120	<0.10	ug/L	5.2 (1)	20
A099845	Dissolved Silicon (Si)	2020/12/01	102	80 - 120	99	80 - 120	<100	ug/L	1.4 (1)	20
A099845	Dissolved Silver (Ag)	2020/12/01	102	80 - 120	100	80 - 120	<0.020	ug/L	NC (1)	20
A099845	Dissolved Strontium (Sr)	2020/12/01	NC	80 - 120	100	80 - 120	<1.0	ug/L	1.4 (1)	20
A099845	Dissolved Thallium (Tl)	2020/12/01	102	80 - 120	101	80 - 120	<0.010	ug/L	NC (1)	20
A099845	Dissolved Tin (Sn)	2020/12/01	103	80 - 120	101	80 - 120	<5.0	ug/L	NC (1)	20
A099845	Dissolved Titanium (Ti)	2020/12/01	104	80 - 120	102	80 - 120	<5.0	ug/L	NC (1)	20
A099845	Dissolved Uranium (U)	2020/12/01	104	80 - 120	101	80 - 120	<0.10	ug/L	NC (1)	20
A099845	Dissolved Vanadium (V)	2020/12/01	103	80 - 120	101	80 - 120	<5.0	ug/L	NC (1)	20
A099845	Dissolved Zinc (Zn)	2020/12/01	104	80 - 120	105	80 - 120	<5.0	ug/L	0.14 (1)	20
A099845	Dissolved Zirconium (Zr)	2020/12/01	107	80 - 120	101	80 - 120	<0.10	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
A099884	Dissolved Chloride (Cl)	2020/11/30	102	80 - 120	104	80 - 120	<1.0	mg/L	4.4 (1)	20
A099884	Dissolved Sulphate (SO4)	2020/11/30	100	80 - 120	99	80 - 120	<1.0	mg/L	0.34 (1)	20
A100070	Alkalinity (PP as CaCO3)	2020/11/30					<1.0	mg/L	NC (1)	20
A100070	Alkalinity (Total as CaCO3)	2020/11/30	NC	80 - 120	93	80 - 120	<1.0	mg/L	2.7 (1)	20
A100070	Bicarbonate (HCO3)	2020/11/30					<1.0	mg/L	2.7 (1)	20
A100070	Carbonate (CO3)	2020/11/30					<1.0	mg/L	NC (1)	20
A100070	Hydroxide (OH)	2020/11/30					<1.0	mg/L	NC (1)	20
A100073	Conductivity	2020/11/30			98	80 - 120	<2.0	uS/cm	1.8 (1)	10
A100673	Dissolved Mercury (Hg)	2020/12/01	89	80 - 120	85	80 - 120	<0.0019	ug/L	NC (1)	20
A102059	Total Ammonia (N)	2020/12/02	84	80 - 120	98	80 - 120	<0.015	mg/L	11 (1)	20
A102060	Total Ammonia (N)	2020/12/02	99	80 - 120	101	80 - 120	<0.015	mg/L	4.7 (1)	20
A102280	Total Dissolved Solids	2020/12/03	101	80 - 120	97	80 - 120	<10	mg/L	4.2 (1)	20
A105265	Total Sulphide	2020/12/05	97 (2)	80 - 120	106	80 - 120	<0.0018	mg/L	NC (3)	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 [YY2174-06]

(3) Duplicate Parent ID [YY2173-06]

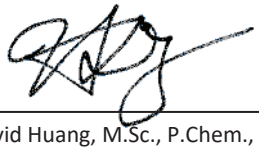
Bureau Veritas Laboratories Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

BV Labs Job #: C087842
Report Date: 2020/12/07

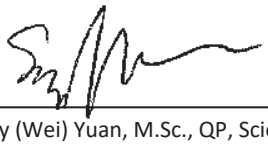
GHD Limited
Client Project #: 088877-07-02
Site Location: UPLAND
Your P.O. #: 73506780-08
Sampler Initials: RP

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).



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



Sandy (Wei) Yuan, M.Sc., QP, Scientific Specialist

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

08488005

Burnaby: 4606 Canada Way, Burnaby, BC V5G 1K5 Toll Free (800) 665 8566
Victoria: 460 Tennyson Place, Unit 1, Victoria, BC V8Z 6S8 Toll Free (866) 385-6113
bvlabs.com

CHAIN OF CUSTODY RECORD

Page 1 of 1

Invoice Information		Report Information (if differs from invoice)		Project Information		Turnaround Time (TAT) Required
Company:	#163 GHD Limited	Company:	#28639 GHD Limited	Quotation		☑ 5 - 7 Days Regular (Most analyses)
Contact Name:	Airesse MacPhee	Contact Name:	Airesse MacPhee	P.O. #/AFE#:	7350678[illegible] -- 8	PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS
Address:	455 Pillip Street	Address:	10271 Shellbridge Way		(Groundwater)	Rush TAT (Surcharges will be applied)
	Waterloo, ON PC: N2L 3X2		Richmond, BC PC: V6X 2W8	Project #:	088877-07-02	☐ Same Day ☐ 2 Days
Phone/Fax:	(519) 884-0510	Phone/Fax:	(604) 248-3661	Site Location:	Upland	☐ 1 Day ☐ 3-4 Days
Email:	airesse.macphee@ghd.com	Email:	airesse.macphee@ghd.com	Site #:		Date Required:
Copies:	Reference PO	Copies:	Reference PO	Sampled By:	R.Plaha	Rush Confirmation #:

Laboratory Use Only

	YES	NO	Cooler ID	Temp
Seal Present		X	1	8 7 7
Seal Intact	—			
Cooling Media	X			
	YES	NO	Cooler ID	Temp
Seal Present		X	2	10 8 9
Seal Intact	—			
Cooling Media	X			
	YES	NO	Cooler ID	Temp
Seal Present				
Seal Intact				
Cooling Media				

Depot Reception

Analysis Requested

	Sample Identification	Date Sampled (yyyy/mm/dd)	Time Sampled (hh:mm)	Matrix	# of Containers	Speciated Alkalinity, Ec, TDS	Cl, SO4 (dissolved), NO2, NO3, N+N	Orthophosphate	NH3	Sulphide (as S), Low Level Sulphide (as H2S)	Dissolved CSR Metals (+Hg)	Dissolved Hardness	HOLD - DO NOT ANALYZE
1	WG-088877-26120-RP-01	2020/11/26	13:15	GW	6	X	X	X	X	X	X	X	
2	WG-088877-26120-RP-02		15:00			X	X	X	X	X	X	X	
3	-03		15:45			X	X	X	X	X	X	X	
4	-04		16:45			X	X	X	X	X	X	X	
5	WG-088877-27120-RP-05	2020/11/27	12:30			X	X	X	X	X	X	X	
6													
7													
8													
9													
10													

Regulatory Criteria

☐ BC CSR
☐ YK CSR
☐ CCME
☐ Drinking Water
☐ BC Water Quality
☐ Other

Special Instructions

Short holding times!
All bottles were field filtered and preserved as required.

Relinquished by: (Signature/ Print)	Date (yyyy/mm/dd):	Time (hh:mm):	Received by: (Signature/ Print)	Date (yyyy/mm/dd):	Time (hh:mm):
RPlaha / Rumi Plaha	2020/11/27	23:15	MPEDRO TACK	2020/11/28	09:00

C087842_COC

BV Labs Job Number: C087842
Report Date: 2020/12/07

GHD Limited
Client Project #: 088877-07-02
Site Location: UPLAND
Your P.O. #: 73506780-08
Sampler Initials: RP

RESULTS OF CHEMICAL ANALYSES OF WATER

BV Labs ID		YY2173	YY2173	YY2174	YY2175	YY2176		YY2177			
Sampling Date		2020/11/26 13:15	2020/11/26 13:15	2020/11/26 15:00	2020/11/26 15:45	2020/11/26 16:45		2020/11/27 12:30			
COC Number		08488005	08488005	08488005	08488005	08488005		08488005			
	UNITS	**WG-088877-261120-RP-01**	**WG-088877-261120-RP-01 Lab-Dup**	**WG-088877-261120-RP-02**	**WG-088877-261120-RP-03**	**WG-088877-261120-RP-04**	**QC Batch**	**WG-088877-271120-RP-05**	**RDL**	**MDL**	**QC Batch**
ANIONS											
Nitrite (N)	mg/L	<0.10	N/A	<0.10	<0.10	<0.10	A098776	<0.10	0.10	0.10	A098776
Calculated Parameters											
Filter and HNO3 Preservation	N/A	FIELD	N/A	FIELD	FIELD	FIELD	ONSITE	FIELD	N/A	N/A	ONSITE
Nitrate (N)	mg/L	0.37	N/A	0.52	<0.10	0.24	A098725	0.34	0.10	N/A	A098725
Sulphide (as H2S)	mg/L	<0.0020	N/A	<0.0020	<0.0020	<0.0020	A098721	<0.0020	0.0020	N/A	A098721
Misc. Inorganics											
Conductivity	uS/cm	250	N/A	83	85	130	A100073	170	2.0	N/A	A100073
Total Dissolved Solids	mg/L	140	N/A	50	42	60	A102280	94	10	N/A	A102280
Anions											
Alkalinity (PP as CaCO3)	mg/L	<1.0	N/A	<1.0	<1.0	<1.0	A100070	<1.0	1.0	N/A	A100070
Alkalinity (Total as CaCO3)	mg/L	120	N/A	27	39	54	A100070	68	1.0	N/A	A100070
Bicarbonate (HCO3)	mg/L	140	N/A	33	47	66	A100070	83	1.0	N/A	A100070
Carbonate (CO3)	mg/L	<1.0	N/A	<1.0	<1.0	<1.0	A100070	<1.0	1.0	N/A	A100070
Hydroxide (OH)	mg/L	<1.0	N/A	<1.0	<1.0	<1.0	A100070	<1.0	1.0	N/A	A100070
Total Sulphide	mg/L	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	A105265	<0.0018	0.0018	N/A	A105265
Dissolved Chloride (Cl)	mg/L	5.7	N/A	3.5	<1.0	2.3	A099884	6.5	1.0	N/A	A099884
Dissolved Sulphate (SO4)	mg/L	6.6	N/A	6.2	3.1	5.4	A099884	7.5	1.0	N/A	A099884
Nutrients											
Total Ammonia (N)	mg/L	<0.015	N/A	0.016	<0.015	0.017	A102060	0.019	0.015	0.0040	A102059
Orthophosphate (P)	mg/L	0.011	N/A	0.0050	0.023	0.0077	A098783	0.012	0.0030	0.0030	A098783
Nitrate plus Nitrite (N)	mg/L	0.37	N/A	0.52	<0.10	0.24	A098773	0.34	0.10	0.10	A098773

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

Results relate only to the items tested.

BV Labs Job Number: C087842
Report Date: 2020/12/07

GHD Limited
Client Project #: 088877-07-02
Site Location: UPLAND
Your P.O. #: 73506780-08
Sampler Initials: RP

CSR/CCME DISS. METALS IN WATER W/ CV HG (WATER)

BV Labs ID		YY2173	YY2174	YY2175	YY2176	YY2177			
Sampling Date		2020/11/26 13:15	2020/11/26 15:00	2020/11/26 15:45	2020/11/26 16:45	2020/11/27 12:30			
COC Number		08488005	08488005	08488005	08488005	08488005			
	UNITS	**WG-088877-261120-RP-01**	**WG-088877-261120-RP-02**	**WG-088877-261120-RP-03**	**WG-088877-261120-RP-04**	**WG-088877-271120-RP-05**	**RDL**	**MDL**	**QC Batch**
Calculated Parameters									
Dissolved Hardness (CaCO3)	mg/L	110	26.8	38.9	52.7	69.4	0.50	0.50	A098641
Elements									
Dissolved Mercury (Hg)	ug/L	<0.0019	0.0022	<0.0019	<0.0019	0.0032	0.0019	0.0019	A100673
Dissolved Metals by ICPMS									
Dissolved Aluminum (Al)	ug/L	134	<3.0	5.6	<3.0	3.6	3.0	0.030	A099845
Dissolved Antimony (Sb)	ug/L	<0.50	<0.50	<0.50	<0.50	<0.50	0.50	0.0020	A099845
Dissolved Arsenic (As)	ug/L	0.25	<0.10	0.81	0.12	0.39	0.10	0.010	A099845
Dissolved Barium (Ba)	ug/L	8.2	<1.0	2.8	1.4	3.6	1.0	0.0020	A099845
Dissolved Beryllium (Be)	ug/L	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	0.0030	A099845
Dissolved Bismuth (Bi)	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	1.0	0.0010	A099845
Dissolved Boron (B)	ug/L	<50	<50	<50	<50	<50	50	50	A099845
Dissolved Cadmium (Cd)	ug/L	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	0.0020	A099845
Dissolved Chromium (Cr)	ug/L	1.3	<1.0	<1.0	<1.0	<1.0	1.0	0.020	A099845
Dissolved Cobalt (Co)	ug/L	<0.20	<0.20	<0.20	<0.20	<0.20	0.20	0.20	A099845
Dissolved Copper (Cu)	ug/L	1.54	1.18	0.59	1.08	0.76	0.20	0.010	A099845
Dissolved Iron (Fe)	ug/L	104	<5.0	<5.0	<5.0	<5.0	5.0	0.040	A099845
Dissolved Lead (Pb)	ug/L	<0.20	<0.20	<0.20	<0.20	<0.20	0.20	0.0010	A099845
Dissolved Lithium (Li)	ug/L	<2.0	<2.0	<2.0	<2.0	<2.0	2.0	2.0	A099845
Dissolved Manganese (Mn)	ug/L	1.9	<1.0	<1.0	<1.0	<1.0	1.0	0.030	A099845
Dissolved Molybdenum (Mo)	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	1.0	0.0020	A099845
Dissolved Nickel (Ni)	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	1.0	0.010	A099845
Dissolved Selenium (Se)	ug/L	0.20	0.22	<0.10	0.10	0.15	0.10	0.0060	A099845
Dissolved Silicon (Si)	ug/L	8800	3340	3930	6020	5880	100	0.30	A099845
Dissolved Silver (Ag)	ug/L	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	0.0020	A099845
Dissolved Strontium (Sr)	ug/L	56.9	14.7	16.4	26.4	31.5	1.0	0.0020	A099845
Dissolved Thallium (Tl)	ug/L	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	0.010	A099845
Dissolved Tin (Sn)	ug/L	<5.0	<5.0	<5.0	<5.0	<5.0	5.0	0.0050	A099845
Dissolved Titanium (Ti)	ug/L	<5.0	<5.0	<5.0	<5.0	<5.0	5.0	0.30	A099845
Dissolved Uranium (U)	ug/L	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	0.0010	A099845
Dissolved Vanadium (V)	ug/L	5.1	<5.0	6.7	<5.0	<5.0	5.0	0.020	A099845
Dissolved Zinc (Zn)	ug/L	<5.0	<5.0	<5.0	<5.0	<5.0	5.0	0.050	A099845
Dissolved Zirconium (Zr)	ug/L	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	0.0080	A099845
Dissolved Calcium (Ca)	mg/L	35.0	7.78	12.5	16.4	22.1	0.050	0.0010	A098642
Dissolved Magnesium (Mg)	mg/L	5.61	1.79	1.83	2.84	3.42	0.050	0.00050	A098642
Dissolved Potassium (K)	mg/L	0.486	0.159	0.197	0.226	0.375	0.050	0.0020	A098642
Dissolved Sodium (Na)	mg/L	7.73	5.17	1.13	3.92	6.54	0.050	0.0010	A098642
Dissolved Sulphur (S)	mg/L	<3.0	<3.0	<3.0	<3.0	<3.0	3.0	1.0	A098642

RDL = Reportable Detection Limit
N/A = Not Applicable

Results relate only to the items tested.

GENERAL COMMENTS

V2: Report reissued to include speciated alkalinity results on all samples as per COC.

Sample YY2173 [WG-088877-261120-RP-01] : Sample was analyzed past method specified hold time for Total Sulphide. Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised.

Sample YY2174 [WG-088877-261120-RP-02] : Sample was analyzed past method specified hold time for Total Sulphide. Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised.

Sample YY2175 [WG-088877-261120-RP-03] : Sample was analyzed past method specified hold time for Total Sulphide. Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised.

Sample YY2176 [WG-088877-261120-RP-04] : Sample was analyzed past method specified hold time for Total Sulphide. Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised.

Sample YY2177 [WG-088877-271120-RP-05] : Sample was analyzed past method specified hold time for Total Sulphide. Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised.

Results relate only to the items tested.

Report Date: 2020/12/07

GHD Limited
Attention: 088877 Distribution
Client Project #: 088877-07-02
Your P.O. #:73506780-08
Site Location: UPLAND

Quality Assurance Report
BV Labs Job Number: C087842

QA/QC Ba	Init	QC Type	Parameter	Date Analy	Value	Recovery	UNITS	QC Limits
A098773	MO5	Spiked Blank	Nitrate plus Nitrite (N)	11/28/2020		105	%	80 - 120
A098773	MO5	Method Blank	Nitrate plus Nitrite (N)	11/28/2020	<0.10		mg/L	
A098776	MO5	Spiked Blank	Nitrite (N)	11/28/2020		100	%	80 - 120
A098776	MO5	Method Blank	Nitrite (N)	11/28/2020	<0.10		mg/L	
A098783	MO5	Spiked Blank	Orthophosphate (P)	11/28/2020		98	%	80 - 120
A098783	MO5	Method Blank	Orthophosphate (P)	11/28/2020	<0.0030		mg/L	
A099845	AA1	Matrix Spike	Dissolved Aluminum (Al)	12/1/2020		105	%	80 - 120
			Dissolved Antimony (Sb)	12/1/2020		103	%	80 - 120
			Dissolved Arsenic (As)	12/1/2020		101	%	80 - 120
			Dissolved Barium (Ba)	12/1/2020		NC	%	80 - 120
			Dissolved Beryllium (Be)	12/1/2020		102	%	80 - 120
			Dissolved Bismuth (Bi)	12/1/2020		97	%	80 - 120
			Dissolved Boron (B)	12/1/2020		103	%	80 - 120
			Dissolved Cadmium (Cd)	12/1/2020		103	%	80 - 120
			Dissolved Chromium (Cr)	12/1/2020		101	%	80 - 120
			Dissolved Cobalt (Co)	12/1/2020		97	%	80 - 120
			Dissolved Copper (Cu)	12/1/2020		97	%	80 - 120
			Dissolved Iron (Fe)	12/1/2020		113	%	80 - 120
			Dissolved Lead (Pb)	12/1/2020		101	%	80 - 120
			Dissolved Lithium (Li)	12/1/2020		99	%	80 - 120
			Dissolved Manganese (Mn)	12/1/2020		101	%	80 - 120
			Dissolved Molybdenum (Mo)	12/1/2020		105	%	80 - 120
			Dissolved Nickel (Ni)	12/1/2020		98	%	80 - 120
			Dissolved Selenium (Se)	12/1/2020		104	%	80 - 120
			Dissolved Silicon (Si)	12/1/2020		102	%	80 - 120
			Dissolved Silver (Ag)	12/1/2020		102	%	80 - 120
			Dissolved Strontium (Sr)	12/1/2020		NC	%	80 - 120
			Dissolved Thallium (Tl)	12/1/2020		102	%	80 - 120
			Dissolved Tin (Sn)	12/1/2020		103	%	80 - 120
			Dissolved Titanium (Ti)	12/1/2020		104	%	80 - 120
			Dissolved Uranium (U)	12/1/2020		104	%	80 - 120
			Dissolved Vanadium (V)	12/1/2020		103	%	80 - 120
			Dissolved Zinc (Zn)	12/1/2020		104	%	80 - 120
			Dissolved Zirconium (Zr)	12/1/2020		107	%	80 - 120
A099845	AA1	Spiked Blank	Dissolved Aluminum (Al)	12/1/2020		101	%	80 - 120
			Dissolved Antimony (Sb)	12/1/2020		100	%	80 - 120
			Dissolved Arsenic (As)	12/1/2020		99	%	80 - 120
			Dissolved Barium (Ba)	12/1/2020		100	%	80 - 120
			Dissolved Beryllium (Be)	12/1/2020		104	%	80 - 120
			Dissolved Bismuth (Bi)	12/1/2020		100	%	80 - 120
			Dissolved Boron (B)	12/1/2020		107	%	80 - 120
			Dissolved Cadmium (Cd)	12/1/2020		101	%	80 - 120
			Dissolved Chromium (Cr)	12/1/2020		101	%	80 - 120
			Dissolved Cobalt (Co)	12/1/2020		98	%	80 - 120
			Dissolved Copper (Cu)	12/1/2020		99	%	80 - 120
			Dissolved Iron (Fe)	12/1/2020		103	%	80 - 120
			Dissolved Lead (Pb)	12/1/2020		101	%	80 - 120
			Dissolved Lithium (Li)	12/1/2020		97	%	80 - 120
			Dissolved Manganese (Mn)	12/1/2020		100	%	80 - 120
			Dissolved Molybdenum (Mo)	12/1/2020		104	%	80 - 120
			Dissolved Nickel (Ni)	12/1/2020		101	%	80 - 120
			Dissolved Selenium (Se)	12/1/2020		101	%	80 - 120
			Dissolved Silicon (Si)	12/1/2020		99	%	80 - 120
			Dissolved Silver (Ag)	12/1/2020		100	%	80 - 120
			Dissolved Strontium (Sr)	12/1/2020		100	%	80 - 120
			Dissolved Thallium (Tl)	12/1/2020		101	%	80 - 120
			Dissolved Tin (Sn)	12/1/2020		101	%	80 - 120
			Dissolved Titanium (Ti)	12/1/2020		102	%	80 - 120
			Dissolved Uranium (U)	12/1/2020		101	%	80 - 120
			Dissolved Vanadium (V)	12/1/2020		101	%	80 - 120
			Dissolved Zinc (Zn)	12/1/2020		105	%	80 - 120
			Dissolved Zirconium (Zr)	12/1/2020		101	%	80 - 120
A099845	AA1	Method Blank	Dissolved Aluminum (Al)	12/1/2020	<3.0		ug/L	
			Dissolved Antimony (Sb)	12/1/2020	<0.50		ug/L	
			Dissolved Arsenic (As)	12/1/2020	<0.10		ug/L	
			Dissolved Barium (Ba)	12/1/2020	<1.0		ug/L	
			Dissolved Beryllium (Be)	12/1/2020	<0.10		ug/L	
			Dissolved Bismuth (Bi)	12/1/2020	<1.0		ug/L	
			Dissolved Boron (B)	12/1/2020	<50		ug/L	
			Dissolved Cadmium (Cd)	12/1/2020	<0.010		ug/L	
			Dissolved Chromium (Cr)	12/1/2020	<1.0		ug/L	
			Dissolved Cobalt (Co)	12/1/2020	<0.20		ug/L	
			Dissolved Copper (Cu)	12/1/2020	<0.20		ug/L	
			Dissolved Iron (Fe)	12/1/2020	<5.0		ug/L	
			Dissolved Lead (Pb)	12/1/2020	<0.20		ug/L	
			Dissolved Lithium (Li)	12/1/2020	<2.0		ug/L	
			Dissolved Manganese (Mn)	12/1/2020	<1.0		ug/L	
			Dissolved Molybdenum (Mo)	12/1/2020	<1.0		ug/L	
			Dissolved Nickel (Ni)	12/1/2020	<1.0		ug/L	
			Dissolved Selenium (Se)	12/1/2020	<0.10		ug/L	
			Dissolved Silicon (Si)	12/1/2020	<100		ug/L	
			Dissolved Silver (Ag)	12/1/2020	<0.020		ug/L	
			Dissolved Strontium (Sr)	12/1/2020	<1.0		ug/L	
			Dissolved Thallium (Tl)	12/1/2020	<0.010		ug/L	
			Dissolved Tin (Sn)	12/1/2020	<5.0		ug/L	
			Dissolved Titanium (Ti)	12/1/2020	<5.0		ug/L	
			Dissolved Uranium (U)	12/1/2020	<0.10		ug/L	
			Dissolved Vanadium (V)	12/1/2020	<5.0		ug/L	
			Dissolved Zinc (Zn)	12/1/2020	<5.0		ug/L	
			Dissolved Zirconium (Zr)	12/1/2020	<0.10		ug/L	
A099845	AA1	RPD	Dissolved Aluminum (Al)	12/1/2020	0.87 (1)		%	20
			Dissolved Antimony (Sb)	12/1/2020	NC (1)		%	20
			Dissolved Arsenic (As)	12/1/2020	0.35 (1)		%	20
			Dissolved Barium (Ba)	12/1/2020	0.98 (1)		%	20
			Dissolved Beryllium (Be)	12/1/2020	NC (1)		%	20
			Dissolved Bismuth (Bi)	12/1/2020	NC (1)		%	20
			Dissolved Boron (B)	12/1/2020	NC (1)		%	20
			Dissolved Cadmium (Cd)	12/1/2020	6.6 (1)		%	20
			Dissolved Chromium (Cr)	12/1/2020	NC (1)		%	20
			Dissolved Cobalt (Co)	12/1/2020	NC (1)		%	20
			Dissolved Copper (Cu)	12/1/2020	1.3 (1)		%	20
			Dissolved Iron (Fe)	12/1/2020	12 (1)		%	20
			Dissolved Lead (Pb)	12/1/2020	NC (1)		%	20
			Dissolved Lithium (Li)	12/1/2020	NC (1)		%	20
			Dissolved Manganese (Mn)	12/1/2020	2.1 (1)		%	20
			Dissolved Molybdenum (Mo)	12/1/2020	2.7 (1)		%	20
			Dissolved Nickel (Ni)	12/1/2020	1.2 (1)		%	20

Report Date: 2020/12/07

GHD Limited
Attention: 088877 Distribution
Client Project #: 088877-07-02
Your P.O. #:73506780-08
Site Location: UPLAND

Quality Assurance Report
BV Labs Job Number: C087842

			Dissolved Selenium (Se)	12/1/2020	5.2 (1)		%	20
			Dissolved Silicon (Si)	12/1/2020	1.4 (1)		%	20
			Dissolved Silver (Ag)	12/1/2020	NC (1)		%	20
			Dissolved Strontium (Sr)	12/1/2020	1.4 (1)		%	20
			Dissolved Thallium (Tl)	12/1/2020	NC (1)		%	20
			Dissolved Tin (Sn)	12/1/2020	NC (1)		%	20
			Dissolved Titanium (Ti)	12/1/2020	NC (1)		%	20
			Dissolved Uranium (U)	12/1/2020	NC (1)		%	20
			Dissolved Vanadium (V)	12/1/2020	NC (1)		%	20
			Dissolved Zinc (Zn)	12/1/2020	0.14 (1)		%	20
			Dissolved Zirconium (Zr)	12/1/2020	NC (1)		%	20
A099884	BB3	Matrix Spike	Dissolved Chloride (Cl)	11/30/2020		102	%	80 - 120
			Dissolved Sulphate (SO4)	11/30/2020		100	%	80 - 120
A099884	BB3	Spiked Blank	Dissolved Chloride (Cl)	11/30/2020		104	%	80 - 120
			Dissolved Sulphate (SO4)	11/30/2020		99	%	80 - 120
A099884	BB3	Method Blank	Dissolved Chloride (Cl)	11/30/2020	<1.0		mg/L	
			Dissolved Sulphate (SO4)	11/30/2020	<1.0		mg/L	
A099884	BB3	RPD	Dissolved Chloride (Cl)	11/30/2020	NC (1)		%	20
			Dissolved Sulphate (SO4)	11/30/2020	NC (1)		%	20
			Dissolved Chloride (Cl)	11/30/2020	4.4 (1)		%	20
			Dissolved Sulphate (SO4)	11/30/2020	0.34 (1)		%	20
A100070	WAY	Matrix Spike	Alkalinity (Total as CaCO3)	11/30/2020		NC	%	80 - 120
A100070	WAY	Spiked Blank	Alkalinity (Total as CaCO3)	11/30/2020		93	%	80 - 120
A100070	WAY	Method Blank	Alkalinity (PP as CaCO3)	11/30/2020	<1.0		mg/L	
			Alkalinity (Total as CaCO3)	11/30/2020	<1.0		mg/L	
			Bicarbonate (HCO3)	11/30/2020	<1.0		mg/L	
			Carbonate (CO3)	11/30/2020	<1.0		mg/L	
			Hydroxide (OH)	11/30/2020	<1.0		mg/L	
A100070	WAY	RPD	Alkalinity (PP as CaCO3)	11/30/2020	NC (1)		%	20
			Alkalinity (Total as CaCO3)	11/30/2020	2.7 (1)		%	20
			Bicarbonate (HCO3)	11/30/2020	2.7 (1)		%	20
			Carbonate (CO3)	11/30/2020	NC (1)		%	20
			Hydroxide (OH)	11/30/2020	NC (1)		%	20
A100073	WAY	Spiked Blank	Conductivity	11/30/2020		98	%	80 - 120
A100073	WAY	Method Blank	Conductivity	11/30/2020	<2.0		uS/cm	
A100073	WAY	RPD	Conductivity	11/30/2020	1.8 (1)		%	10
A100673	JC8	Matrix Spike	Dissolved Mercury (Hg)	12/1/2020		89	%	80 - 120
A100673	JC8	Spiked Blank	Dissolved Mercury (Hg)	12/1/2020		85	%	80 - 120
A100673	JC8	Method Blank	Dissolved Mercury (Hg)	12/1/2020	<0.0019		ug/L	
A100673	JC8	RPD	Dissolved Mercury (Hg)	12/1/2020	NC (1)		%	20
A102059	MO5	Matrix Spike	Total Ammonia (N)	12/2/2020		84	%	80 - 120
A102059	MO5	Spiked Blank	Total Ammonia (N)	12/2/2020		98	%	80 - 120
A102059	MO5	Method Blank	Total Ammonia (N)	12/2/2020	<0.015		mg/L	
A102059	MO5	RPD	Total Ammonia (N)	12/2/2020	11 (1)		%	20
A102060	MO5	Matrix Spike	Total Ammonia (N)	12/2/2020		99	%	80 - 120
A102060	MO5	Spiked Blank	Total Ammonia (N)	12/2/2020		101	%	80 - 120
A102060	MO5	Method Blank	Total Ammonia (N)	12/2/2020	<0.015		mg/L	
A102060	MO5	RPD	Total Ammonia (N)	12/2/2020	4.7 (1)		%	20
A102280	WZ1	Matrix Spike	Total Dissolved Solids	12/3/2020		101	%	80 - 120
A102280	WZ1	Spiked Blank	Total Dissolved Solids	12/3/2020		97	%	80 - 120
A102280	WZ1	Method Blank	Total Dissolved Solids	12/3/2020	<10		mg/L	
A102280	WZ1	RPD	Total Dissolved Solids	12/3/2020	4.2 (1)		%	20
A105265	PK8	Matrix Spike [YY2174-06]	Total Sulphide	12/5/2020		97 (2)	%	80 - 120
A105265	PK8	Spiked Blank	Total Sulphide	12/5/2020		106	%	80 - 120
A105265	PK8	Method Blank	Total Sulphide	12/5/2020	<0.0018		mg/L	
A105265	PK8	RPD [YY2173-06]	Total Sulphide	12/5/2020	NC (3)		%	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 [YY2174-06]
(3) Duplicate Parent ID [YY2173-06]

Your P.O. #: 73506780-8
Your Project #: 088877-08-02
Site#: 088877-08-02
Your C.O.C. #: 623551-03-01

Attention: Airesse MacPhee

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

Report Date: 2020/12/07
Report #: R2964222
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C087845
Received: 2020/11/28, 09:00

Sample Matrix: Soil
Samples Received: 1

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Elements by ICPMS (total)	1	2020/12/04	2020/12/04	BBY7SOP-00004 / BBY7SOP-00001	EPA 6020b R2 m
pH (2:1 DI Water Extract)	1	2020/12/04	2020/12/04	BBY6SOP-00028	BCMOE BCLM Mar2005 m

Remarks:

Bureau Veritas Laboratories are accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by BV Labs 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 BV Labs profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and BV Labs 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.

BV Labs liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. BV Labs 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 BV Labs, unless otherwise agreed in writing. BV Labs 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 BV Labs, results relate to the supplied samples tested.

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.

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

Your P.O. #: 73506780-8
Your Project #: 088877-08-02
Site#: 088877-08-02
Your C.O.C. #: 623551-03-01

Attention: Airesse MacPhee

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

Report Date: 2020/12/07
Report #: R2964222
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C087845
Received: 2020/11/28, 09:00

Encryption Key

Nahed Amer
Customer Solutions Representative
07 Dec 2020 16:14:40

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Nahed Amer, Customer Solutions Representative
Email: Nahed.AMER@bvlabs.com
Phone# (604) 734 7276
==========
This report has been generated and distributed using a secure automated process.
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

CSR/CCME METALS IN SOIL WITH HG (SOIL)

BV Labs ID		YY2197			
Sampling Date		2020/11/17 12:00			
COC Number		623551-03-01			
	UNITS	SO-CW-171120-01	RDL	MDL	QC Batch
Physical Properties					
Soluble (2:1) pH	pH	8.78	N/A	N/A	A103839
Total Metals by ICPMS					
Total Aluminum (Al)	mg/kg	1060	100	100	A103832
Total Antimony (Sb)	mg/kg	0.37	0.10	0.10	A103832
Total Arsenic (As)	mg/kg	2.06	0.20	0.20	A103832
Total Barium (Ba)	mg/kg	18.6	0.10	0.10	A103832
Total Beryllium (Be)	mg/kg	<0.20	0.20	0.20	A103832
Total Bismuth (Bi)	mg/kg	1.05	0.10	0.10	A103832
Total Boron (B)	mg/kg	2.5	1.0	0.30	A103832
Total Cadmium (Cd)	mg/kg	0.060	0.050	0.050	A103832
Total Calcium (Ca)	mg/kg	2730	100	100	A103832
Total Chromium (Cr)	mg/kg	9.70	0.50	0.50	A103832
Total Cobalt (Co)	mg/kg	2.10	0.10	0.10	A103832
Total Copper (Cu)	mg/kg	20.3	0.50	0.50	A103832
Total Iron (Fe)	mg/kg	12900	100	100	A103832
Total Lead (Pb)	mg/kg	3.07	0.10	0.10	A103832
Total Lithium (Li)	mg/kg	0.87	0.50	0.50	A103832
Total Magnesium (Mg)	mg/kg	998	100	100	A103832
Total Manganese (Mn)	mg/kg	164	0.20	0.20	A103832
Total Mercury (Hg)	mg/kg	<0.050	0.050	0.050	A103832
Total Molybdenum (Mo)	mg/kg	1.57	0.10	0.050	A103832
Total Nickel (Ni)	mg/kg	8.70	0.50	0.50	A103832
Total Phosphorus (P)	mg/kg	104	10	10	A103832
Total Potassium (K)	mg/kg	131	100	100	A103832
Total Selenium (Se)	mg/kg	<0.50	0.50	0.50	A103832
Total Silver (Ag)	mg/kg	<0.050	0.050	0.050	A103832
Total Sodium (Na)	mg/kg	<100	100	100	A103832
Total Strontium (Sr)	mg/kg	5.07	0.10	0.10	A103832
Total Thallium (Tl)	mg/kg	<0.050	0.050	0.050	A103832
Total Tin (Sn)	mg/kg	0.98	0.10	0.10	A103832
Total Titanium (Ti)	mg/kg	169	1.0	1.0	A103832

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

CSR/CCME METALS IN SOIL WITH HG (SOIL)

BV Labs ID		YY2197			
Sampling Date		2020/11/17 12:00			
COC Number		623551-03-01			
	UNITS	SO-CW-171120-01	RDL	MDL	QC Batch
Total Tungsten (W)	mg/kg	<0.50	0.50	0.50	A103832
Total Uranium (U)	mg/kg	0.269	0.050	0.050	A103832
Total Vanadium (V)	mg/kg	6.4	1.0	1.0	A103832
Total Zinc (Zn)	mg/kg	4800	1.0	1.0	A103832
Total Zirconium (Zr)	mg/kg	2.56	0.50	0.50	A103832
RDL = Reportable Detection Limit					

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

GENERAL COMMENTS

Results relate only to the items tested.

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

BV Labs Job #: C087845
Report Date: 2020/12/07

QUALITY ASSURANCE REPORT

GHD Limited
Client Project #: 088877-08-02
Your P.O. #: 73506780-8

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
A103832	Total Aluminum (Al)	2020/12/04	NC	75 - 125	102	75 - 125	<100	mg/kg			96	70 - 130
A103832	Total Antimony (Sb)	2020/12/04	96	75 - 125	104	75 - 125	<0.10	mg/kg			114	70 - 130
A103832	Total Arsenic (As)	2020/12/04	97	75 - 125	98	75 - 125	<0.20	mg/kg	2.0 (2)	30	90	70 - 130
A103832	Total Barium (Ba)	2020/12/04	109	75 - 125	95	75 - 125	<0.10	mg/kg	4.1 (2)	40	101	70 - 130
A103832	Total Beryllium (Be)	2020/12/04	102	75 - 125	101	75 - 125	<0.20	mg/kg			101	70 - 130
A103832	Total Bismuth (Bi)	2020/12/04	97	75 - 125	97	75 - 125	<0.10	mg/kg				
A103832	Total Boron (B)	2020/12/04	102	75 - 125	103	75 - 125	<1.0	mg/kg				
A103832	Total Cadmium (Cd)	2020/12/04	97	75 - 125	100	75 - 125	<0.050	mg/kg			95	70 - 130
A103832	Total Calcium (Ca)	2020/12/04	NC	75 - 125	101	75 - 125	<100	mg/kg			96	70 - 130
A103832	Total Chromium (Cr)	2020/12/04	97	75 - 125	102	75 - 125	<0.50	mg/kg	3.7 (2)	30	103	70 - 130
A103832	Total Cobalt (Co)	2020/12/04	95	75 - 125	98	75 - 125	<0.10	mg/kg			96	70 - 130
A103832	Total Copper (Cu)	2020/12/04	92	75 - 125	99	75 - 125	<0.50	mg/kg	2.5 (2)	30	98	70 - 130
A103832	Total Iron (Fe)	2020/12/04	NC	75 - 125	102	75 - 125	<100	mg/kg			100	70 - 130
A103832	Total Lead (Pb)	2020/12/04	99	75 - 125	101	75 - 125	<0.10	mg/kg	11 (2)	40	110	70 - 130
A103832	Total Lithium (Li)	2020/12/04	97	75 - 125	98	75 - 125	<0.50	mg/kg			99	70 - 130
A103832	Total Magnesium (Mg)	2020/12/04	NC	75 - 125	106	75 - 125	<100	mg/kg			106	70 - 130
A103832	Total Manganese (Mn)	2020/12/04	96	75 - 125	103	75 - 125	<0.20	mg/kg			106	70 - 130
A103832	Total Mercury (Hg)	2020/12/04	97	75 - 125	99	75 - 125	<0.050	mg/kg			93	70 - 130
A103832	Total Molybdenum (Mo)	2020/12/04	95	75 - 125	94	75 - 125	<0.10	mg/kg			96	70 - 130
A103832	Total Nickel (Ni)	2020/12/04	94	75 - 125	99	75 - 125	<0.50	mg/kg			103	70 - 130
A103832	Total Phosphorus (P)	2020/12/04	93	75 - 125	97	75 - 125	<10	mg/kg			94	70 - 130
A103832	Total Potassium (K)	2020/12/04	136 (1)	75 - 125	104	75 - 125	<100	mg/kg			92	70 - 130
A103832	Total Selenium (Se)	2020/12/04	100	75 - 125	99	75 - 125	<0.50	mg/kg				
A103832	Total Silver (Ag)	2020/12/04	95	75 - 125	96	75 - 125	<0.050	mg/kg			116	70 - 130
A103832	Total Sodium (Na)	2020/12/04	115	75 - 125	104	75 - 125	<100	mg/kg			99	70 - 130
A103832	Total Strontium (Sr)	2020/12/04	106	75 - 125	98	75 - 125	<0.10	mg/kg			103	70 - 130
A103832	Total Thallium (Tl)	2020/12/04	98	75 - 125	101	75 - 125	<0.050	mg/kg			87	70 - 130
A103832	Total Tin (Sn)	2020/12/04	100	75 - 125	103	75 - 125	<0.10	mg/kg			99	70 - 130
A103832	Total Titanium (Ti)	2020/12/04	NC	75 - 125	98	75 - 125	<1.0	mg/kg				
A103832	Total Tungsten (W)	2020/12/04	85	75 - 125	106	75 - 125	<0.50	mg/kg				
A103832	Total Uranium (U)	2020/12/04	98	75 - 125	101	75 - 125	<0.050	mg/kg			98	70 - 130
A103832	Total Vanadium (V)	2020/12/04	101	75 - 125	104	75 - 125	<1.0	mg/kg			102	70 - 130

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 Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
A103832	Total Zinc (Zn)	2020/12/04	96	75 - 125	99	75 - 125	<1.0	mg/kg	2.9 (2)	30	104	70 - 130
A103832	Total Zirconium (Zr)	2020/12/04	126 (1)	75 - 125	99	75 - 125	<0.50	mg/kg				
A103839	Soluble (2:1) pH	2020/12/04			100	97 - 103			0.34 (2)	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.

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

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)

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

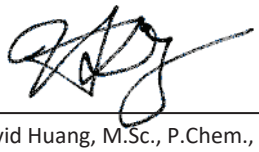
(2) Duplicate Parent ID

BV Labs Job #: C087845
Report Date: 2020/12/07

GHD Limited
Client Project #: 088877-08-02
Your P.O. #: 73506780-8

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).



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

Page 1 of 1

C087845_COC

Only

Bottle Order #: 623551

Chain Of Custody Record: C#623551-03-01

Project Manager: Nahed Amer

INVOICE TO:		Report Information		Project Information	
Company Name	#163 GHD Limited	Company Name		Quotation #	B80076
Contact Name	Airesse MacPhee	Contact Name	Airesse MacPhee	P.O. #	73506780-8
Address	455 PHILLIP STREET	Address		Project #	088877-07-02 08
	WATERLOO ON N2L 3X2			Project Name	
Phone	(519) 884-0510 Fax: (519) 725-1394	Phone	Fax:	Site #	088877-07-02 08
Email	airesse.macphee@ghd.com; NationalEDDSupport@ma	Email	airesse.macphee@ghd.com; NationalEDDSupport@ma	Sampled By	

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

Special Instructions:

• 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.

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)	Alkalinity (speciated)	Chloride/Sulphate	Total Dissolved Solids (Filt. Residue)	Ammonia-N (Total)	Nitrate, Nitrite, N+N	Orthophosphate	Sulphide with H2S Calculation- Water	CSR Dissolved Metals in Water with CV Hg	CSR Total metals		# of Bottles	Comments
1	SO-(W-A)120-01		Nov 17 2020	1200	SOIL										X		1	Rose Marie Rada / Airesse Macphee to provide RDO details
2																		
3																		
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?
Rimi Plaha	20/11/17	23:30	PEDRO TACE	2020/11/18	09:00		☐	8,7,7	N/A ☐ 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. #: 73506780-8
Your Project #: 088877-07-02
Site#: 088877-07-02
Site Location: UPLAND
Your C.O.C. #: 08488001

Attention: 088877 Distribution

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

Report Date: 2020/12/07
Report #: R2964248
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C087847
Received: 2020/11/28, 09:00

Sample Matrix: Water
Samples Received: 5

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity @25C (pp, total), CO3,HCO3,OH	4	N/A	2020/11/30	BBY6SOP-00026	SM 23 2320 B m
Biochemical Oxygen Demand	4	2020/11/30	2020/12/05	BBY6SOP-00045	SM 23 5210 B m
BTEX/MTBE LH, VH, F1 SIM/MS	5	N/A	2020/11/30	BBY8SOP-00010 / BBY8SOP-00011 / BBY8SOP-00012	BCMOE BCLM Jul 2017
Chloride/Sulphate by Auto Colourimetry	3	N/A	2020/11/30	BBY6SOP-00011 / BBY6SOP-00017	SM23-4500-Cl/SO4-E m
Chloride/Sulphate by Auto Colourimetry	1	N/A	2020/12/07	BBY6SOP-00011 / BBY6SOP-00017	SM23-4500-Cl/SO4-E m
COD by Colorimeter	4	N/A	2020/12/01	BBY6SOP-00024	SM 23 5220 D m
Conductivity @25C	4	N/A	2020/11/30	BBY6SOP-00026	SM 23 2510 B m
Sulphide (as H2S) (1)	4	N/A	2020/12/05		Auto Calc
Hardness Total (calculated as CaCO3) (2)	4	N/A	2020/12/03	BBY WI-00033	Auto Calc
Hardness (calculated as CaCO3)	4	N/A	2020/12/02	BBY WI-00033	Auto Calc
Mercury (Dissolved) by CV	4	2020/12/01	2020/12/01	AB SOP-00084	BCMOE BCLM Oct2013 m
Mercury (Total) by CV	4	2020/12/01	2020/12/01	AB SOP-00084	BCMOE BCLM Oct2013 m
Na, K, Ca, Mg, S by CRC ICPMS (diss.)	4	N/A	2020/12/02	BBY WI-00033	Auto Calc
Elements by CRC ICPMS (dissolved)	4	N/A	2020/12/01	BBY7SOP-00002	EPA 6020b R2 m
Na, K, Ca, Mg, S by CRC ICPMS (total)	4	2020/11/28	2020/12/03	BBY WI-00033	Auto Calc
Elements by CRC ICPMS (total)	4	2020/12/02	2020/12/02	BBY7SOP-00003 / BBY7SOP-00002	EPA 6020b R2 m
Ammonia-N (Total)	4	N/A	2020/12/02	AB SOP-00007	SM 23 4500 NH3 A G m
Nitrate + Nitrite (N) (highlevel)	4	N/A	2020/11/28	BBY6SOP-00010	SM 23 4500-NO3- I m
Nitrite (N) by CFA (highlevel)	4	N/A	2020/11/28	BBY6SOP-00010	SM 23 4500-NO3- I m
Nitrogen - Nitrate (as N)	4	N/A	2020/11/28	BBY WI-00033	Auto Calc
PAH in Water by GC/MS (SIM)	3	2020/12/02	2020/12/03	BBY8SOP-00021	BCMOE BCLM Jul2017m
PAH in Water by GC/MS (SIM)	1	2020/12/02	2020/12/04	BBY8SOP-00021	BCMOE BCLM Jul2017m
Total LMW, HMW, Total PAH Calc (3)	3	N/A	2020/12/04	BBY WI-00033	Auto Calc
Total LMW, HMW, Total PAH Calc (3)	1	N/A	2020/12/07	BBY WI-00033	Auto Calc
Filter and HNO3 Preserve for Metals	4	N/A	2020/11/28	BBY7 WI-00004	SM 23 3030B m
Orthophosphate by Konelab (4)	4	N/A	2020/11/28	BBY6SOP-00013	SM 23 4500-P E m
Total Sulphide (1)	4	N/A	2020/12/05	AB SOP-00080	SM 23 4500 S2-A D Fm

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

Your P.O. #: 73506780-8
Your Project #: 088877-07-02
Site#: 088877-07-02
Site Location: UPLAND
Your C.O.C. #: 08488001

Attention: 088877 Distribution

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

Report Date: 2020/12/07
Report #: R2964248
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C087847
Received: 2020/11/28, 09:00

Sample Matrix: Water
Samples Received: 5

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Total Dissolved Solids (Filt. Residue)	4	2020/12/02	2020/12/03	BBY6SOP-00033	SM 23 2540 C m
Total Suspended Solids (NFR)	4	2020/12/03	2020/12/04	BBY6SOP-00034	SM 23 2540 D m
Volatile HC-BTEX (5)	5	N/A	2020/12/01	BBY WI-00033	Auto Calc

Remarks:

Bureau Veritas Laboratories are accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by BV Labs 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 BV Labs profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and BV Labs 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.

BV Labs liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. BV Labs 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 BV Labs, unless otherwise agreed in writing. BV Labs 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 BV Labs, results relate to the supplied samples tested.

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 BV Labs 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) 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) Orthophosphate > Total Phosphorus Imbalance: When applicable, Orthophosphate, Total Phosphorus and dissolved Phosphorus results were reviewed and data quality meets acceptable levels unless otherwise noted.
(5) VPH = VH - (Benzene + Toluene + Ethylbenzene + m & p-Xylene + o-Xylene + Styrene)

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

Your P.O. #: 73506780-8
Your Project #: 088877-07-02
Site#: 088877-07-02
Site Location: UPLAND
Your C.O.C. #: 08488001

Attention: 088877 Distribution

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

Report Date: 2020/12/07
Report #: R2964248
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C087847
Received: 2020/11/28, 09:00

Encryption Key

Gail Pedersen
Key Account Specialist
07 Dec 2020 17:06:27

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Nahed Amer, Customer Solutions Representative
Email: Nahed.AMER@bvlabs.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

BV Labs Job #: C087847
Report Date: 2020/12/07

GHD Limited
Client Project #: 088877-07-02
Site Location: UPLAND
Your P.O. #: 73506780-8
Sampler Initials: RP

RESULTS OF CHEMICAL ANALYSES OF WATER

BV Labs ID		YY2200	YY2200			
Sampling Date		2020/11/27 13:30	2020/11/27 13:30			
COC Number		08488001	08488001			
	UNITS	WL-088877-271120-RP-06	WL-088877-271120-RP-06 Lab-Dup	RDL	MDL	QC Batch
ANIONS						
Nitrite (N)	mg/L	<0.10	N/A	0.10	0.10	A098776
Calculated Parameters						
Filter and HNO3 Preservation	N/A	FIELD	N/A	N/A	N/A	ONSITE
Nitrate (N)	mg/L	1.04	N/A	0.10	N/A	A098725
Sulphide (as H2S)	mg/L	<0.0020	N/A	0.0020	N/A	A098721
Demand Parameters						
Biochemical Oxygen Demand	mg/L	9.7	9.9	2.0	N/A	A099809
Chemical Oxygen Demand	mg/L	151	163	10	10	A100464
Misc. Inorganics						
Conductivity	uS/cm	1100	N/A	2.0	N/A	A100073
Total Dissolved Solids	mg/L	810	N/A	10	N/A	A102280
Total Suspended Solids	mg/L	20	N/A	1.0	N/A	A102980
Anions						
Alkalinity (PP as CaCO3)	mg/L	<1.0	N/A	1.0	N/A	A100070
Alkalinity (Total as CaCO3)	mg/L	370	N/A	1.0	N/A	A100070
Bicarbonate (HCO3)	mg/L	450	N/A	1.0	N/A	A100070
Carbonate (CO3)	mg/L	<1.0	N/A	1.0	N/A	A100070
Hydroxide (OH)	mg/L	<1.0	N/A	1.0	N/A	A100070
Total Sulphide	mg/L	<0.0018 (1)	N/A	0.0018	N/A	A105265
Dissolved Chloride (Cl)	mg/L	49	N/A	1.0	N/A	A107205
Dissolved Sulphate (SO4)	mg/L	200	N/A	1.0	N/A	A107205
Nutrients						
Total Ammonia (N)	mg/L	0.55	N/A	0.015	0.0040	A102059
Orthophosphate (P)	mg/L	<0.0030	N/A	0.0030	0.0030	A098783
Nitrate plus Nitrite (N)	mg/L	1.04	N/A	0.10	0.10	A098773

RDL = Reportable Detection Limit
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable
(1) 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

BV Labs Job #: C087847
Report Date: 2020/12/07

GHD Limited
Client Project #: 088877-07-02
Site Location: UPLAND
Your P.O. #: 73506780-8
Sampler Initials: RP

RESULTS OF CHEMICAL ANALYSES OF WATER

BV Labs ID		YY2201	YY2201			
Sampling Date		2020/11/27 13:35	2020/11/27 13:35			
COC Number		08488001	08488001			
	UNITS	WL-088877-271120-RP-07	WL-088877-271120-RP-07 Lab-Dup	RDL	MDL	QC Batch
ANIONS						
Nitrite (N)	mg/L	<0.10	N/A	0.10	0.10	A098776
Calculated Parameters						
Filter and HNO3 Preservation	N/A	FIELD	N/A	N/A	N/A	ONSITE
Nitrate (N)	mg/L	1.09	N/A	0.10	N/A	A098725
Sulphide (as H2S)	mg/L	<0.0020	N/A	0.0020	N/A	A098721
Demand Parameters						
Biochemical Oxygen Demand	mg/L	7.6	N/A	2.0	N/A	A099809
Chemical Oxygen Demand	mg/L	123	N/A	10	10	A100464
Misc. Inorganics						
Conductivity	uS/cm	1600	N/A	2.0	N/A	A100073
Total Dissolved Solids	mg/L	1100	N/A	10	N/A	A102280
Total Suspended Solids	mg/L	21	N/A	1.0	N/A	A102980
Anions						
Alkalinity (PP as CaCO3)	mg/L	<1.0	N/A	1.0	N/A	A100070
Alkalinity (Total as CaCO3)	mg/L	390	N/A	1.0	N/A	A100070
Bicarbonate (HCO3)	mg/L	470	N/A	1.0	N/A	A100070
Carbonate (CO3)	mg/L	<1.0	N/A	1.0	N/A	A100070
Hydroxide (OH)	mg/L	<1.0	N/A	1.0	N/A	A100070
Total Sulphide	mg/L	<0.0018 (1)	N/A	0.0018	N/A	A105265
Dissolved Chloride (Cl)	mg/L	97	N/A	1.0	N/A	A099884
Dissolved Sulphate (SO4)	mg/L	350 (2)	N/A	10	N/A	A099884
Nutrients						
Total Ammonia (N)	mg/L	0.53	0.48	0.015	0.0040	A102059
Orthophosphate (P)	mg/L	<0.0030	N/A	0.0030	0.0030	A098783
Nitrate plus Nitrite (N)	mg/L	1.09	N/A	0.10	0.10	A098773

RDL = Reportable Detection Limit
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable
(1) 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.

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

BV Labs Job #: C087847
Report Date: 2020/12/07

GHD Limited
Client Project #: 088877-07-02
Site Location: UPLAND
Your P.O. #: 73506780-8
Sampler Initials: RP

RESULTS OF CHEMICAL ANALYSES OF WATER

BV Labs ID		YY2202				YY2203			
Sampling Date		2020/11/27 15:00				2020/11/27 16:00			
COC Number		08488001				08488001			
	UNITS	WL-088877-271120-RP-08	RDL	MDL	QC Batch	WL-088877-271120-RP-09	RDL	MDL	QC Batch
ANIONS									
Nitrite (N)	mg/L	<0.10	0.10	0.10	A098776	0.10	0.10	0.10	A098776
Calculated Parameters									
Filter and HNO3 Preservation	N/A	FIELD	N/A	N/A	ONSITE	FIELD	N/A	N/A	ONSITE
Nitrate (N)	mg/L	<0.10	0.10	N/A	A098725	0.18	0.10	N/A	A098725
Sulphide (as H2S)	mg/L	<0.0020	0.0020	N/A	A098721	0.027	0.0020	N/A	A098721
Demand Parameters									
Biochemical Oxygen Demand	mg/L	3.2	2.0	N/A	A099809	3.2	2.0	N/A	A099809
Chemical Oxygen Demand	mg/L	72	10	10	A100464	92	10	10	A100464
Misc. Inorganics									
Conductivity	uS/cm	1100	2.0	N/A	A100073	770	2.0	N/A	A100073
Total Dissolved Solids	mg/L	650	10	N/A	A102280	470	10	N/A	A102280
Total Suspended Solids	mg/L	76	1.0	N/A	A102980	69	1.0	N/A	A102980
Anions									
Alkalinity (PP as CaCO3)	mg/L	<1.0	1.0	N/A	A100070	<1.0	1.0	N/A	A100070
Alkalinity (Total as CaCO3)	mg/L	380	1.0	N/A	A100070	280	1.0	N/A	A100070
Bicarbonate (HCO3)	mg/L	460	1.0	N/A	A100070	340	1.0	N/A	A100070
Carbonate (CO3)	mg/L	<1.0	1.0	N/A	A100070	<1.0	1.0	N/A	A100070
Hydroxide (OH)	mg/L	<1.0	1.0	N/A	A100070	<1.0	1.0	N/A	A100070
Total Sulphide	mg/L	<0.0018 (1)	0.0018	N/A	A105265	0.026 (1)	0.0018	N/A	A105265
Dissolved Chloride (Cl)	mg/L	82	1.0	N/A	A099884	63	1.0	N/A	A099884
Dissolved Sulphate (SO4)	mg/L	98	1.0	N/A	A099884	37	1.0	N/A	A099884
Nutrients									
Total Ammonia (N)	mg/L	1.8	0.015	0.0040	A102060	4.0 (2)	0.075	0.020	A102059
Orthophosphate (P)	mg/L	<0.0030	0.0030	0.0030	A098783	0.017	0.0030	0.0030	A098783
Nitrate plus Nitrite (N)	mg/L	<0.10	0.10	0.10	A098773	0.28	0.10	0.10	A098773

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.
(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 #: C087847
Report Date: 2020/12/07

GHD Limited
Client Project #: 088877-07-02
Site Location: UPLAND
Your P.O. #: 73506780-8
Sampler Initials: RP

CSR BTEX/VPH IN WATER (WATER)

BV Labs ID		YY2200	YY2200	YY2201			
Sampling Date		2020/11/27 13:30	2020/11/27 13:30	2020/11/27 13:35			
COC Number		08488001	08488001	08488001			
	UNITS	WL-088877-271120-RP-06	WL-088877-271120-RP-06 Lab-Dup	WL-088877-271120-RP-07	RDL	MDL	QC Batch
Calculated Parameters							
VPH (VHW6 to 10 - BTEX)	ug/L	<300	N/A	<300	300	300	A098732
Volatiles							
Methyl-tert-butylether (MTBE)	ug/L	<4.0	<4.0	<4.0	4.0	4.0	A099567
Benzene	ug/L	<0.40	<0.40	<0.40	0.40	0.40	A099567
Toluene	ug/L	<0.40	<0.40	<0.40	0.40	0.40	A099567
Ethylbenzene	ug/L	<0.40	<0.40	<0.40	0.40	0.40	A099567
m & p-Xylene	ug/L	<0.40	<0.40	<0.40	0.40	0.40	A099567
o-Xylene	ug/L	<0.40	<0.40	<0.40	0.40	0.40	A099567
Styrene	ug/L	<0.40	<0.40	<0.40	0.40	0.40	A099567
Xylenes (Total)	ug/L	<0.40	<0.40	<0.40	0.40	0.40	A099567
VH C6-C10	ug/L	<300	<300	<300	300	300	A099567
Surrogate Recovery (%)							
1,4-Difluorobenzene (sur.)	%	85	88	84	N/A	N/A	A099567
4-Bromofluorobenzene (sur.)	%	89	89	89	N/A	N/A	A099567
D4-1,2-Dichloroethane (sur.)	%	87	98	89	N/A	N/A	A099567

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

BV Labs Job #: C087847
Report Date: 2020/12/07

GHD Limited
Client Project #: 088877-07-02
Site Location: UPLAND
Your P.O. #: 73506780-8
Sampler Initials: RP

CSR BTEX/VPH IN WATER (WATER)

BV Labs ID		YY2202	YY2203	YY2204			
Sampling Date		2020/11/27 15:00	2020/11/27 16:00	2020/11/27 08:00			
COC Number		08488001	08488001	08488001			
	UNITS	WL-088877-271120-RP-08	WL-088877-271120-RP-09	TRIP BLANK-271120-RP-10	RDL	MDL	QC Batch
Calculated Parameters							
VPH (VHW6 to 10 - BTEX)	ug/L	<300	<300	<300	300	300	A098732
Volatiles							
Methyl-tert-butylether (MTBE)	ug/L	<4.0	<4.0	<4.0	4.0	4.0	A099567
Benzene	ug/L	<0.40	<0.40	<0.40	0.40	0.40	A099567
Toluene	ug/L	<0.40	0.48	<0.40	0.40	0.40	A099567
Ethylbenzene	ug/L	<0.40	<0.40	<0.40	0.40	0.40	A099567
m & p-Xylene	ug/L	<0.40	<0.40	<0.40	0.40	0.40	A099567
o-Xylene	ug/L	<0.40	<0.40	<0.40	0.40	0.40	A099567
Styrene	ug/L	<0.40	<0.40	<0.40	0.40	0.40	A099567
Xylenes (Total)	ug/L	<0.40	<0.40	<0.40	0.40	0.40	A099567
VH C6-C10	ug/L	<300	<300	<300	300	300	A099567
Surrogate Recovery (%)							
1,4-Difluorobenzene (sur.)	%	86	88	85	N/A	N/A	A099567
4-Bromofluorobenzene (sur.)	%	88	91	90	N/A	N/A	A099567
D4-1,2-Dichloroethane (sur.)	%	88	93	92	N/A	N/A	A099567

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 #: C087847
Report Date: 2020/12/07

GHD Limited
Client Project #: 088877-07-02
Site Location: UPLAND
Your P.O. #: 73506780-8
Sampler Initials: RP

CSR/CCME DISS. METALS IN WATER W/ CV HG (WATER)

BV Labs ID		YY2200	YY2201	YY2202			
Sampling Date		2020/11/27 13:30	2020/11/27 13:35	2020/11/27 15:00			
COC Number		08488001	08488001	08488001			
	UNITS	WL-088877-271120-RP-06	WL-088877-271120-RP-07	WL-088877-271120-RP-08	RDL	MDL	QC Batch
Calculated Parameters							
Dissolved Hardness (CaCO3)	mg/L	855	815	387	0.50	0.50	A098641
Elements							
Dissolved Mercury (Hg)	ug/L	0.0035	0.0036	<0.0019	0.0019	0.0019	A100673
Dissolved Metals by ICPMS							
Dissolved Aluminum (Al)	ug/L	9.3	8.8	15.3	3.0	0.030	A099845
Dissolved Antimony (Sb)	ug/L	<0.50	<0.50	<0.50	0.50	0.0020	A099845
Dissolved Arsenic (As)	ug/L	1.16	1.11	0.82	0.10	0.010	A099845
Dissolved Barium (Ba)	ug/L	49.1	47.7	41.5	1.0	0.0020	A099845
Dissolved Beryllium (Be)	ug/L	<0.10	<0.10	<0.10	0.10	0.0030	A099845
Dissolved Bismuth (Bi)	ug/L	<1.0	<1.0	<1.0	1.0	0.0010	A099845
Dissolved Boron (B)	ug/L	782	836	211	50	50	A099845
Dissolved Cadmium (Cd)	ug/L	0.119	0.139	0.012	0.010	0.0020	A099845
Dissolved Chromium (Cr)	ug/L	<1.0	<1.0	<1.0	1.0	0.020	A099845
Dissolved Cobalt (Co)	ug/L	5.14	4.82	7.10	0.20	0.20	A099845
Dissolved Copper (Cu)	ug/L	26.6	33.4	1.02	0.20	0.010	A099845
Dissolved Iron (Fe)	ug/L	784	371	19900	5.0	0.040	A099845
Dissolved Lead (Pb)	ug/L	<0.20	0.21	<0.20	0.20	0.0010	A099845
Dissolved Lithium (Li)	ug/L	<2.0	<2.0	<2.0	2.0	2.0	A099845
Dissolved Manganese (Mn)	ug/L	7390	6960	7390	1.0	0.030	A099845
Dissolved Molybdenum (Mo)	ug/L	2.0	1.9	<1.0	1.0	0.0020	A099845
Dissolved Nickel (Ni)	ug/L	3.9	3.6	<1.0	1.0	0.010	A099845
Dissolved Selenium (Se)	ug/L	0.36	0.33	0.15	0.10	0.0060	A099845
Dissolved Silicon (Si)	ug/L	9180	8890	4890	100	0.30	A099845
Dissolved Silver (Ag)	ug/L	<0.020	<0.020	<0.020	0.020	0.0020	A099845
Dissolved Strontium (Sr)	ug/L	914	899	438	1.0	0.0020	A099845
Dissolved Thallium (Tl)	ug/L	<0.010	<0.010	<0.010	0.010	0.010	A099845
Dissolved Tin (Sn)	ug/L	<5.0	<5.0	<5.0	5.0	0.0050	A099845
Dissolved Titanium (Ti)	ug/L	<5.0	<5.0	<5.0	5.0	0.30	A099845
Dissolved Uranium (U)	ug/L	6.15	5.99	<0.10	0.10	0.0010	A099845
Dissolved Vanadium (V)	ug/L	<5.0	<5.0	<5.0	5.0	0.020	A099845
Dissolved Zinc (Zn)	ug/L	18.0	16.7	7.5	5.0	0.050	A099845

RDL = Reportable Detection Limit

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

BV Labs Job #: C087847
Report Date: 2020/12/07

GHD Limited
Client Project #: 088877-07-02
Site Location: UPLAND
Your P.O. #: 73506780-8
Sampler Initials: RP

CSR/CCME DISS. METALS IN WATER W/ CV HG (WATER)

BV Labs ID		YY2200	YY2201	YY2202			
Sampling Date		2020/11/27 13:30	2020/11/27 13:35	2020/11/27 15:00			
COC Number		08488001	08488001	08488001			
	UNITS	WL-088877-271120-RP-06	WL-088877-271120-RP-07	WL-088877-271120-RP-08	RDL	MDL	QC Batch
Dissolved Zirconium (Zr)	ug/L	0.36	0.38	0.18	0.10	0.0080	A099845
Dissolved Calcium (Ca)	mg/L	265	252	114	0.050	0.0010	A098642
Dissolved Magnesium (Mg)	mg/L	47.3	44.7	24.9	0.050	0.00050	A098642
Dissolved Potassium (K)	mg/L	4.74	4.62	7.43	0.050	0.0020	A098642
Dissolved Sodium (Na)	mg/L	91.6	86.9	69.6	0.050	0.0010	A098642
Dissolved Sulphur (S)	mg/L	165	157	30.8	3.0	1.0	A098642
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 #: 088877-07-02
Site Location: UPLAND
Your P.O. #: 73506780-8
Sampler Initials: RP

CSR/CCME DISS. METALS IN WATER W/ CV HG (WATER)

BV Labs ID		YY2203			
Sampling Date		2020/11/27 16:00			
COC Number		08488001			
	UNITS	WL-088877-271120-RP-09	RDL	MDL	QC Batch
Calculated Parameters					
Dissolved Hardness (CaCO3)	mg/L	276	0.50	0.50	A098641
Elements					
Dissolved Mercury (Hg)	ug/L	<0.0019	0.0019	0.0019	A100673
Dissolved Metals by ICPMS					
Dissolved Aluminum (Al)	ug/L	57.8	3.0	0.030	A099845
Dissolved Antimony (Sb)	ug/L	<0.50	0.50	0.0020	A099845
Dissolved Arsenic (As)	ug/L	5.36	0.10	0.010	A099845
Dissolved Barium (Ba)	ug/L	27.6	1.0	0.0020	A099845
Dissolved Beryllium (Be)	ug/L	<0.10	0.10	0.0030	A099845
Dissolved Bismuth (Bi)	ug/L	<1.0	1.0	0.0010	A099845
Dissolved Boron (B)	ug/L	98	50	50	A099845
Dissolved Cadmium (Cd)	ug/L	0.016	0.010	0.0020	A099845
Dissolved Chromium (Cr)	ug/L	1.3	1.0	0.020	A099845
Dissolved Cobalt (Co)	ug/L	5.60	0.20	0.20	A099845
Dissolved Copper (Cu)	ug/L	8.94	0.20	0.010	A099845
Dissolved Iron (Fe)	ug/L	6680	5.0	0.040	A099845
Dissolved Lead (Pb)	ug/L	<0.20	0.20	0.0010	A099845
Dissolved Lithium (Li)	ug/L	<2.0	2.0	2.0	A099845
Dissolved Manganese (Mn)	ug/L	4200	1.0	0.030	A099845
Dissolved Molybdenum (Mo)	ug/L	<1.0	1.0	0.0020	A099845
Dissolved Nickel (Ni)	ug/L	4.2	1.0	0.010	A099845
Dissolved Selenium (Se)	ug/L	0.23	0.10	0.0060	A099845
Dissolved Silicon (Si)	ug/L	11600	100	0.30	A099845
Dissolved Silver (Ag)	ug/L	<0.020	0.020	0.0020	A099845
Dissolved Strontium (Sr)	ug/L	321	1.0	0.0020	A099845
Dissolved Thallium (Tl)	ug/L	<0.010	0.010	0.010	A099845
Dissolved Tin (Sn)	ug/L	<5.0	5.0	0.0050	A099845
Dissolved Titanium (Ti)	ug/L	<5.0	5.0	0.30	A099845
Dissolved Uranium (U)	ug/L	0.15	0.10	0.0010	A099845
Dissolved Vanadium (V)	ug/L	<5.0	5.0	0.020	A099845
Dissolved Zinc (Zn)	ug/L	20.2	5.0	0.050	A099845

RDL = Reportable Detection Limit

GHD Limited
Client Project #: 088877-07-02
Site Location: UPLAND
Your P.O. #: 73506780-8
Sampler Initials: RP

CSR/CCME DISS. METALS IN WATER W/ CV HG (WATER)

BV Labs ID		YY2203			
Sampling Date		2020/11/27 16:00			
COC Number		08488001			
	UNITS	WL-088877-271120-RP-09	RDL	MDL	QC Batch
Dissolved Zirconium (Zr)	ug/L	0.49	0.10	0.0080	A099845
Dissolved Calcium (Ca)	mg/L	79.4	0.050	0.0010	A098642
Dissolved Magnesium (Mg)	mg/L	19.0	0.050	0.00050	A098642
Dissolved Potassium (K)	mg/L	6.41	0.050	0.0020	A098642
Dissolved Sodium (Na)	mg/L	28.6	0.050	0.0010	A098642
Dissolved Sulphur (S)	mg/L	13.0	3.0	1.0	A098642
RDL = Reportable Detection Limit					

BV Labs Job #: C087847
Report Date: 2020/12/07

GHD Limited
Client Project #: 088877-07-02
Site Location: UPLAND
Your P.O. #: 73506780-8
Sampler Initials: RP

CSR/CCME TOT. METALS IN WATER W/ CV HG (WATER)

BV Labs ID		YY2200			YY2201			
Sampling Date		2020/11/27 13:30			2020/11/27 13:35			
COC Number		08488001			08488001			
	UNITS	WL-088877-271120-RP-06	RDL	MDL	WL-088877-271120-RP-07	RDL	MDL	QC Batch
Calculated Parameters								
Total Hardness (CaCO3)	mg/L	1030	0.50	0.50	717	0.50	0.50	A098640
Elements								
Total Mercury (Hg)	ug/L	0.0152	0.0019	0.0019	0.0123	0.0019	0.0019	A100750
Total Metals by ICPMS								
Total Aluminum (Al)	ug/L	92.4	6.0	0.060	367	3.0	0.030	A101489
Total Antimony (Sb)	ug/L	<1.0	1.0	0.0040	<0.50	0.50	0.0020	A101489
Total Arsenic (As)	ug/L	1.75	0.20	0.020	1.37	0.10	0.010	A101489
Total Barium (Ba)	ug/L	65.6	2.0	0.0040	46.8	1.0	0.0020	A101489
Total Beryllium (Be)	ug/L	<0.20	0.20	0.0060	<0.10	0.10	0.0030	A101489
Total Bismuth (Bi)	ug/L	<2.0	2.0	0.0020	<1.0	1.0	0.0010	A101489
Total Boron (B)	ug/L	1390	100	100	698	50	50	A101489
Total Cadmium (Cd)	ug/L	0.250	0.020	0.0040	0.130	0.010	0.0020	A101489
Total Chromium (Cr)	ug/L	<2.0	2.0	0.040	2.0	1.0	0.020	A101489
Total Cobalt (Co)	ug/L	5.56	0.40	0.40	4.97	0.20	0.20	A101489
Total Copper (Cu)	ug/L	48.9	1.0	0.060	81.3	0.50	0.030	A101489
Total Iron (Fe)	ug/L	3130	20	1.4	3500	10	0.70	A101489
Total Lead (Pb)	ug/L	2.12	0.40	0.0020	6.50	0.20	0.0010	A101489
Total Lithium (Li)	ug/L	<4.0	4.0	4.0	<2.0	2.0	2.0	A101489
Total Manganese (Mn)	ug/L	7300	2.0	0.060	6850	1.0	0.030	A101489
Total Molybdenum (Mo)	ug/L	2.8	2.0	0.0040	1.7	1.0	0.0020	A101489
Total Nickel (Ni)	ug/L	5.2	2.0	0.020	3.9	1.0	0.010	A101489
Total Selenium (Se)	ug/L	0.42	0.20	0.012	0.33	0.10	0.0060	A101489
Total Silicon (Si)	ug/L	8470	200	0.60	9630	100	0.30	A101489
Total Silver (Ag)	ug/L	<0.040	0.040	0.0040	<0.020	0.020	0.0020	A101489
Total Strontium (Sr)	ug/L	1110	2.0	0.0040	770	1.0	0.0020	A101489
Total Thallium (Tl)	ug/L	<0.020	0.020	0.020	<0.010	0.010	0.010	A101489
Total Tin (Sn)	ug/L	<10	10	0.010	<5.0	5.0	0.0050	A101489
Total Titanium (Ti)	ug/L	<10	10	0.60	29.5	5.0	0.30	A101489
Total Uranium (U)	ug/L	10.0	0.20	0.0020	4.62	0.10	0.0010	A101489
Total Vanadium (V)	ug/L	<10	10	0.040	<5.0	5.0	0.020	A101489
Total Zinc (Zn)	ug/L	19	10	0.10	31.4	5.0	0.050	A101489

RDL = Reportable Detection Limit

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

BV Labs Job #: C087847
Report Date: 2020/12/07

GHD Limited
Client Project #: 088877-07-02
Site Location: UPLAND
Your P.O. #: 73506780-8
Sampler Initials: RP

CSR/CCME TOT. METALS IN WATER W/ CV HG (WATER)

BV Labs ID		YY2200			YY2201			
Sampling Date		2020/11/27 13:30			2020/11/27 13:35			
COC Number		08488001			08488001			
	UNITS	WL-088877-271120-RP-06	RDL	MDL	WL-088877-271120-RP-07	RDL	MDL	QC Batch
Total Zirconium (Zr)	ug/L	0.50	0.20	0.016	0.48	0.10	0.0080	A101489
Total Calcium (Ca)	mg/L	319	0.10	0.0020	226	0.050	0.0010	A098643
Total Magnesium (Mg)	mg/L	55.9	0.10	0.0010	37.1	0.050	0.00050	A098643
Total Potassium (K)	mg/L	5.19	0.10	0.0040	4.27	0.050	0.0020	A098643
Total Sodium (Na)	mg/L	120	0.10	0.0020	66.7	0.050	0.0010	A098643
Total Sulphur (S)	mg/L	224	6.0	2.0	127	3.0	1.0	A098643
RDL = Reportable Detection Limit								

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

BV Labs Job #: C087847
Report Date: 2020/12/07

GHD Limited
Client Project #: 088877-07-02
Site Location: UPLAND
Your P.O. #: 73506780-8
Sampler Initials: RP

CSR/CCME TOT. METALS IN WATER W/ CV HG (WATER)

BV Labs ID		YY2202	YY2203			
Sampling Date		2020/11/27 15:00	2020/11/27 16:00			
COC Number		08488001	08488001			
	UNITS	WL-088877-271120-RP-08	WL-088877-271120-RP-09	RDL	MDL	QC Batch
Calculated Parameters						
Total Hardness (CaCO3)	mg/L	385	296	0.50	0.50	A098640
Elements						
Total Mercury (Hg)	ug/L	0.0028	0.0030	0.0019	0.0019	A100750
Total Metals by ICPMS						
Total Aluminum (Al)	ug/L	637	1160	3.0	0.030	A101489
Total Antimony (Sb)	ug/L	<0.50	<0.50	0.50	0.0020	A101489
Total Arsenic (As)	ug/L	1.48	8.19	0.10	0.010	A101489
Total Barium (Ba)	ug/L	45.6	35.1	1.0	0.0020	A101489
Total Beryllium (Be)	ug/L	<0.10	<0.10	0.10	0.0030	A101489
Total Bismuth (Bi)	ug/L	<1.0	<1.0	1.0	0.0010	A101489
Total Boron (B)	ug/L	227	106	50	50	A101489
Total Cadmium (Cd)	ug/L	0.041	0.038	0.010	0.0020	A101489
Total Chromium (Cr)	ug/L	<1.0	2.6	1.0	0.020	A101489
Total Cobalt (Co)	ug/L	7.51	6.55	0.20	0.20	A101489
Total Copper (Cu)	ug/L	4.93	21.5	0.50	0.030	A101489
Total Iron (Fe)	ug/L	26100	12800	10	0.70	A101489
Total Lead (Pb)	ug/L	3.02	2.34	0.20	0.0010	A101489
Total Lithium (Li)	ug/L	<2.0	<2.0	2.0	2.0	A101489
Total Manganese (Mn)	ug/L	7410	4530	1.0	0.030	A101489
Total Molybdenum (Mo)	ug/L	<1.0	1.0	1.0	0.0020	A101489
Total Nickel (Ni)	ug/L	1.5	5.3	1.0	0.010	A101489
Total Selenium (Se)	ug/L	0.18	0.29	0.10	0.0060	A101489
Total Silicon (Si)	ug/L	5650	13600	100	0.30	A101489
Total Silver (Ag)	ug/L	0.022	0.023	0.020	0.0020	A101489
Total Strontium (Sr)	ug/L	448	337	1.0	0.0020	A101489
Total Thallium (Tl)	ug/L	<0.010	<0.010	0.010	0.010	A101489
Total Tin (Sn)	ug/L	<5.0	<5.0	5.0	0.0050	A101489
Total Titanium (Ti)	ug/L	54.1	70.7	5.0	0.30	A101489
Total Uranium (U)	ug/L	<0.10	0.21	0.10	0.0010	A101489
Total Vanadium (V)	ug/L	5.3	10.2	5.0	0.020	A101489
Total Zinc (Zn)	ug/L	17.1	32.1	5.0	0.050	A101489

RDL = Reportable Detection Limit

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

BV Labs Job #: C087847
Report Date: 2020/12/07

GHD Limited
Client Project #: 088877-07-02
Site Location: UPLAND
Your P.O. #: 73506780-8
Sampler Initials: RP

CSR/CCME TOT. METALS IN WATER W/ CV HG (WATER)

BV Labs ID		YY2202	YY2203			
Sampling Date		2020/11/27 15:00	2020/11/27 16:00			
COC Number		08488001	08488001			
	UNITS	WL-088877-271120-RP-08	WL-088877-271120-RP-09	RDL	MDL	QC Batch
Total Zirconium (Zr)	ug/L	0.46	0.66	0.10	0.0080	A101489
Total Calcium (Ca)	mg/L	115	86.1	0.050	0.0010	A098643
Total Magnesium (Mg)	mg/L	23.9	19.6	0.050	0.00050	A098643
Total Potassium (K)	mg/L	7.28	6.99	0.050	0.0020	A098643
Total Sodium (Na)	mg/L	66.1	31.2	0.050	0.0010	A098643
Total Sulphur (S)	mg/L	30.6	12.1	3.0	1.0	A098643
RDL = Reportable Detection Limit						

BV Labs Job #: C087847
Report Date: 2020/12/07

GHD Limited
Client Project #: 088877-07-02
Site Location: UPLAND
Your P.O. #: 73506780-8
Sampler Initials: RP

CSR PAH IN WATER BY GC-MS (WATER)

BV Labs ID		YY2200	YY2201	YY2202			
Sampling Date		2020/11/27 13:30	2020/11/27 13:35	2020/11/27 15:00			
COC Number		08488001	08488001	08488001			
	UNITS	WL-088877-271120-RP-06	WL-088877-271120-RP-07	WL-088877-271120-RP-08	RDL	MDL	QC Batch
Calculated Parameters							
Low Molecular Weight PAH`s	ug/L	25	21	2.0	0.10	0.010	A098728
High Molecular Weight PAH`s	ug/L	0.42	0.40	<0.050	0.050	0.020	A098728
Total PAH	ug/L	26	21	2.0	0.10	0.010	A098728
Polycyclic Aromatics							
Quinoline	ug/L	<0.020	<0.020	<0.020	0.020	0.020	A101614
Naphthalene	ug/L	15	12	0.33	0.10	0.050	A101614
1-Methylnaphthalene	ug/L	2.8	2.4	0.077	0.050	0.050	A101614
2-Methylnaphthalene	ug/L	0.78	0.60	<0.10	0.10	0.050	A101614
Acenaphthylene	ug/L	0.060	0.056	<0.050	0.050	0.050	A101614
Acenaphthene	ug/L	3.8	3.3	1.3	0.050	0.050	A101614
Fluorene	ug/L	1.7	1.5	0.26	0.050	0.050	A101614
Phenanthrene	ug/L	0.97	0.90	<0.050	0.050	0.050	A101614
Anthracene	ug/L	0.24	0.24	0.030	0.010	0.010	A101614
Acridine	ug/L	0.20	0.16	<0.050	0.050	0.050	A101614
Fluoranthene	ug/L	0.25	0.23	<0.020	0.020	0.020	A101614
Pyrene	ug/L	0.16	0.15	<0.020	0.020	0.020	A101614
Benzo(a)anthracene	ug/L	0.011	0.012	<0.010	0.010	0.010	A101614
Chrysene	ug/L	<0.020	<0.020	<0.020	0.020	0.020	A101614
Benzo(b&j)fluoranthene	ug/L	<0.030	<0.030	<0.030	0.030	0.030	A101614
Benzo(k)fluoranthene	ug/L	<0.050	<0.050	<0.050	0.050	0.050	A101614
Benzo(a)pyrene	ug/L	<0.0050	<0.0050	<0.0050	0.0050	0.0050	A101614
Indeno(1,2,3-cd)pyrene	ug/L	<0.050	<0.050	<0.050	0.050	0.050	A101614
Dibenz(a,h)anthracene	ug/L	<0.0030	<0.0030	<0.0030	0.0030	0.0030	A101614
Benzo(g,h,i)perylene	ug/L	<0.050	<0.050	<0.050	0.050	0.050	A101614
Surrogate Recovery (%)							
D10-ANTHRACENE (sur.)	%	95	101	99	N/A	N/A	A101614
D8-ACENAPHTHYLENE (sur.)	%	97	101	96	N/A	N/A	A101614
D8-NAPHTHALENE (sur.)	%	92	93	92	N/A	N/A	A101614
TERPHENYL-D14 (sur.)	%	92	100	95	N/A	N/A	A101614

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

GHD Limited
Client Project #: 088877-07-02
Site Location: UPLAND
Your P.O. #: 73506780-8
Sampler Initials: RP

CSR PAH IN WATER BY GC-MS (WATER)

BV Labs ID		YY2203			
Sampling Date		2020/11/27 16:00			
COC Number		08488001			
	UNITS	WL-088877-271120-RP-09	RDL	MDL	QC Batch
Calculated Parameters					
Low Molecular Weight PAH`s	ug/L	150	0.50	0.050	A098728
High Molecular Weight PAH`s	ug/L	7.3	0.050	0.020	A098728
Total PAH	ug/L	160	0.50	0.050	A098728
Polycyclic Aromatics					
Quinoline	ug/L	0.12	0.020	0.020	A101614
Naphthalene	ug/L	83 (1)	0.50	0.25	A101614
1-Methylnaphthalene	ug/L	11	0.050	0.050	A101614
2-Methylnaphthalene	ug/L	15	0.10	0.050	A101614
Acenaphthylene	ug/L	0.20	0.050	0.050	A101614
Acenaphthene	ug/L	15	0.050	0.050	A101614
Fluorene	ug/L	11	0.050	0.050	A101614
Phenanthrene	ug/L	13	0.050	0.050	A101614
Anthracene	ug/L	2.3	0.010	0.010	A101614
Acridine	ug/L	0.37	0.050	0.050	A101614
Fluoranthene	ug/L	3.9	0.020	0.020	A101614
Pyrene	ug/L	2.8	0.020	0.020	A101614
Benzo(a)anthracene	ug/L	0.20	0.010	0.010	A101614
Chrysene	ug/L	0.26	0.020	0.020	A101614
Benzo(b&j)fluoranthene	ug/L	0.095	0.030	0.030	A101614
Benzo(k)fluoranthene	ug/L	<0.050	0.050	0.050	A101614
Benzo(a)pyrene	ug/L	0.058	0.0050	0.0050	A101614
Indeno(1,2,3-cd)pyrene	ug/L	<0.050	0.050	0.050	A101614
Dibenz(a,h)anthracene	ug/L	0.0047	0.0030	0.0030	A101614
Benzo(g,h,i)perylene	ug/L	<0.050	0.050	0.050	A101614
Surrogate Recovery (%)					
D10-ANTHRACENE (sur.)	%	97	N/A	N/A	A101614
D8-ACENAPHTHYLENE (sur.)	%	96	N/A	N/A	A101614
D8-NAPHTHALENE (sur.)	%	83	N/A	N/A	A101614

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

BV Labs Job #: C087847
Report Date: 2020/12/07

GHD Limited
Client Project #: 088877-07-02
Site Location: UPLAND
Your P.O. #: 73506780-8
Sampler Initials: RP

CSR PAH IN WATER BY GC-MS (WATER)

BV Labs ID		YY2203			
Sampling Date		2020/11/27 16:00			
COC Number		08488001			
	UNITS	WL-088877-271120-RP-09	RDL	MDL	QC Batch
TERPHENYL-D14 (sur.)	%	93	N/A	N/A	A101614

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 #: C087847
Report Date: 2020/12/07

GHD Limited
Client Project #: 088877-07-02
Site Location: UPLAND
Your P.O. #: 73506780-8
Sampler Initials: RP

GENERAL COMMENTS

Sample YY2200 [WL-088877-271120-RP-06] : Sample was analyzed past method specified hold time for Total Sulphide. Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised.

Sample YY2201 [WL-088877-271120-RP-07] : Sample was analyzed past method specified hold time for Total Sulphide. Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised.

Sample YY2202 [WL-088877-271120-RP-08] : Sample was analyzed past method specified hold time for Total Sulphide. Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised.

Sample YY2203 [WL-088877-271120-RP-09] : Sample was analyzed past method specified hold time for Total Sulphide. Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised.

CSR/CCME TOT. METALS IN WATER W/ CV HG (WATER) Comments

Sample YY2200 [WL-088877-271120-RP-06] Elements by CRC ICPMS (total): RDL raised due to concentration over linear range, sample dilution required.

Results relate only to the items tested.

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
A099567	1,4-Difluorobenzene (sur.)	2020/11/30	86 (1)	70 - 130	85	70 - 130	83	%		
A099567	4-Bromofluorobenzene (sur.)	2020/11/30	92 (1)	70 - 130	90	70 - 130	87	%		
A099567	D4-1,2-Dichloroethane (sur.)	2020/11/30	93 (1)	70 - 130	85	70 - 130	95	%		
A101614	D10-ANTHRACENE (sur.)	2020/12/03	87	50 - 140	82	50 - 140	109	%		
A101614	D8-ACENAPHTHYLENE (sur.)	2020/12/03	84	50 - 140	96	50 - 140	99	%		
A101614	D8-NAPHTHALENE (sur.)	2020/12/03	81	50 - 140	88	50 - 140	96	%		
A101614	TERPHENYL-D14 (sur.)	2020/12/03	87	50 - 140	85	50 - 140	107	%		
A098773	Nitrate plus Nitrite (N)	2020/11/28			105	80 - 120	<0.10	mg/L		
A098776	Nitrite (N)	2020/11/28			100	80 - 120	<0.10	mg/L		
A098783	Orthophosphate (P)	2020/11/28			98	80 - 120	<0.0030	mg/L		
A099567	Benzene	2020/11/30	84 (1)	70 - 130	88	70 - 130	<0.40	ug/L	NC (2)	30
A099567	Ethylbenzene	2020/11/30	87 (1)	70 - 130	92	70 - 130	<0.40	ug/L	NC (2)	30
A099567	m & p-Xylene	2020/11/30	87 (1)	70 - 130	91	70 - 130	<0.40	ug/L	NC (2)	30
A099567	Methyl-tert-butylether (MTBE)	2020/11/30	86 (1)	70 - 130	88	70 - 130	<4.0	ug/L	NC (2)	30
A099567	o-Xylene	2020/11/30	87 (1)	70 - 130	91	70 - 130	<0.40	ug/L	NC (2)	30
A099567	Styrene	2020/11/30	91 (1)	70 - 130	95	70 - 130	<0.40	ug/L	NC (2)	30
A099567	Toluene	2020/11/30	84 (1)	70 - 130	89	70 - 130	<0.40	ug/L	NC (2)	30
A099567	VH C6-C10	2020/11/30			93	70 - 130	<300	ug/L	NC (2)	30
A099567	Xylenes (Total)	2020/11/30					<0.40	ug/L	NC (2)	30
A099809	Biochemical Oxygen Demand	2020/12/05			102	85 - 115	<2.0	mg/L	1.5 (3)	20
A099845	Dissolved Aluminum (Al)	2020/12/01	105	80 - 120	101	80 - 120	<3.0	ug/L	0.87 (4)	20
A099845	Dissolved Antimony (Sb)	2020/12/01	103	80 - 120	100	80 - 120	<0.50	ug/L	NC (4)	20
A099845	Dissolved Arsenic (As)	2020/12/01	101	80 - 120	99	80 - 120	<0.10	ug/L	0.35 (4)	20
A099845	Dissolved Barium (Ba)	2020/12/01	NC	80 - 120	100	80 - 120	<1.0	ug/L	0.98 (4)	20
A099845	Dissolved Beryllium (Be)	2020/12/01	102	80 - 120	104	80 - 120	<0.10	ug/L	NC (4)	20
A099845	Dissolved Bismuth (Bi)	2020/12/01	97	80 - 120	100	80 - 120	<1.0	ug/L	NC (4)	20
A099845	Dissolved Boron (B)	2020/12/01	103	80 - 120	107	80 - 120	<50	ug/L	NC (4)	20
A099845	Dissolved Cadmium (Cd)	2020/12/01	103	80 - 120	101	80 - 120	<0.010	ug/L	6.6 (4)	20
A099845	Dissolved Chromium (Cr)	2020/12/01	101	80 - 120	101	80 - 120	<1.0	ug/L	NC (4)	20
A099845	Dissolved Cobalt (Co)	2020/12/01	97	80 - 120	98	80 - 120	<0.20	ug/L	NC (4)	20
A099845	Dissolved Copper (Cu)	2020/12/01	97	80 - 120	99	80 - 120	<0.20	ug/L	1.3 (4)	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
A099845	Dissolved Iron (Fe)	2020/12/01	113	80 - 120	103	80 - 120	<5.0	ug/L	12 (4)	20
A099845	Dissolved Lead (Pb)	2020/12/01	101	80 - 120	101	80 - 120	<0.20	ug/L	NC (4)	20
A099845	Dissolved Lithium (Li)	2020/12/01	99	80 - 120	97	80 - 120	<2.0	ug/L	NC (4)	20
A099845	Dissolved Manganese (Mn)	2020/12/01	101	80 - 120	100	80 - 120	<1.0	ug/L	2.1 (4)	20
A099845	Dissolved Molybdenum (Mo)	2020/12/01	105	80 - 120	104	80 - 120	<1.0	ug/L	2.7 (4)	20
A099845	Dissolved Nickel (Ni)	2020/12/01	98	80 - 120	101	80 - 120	<1.0	ug/L	1.2 (4)	20
A099845	Dissolved Selenium (Se)	2020/12/01	104	80 - 120	101	80 - 120	<0.10	ug/L	5.2 (4)	20
A099845	Dissolved Silicon (Si)	2020/12/01	102	80 - 120	99	80 - 120	<100	ug/L	1.4 (4)	20
A099845	Dissolved Silver (Ag)	2020/12/01	102	80 - 120	100	80 - 120	<0.020	ug/L	NC (4)	20
A099845	Dissolved Strontium (Sr)	2020/12/01	NC	80 - 120	100	80 - 120	<1.0	ug/L	1.4 (4)	20
A099845	Dissolved Thallium (Tl)	2020/12/01	102	80 - 120	101	80 - 120	<0.010	ug/L	NC (4)	20
A099845	Dissolved Tin (Sn)	2020/12/01	103	80 - 120	101	80 - 120	<5.0	ug/L	NC (4)	20
A099845	Dissolved Titanium (Ti)	2020/12/01	104	80 - 120	102	80 - 120	<5.0	ug/L	NC (4)	20
A099845	Dissolved Uranium (U)	2020/12/01	104	80 - 120	101	80 - 120	<0.10	ug/L	NC (4)	20
A099845	Dissolved Vanadium (V)	2020/12/01	103	80 - 120	101	80 - 120	<5.0	ug/L	NC (4)	20
A099845	Dissolved Zinc (Zn)	2020/12/01	104	80 - 120	105	80 - 120	<5.0	ug/L	0.14 (4)	20
A099845	Dissolved Zirconium (Zr)	2020/12/01	107	80 - 120	101	80 - 120	<0.10	ug/L	NC (4)	20
A099884	Dissolved Chloride (Cl)	2020/11/30	102	80 - 120	104	80 - 120	<1.0	mg/L	4.4 (4)	20
A099884	Dissolved Sulphate (SO4)	2020/11/30	100	80 - 120	99	80 - 120	<1.0	mg/L	0.34 (4)	20
A100070	Alkalinity (PP as CaCO3)	2020/11/30					<1.0	mg/L	NC (4)	20
A100070	Alkalinity (Total as CaCO3)	2020/11/30	NC	80 - 120	93	80 - 120	<1.0	mg/L	2.7 (4)	20
A100070	Bicarbonate (HCO3)	2020/11/30					<1.0	mg/L	2.7 (4)	20
A100070	Carbonate (CO3)	2020/11/30					<1.0	mg/L	NC (4)	20
A100070	Hydroxide (OH)	2020/11/30					<1.0	mg/L	NC (4)	20
A100073	Conductivity	2020/11/30			98	80 - 120	<2.0	uS/cm	1.8 (4)	10
A100464	Chemical Oxygen Demand	2020/12/01	NC (5)	80 - 120	104	80 - 120	<10	mg/L	7.7 (6)	20
A100673	Dissolved Mercury (Hg)	2020/12/01	89	80 - 120	85	80 - 120	<0.0019	ug/L	NC (4)	20
A100750	Total Mercury (Hg)	2020/12/01	95	80 - 120	94	80 - 120	<0.0019	ug/L	NC (4)	20
A101489	Total Aluminum (Al)	2020/12/02	99	80 - 120	100	80 - 120	<3.0	ug/L		
A101489	Total Antimony (Sb)	2020/12/02	101	80 - 120	101	80 - 120	<0.50	ug/L		
A101489	Total Arsenic (As)	2020/12/02	99	80 - 120	98	80 - 120	<0.10	ug/L		

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
A101489	Total Barium (Ba)	2020/12/02	99	80 - 120	98	80 - 120	<1.0	ug/L		
A101489	Total Beryllium (Be)	2020/12/02	102	80 - 120	101	80 - 120	<0.10	ug/L		
A101489	Total Bismuth (Bi)	2020/12/02	98	80 - 120	99	80 - 120	<1.0	ug/L		
A101489	Total Boron (B)	2020/12/02	104	80 - 120	105	80 - 120	<50	ug/L		
A101489	Total Cadmium (Cd)	2020/12/02	101	80 - 120	100	80 - 120	<0.010	ug/L		
A101489	Total Chromium (Cr)	2020/12/02	97	80 - 120	99	80 - 120	<1.0	ug/L		
A101489	Total Cobalt (Co)	2020/12/02	96	80 - 120	98	80 - 120	<0.20	ug/L		
A101489	Total Copper (Cu)	2020/12/02	95	80 - 120	97	80 - 120	<0.50	ug/L		
A101489	Total Iron (Fe)	2020/12/02	101	80 - 120	100	80 - 120	<10	ug/L		
A101489	Total Lead (Pb)	2020/12/02	100	80 - 120	99	80 - 120	<0.20	ug/L		
A101489	Total Lithium (Li)	2020/12/02	99	80 - 120	99	80 - 120	<2.0	ug/L		
A101489	Total Manganese (Mn)	2020/12/02	98	80 - 120	100	80 - 120	<1.0	ug/L		
A101489	Total Molybdenum (Mo)	2020/12/02	103	80 - 120	103	80 - 120	<1.0	ug/L		
A101489	Total Nickel (Ni)	2020/12/02	98	80 - 120	99	80 - 120	<1.0	ug/L		
A101489	Total Selenium (Se)	2020/12/02	100	80 - 120	97	80 - 120	<0.10	ug/L		
A101489	Total Silicon (Si)	2020/12/02	101	80 - 120	102	80 - 120	<100	ug/L		
A101489	Total Silver (Ag)	2020/12/02	97	80 - 120	98	80 - 120	<0.020	ug/L		
A101489	Total Strontium (Sr)	2020/12/02	96	80 - 120	96	80 - 120	<1.0	ug/L		
A101489	Total Thallium (Tl)	2020/12/02	100	80 - 120	100	80 - 120	<0.010	ug/L		
A101489	Total Tin (Sn)	2020/12/02	101	80 - 120	101	80 - 120	<5.0	ug/L		
A101489	Total Titanium (Ti)	2020/12/02	101	80 - 120	103	80 - 120	<5.0	ug/L		
A101489	Total Uranium (U)	2020/12/02	104	80 - 120	105	80 - 120	<0.10	ug/L		
A101489	Total Vanadium (V)	2020/12/02	97	80 - 120	99	80 - 120	<5.0	ug/L		
A101489	Total Zinc (Zn)	2020/12/02	100	80 - 120	101	80 - 120	<5.0	ug/L		
A101489	Total Zirconium (Zr)	2020/12/02	101	80 - 120	100	80 - 120	<0.10	ug/L		
A101614	1-Methylnaphthalene	2020/12/04	88	50 - 140	94	50 - 140	<0.050	ug/L	NC (4)	40
A101614	2-Methylnaphthalene	2020/12/04	88	50 - 140	94	50 - 140	<0.10	ug/L	NC (4)	40
A101614	Acenaphthene	2020/12/04	92	50 - 140	96	50 - 140	<0.050	ug/L	NC (4)	40
A101614	Acenaphthylene	2020/12/03	87	50 - 140	93	50 - 140	<0.050	ug/L		
A101614	Acridine	2020/12/04	110	50 - 140	108	50 - 140	<0.050	ug/L	NC (4)	40
A101614	Anthracene	2020/12/04	92	50 - 140	80	50 - 140	<0.010	ug/L	NC (4)	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
A101614	Benzo(a)anthracene	2020/12/03	90	50 - 140	100	50 - 140	<0.010	ug/L		
A101614	Benzo(a)pyrene	2020/12/03	81	50 - 140	84	50 - 140	<0.0050	ug/L		
A101614	Benzo(b&j)fluoranthene	2020/12/03	84	50 - 140	87	50 - 140	<0.030	ug/L		
A101614	Benzo(g,h,i)perylene	2020/12/03	82	50 - 140	97	50 - 140	<0.050	ug/L		
A101614	Benzo(k)fluoranthene	2020/12/03	98	50 - 140	105	50 - 140	<0.050	ug/L		
A101614	Chrysene	2020/12/03	91	50 - 140	93	50 - 140	<0.020	ug/L		
A101614	Dibenz(a,h)anthracene	2020/12/03	81	50 - 140	100	50 - 140	<0.0030	ug/L		
A101614	Fluoranthene	2020/12/03	93	50 - 140	87	50 - 140	<0.020	ug/L		
A101614	Fluorene	2020/12/04	90	50 - 140	96	50 - 140	<0.050	ug/L	NC (4)	40
A101614	Indeno(1,2,3-cd)pyrene	2020/12/03	92	50 - 140	90	50 - 140	<0.050	ug/L		
A101614	Naphthalene	2020/12/04	90	50 - 140	96	50 - 140	<0.10	ug/L	NC (4)	40
A101614	Phenanthrene	2020/12/04	88	50 - 140	93	50 - 140	<0.050	ug/L	NC (4)	40
A101614	Pyrene	2020/12/03	92	50 - 140	84	50 - 140	<0.020	ug/L		
A101614	Quinoline	2020/12/03	113	50 - 140	109	50 - 140	<0.020	ug/L		
A102059	Total Ammonia (N)	2020/12/02	84 (7)	80 - 120	98	80 - 120	<0.015	mg/L	11 (8)	20
A102060	Total Ammonia (N)	2020/12/02	99	80 - 120	101	80 - 120	<0.015	mg/L	4.7 (4)	20
A102280	Total Dissolved Solids	2020/12/03	101	80 - 120	97	80 - 120	<10	mg/L	4.2 (4)	20
A102980	Total Suspended Solids	2020/12/04	108	80 - 120	104	80 - 120	<1.0	mg/L	NC (4)	20
A105265	Total Sulphide	2020/12/05	97	80 - 120	106	80 - 120	<0.0018	mg/L	NC (4)	20
A107205	Dissolved Chloride (Cl)	2020/12/07			104	80 - 120	<1.0	mg/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
A107205	Dissolved Sulphate (SO4)	2020/12/07			98	80 - 120	<1.0	mg/L		

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) Matrix Spike Parent ID [YY2200-10]

(2) Duplicate Parent ID [YY2200-10]

(3) Duplicate Parent ID [YY2200-03]

(4) Duplicate Parent ID

(5) Matrix Spike Parent ID [YY2200-11]

(6) Duplicate Parent ID [YY2200-11]

(7) Matrix Spike Parent ID [YY2201-12]

(8) Duplicate Parent ID [YY2201-12]

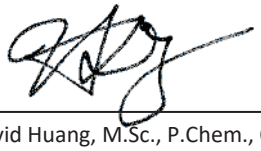
Bureau Veritas Laboratories Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

BV Labs Job #: C087847
Report Date: 2020/12/07

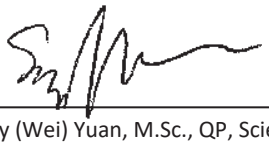
GHD Limited
Client Project #: 088877-07-02
Site Location: UPLAND
Your P.O. #: 73506780-8
Sampler Initials: RP

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).



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



Sandy (Wei) Yuan, M.Sc., QP, Scientific Specialist

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

08488001

Bureau Veritas
Burnaby: 4606 Canada Way, Burnaby, BC V5G 1K5 Toll Free (800) 665-8566
Victoria: 460 Tennyson Place, Unit 1, Victoria, BC V8Z 6S8 Toll Free (866) 385-6112
bvlabs.com

CHAIN OF CUSTODY RECORD

Page 1 of 1

Invoice Information		Report Information (if differs from invoice)		Project Information		Turnaround Time (TAT) Required
Company:	#163 GHD Limited	Company:	#28639 GHD Limited	Quotation		☑ 5 - 7 Days Regular (Most analyses)
Contact Name:	Airesse MacPhee	Contact Name:	Airesse MacPhee	P.O. #/AFE#:	7350678[illegible]8	PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS
Address:	455 Pillip Street	Address:	10271 Shellbridge Way		(Leachate Water)	Rush TAT (Surcharges will be applied)
	Waterloo, ON PC: N2L 3X2		Richmond, BC PC: V6X 2W8	Project #:	088877-07-02	☐ Same Day ☐ 2 Days
Phone/Fax:	(519) 884-0510	Phone/Fax:	(604) 248-3661	Site Location:	Upland	☐ 1 Day ☐ 3-4 Days
Email:	airesse.macphee@ghd.com	Email:	airesse.macphee@ghd.com	Site #:		Date Required:
Copies:	Reference PO	Copies:	Reference PO	Sampled By:	R.Plaha	Rush Confirmation #:

Laboratory Use Only

	YES	NO	Cooler ID	Depot Reception
Seal Present		X	1	
Seal Intact	—	—	Temp: 8 7 7	
Cooling Media	X			
	YES	NO	Cooler ID 2	
Seal Present		X		
Seal Intact	—	—	Temp: 10 8 9	
Cooling Media	X			
	YES	NO	Cooler ID	
Seal Present				
Seal Intact			Temp:	
Cooling Media				

Analysis Requested

	Sample Identification	Date Sampled (yyyy/mm/dd)	Time Sampled (hh:mm)	Matrix	# of Containers	Speciated Alkalinity, Ec	BOD, COD	Cl, SO4 (dissolved), NO2, NO3, N+N	NH3, Orthophosphate	TDS, TSS	Sulphide (as SI. Low Level Sulphide (as H2S)	Dissolved CSR Metals (+Hg)	Dissolved Hardness	Total CSR Metals (+Hg)	PAHs	BTEX/VPH	HOLD - DO NOT ANALYZE
1	WL-088277-271120-RP-06	2020/11/27	13:30	LW	15	X	X	X	X	X	X	X	X	X	X	X	
2	-07		13:35		15	X	X	X	X	X	X	X	X	X	X	X	
3	-08		15:00		15	X	X	X	X	X	X	X	X	X	X	X	
4	-09		16:00		15	X	X	X	X	X	X	X	X	X	X	X	
5	~~TRIP BLANK - RP -10~~																
6	TRIP BLANK -271120-RP-10		08:00		2											X	
7																	
8																	
9																	
10																	

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

Special Instructions: Short holding times! All bottles were field filtered and preserved as required.

Unless otherwise agreed to in writing, work submitted on this Chain of Custody is subject to Bureau Veritas Laboratories' standard Terms and Conditions. Signing of this Chain of Custody document is acknowledgment and acceptance

Relinquished by: (Signature/ Print)	Date (yyyy/mm/dd):	Time (hh:mm):	Received by: (Signature/ Print)	Date (yyyy/mm/dd):	Time (hh:mm):
RPlaha/Ravi Plaha	2020/11/27	23:15	PEDRO TAOA	2020/11/28	09:00

C087847_COC

BV Labs Job Number: C087847
Report Date: 2020/12/07

GHD Limited
Client Project #: 088877-07-02
Site Location: UPLAND
Your P.O. #: 73506780-8
Sampler Initials: RP

RESULTS OF CHEMICAL ANALYSES OF WATER

BV Labs ID		YY2200	YY2200			YY2201	YY2201			YY2202				YY2203			
Sampling Date		2020/11/27 13:30	2020/11/27 13:30			2020/11/27 13:35	2020/11/27 13:35			2020/11/27 15:00				2020/11/27 16:00			
COC Number		08488001	08488001			08488001	08488001			08488001				08488001			
	UNITS	**WL-088877-271120-RP-06**	**WL-088877-271120-RP-06 Lab-Dup**	**RDL**	**QC Batch**	**WL-088877-271120-RP-07**	**WL-088877-271120-RP-07 Lab-Dup**	**RDL**	**QC Batch**	**WL-088877-271120-RP-08**	**RDL**	**MDL**	**QC Batch**	**WL-088877-271120-RP-09**	**RDL**	**MDL**	**QC Batch**
ANIONS																	
Nitrite (N)	mg/L	<0.10	N/A	0.10	A098776	<0.10	N/A	0.10	A098776	<0.10	0.10	0.10	A098776	0.10	0.10	0.10	A098776
Calculated Parameters																	
Filter and HNO3 Preservation	N/A	FIELD	N/A	N/A	ONSITE	FIELD	N/A	N/A	ONSITE	FIELD	N/A	N/A	ONSITE	FIELD	N/A	N/A	ONSITE
Nitrate (N)	mg/L	1.04	N/A	0.10	A098725	1.09	N/A	0.10	A098725	<0.10	0.10	N/A	A098725	0.18	0.10	N/A	A098725
Sulphide (as H2S)	mg/L	<0.0020	N/A	0.0020	A098721	<0.0020	N/A	0.0020	A098721	<0.0020	0.0020	N/A	A098721	0.027	0.0020	N/A	A098721
Demand Parameters																	
Biochemical Oxygen Demand	mg/L	9.7	9.9	2.0	A099809	7.6	N/A	2.0	A099809	3.2	2.0	N/A	A099809	3.2	2.0	N/A	A099809
Chemical Oxygen Demand	mg/L	151	163	10	A100464	123	N/A	10	A100464	72	10	10	A100464	92	10	10	A100464
Misc. Inorganics																	
Conductivity	uS/cm	1100	N/A	2.0	A100073	1600	N/A	2.0	A100073	1100	2.0	N/A	A100073	770	2.0	N/A	A100073
Total Dissolved Solids	mg/L	810	N/A	10	A102280	1100	N/A	10	A102280	650	10	N/A	A102280	470	10	N/A	A102280
Total Suspended Solids	mg/L	20	N/A	1.0	A102980	21	N/A	1.0	A102980	76	1.0	N/A	A102980	69	1.0	N/A	A102980
Anions																	
Alkalinity (PP as CaCO3)	mg/L	<1.0	N/A	1.0	A100070	<1.0	N/A	1.0	A100070	<1.0	1.0	N/A	A100070	<1.0	1.0	N/A	A100070
Alkalinity (Total as CaCO3)	mg/L	370	N/A	1.0	A100070	390	N/A	1.0	A100070	380	1.0	N/A	A100070	280	1.0	N/A	A100070
Bicarbonate (HCO3)	mg/L	450	N/A	1.0	A100070	470	N/A	1.0	A100070	460	1.0	N/A	A100070	340	1.0	N/A	A100070
Carbonate (CO3)	mg/L	<1.0	N/A	1.0	A100070	<1.0	N/A	1.0	A100070	<1.0	1.0	N/A	A100070	<1.0	1.0	N/A	A100070
Hydroxide (OH)	mg/L	<1.0	N/A	1.0	A100070	<1.0	N/A	1.0	A100070	<1.0	1.0	N/A	A100070	<1.0	1.0	N/A	A100070
Total Sulphide	mg/L	<0.0018 (1)	N/A	0.0018	A105265	<0.0018 (1)	N/A	0.0018	A105265	<0.0018 (1)	0.0018	N/A	A105265	0.026 (1)	0.0018	N/A	A105265
Dissolved Chloride (Cl)	mg/L	49	N/A	1.0	A107205	97	N/A	1.0	A099884	82	1.0	N/A	A099884	63	1.0	N/A	A099884
Dissolved Sulphate (SO4)	mg/L	200	N/A	1.0	A107205	350 (2)	N/A	10	A099884	98	1.0	N/A	A099884	37	1.0	N/A	A099884
Nutrients																	
Total Ammonia (N)	mg/L	0.55	N/A	0.015	A102059	0.53	0.48	0.015	A102059	1.8	0.015	0.0040	A102060	4.0 (2)	0.075	0.020	A102059
Orthophosphate (P)	mg/L	<0.0030	N/A	0.0030	A098783	<0.0030	N/A	0.0030	A098783	<0.0030	0.0030	0.0030	A098783	0.017	0.0030	0.0030	A098783
Nitrate plus Nitrite (N)	mg/L	1.04	N/A	0.10	A098773	1.09	N/A	0.10	A098773	<0.10	0.10	0.10	A098773	0.28	0.10	0.10	A098773

RDL = Reportable Detection Limit
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable
(1) 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.

Results relate only to the items tested.

BV Labs Job Number: C087847
Report Date: 2020/12/07

GHD Limited
Client Project #: 088877-07-02
Site Location: UPLAND
Your P.O. #: 73506780-8
Sampler Initials: RP

CSR BTEX/VPH IN WATER (WATER)

BV Labs ID		YY2200	YY2200	YY2201	YY2202	YY2203	YY2204			
Sampling Date		2020/11/27 13:30	2020/11/27 13:30	2020/11/27 13:35	2020/11/27 15:00	2020/11/27 16:00	2020/11/27 08:00			
COC Number		08488001	08488001	08488001	08488001	08488001	08488001			
	UNITS	**WL-088877-271120-RP-06**	**WL-088877-271120-RP-06 Lab-Dup**	**WL-088877-271120-RP-07**	**WL-088877-271120-RP-08**	**WL-088877-271120-RP-09**	**TRIP BLANK-271120-RP-10**	**RDL**	**MDL**	**QC Batch**
Calculated Parameters										
VPH (VHW6 to 10 - BTEX)	ug/L	<300	N/A	<300	<300	<300	<300	300	300	A098732
Volatiles										
Methyl-tert-butylether (MTBE)	ug/L	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	4.0	4.0	A099567
Benzene	ug/L	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	0.40	0.40	A099567
Toluene	ug/L	<0.40	<0.40	<0.40	<0.40	0.48	<0.40	0.40	0.40	A099567
Ethylbenzene	ug/L	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	0.40	0.40	A099567
m & p-Xylene	ug/L	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	0.40	0.40	A099567
o-Xylene	ug/L	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	0.40	0.40	A099567
Styrene	ug/L	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	0.40	0.40	A099567
Xylenes (Total)	ug/L	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	0.40	0.40	A099567
VH C6-C10	ug/L	<300	<300	<300	<300	<300	<300	300	300	A099567
Surrogate Recovery (%)										
1,4-Difluorobenzene (sur.)	%	85	88	84	86	88	85	N/A	N/A	A099567
4-Bromofluorobenzene (sur.)	%	89	89	89	88	91	90	N/A	N/A	A099567
D4-1,2-Dichloroethane (sur.)	%	87	98	89	88	93	92	N/A	N/A	A099567

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

Results relate only to the items tested.

BV Labs Job Number: C087847
Report Date: 2020/12/07

GHD Limited
Client Project #: 088877-07-02
Site Location: UPLAND
Your P.O. #: 73506780-8
Sampler Initials: RP

CSR/CCME DISS. METALS IN WATER W/ CV HG (WATER)

BV Labs ID		YY2200	YY2201	YY2202	YY2203			
Sampling Date		2020/11/27 13:30	2020/11/27 13:35	2020/11/27 15:00	2020/11/27 16:00			
COC Number		08488001	08488001	08488001	08488001			
	UNITS	**WL-088877-271120-RP-06**	**WL-088877-271120-RP-07**	**WL-088877-271120-RP-08**	**WL-088877-271120-RP-09**	**RDL**	**MDL**	**QC Batch**
Calculated Parameters								
Dissolved Hardness (CaCO3)	mg/L	855	815	387	276	0.50	0.50	A098641
Elements								
Dissolved Mercury (Hg)	ug/L	0.0035	0.0036	<0.0019	<0.0019	0.0019	0.0019	A100673
Dissolved Metals by ICPMS								
Dissolved Aluminum (Al)	ug/L	9.3	8.8	15.3	57.8	3.0	0.030	A099845
Dissolved Antimony (Sb)	ug/L	<0.50	<0.50	<0.50	<0.50	0.50	0.0020	A099845
Dissolved Arsenic (As)	ug/L	1.16	1.11	0.82	5.36	0.10	0.010	A099845
Dissolved Barium (Ba)	ug/L	49.1	47.7	41.5	27.6	1.0	0.0020	A099845
Dissolved Beryllium (Be)	ug/L	<0.10	<0.10	<0.10	<0.10	0.10	0.0030	A099845
Dissolved Bismuth (Bi)	ug/L	<1.0	<1.0	<1.0	<1.0	1.0	0.0010	A099845
Dissolved Boron (B)	ug/L	782	836	211	98	50	50	A099845
Dissolved Cadmium (Cd)	ug/L	0.119	0.139	0.012	0.016	0.010	0.0020	A099845
Dissolved Chromium (Cr)	ug/L	<1.0	<1.0	<1.0	1.3	1.0	0.020	A099845
Dissolved Cobalt (Co)	ug/L	5.14	4.82	7.10	5.60	0.20	0.20	A099845
Dissolved Copper (Cu)	ug/L	26.6	33.4	1.02	8.94	0.20	0.010	A099845
Dissolved Iron (Fe)	ug/L	784	371	19900	6680	5.0	0.040	A099845
Dissolved Lead (Pb)	ug/L	<0.20	0.21	<0.20	<0.20	0.20	0.0010	A099845
Dissolved Lithium (Li)	ug/L	<2.0	<2.0	<2.0	<2.0	2.0	2.0	A099845
Dissolved Manganese (Mn)	ug/L	7390	6960	7390	4200	1.0	0.030	A099845
Dissolved Molybdenum (Mo)	ug/L	2.0	1.9	<1.0	<1.0	1.0	0.0020	A099845
Dissolved Nickel (Ni)	ug/L	3.9	3.6	<1.0	4.2	1.0	0.010	A099845
Dissolved Selenium (Se)	ug/L	0.36	0.33	0.15	0.23	0.10	0.0060	A099845
Dissolved Silicon (Si)	ug/L	9180	8890	4890	11600	100	0.30	A099845
Dissolved Silver (Ag)	ug/L	<0.020	<0.020	<0.020	<0.020	0.020	0.0020	A099845
Dissolved Strontium (Sr)	ug/L	914	899	438	321	1.0	0.0020	A099845
Dissolved Thallium (Tl)	ug/L	<0.010	<0.010	<0.010	<0.010	0.010	0.010	A099845
Dissolved Tin (Sn)	ug/L	<5.0	<5.0	<5.0	<5.0	5.0	0.0050	A099845
Dissolved Titanium (Ti)	ug/L	<5.0	<5.0	<5.0	<5.0	5.0	0.30	A099845
Dissolved Uranium (U)	ug/L	6.15	5.99	<0.10	0.15	0.10	0.0010	A099845
Dissolved Vanadium (V)	ug/L	<5.0	<5.0	<5.0	<5.0	5.0	0.020	A099845
Dissolved Zinc (Zn)	ug/L	18.0	16.7	7.5	20.2	5.0	0.050	A099845
Dissolved Zirconium (Zr)	ug/L	0.36	0.38	0.18	0.49	0.10	0.0080	A099845
Dissolved Calcium (Ca)	mg/L	265	252	114	79.4	0.050	0.0010	A098642
Dissolved Magnesium (Mg)	mg/L	47.3	44.7	24.9	19.0	0.050	0.00050	A098642
Dissolved Potassium (K)	mg/L	4.74	4.62	7.43	6.41	0.050	0.0020	A098642
Dissolved Sodium (Na)	mg/L	91.6	86.9	69.6	28.6	0.050	0.0010	A098642
Dissolved Sulphur (S)	mg/L	165	157	30.8	13.0	3.0	1.0	A098642

RDL = Reportable Detection Limit
N/A = Not Applicable

Results relate only to the items tested.

BV Labs Job Number: C087847
Report Date: 2020/12/07

GHD Limited
Client Project #: 088877-07-02
Site Location: UPLAND
Your P.O. #: 73506780-8
Sampler Initials: RP

CSR/CCME TOT. METALS IN WATER W/ CV HG (WATER)

BV Labs ID		YY2200			YY2201	YY2202	YY2203			
Sampling Date		2020/11/27 13:30			2020/11/27 13:35	2020/11/27 15:00	2020/11/27 16:00			
COC Number		08488001			08488001	08488001	08488001			
	UNITS	**WL-088877-271120-RP-06**	**RDL**	**MDL**	**WL-088877-271120-RP-07**	**WL-088877-271120-RP-08**	**WL-088877-271120-RP-09**	**RDL**	**MDL**	**QC Batch**
Calculated Parameters										
Total Hardness (CaCO3)	mg/L	1030	0.50	0.50	717	385	296	0.50	0.50	A098640
Elements										
Total Mercury (Hg)	ug/L	0.0152	0.0019	0.0019	0.0123	0.0028	0.0030	0.0019	0.0019	A100750
Total Metals by ICPMS										
Total Aluminum (Al)	ug/L	92.4	6.0	0.060	367	637	1160	3.0	0.030	A101489
Total Antimony (Sb)	ug/L	<1.0	1.0	0.0040	<0.50	<0.50	<0.50	0.50	0.0020	A101489
Total Arsenic (As)	ug/L	1.75	0.20	0.020	1.37	1.48	8.19	0.10	0.010	A101489
Total Barium (Ba)	ug/L	65.6	2.0	0.0040	46.8	45.6	35.1	1.0	0.0020	A101489
Total Beryllium (Be)	ug/L	<0.20	0.20	0.0060	<0.10	<0.10	<0.10	0.10	0.0030	A101489
Total Bismuth (Bi)	ug/L	<2.0	2.0	0.0020	<1.0	<1.0	<1.0	1.0	0.0010	A101489
Total Boron (B)	ug/L	1390	100	100	698	227	106	50	50	A101489
Total Cadmium (Cd)	ug/L	0.250	0.020	0.0040	0.130	0.041	0.038	0.010	0.0020	A101489
Total Chromium (Cr)	ug/L	<2.0	2.0	0.040	2.0	<1.0	2.6	1.0	0.020	A101489
Total Cobalt (Co)	ug/L	5.56	0.40	0.40	4.97	7.51	6.55	0.20	0.20	A101489
Total Copper (Cu)	ug/L	48.9	1.0	0.060	81.3	4.93	21.5	0.50	0.030	A101489
Total Iron (Fe)	ug/L	3130	20	1.4	3500	26100	12800	10	0.70	A101489
Total Lead (Pb)	ug/L	2.12	0.40	0.0020	6.50	3.02	2.34	0.20	0.0010	A101489
Total Lithium (Li)	ug/L	<4.0	4.0	4.0	<2.0	<2.0	<2.0	2.0	2.0	A101489
Total Manganese (Mn)	ug/L	7300	2.0	0.060	6850	7410	4530	1.0	0.030	A101489
Total Molybdenum (Mo)	ug/L	2.8	2.0	0.0040	1.7	<1.0	1.0	1.0	0.0020	A101489
Total Nickel (Ni)	ug/L	5.2	2.0	0.020	3.9	1.5	5.3	1.0	0.010	A101489
Total Selenium (Se)	ug/L	0.42	0.20	0.012	0.33	0.18	0.29	0.10	0.0060	A101489
Total Silicon (Si)	ug/L	8470	200	0.60	9630	5650	13600	100	0.30	A101489
Total Silver (Ag)	ug/L	<0.040	0.040	0.0040	<0.020	0.022	0.023	0.020	0.0020	A101489
Total Strontium (Sr)	ug/L	1110	2.0	0.0040	770	448	337	1.0	0.0020	A101489
Total Thallium (Tl)	ug/L	<0.020	0.020	0.020	<0.010	<0.010	<0.010	0.010	0.010	A101489
Total Tin (Sn)	ug/L	<10	10	0.010	<5.0	<5.0	<5.0	5.0	0.0050	A101489
Total Titanium (Ti)	ug/L	<10	10	0.60	29.5	54.1	70.7	5.0	0.30	A101489
Total Uranium (U)	ug/L	10.0	0.20	0.0020	4.62	<0.10	0.21	0.10	0.0010	A101489
Total Vanadium (V)	ug/L	<10	10	0.040	<5.0	5.3	10.2	5.0	0.020	A101489
Total Zinc (Zn)	ug/L	19	10	0.10	31.4	17.1	32.1	5.0	0.050	A101489
Total Zirconium (Zr)	ug/L	0.50	0.20	0.016	0.48	0.46	0.66	0.10	0.0080	A101489
Total Calcium (Ca)	mg/L	319	0.10	0.0020	226	115	86.1	0.050	0.0010	A098643
Total Magnesium (Mg)	mg/L	55.9	0.10	0.0010	37.1	23.9	19.6	0.050	0.00050	A098643
Total Potassium (K)	mg/L	5.19	0.10	0.0040	4.27	7.28	6.99	0.050	0.0020	A098643

Total Sodium (Na)	mg/L	120	0.10	0.0020	66.7	66.1	31.2	0.050	0.0010	A098643
Total Sulphur (S)	mg/L	224	6.0	2.0	127	30.6	12.1	3.0	1.0	A098643

RDL = Reportable Detection Limit
N/A = Not Applicable

Results relate only to the items tested.

BV Labs Job Number: C087847
Report Date: 2020/12/07

GHD Limited
Client Project #: 088877-07-02
Site Location: UPLAND
Your P.O. #: 73506780-8
Sampler Initials: RP

CSR PAH IN WATER BY GC-MS (WATER)

BV Labs ID		YY2200	YY2201	YY2202			YY2203			
Sampling Date		2020/11/27 13:30	2020/11/27 13:35	2020/11/27 15:00			2020/11/27 16:00			
COC Number		08488001	08488001	08488001			08488001			
	UNITS	**WL-088877-271120-RP-06**	**WL-088877-271120-RP-07**	**WL-088877-271120-RP-08**	**RDL**	**MDL**	**WL-088877-271120-RP-09**	**RDL**	**MDL**	**QC Batch**
Calculated Parameters										
Low Molecular Weight PAH`s	ug/L	25	21	2.0	0.10	0.010	150	0.50	0.050	A098728
High Molecular Weight PAH`s	ug/L	0.42	0.40	<0.050	0.050	0.020	7.3	0.050	0.020	A098728
Total PAH	ug/L	26	21	2.0	0.10	0.010	160	0.50	0.050	A098728
Polycyclic Aromatics										
Quinoline	ug/L	<0.020	<0.020	<0.020	0.020	0.020	0.12	0.020	0.020	A101614
Naphthalene	ug/L	15	12	0.33	0.10	0.050	83 (1)	0.50	0.25	A101614
1-Methylnaphthalene	ug/L	2.8	2.4	0.077	0.050	0.050	11	0.050	0.050	A101614
2-Methylnaphthalene	ug/L	0.78	0.60	<0.10	0.10	0.050	15	0.10	0.050	A101614
Acenaphthylene	ug/L	0.060	0.056	<0.050	0.050	0.050	0.20	0.050	0.050	A101614
Acenaphthene	ug/L	3.8	3.3	1.3	0.050	0.050	15	0.050	0.050	A101614
Fluorene	ug/L	1.7	1.5	0.26	0.050	0.050	11	0.050	0.050	A101614
Phenanthrene	ug/L	0.97	0.90	<0.050	0.050	0.050	13	0.050	0.050	A101614
Anthracene	ug/L	0.24	0.24	0.030	0.010	0.010	2.3	0.010	0.010	A101614
Acridine	ug/L	0.20	0.16	<0.050	0.050	0.050	0.37	0.050	0.050	A101614
Fluoranthene	ug/L	0.25	0.23	<0.020	0.020	0.020	3.9	0.020	0.020	A101614
Pyrene	ug/L	0.16	0.15	<0.020	0.020	0.020	2.8	0.020	0.020	A101614
Benzo(a)anthracene	ug/L	0.011	0.012	<0.010	0.010	0.010	0.20	0.010	0.010	A101614
Chrysene	ug/L	<0.020	<0.020	<0.020	0.020	0.020	0.26	0.020	0.020	A101614
Benzo(b&j)fluoranthene	ug/L	<0.030	<0.030	<0.030	0.030	0.030	0.095	0.030	0.030	A101614
Benzo(k)fluoranthene	ug/L	<0.050	<0.050	<0.050	0.050	0.050	<0.050	0.050	0.050	A101614
Benzo(a)pyrene	ug/L	<0.0050	<0.0050	<0.0050	0.0050	0.0050	0.058	0.0050	0.0050	A101614
Indeno(1,2,3-cd)pyrene	ug/L	<0.050	<0.050	<0.050	0.050	0.050	<0.050	0.050	0.050	A101614
Dibenz(a,h)anthracene	ug/L	<0.0030	<0.0030	<0.0030	0.0030	0.0030	0.0047	0.0030	0.0030	A101614
Benzo(g,h,i)perylene	ug/L	<0.050	<0.050	<0.050	0.050	0.050	<0.050	0.050	0.050	A101614
Surrogate Recovery (%)										
D10-ANTHRACENE (sur.)	%	95	101	99	N/A	N/A	97	N/A	N/A	A101614
D8-ACENAPHTHYLENE (sur.)	%	97	101	96	N/A	N/A	96	N/A	N/A	A101614
D8-NAPHTHALENE (sur.)	%	92	93	92	N/A	N/A	83	N/A	N/A	A101614
TERPHENYL-D14 (sur.)	%	92	100	95	N/A	N/A	93	N/A	N/A	A101614

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

Results relate only to the items tested.

GENERAL COMMENTS

Sample YY2200 [WL-088877-271120-RP-06] : Sample was analyzed past method specified hold time for Total Sulphide. Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised.

Sample YY2201 [WL-088877-271120-RP-07] : Sample was analyzed past method specified hold time for Total Sulphide. Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised.

Sample YY2202 [WL-088877-271120-RP-08] : Sample was analyzed past method specified hold time for Total Sulphide. Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised.

Sample YY2203 [WL-088877-271120-RP-09] : Sample was analyzed past method specified hold time for Total Sulphide. Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised.

CSR/CCME TOT. METALS IN WATER W/ CV HG (WATER) Comments

Sample YY2200 [WL-088877-271120-RP-06] Elements by CRC ICPMS (total): RDL raised due to concentration over linear range, sample dilution required.

Results relate only to the items tested.

Report Date: 2020/12/07

GHD Limited
Attention: 088877 Distribution
Client Project #: 088877-07-02
Your P.O. #:73506780-8
Site Location: UPLAND

Quality Assurance Report
BV Labs Job Number: C087847

QA/QC Ba	Init	QC Type	Parameter	Date Analyzi	Value	Recovery	UNITS	QC Limits
A098773	MO5	Spiked Blank	Nitrate plus Nitrite (N)	11/28/2020		105	%	80 - 120
A098773	MO5	Method Blank	Nitrate plus Nitrite (N)	11/28/2020	<0.10		mg/L	
A098776	MO5	Spiked Blank	Nitrite (N)	11/28/2020		100	%	80 - 120
A098776	MO5	Method Blank	Nitrite (N)	11/28/2020	<0.10		mg/L	
A098783	MO5	Spiked Blank	Orthophosphate (P)	11/28/2020		98	%	80 - 120
A098783	MO5	Method Blank	Orthophosphate (P)	11/28/2020	<0.0030		mg/L	
A099567	KL	Matrix Spike [YY2200-10]	1,4-Difluorobenzene (sur.)	11/30/2020		86 (1)	%	70 - 130
			4-Bromofluorobenzene (sur.)	11/30/2020		92 (1)	%	70 - 130
			D4-1,2-Dichloroethane (sur.)	11/30/2020		93 (1)	%	70 - 130
			Methyl-tert-butylether (MTBE)	11/30/2020		86 (1)	%	70 - 130
			Benzene	11/30/2020		84 (1)	%	70 - 130
			Toluene	11/30/2020		84 (1)	%	70 - 130
			Ethylbenzene	11/30/2020		87 (1)	%	70 - 130
			m & p-Xylene	11/30/2020		87 (1)	%	70 - 130
			o-Xylene	11/30/2020		87 (1)	%	70 - 130
			Styrene	11/30/2020		91 (1)	%	70 - 130
A099567	KL	Spiked Blank	1,4-Difluorobenzene (sur.)	11/30/2020		85	%	70 - 130
			4-Bromofluorobenzene (sur.)	11/30/2020		90	%	70 - 130
			D4-1,2-Dichloroethane (sur.)	11/30/2020		85	%	70 - 130
			Methyl-tert-butylether (MTBE)	11/30/2020		88	%	70 - 130
			Benzene	11/30/2020		88	%	70 - 130
			Toluene	11/30/2020		89	%	70 - 130
			Ethylbenzene	11/30/2020		92	%	70 - 130
			m & p-Xylene	11/30/2020		91	%	70 - 130
			o-Xylene	11/30/2020		91	%	70 - 130
			Styrene	11/30/2020		95	%	70 - 130
			VH C6-C10	11/30/2020		93	%	70 - 130
A099567	KL	Method Blank	1,4-Difluorobenzene (sur.)	11/30/2020		83	%	70 - 130
			4-Bromofluorobenzene (sur.)	11/30/2020		87	%	70 - 130
			D4-1,2-Dichloroethane (sur.)	11/30/2020		95	%	70 - 130
			Methyl-tert-butylether (MTBE)	11/30/2020	<4.0		ug/L	
			Benzene	11/30/2020	<0.40		ug/L	
			Toluene	11/30/2020	<0.40		ug/L	
			Ethylbenzene	11/30/2020	<0.40		ug/L	
			m & p-Xylene	11/30/2020	<0.40		ug/L	
			o-Xylene	11/30/2020	<0.40		ug/L	
			Styrene	11/30/2020	<0.40		ug/L	
			Xylenes (Total)	11/30/2020	<0.40		ug/L	
			VH C6-C10	11/30/2020	<300		ug/L	
A099567	KL	RPD [YY2200-10]	Methyl-tert-butylether (MTBE)	11/30/2020	NC (2)		%	30
			Benzene	11/30/2020	NC (2)		%	30
			Toluene	11/30/2020	NC (2)		%	30
			Ethylbenzene	11/30/2020	NC (2)		%	30
			m & p-Xylene	11/30/2020	NC (2)		%	30
			o-Xylene	11/30/2020	NC (2)		%	30
			Styrene	11/30/2020	NC (2)		%	30
			Xylenes (Total)	11/30/2020	NC (2)		%	30
			VH C6-C10	11/30/2020	NC (2)		%	30
A099809	IC4	Spiked Blank	Biochemical Oxygen Demand	12/5/2020		102	%	85 - 115
A099809	IC4	Method Blank	Biochemical Oxygen Demand	12/5/2020	<2.0		mg/L	
A099809	IC4	RPD [YY2200-03]	Biochemical Oxygen Demand	12/5/2020	1.5 (3)		%	20
A099845	AA1	Matrix Spike	Dissolved Aluminum (Al)	12/1/2020		105	%	80 - 120
			Dissolved Antimony (Sb)	12/1/2020		103	%	80 - 120
			Dissolved Arsenic (As)	12/1/2020		101	%	80 - 120
			Dissolved Barium (Ba)	12/1/2020		NC	%	80 - 120
			Dissolved Beryllium (Be)	12/1/2020		102	%	80 - 120
			Dissolved Bismuth (Bi)	12/1/2020		97	%	80 - 120
			Dissolved Boron (B)	12/1/2020		103	%	80 - 120
			Dissolved Cadmium (Cd)	12/1/2020		103	%	80 - 120
			Dissolved Chromium (Cr)	12/1/2020		101	%	80 - 120
			Dissolved Cobalt (Co)	12/1/2020		97	%	80 - 120
			Dissolved Copper (Cu)	12/1/2020		97	%	80 - 120
			Dissolved Iron (Fe)	12/1/2020		113	%	80 - 120
			Dissolved Lead (Pb)	12/1/2020		101	%	80 - 120
			Dissolved Lithium (Li)	12/1/2020		99	%	80 - 120
			Dissolved Manganese (Mn)	12/1/2020		101	%	80 - 120
			Dissolved Molybdenum (Mo)	12/1/2020		105	%	80 - 120
			Dissolved Nickel (Ni)	12/1/2020		98	%	80 - 120
			Dissolved Selenium (Se)	12/1/2020		104	%	80 - 120
			Dissolved Silicon (Si)	12/1/2020		102	%	80 - 120
			Dissolved Silver (Ag)	12/1/2020		102	%	80 - 120
			Dissolved Strontium (Sr)	12/1/2020		NC	%	80 - 120
			Dissolved Thallium (Tl)	12/1/2020		102	%	80 - 120
			Dissolved Tin (Sn)	12/1/2020		103	%	80 - 120
			Dissolved Titanium (Ti)	12/1/2020		104	%	80 - 120
			Dissolved Uranium (U)	12/1/2020		104	%	80 - 120
			Dissolved Vanadium (V)	12/1/2020		103	%	80 - 120
			Dissolved Zinc (Zn)	12/1/2020		104	%	80 - 120
			Dissolved Zirconium (Zr)	12/1/2020		107	%	80 - 120
A099845	AA1	Spiked Blank	Dissolved Aluminum (Al)	12/1/2020		101	%	80 - 120
			Dissolved Antimony (Sb)	12/1/2020		100	%	80 - 120
			Dissolved Arsenic (As)	12/1/2020		99	%	80 - 120
			Dissolved Barium (Ba)	12/1/2020		100	%	80 - 120
			Dissolved Beryllium (Be)	12/1/2020		104	%	80 - 120
			Dissolved Bismuth (Bi)	12/1/2020		100	%	80 - 120
			Dissolved Boron (B)	12/1/2020		107	%	80 - 120
			Dissolved Cadmium (Cd)	12/1/2020		101	%	80 - 120
			Dissolved Chromium (Cr)	12/1/2020		101	%	80 - 120
			Dissolved Cobalt (Co)	12/1/2020		98	%	80 - 120
			Dissolved Copper (Cu)	12/1/2020		99	%	80 - 120
			Dissolved Iron (Fe)	12/1/2020		103	%	80 - 120
			Dissolved Lead (Pb)	12/1/2020		101	%	80 - 120
			Dissolved Lithium (Li)	12/1/2020		97	%	80 - 120
			Dissolved Manganese (Mn)	12/1/2020		100	%	80 - 120
			Dissolved Molybdenum (Mo)	12/1/2020		104	%	80 - 120
			Dissolved Nickel (Ni)	12/1/2020		101	%	80 - 120
			Dissolved Selenium (Se)	12/1/2020		101	%	80 - 120
			Dissolved Silicon (Si)	12/1/2020		99	%	80 - 120
			Dissolved Silver (Ag)	12/1/2020		100	%	80 - 120
			Dissolved Strontium (Sr)	12/1/2020		100	%	80 - 120
			Dissolved Thallium (Tl)	12/1/2020		101	%	80 - 120
			Dissolved Tin (Sn)	12/1/2020		101	%	80 - 120
			Dissolved Titanium (Ti)	12/1/2020		102	%	80 - 120
			Dissolved Uranium (U)	12/1/2020		101	%	80 - 120
			Dissolved Vanadium (V)	12/1/2020		101	%	80 - 120
			Dissolved Zinc (Zn)	12/1/2020		105	%	80 - 120
			Dissolved Zirconium (Zr)	12/1/2020		101	%	80 - 120
A099845	AA1	Method Blank	Dissolved Aluminum (Al)	12/1/2020	<3.0		ug/L	
			Dissolved Antimony (Sb)	12/1/2020	<0.50		ug/L	
			Dissolved Arsenic (As)	12/1/2020	<0.10		ug/L	
			Dissolved Barium (Ba)	12/1/2020	<1.0		ug/L	
			Dissolved Beryllium (Be)	12/1/2020	<0.10		ug/L	
			Dissolved Bismuth (Bi)	12/1/2020	<1.0		ug/L	
			Dissolved Boron (B)	12/1/2020	<50		ug/L	
			Dissolved Cadmium (Cd)	12/1/2020	<0.010		ug/L	
			Dissolved Chromium (Cr)	12/1/2020	<1.0		ug/L	
			Dissolved Cobalt (Co)	12/1/2020	<0.20		ug/L	
			Dissolved Copper (Cu)	12/1/2020	<0.20		ug/L	
			Dissolved Iron (Fe)	12/1/2020	<5.0		ug/L	
			Dissolved Lead (Pb)	12/1/2020	<0.20		ug/L	
			Dissolved Lithium (Li)	12/1/2020	<2.0		ug/L	
			Dissolved Manganese (Mn)	12/1/2020	<1.0		ug/L	
			Dissolved Molybdenum (Mo)	12/1/2020	<1.0		ug/L	
			Dissolved Nickel (Ni)	12/1/2020	<1.0		ug/L	
			Dissolved Selenium (Se)	12/1/2020	<0.10		ug/L	
			Dissolved Silicon (Si)	12/1/2020	<100		ug/L	
			Dissolved Silver (Ag)	12/1/2020	<0.020		ug/L	
			Dissolved Strontium (Sr)	12/1/2020	<1.0		ug/L	
			Dissolved Thallium (Tl)	12/1/2020	<0.010		ug/L	
			Dissolved Tin (Sn)	12/1/2020	<5.0		ug/L	
			Dissolved Titanium (Ti)	12/1/2020	<5.0		ug/L	
			Dissolved Uranium (U)	12/1/2020	<0.10		ug/L	
			Dissolved Vanadium (V)	12/1/2020	<5.0		ug/L	
			Dissolved Zinc (Zn)	12/1/2020	<5.0		ug/L	
			Dissolved Zirconium (Zr)	12/1/2020	<0.10		ug/L	
A099845	AA1	RPD	Dissolved Aluminum (Al)	12/1/2020	0.87 (4)		%	20
			Dissolved Antimony (Sb)	12/1/2020	NC (4)		%	20
			Dissolved Arsenic (As)	12/1/2020	0.35 (4)		%	20
			Dissolved Barium (Ba)	12/1/2020	0.98 (4)		%	20
			Dissolved Beryllium (Be)	12/1/2020	NC (4)		%	20
			Dissolved Bismuth (Bi)	12/1/2020	NC (4)		%	20
			Dissolved Boron (B)	12/1/2020	NC (4)		%	20

Report Date: 2020/12/07

GHD Limited
Attention: 088877 Distribution
Client Project #: 088877-07-02
Your P.O. #:73506780-8
Site Location: UPLAND

Quality Assurance Report
BV Labs Job Number: C087847

QA/QC Ba	Init	QC Type	Parameter	Date Analyzi	Value	Recovery	UNITS	QC Limits
			Dissolved Cadmium (Cd)	12/1/2020	6.6 (4)		%	20
			Dissolved Chromium (Cr)	12/1/2020	NC (4)		%	20
			Dissolved Cobalt (Co)	12/1/2020	NC (4)		%	20
			Dissolved Copper (Cu)	12/1/2020	1.3 (4)		%	20
			Dissolved Iron (Fe)	12/1/2020	12 (4)		%	20
			Dissolved Lead (Pb)	12/1/2020	NC (4)		%	20
			Dissolved Lithium (Li)	12/1/2020	NC (4)		%	20
			Dissolved Manganese (Mn)	12/1/2020	2.1 (4)		%	20
			Dissolved Molybdenum (Mo)	12/1/2020	2.7 (4)		%	20
			Dissolved Nickel (Ni)	12/1/2020	1.2 (4)		%	20
			Dissolved Selenium (Se)	12/1/2020	5.2 (4)		%	20
			Dissolved Silicon (Si)	12/1/2020	1.4 (4)		%	20
			Dissolved Silver (Ag)	12/1/2020	NC (4)		%	20
			Dissolved Strontium (Sr)	12/1/2020	1.4 (4)		%	20
			Dissolved Thallium (Tl)	12/1/2020	NC (4)		%	20
			Dissolved Tin (Sn)	12/1/2020	NC (4)		%	20
			Dissolved Titanium (Ti)	12/1/2020	NC (4)		%	20
			Dissolved Uranium (U)	12/1/2020	NC (4)		%	20
			Dissolved Vanadium (V)	12/1/2020	NC (4)		%	20
			Dissolved Zinc (Zn)	12/1/2020	0.14 (4)		%	20
			Dissolved Zirconium (Zr)	12/1/2020	NC (4)		%	20
A099884	BB3	Matrix Spike	Dissolved Chloride (Cl)	11/30/2020		102	%	80 - 120
			Dissolved Sulphate (SO4)	11/30/2020		100	%	80 - 120
A099884	BB3	Spiked Blank	Dissolved Chloride (Cl)	11/30/2020		104	%	80 - 120
			Dissolved Sulphate (SO4)	11/30/2020		99	%	80 - 120
A099884	BB3	Method Blank	Dissolved Chloride (Cl)	11/30/2020	<1.0		mg/L	
			Dissolved Sulphate (SO4)	11/30/2020	<1.0		mg/L	
A099884	BB3	RPD	Dissolved Chloride (Cl)	11/30/2020	NC (4)		%	20
			Dissolved Sulphate (SO4)	11/30/2020	NC (4)		%	20
			Dissolved Chloride (Cl)	11/30/2020	4.4 (4)		%	20
			Dissolved Sulphate (SO4)	11/30/2020	0.34 (4)		%	20
A100070	WAY	Matrix Spike	Alkalinity (Total as CaCO3)	11/30/2020		NC	%	80 - 120
A100070	WAY	Spiked Blank	Alkalinity (Total as CaCO3)	11/30/2020		93	%	80 - 120
A100070	WAY	Method Blank	Alkalinity (PP as CaCO3)	11/30/2020	<1.0		mg/L	
			Alkalinity (Total as CaCO3)	11/30/2020	<1.0		mg/L	
			Bicarbonate (HCO3)	11/30/2020	<1.0		mg/L	
			Carbonate (CO3)	11/30/2020	<1.0		mg/L	
			Hydroxide (OH)	11/30/2020	<1.0		mg/L	
A100070	WAY	RPD	Alkalinity (PP as CaCO3)	11/30/2020	NC (4)		%	20
			Alkalinity (Total as CaCO3)	11/30/2020	2.7 (4)		%	20
			Bicarbonate (HCO3)	11/30/2020	2.7 (4)		%	20
			Carbonate (CO3)	11/30/2020	NC (4)		%	20
			Hydroxide (OH)	11/30/2020	NC (4)		%	20
A100073	WAY	Spiked Blank	Conductivity	11/30/2020		98	%	80 - 120
A100073	WAY	Method Blank	Conductivity	11/30/2020	<2.0		uS/cm	
A100073	WAY	RPD	Conductivity	11/30/2020	1.8 (4)		%	10
A100464	IC4	Matrix Spike [YY2200-11]	Chemical Oxygen Demand	12/1/2020		NC (5)	%	80 - 120
A100464	IC4	Spiked Blank	Chemical Oxygen Demand	12/1/2020		104	%	80 - 120
A100464	IC4	Method Blank	Chemical Oxygen Demand	12/1/2020	<10		mg/L	
A100464	IC4	RPD [YY2200-11]	Chemical Oxygen Demand	12/1/2020	7.7 (6)		%	20
A100673	JC8	Matrix Spike	Dissolved Mercury (Hg)	12/1/2020		89	%	80 - 120
A100673	JC8	Spiked Blank	Dissolved Mercury (Hg)	12/1/2020		85	%	80 - 120
A100673	JC8	Method Blank	Dissolved Mercury (Hg)	12/1/2020	<0.0019		ug/L	
A100673	JC8	RPD	Dissolved Mercury (Hg)	12/1/2020	NC (4)		%	20
A100750	JC8	Matrix Spike	Total Mercury (Hg)	12/1/2020		95	%	80 - 120
A100750	JC8	Spiked Blank	Total Mercury (Hg)	12/1/2020		94	%	80 - 120
A100750	JC8	Method Blank	Total Mercury (Hg)	12/1/2020	<0.0019		ug/L	
A100750	JC8	RPD	Total Mercury (Hg)	12/1/2020	NC (4)		%	20
A101489	AA1	Matrix Spike	Total Aluminum (Al)	12/2/2020		99	%	80 - 120
			Total Antimony (Sb)	12/2/2020		101	%	80 - 120
			Total Arsenic (As)	12/2/2020		99	%	80 - 120
			Total Barium (Ba)	12/2/2020		99	%	80 - 120
			Total Beryllium (Be)	12/2/2020		102	%	80 - 120
			Total Bismuth (Bi)	12/2/2020		98	%	80 - 120
			Total Boron (B)	12/2/2020		104	%	80 - 120
			Total Cadmium (Cd)	12/2/2020		101	%	80 - 120
			Total Chromium (Cr)	12/2/2020		97	%	80 - 120
			Total Cobalt (Co)	12/2/2020		96	%	80 - 120
			Total Copper (Cu)	12/2/2020		95	%	80 - 120
			Total Iron (Fe)	12/2/2020		101	%	80 - 120
			Total Lead (Pb)	12/2/2020		100	%	80 - 120
			Total Lithium (Li)	12/2/2020		99	%	80 - 120
			Total Manganese (Mn)	12/2/2020		98	%	80 - 120
			Total Molybdenum (Mo)	12/2/2020		103	%	80 - 120
			Total Nickel (Ni)	12/2/2020		98	%	80 - 120
			Total Selenium (Se)	12/2/2020		100	%	80 - 120
			Total Silicon (Si)	12/2/2020		101	%	80 - 120
			Total Silver (Ag)	12/2/2020		97	%	80 - 120
			Total Strontium (Sr)	12/2/2020		96	%	80 - 120
			Total Thallium (Tl)	12/2/2020		100	%	80 - 120
			Total Tin (Sn)	12/2/2020		101	%	80 - 120
			Total Titanium (Ti)	12/2/2020		103	%	80 - 120
			Total Uranium (U)	12/2/2020		104	%	80 - 120
			Total Vanadium (V)	12/2/2020		97	%	80 - 120
			Total Zinc (Zn)	12/2/2020		100	%	80 - 120
			Total Zirconium (Zr)	12/2/2020		101	%	80 - 120
A101489	AA1	Spiked Blank	Total Aluminum (Al)	12/2/2020		100	%	80 - 120
			Total Antimony (Sb)	12/2/2020		101	%	80 - 120
			Total Arsenic (As)	12/2/2020		98	%	80 - 120
			Total Barium (Ba)	12/2/2020		98	%	80 - 120
			Total Beryllium (Be)	12/2/2020		101	%	80 - 120
			Total Bismuth (Bi)	12/2/2020		99	%	80 - 120
			Total Boron (B)	12/2/2020		105	%	80 - 120
			Total Cadmium (Cd)	12/2/2020		100	%	80 - 120
			Total Chromium (Cr)	12/2/2020		99	%	80 - 120
			Total Cobalt (Co)	12/2/2020		98	%	80 - 120
			Total Copper (Cu)	12/2/2020		97	%	80 - 120
			Total Iron (Fe)	12/2/2020		100	%	80 - 120
			Total Lead (Pb)	12/2/2020		99	%	80 - 120
			Total Lithium (Li)	12/2/2020		99	%	80 - 120
			Total Manganese (Mn)	12/2/2020		100	%	80 - 120
			Total Molybdenum (Mo)	12/2/2020		103	%	80 - 120
			Total Nickel (Ni)	12/2/2020		99	%	80 - 120
			Total Selenium (Se)	12/2/2020		97	%	80 - 120
			Total Silicon (Si)	12/2/2020		102	%	80 - 120
			Total Silver (Ag)	12/2/2020		98	%	80 - 120
			Total Strontium (Sr)	12/2/2020		96	%	80 - 120
			Total Thallium (Tl)	12/2/2020		100	%	80 - 120
			Total Tin (Sn)	12/2/2020		101	%	80 - 120
			Total Titanium (Ti)	12/2/2020		103	%	80 - 120
			Total Uranium (U)	12/2/2020		105	%	80 - 120
			Total Vanadium (V)	12/2/2020		99	%	80 - 120
			Total Zinc (Zn)	12/2/2020		101	%	80 - 120
			Total Zirconium (Zr)	12/2/2020		100	%	80 - 120
A101489	AA1	Method Blank	Total Aluminum (Al)	12/2/2020	<3.0		ug/L	
			Total Antimony (Sb)	12/2/2020	<0.50		ug/L	
			Total Arsenic (As)	12/2/2020	<0.10		ug/L	
			Total Barium (Ba)	12/2/2020	<1.0		ug/L	
			Total Beryllium (Be)	12/2/2020	<0.10		ug/L	
			Total Bismuth (Bi)	12/2/2020	<1.0		ug/L	
			Total Boron (B)	12/2/2020	<50		ug/L	
			Total Cadmium (Cd)	12/2/2020	<0.010		ug/L	
			Total Chromium (Cr)	12/2/2020	<1.0		ug/L	
			Total Cobalt (Co)	12/2/2020	<0.20		ug/L	
			Total Copper (Cu)	12/2/2020	<0.50		ug/L	
			Total Iron (Fe)	12/2/2020	<10		ug/L	
			Total Lead (Pb)	12/2/2020	<0.20		ug/L	
			Total Lithium (Li)	12/2/2020	<2.0		ug/L	
			Total Manganese (Mn)	12/2/2020	<1.0		ug/L	
			Total Molybdenum (Mo)	12/2/2020	<1.0		ug/L	
			Total Nickel (Ni)	12/2/2020	<1.0		ug/L	
			Total Selenium (Se)	12/2/2020	<0.10		ug/L	
			Total Silicon (Si)	12/2/2020	<100		ug/L	
			Total Silver (Ag)	12/2/2020	<0.020		ug/L	
			Total Strontium (Sr)	12/2/2020	<1.0		ug/L	
			Total Thallium (Tl)	12/2/2020	<0.010		ug/L	
			Total Tin (Sn)	12/2/2020	<5.0		ug/L	
			Total Titanium (Ti)	12/2/2020	<5.0		ug/L	
			Total Uranium (U)	12/2/2020	<0.10		ug/L	
			Total Vanadium (V)	12/2/2020	<5.0		ug/L	
			Total Zinc (Zn)	12/2/2020	<5.0		ug/L	
			Total Zirconium (Zr)	12/2/2020	<0.10		ug/L	
A101614	SY	Matrix Spike	D10-ANTHRACENE (sur.)	12/3/2020		87	%	50 - 140

Report Date: 2020/12/07

GHD Limited
Attention: 088877 Distribution
Client Project #: 088877-07-02
Your P.O. #:73506780-8
Site Location: UPLAND

Quality Assurance Report
BV Labs Job Number: C087847

QA/QC Ba	Init	QC Type	Parameter	Date Analyzi	Value	Recovery	UNITS	QC Limits
			D8-ACENAPHTHYLENE (sur.)	12/3/2020		84	%	50 - 140
			D8-NAPHTHALENE (sur.)	12/3/2020		81	%	50 - 140
			TERPHENYL-D14 (sur.)	12/3/2020		87	%	50 - 140
			Quinoline	12/3/2020		113	%	50 - 140
			Naphthalene	12/3/2020		90	%	50 - 140
			1-Methylnaphthalene	12/3/2020		88	%	50 - 140
			2-Methylnaphthalene	12/3/2020		88	%	50 - 140
			Acenaphthylene	12/3/2020		87	%	50 - 140
			Acenaphthene	12/3/2020		92	%	50 - 140
			Fluorene	12/3/2020		90	%	50 - 140
			Phenanthrene	12/3/2020		88	%	50 - 140
			Anthracene	12/3/2020		92	%	50 - 140
			Acridine	12/3/2020		110	%	50 - 140
			Fluoranthene	12/3/2020		93	%	50 - 140
			Pyrene	12/3/2020		92	%	50 - 140
			Benzo(a)anthracene	12/3/2020		90	%	50 - 140
			Chrysene	12/3/2020		91	%	50 - 140
			Benzo(b&j)fluoranthene	12/3/2020		84	%	50 - 140
			Benzo(k)fluoranthene	12/3/2020		98	%	50 - 140
			Benzo(a)pyrene	12/3/2020		81	%	50 - 140
			Indeno(1,2,3-cd)pyrene	12/3/2020		92	%	50 - 140
			Dibenz(a,h)anthracene	12/3/2020		81	%	50 - 140
			Benzo(g,h,i)perylene	12/3/2020		82	%	50 - 140
A101614	SY	Spiked Blank	D10-ANTHRACENE (sur.)	12/2/2020		82	%	50 - 140
			D8-ACENAPHTHYLENE (sur.)	12/2/2020		96	%	50 - 140
			D8-NAPHTHALENE (sur.)	12/2/2020		88	%	50 - 140
			TERPHENYL-D14 (sur.)	12/2/2020		85	%	50 - 140
			Quinoline	12/2/2020		109	%	50 - 140
			Naphthalene	12/2/2020		96	%	50 - 140
			1-Methylnaphthalene	12/2/2020		94	%	50 - 140
			2-Methylnaphthalene	12/2/2020		94	%	50 - 140
			Acenaphthylene	12/2/2020		93	%	50 - 140
			Acenaphthene	12/2/2020		96	%	50 - 140
			Fluorene	12/2/2020		96	%	50 - 140
			Phenanthrene	12/2/2020		93	%	50 - 140
			Anthracene	12/2/2020		80	%	50 - 140
			Acridine	12/2/2020		108	%	50 - 140
			Fluoranthene	12/2/2020		87	%	50 - 140
			Pyrene	12/2/2020		84	%	50 - 140
			Benzo(a)anthracene	12/2/2020		100	%	50 - 140
			Chrysene	12/2/2020		93	%	50 - 140
			Benzo(b&j)fluoranthene	12/2/2020		87	%	50 - 140
			Benzo(k)fluoranthene	12/2/2020		105	%	50 - 140
			Benzo(a)pyrene	12/2/2020		84	%	50 - 140
			Indeno(1,2,3-cd)pyrene	12/2/2020		90	%	50 - 140
			Dibenz(a,h)anthracene	12/2/2020		100	%	50 - 140
			Benzo(g,h,i)perylene	12/2/2020		97	%	50 - 140
A101614	SY	Method Blank	D10-ANTHRACENE (sur.)	12/3/2020		109	%	50 - 140
			D8-ACENAPHTHYLENE (sur.)	12/3/2020		99	%	50 - 140
			D8-NAPHTHALENE (sur.)	12/3/2020		96	%	50 - 140
			TERPHENYL-D14 (sur.)	12/3/2020		107	%	50 - 140
			Quinoline	12/3/2020	<0.020		ug/L	
			Naphthalene	12/3/2020	<0.10		ug/L	
			1-Methylnaphthalene	12/3/2020	<0.050		ug/L	
			2-Methylnaphthalene	12/3/2020	<0.10		ug/L	
			Acenaphthylene	12/3/2020	<0.050		ug/L	
			Acenaphthene	12/3/2020	<0.050		ug/L	
			Fluorene	12/3/2020	<0.050		ug/L	
			Phenanthrene	12/3/2020	<0.050		ug/L	
			Anthracene	12/3/2020	<0.010		ug/L	
			Acridine	12/3/2020	<0.050		ug/L	
			Fluoranthene	12/3/2020	<0.020		ug/L	
			Pyrene	12/3/2020	<0.020		ug/L	
			Benzo(a)anthracene	12/3/2020	<0.010		ug/L	
			Chrysene	12/3/2020	<0.020		ug/L	
			Benzo(b&j)fluoranthene	12/3/2020	<0.030		ug/L	
			Benzo(k)fluoranthene	12/3/2020	<0.050		ug/L	
			Benzo(a)pyrene	12/3/2020	<0.0050		ug/L	
			Indeno(1,2,3-cd)pyrene	12/3/2020	<0.050		ug/L	
			Dibenz(a,h)anthracene	12/3/2020	<0.0030		ug/L	
			Benzo(g,h,i)perylene	12/3/2020	<0.050		ug/L	
A101614	SY	RPD	Naphthalene	12/4/2020	NC (4)		%	40
			1-Methylnaphthalene	12/4/2020	NC (4)		%	40
			2-Methylnaphthalene	12/4/2020	NC (4)		%	40
			Acenaphthene	12/4/2020	NC (4)		%	40
			Fluorene	12/4/2020	NC (4)		%	40
			Phenanthrene	12/4/2020	NC (4)		%	40
			Anthracene	12/4/2020	NC (4)		%	40
			Acridine	12/4/2020	NC (4)		%	40
A102059	MO5	Matrix Spike [YY2201-12]	Total Ammonia (N)	12/2/2020		84 (7)	%	80 - 120
A102059	MO5	Spiked Blank	Total Ammonia (N)	12/2/2020		98	%	80 - 120
A102059	MO5	Method Blank	Total Ammonia (N)	12/2/2020	<0.015		mg/L	
A102059	MO5	RPD [YY2201-12]	Total Ammonia (N)	12/2/2020	11 (8)		%	20
A102060	MO5	Matrix Spike	Total Ammonia (N)	12/2/2020		99	%	80 - 120
A102060	MO5	Spiked Blank	Total Ammonia (N)	12/2/2020		101	%	80 - 120
A102060	MO5	Method Blank	Total Ammonia (N)	12/2/2020	<0.015		mg/L	
A102060	MO5	RPD	Total Ammonia (N)	12/2/2020	4.7 (4)		%	20
A102280	WZ1	Matrix Spike	Total Dissolved Solids	12/3/2020		101	%	80 - 120
A102280	WZ1	Spiked Blank	Total Dissolved Solids	12/3/2020		97	%	80 - 120
A102280	WZ1	Method Blank	Total Dissolved Solids	12/3/2020	<10		mg/L	
A102280	WZ1	RPD	Total Dissolved Solids	12/3/2020	4.2 (4)		%	20
A102980	WZ1	Matrix Spike	Total Suspended Solids	12/4/2020		108	%	80 - 120
A102980	WZ1	Spiked Blank	Total Suspended Solids	12/4/2020		104	%	80 - 120
A102980	WZ1	Method Blank	Total Suspended Solids	12/4/2020	<1.0		mg/L	
A102980	WZ1	RPD	Total Suspended Solids	12/4/2020	NC (4)		%	20
A105265	PK8	Matrix Spike	Total Sulphide	12/5/2020		97	%	80 - 120
A105265	PK8	Spiked Blank	Total Sulphide	12/5/2020		106	%	80 - 120
A105265	PK8	Method Blank	Total Sulphide	12/5/2020	<0.0018		mg/L	
A105265	PK8	RPD	Total Sulphide	12/5/2020	NC (4)		%	20
A107205	BB3	Spiked Blank	Dissolved Chloride (Cl)	12/7/2020		104	%	80 - 120
			Dissolved Sulphate (SO4)	12/7/2020		98	%	80 - 120
A107205	BB3	Method Blank	Dissolved Chloride (Cl)	12/7/2020	<1.0		mg/L	
			Dissolved Sulphate (SO4)	12/7/2020	<1.0		mg/L	

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) Matrix Spike Parent ID [YY2200-10]
(2) Duplicate Parent ID [YY2200-10]
(3) Duplicate Parent ID [YY2200-03]
(4) Duplicate Parent ID
(5) Matrix Spike Parent ID [YY2200-11]
(6) Duplicate Parent ID [YY2200-11]
(7) Matrix Spike Parent ID [YY2201-12]
(8) Duplicate Parent ID [YY2201-12]

Appendix E
Concentration Versus Time Plots

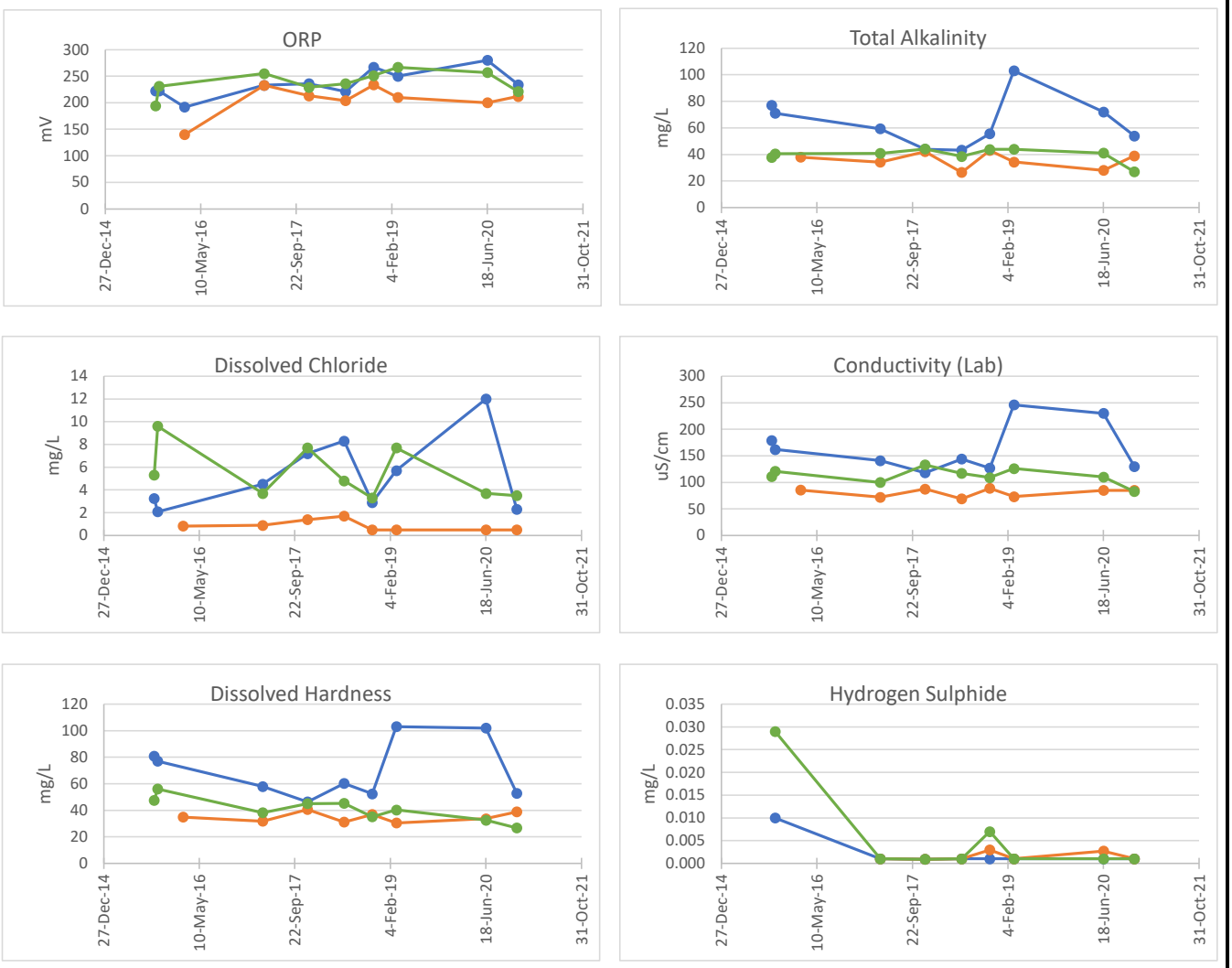
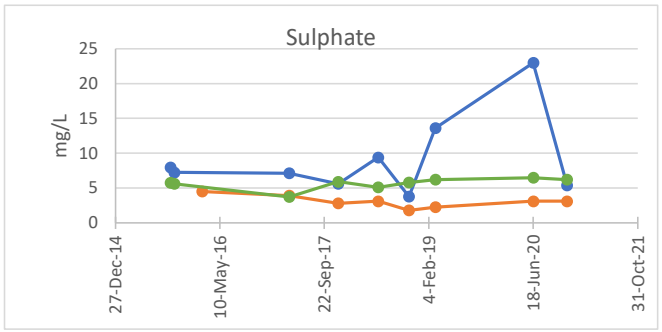
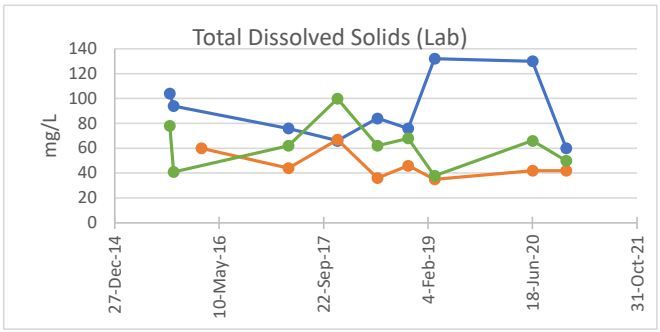
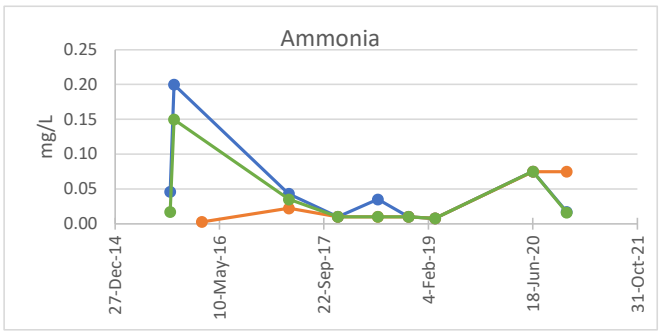
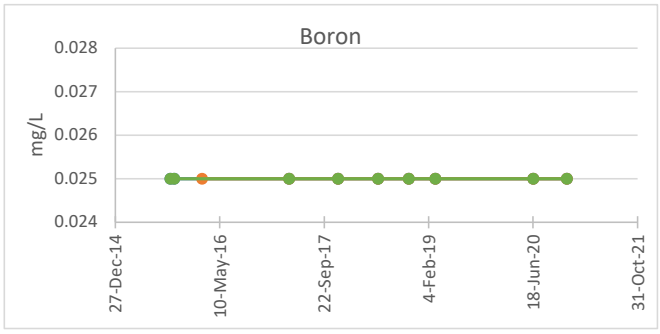


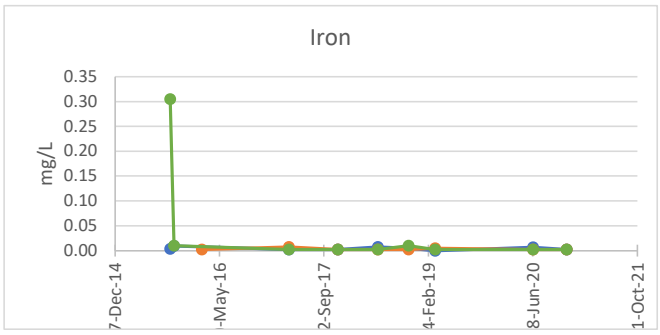
figure 1.1
CONCENTRATION VERSUS TIME - UPGRADIENT
2020 ANNUAL OPERATIONS AND MONITORING REPORT
UPLAND ORIGINAL LANDFILL, CAMPBELL RIVER, BC

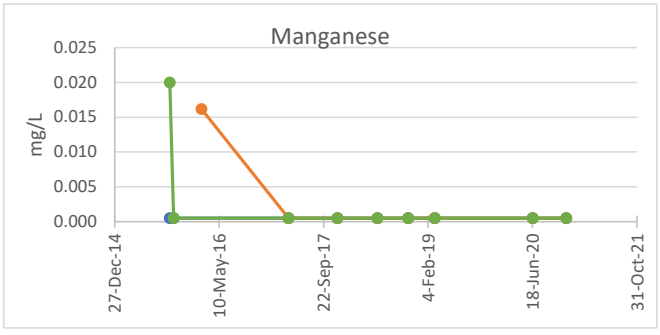












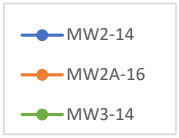
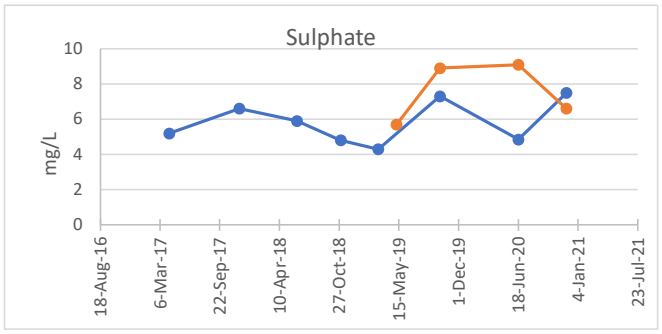
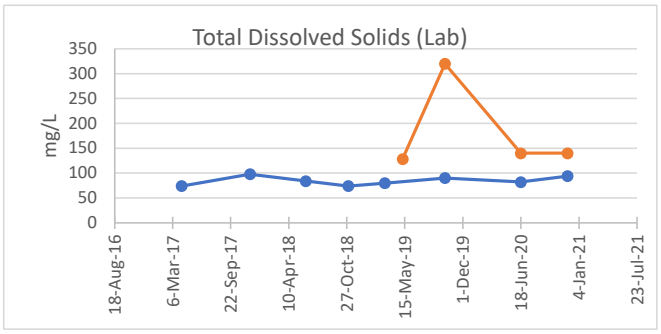
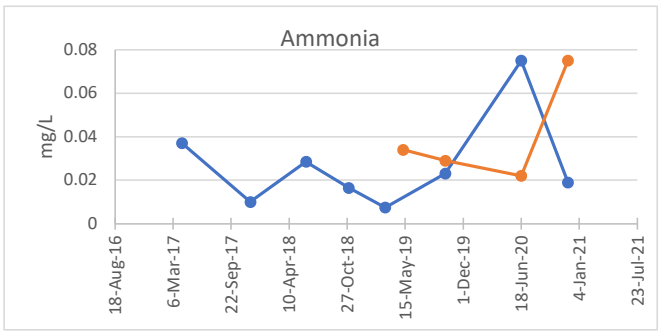


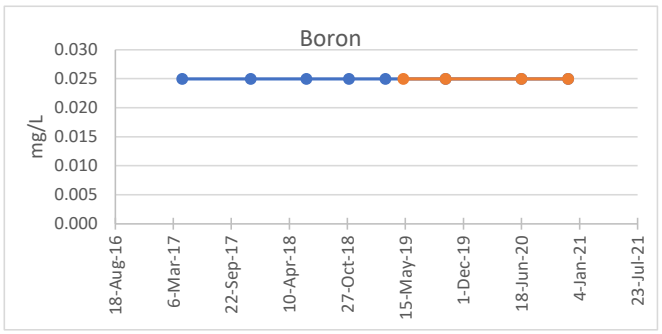
figure 1.2
CONCENTRATION VERSUS TIME - UPGRADIENT
2020 ANNUAL OPERATIONS AND MONITORING REPORT
UPLAND ORIGINAL LANDFILL, CAMPBELL RIVER, BC

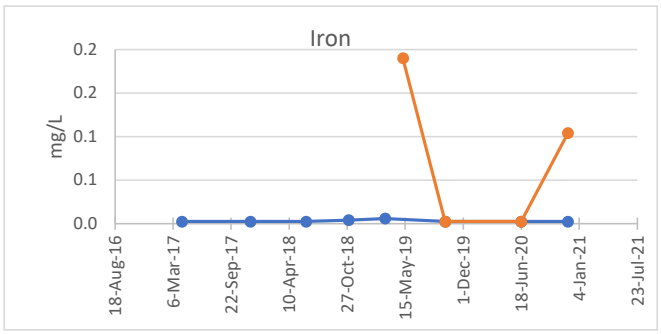
figure 1.3
CONCENTRATION VERSUS TIME - DOWNGRADIENT
2020 ANNUAL OPERATIONS AND MONITORING REPORT
UPLAND ORIGINAL LANDFILL, CAMPBELL RIVER, BC

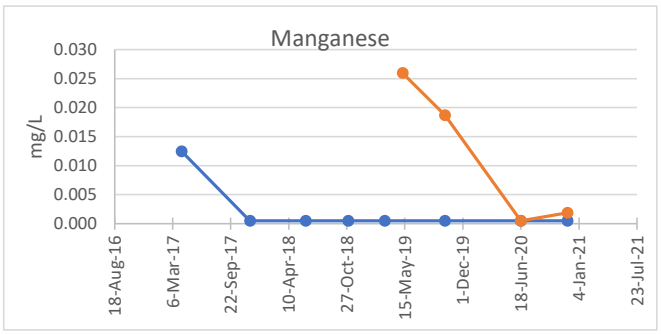












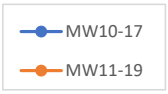


figure 1.4
CONCENTRATION VERSUS TIME - DOWNGRADIENT
2020 ANNUAL OPERATIONS AND MONITORING REPORT
UPLAND ORIGINAL LANDFILL, CAMPBELL RIVER, BC

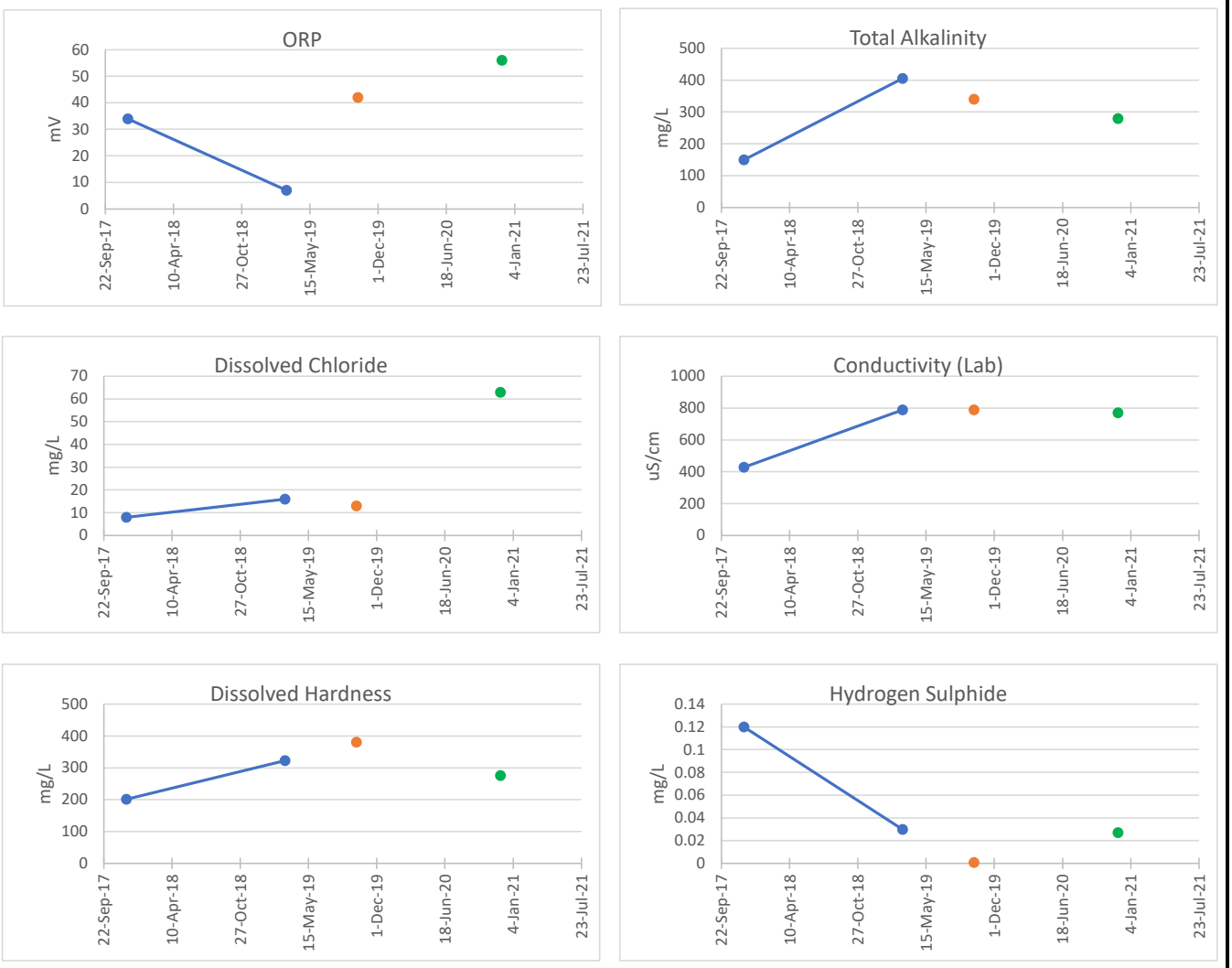
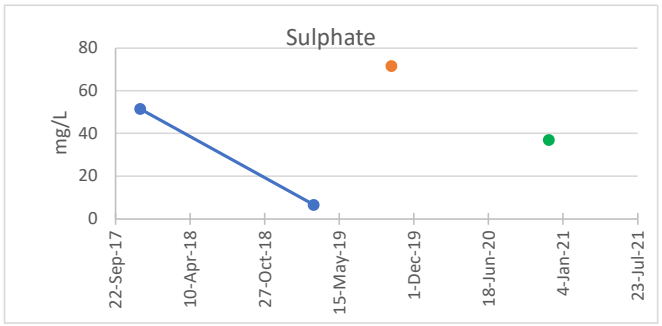
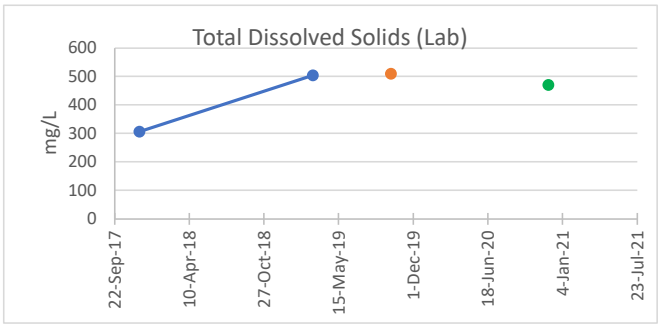
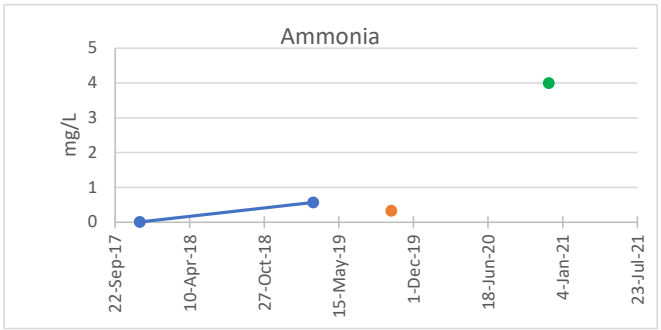
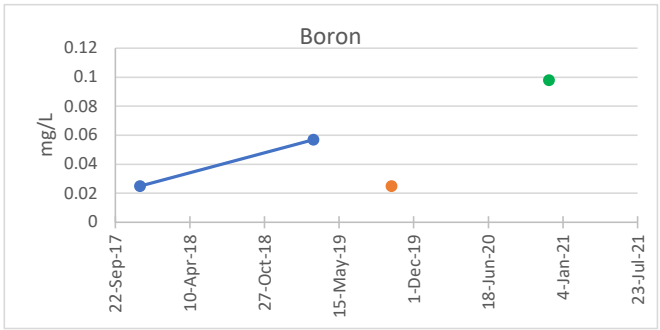


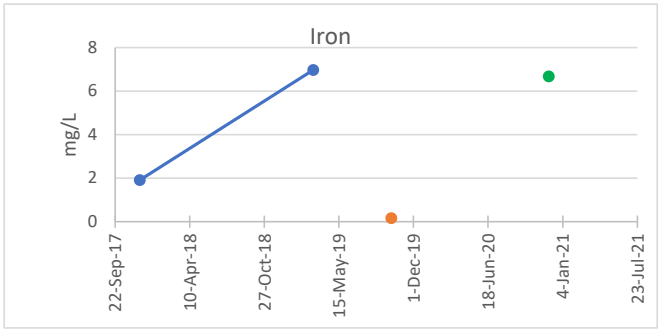
figure 1.5
CONCENTRATION VERSUS TIME - LEACHATE
2020 ANNUAL OPERATIONS AND MONITORING REPORT
UPLAND ORIGINAL LANDFILL, CAMPBELL RIVER, BC

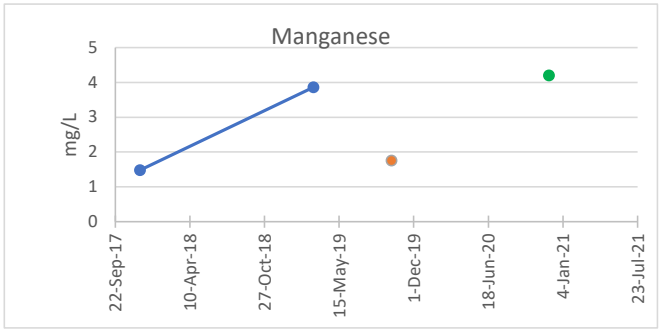












SO2-17
SO3-19
S05-19

figure 1.6
CONCENTRATION VERSUS TIME - LEACHATE
2020 ANNUAL OPERATIONS AND MONITORING REPORT
UPLAND ORIGINAL LANDFILL, CAMPBELL RIVER, BC

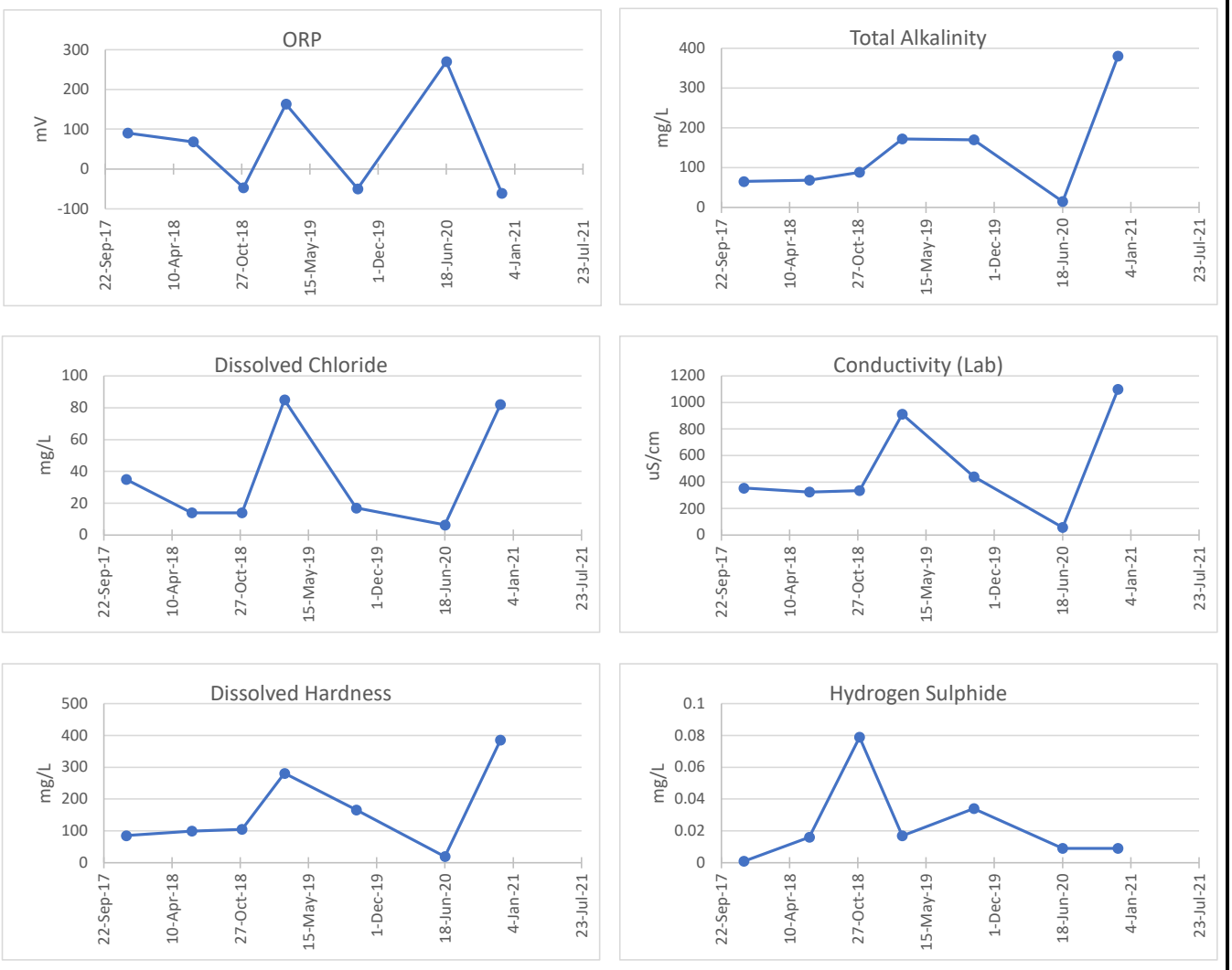
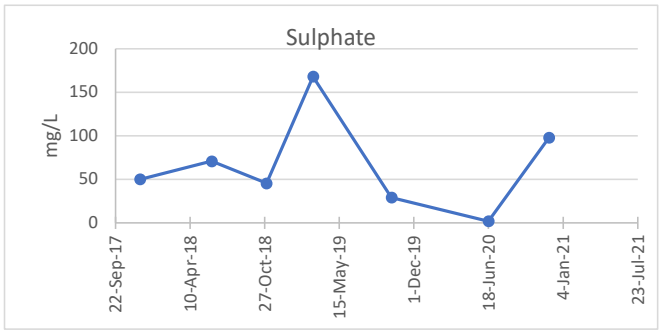
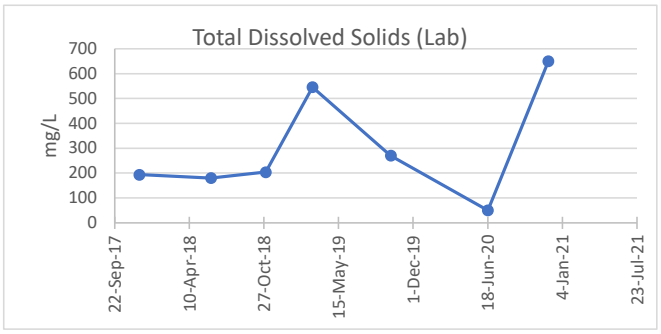
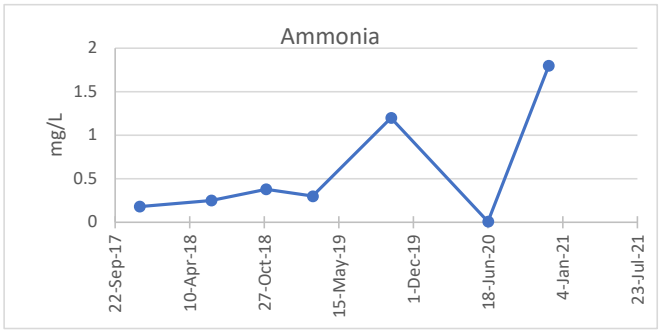
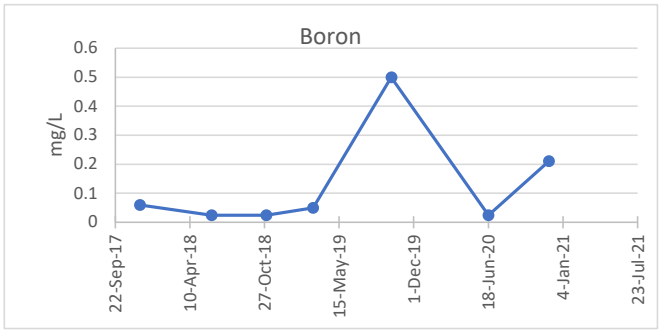


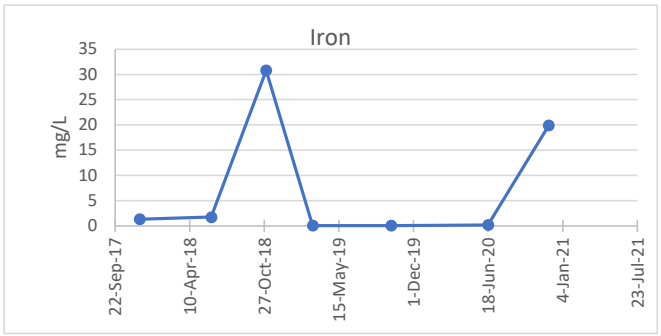
figure 1.7
CONCENTRATION VERSUS TIME - LEAK DETECTION
2020 ANNUAL OPERATIONS AND MONITORING REPORT
UPLAND ORIGINAL LANDFILL, CAMPBELL RIVER, BC











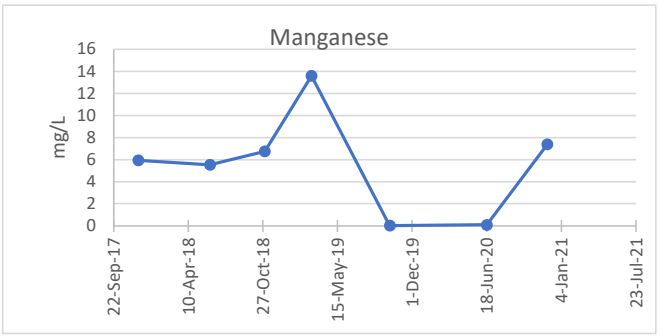


figure 1.8
CONCENTRATION VERSUS TIME - LEAK DETECTION
2020 ANNUAL OPERATIONS AND MONITORING REPORT
UPLAND ORIGINAL LANDFILL, CAMPBELL RIVER, BC

Appendix F
Annual Status Form

AUTHORIZATION NUMBER: 107689
AUTHORIZATION TYPE: Refuse, Permit
LEGAL AUTHORIZATION HOLDER NAME: Upland Excavating Ltd.

AUTHORIZED PERSON NAME:

AUTHORIZED PERSON SIGNATURE:
SIGNATURE DATE:

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
1.0	The maximum rate of waste discharge to the Original Lined Cell is 45,000 tonnes per calendar year.	Yes	N/A - Refer to Section 2.8 of the annual report.
1.1	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.
1.2	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 2.5 of the annual report.
1.3	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 - Remaining airspace. Refer to Section 2.7 of the annual report.
1.5	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
1.6	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.
1.7	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 2.2 of the annual report.
1.8	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 2.2 of the annual report.
1.9	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 - Refer to Section 2.2 of the annual report.
1.12	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.
2.2	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 2.5 of the annual report.
2.5	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 Section 2.4 of the annual report.
2.6	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).	Yes	N/A - Refer to Section 2.3 of the annual report.
2.7	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 - The operational certificate holder notified the Director.
3.0	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 - Refer to Section 2.2 of the annual report.
3.1	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
3.4	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 6.1 and 6.2 of the annual report.
3.11	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 - Refer to Section 2.11 of the annual report.
3.12	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 - Refer to Section 2.11 of the annual report.

AUTHORIZATION NUMBER: 107689
AUTHORIZATION TYPE: Refuse, Permit
LEGAL AUTHORIZATION HOLDER NAME: Upland Excavating Ltd.

AUTHORIZED PERSON NAME:

AUTHORIZED PERSON SIGNATURE:
SIGNATURE DATE:

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
4.0	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.	Yes	N/A - Refer to Section 4.3 of the annual report.
4.1	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.	Yes	N/A - Refer to Sections 4.3 and 4.4 of the annual report.
4.2	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 to Sections 4.5 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 Sections 4.4 of the annual report.
4.4	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 Sections 4.2 and AppB of the annual report.
5.1	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 Section 2.10 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 Section 2.10 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 Section 2.10 of the annual report.
5.4	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 Section 2.10 of the annual report.
5.5	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	
5.6	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 section 2.3 of the annual report.
5.7	The Annual Operations and Monitoring Report must include a summary of construction reports.	Yes	N/A - Refer to section 2.4 of the annual report.
5.8	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 section 2.6 of the annual report.
5.9	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 section 2.8 of the annual report.
5.10	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 section 5.3 of the annual report.
5.11	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 section 2.11 of the annual report.
5.12	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 section 2.11 of the annual report.
5.13	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).
5.14	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 section 2.3 of the annual report.
5.15	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.
5.16	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.
5.17	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.
5.18	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.
5.19	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.
5.20	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 5 and 6 of the annual report.
5.21	The Environmental Monitoring Plan Report must include results, conclusions, recommendations and changes to the environmental monitoring plan.	Yes	N/A - Refer to sections 7 and 8 of the annual report.
5.22	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.

about GHD

GHD is one of the world's leading professional services companies operating in the global markets of water, energy and resources, environment, property and buildings, and transportation. We provide engineering, environmental, and construction services to private and public sector clients.

Rose Marie Rocca
RoseMarie.Rocca@ghd.com
604.248.3662

Michelle Uyeda
Michelle.Uyeda@ghd.com
604.248.3912

www.ghd.com