January 31, 2018 Reference No. 088877-05-02

Mr. Allan Leuschen
Senior Environmental Protection Officer
Authorizations – South
Environmental Protection Division
Ministry of Environment
2080 Labieux Road
Nanaimo, British Columbia V9T 6J9

Dear Mr. Leuschen:

Re: 2017 Existing Conditions
Upland Property Waste Management Area
Upland Excavating, Campbell River, British Columbia

1. Introduction

GHD Limited (GHD) has prepared this letter on behalf of Upland Excavating Ltd. (Upland) for the Ministry of Environment (MOE) to provide background information regarding the existing lined cell and waste management area at the Upland Property (Site) located at 7295 Gold River Highway, Campbell River, British Columbia (BC). In response to an e-mail from the MOE to Upland and GHD dated November 10, 2017, this letter will provide "*Information, plans and specifications, for the temporary lined storage cell including waste type(s) and volume(s), type(s) and thickness of liner(s), cover material, leachate/water management, leak detection, storage, treatment, sampling and any related discharge to the environment.*"

2. Background

2.1 Existing Permit

The Site is currently authorized to accept and discharge inert municipal refuse under the Permit PR-10807 dated June 1, 1992 (Permit). The Permit allows for discharge of 3,200 cubic metres of waste per year. Four burns per year are permitted with the maximum volume of waste per burn being 750 cubic metres.

2.2 Site Location

The Site is located at 7295 Gold River Highway, approximately 7 kilometres (km) southwest of Campbell River, BC. 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 parcels use in the forestry industry.

2.3 Site Layout

The Site encompasses approximately 48 hectares as shown in Figure 1. Access to the Site is to the north via an entrance from Gold River Highway. The Site encompasses a large sand and gravel pit (Pit) that has been in operation since 1969 under Mines Act Permit G-8-114 issued December 1989 (Last amended February 2014). The Pit is approximately 20 metres deep. A perimeter access road is located around the Pit. The access into the Pit is located in the northwest corner of the Pit. The waste management area is located outside the Pit near the southeast corner of the Site. The waste management area is accessed via an access road off the main access road, as shown in Figure 1.

2.4 2017 Water Quality Monitoring Activities

There are 13 groundwater monitoring wells presently located on and immediately adjacent to the Site. The monitoring well regime was established to complete the hydrogeological characterization of the Site and to investigate groundwater quality across the Site (Hydrogeology and Hydrology Characterization Report, Proposed Upland Landfill, Campbell River, British Columbia, GHD May 2017 [May 2017 Characterization Report]).The monitoring well network is present on the Site as shown in Figure 1.

The 2017 water quality monitoring activities consisted of the following:

- Monitoring of all on monitoring wells (on-Site and off-Site) - April 6 and 7, 2017.
- Monitoring of surface water quality in adjacent surface water bodies - April 6, 2017.
- Monitoring of waste management area monitoring wells - November 27, 2017.
- Monitoring of lined cell leachate and leak detection system - November 27, 2017.

The 2017 water quality monitoring results for the waste management area of the Site are presented in the Letter to the MOE dated January 8, 2018 entitled 2017 Water Quality Monitoring Results, which is provided in Attachment A.

3. Site Physical Setting

The Site physical setting discussed below is based on information contained within the 2017 May Characterization Report (GHD, 2017). Additional detailed information is available in this report.

3.1 Topography and Drainage

The Site is located on a terrace partially surrounded by mountainous terrain to the south, southwest and northwest. The terrace gradually slopes towards the Quinsam River located 3.8 kilometers to the southeast of the east Site boundary. The Quinsam River channel is at an elevation more than 100 metres (m) below the Site. The waste management area is located on relatively level ground at approximately Elevation (El.) 190 m. The Upland Property is divided between two watersheds, the Campbell River watershed and Quinsam River Watershed. The Site entrance, Pit and the waste management area are entirely within the Quinsam River Watershed (Figures 2.0A and 2.0B, May 2017 Characterization Report).

3.2 Surface Water

There are no surface water features located on Site.

There are two lakes located near to the Site. McIvor Lake, which is contiguous with Campbell Lake, is approximately 50 m to 150 m north of the northern Site boundary, or approximately 750 m from the waste management area. The smaller Rico Lake is approximately 10 to 15 m west of the western Site boundary, or approximately 725 m from the waste management area.

The Quinsam River is located approximately 3.5 km from the southeastern Site boundaries, or approximately 3.6 m from the waste management area. Several Ephemeral tributaries to the Quinsam River are located at distances of approximately 500 to 1,000 metres southeast of the waste management area.

3.3 Site Geology

The Site is underlain by a unit of native interbedded sand and gravel. The thickness of this unit is highly variable throughout the Site. Below the waste management area, located at an El. 190 m, the sand and gravel deposits have a thickness of greater than 50 m.

Geotechnical investigations at the Site encountered basalt bedrock of the Karmutsen formation below the overburden, which is characteristic of this region of Vancouver Island.

3.4 Hydrogeology

There is an unconfined aquifer in the sand and gravel unit present throughout the Site. The groundwater generally flows from northwest to southeast across the Site. The groundwater levels measured in April 2017 in the vicinity of the waste management area were between El. 150 m and 155 m. This corresponds to an approximate depth to groundwater of 40 m below the ground surface in the waste management area, and 15 m below the base of the excavated area of the sand and gravel pit. The aquifer is identified in the BC Water Resource Atlas (2017) as aquifer 975 IIA (10).

3.5 Climate

The climate of the east coast of Vancouver Island, where the Site is located is marked by wet and mild winters, and warm, dry summers. Climate data for the Site is based on Environment Canada's Climate Normals measured between 1980 and 2010 at Campbell River Airport (Station No. 1021261), located approximately 9 km to the southeast. The average annual precipitation is reported to be 1,489 millilitres with over 75 percent of the precipitation occurring between October and March. November and December experience the most precipitation with an average of 232 and 226 millilitres, respectively. On average, 84 millilitres of snow is recorded per year.

4. Existing Waste Management Operations

The existing waste management operations at the Site include:

- Asphalt and concrete recycling
- Burning of clean wood waste
- Landfilling of stumps, trees, land clearing waste, select demolition debris, soil, and residue of the burning activities in the waste management area

The asphalt and concrete recycling area is located near the northwest corner of the Site, and is not discussed in this report.

Upland intends to relocate waste from the waste management area when an Operational Certificate is issued and the new engineered lined cell is constructed.

5. Existing Waste Management Area

The existing management area consists of lined cell and an unlined area. The location of the existing waste management area is shown on Figure 1.

5.1 Unlined Area Existing Conditions

The unlined waste management area has received waste since the early 1990s. The waste deposited in this area includes wood waste, ash and burning residue, construction and demolition waste.

5.2 Lined Cell Existing Conditions

The temporary lined cell was constructed in April 2015 to contain solid waste imported to the Site. The lined cell is described in Section 6.0 below. The waste placed in the lined cell is discussed in Section 7.0. The lined cell existing conditions are presented on Figure 2.

6. Lined Cell Existing Conditions

6.1 Lined Cell Construction

The lined cell, from the bottom to top, is constructed as follows:

- Levelled subgrade
- 0.3 m thick compacted and smooth sand grading layer
- Lower Coated Woven Polyethylene (CWPE) Liner
- Minimum 0.3 m thick granular leak detection layer
- Upper CWPE Liner

- 0.3 m thick granular protection layer
- Waste Intermediate cover soil

The geosynthetic liner used in the upper and lower layers is a 20 mil CWPE liner supplied by Western Tank and Lining (WTL). The two CWPE liners were factory welded into sections with dimensions of 279 feet by 279 feet (85 metres by 85 meters). The sections were delivered to Site ready for installation. Upland Contracting Ltd. constructed the cell base as described above. QAQC documentation for the two liners was provided by WTL and is provided in Attachment B.

Imported granular material was reportedly obtained from a highway construction project on Gold River Highway. The material was classified by Upland as mostly sand with some gravel. The granular material was screened with a 19 millimetre (mm) screen prior to use in the cell base construction to remove any stones and rocks.

The cell base is constructed to provide a slight slope to the northeast for the lower leak detection later and a slight slope to the northwest for the drainage on the upper liner layer.

An as-built survey of the cell base was not conducted following the construction; however, a photolog of the construction is provided in Attachment C. A schematic of the lined cell layers is presented on Figure 3.

6.2 Perimeter Containment Berm

The lined cell is bound by perimeter containment berms. The interior slopes of the perimeter containment berms are approximately 1.5H:1V to 2H:1V. The perimeter containment berms on the north, east, and south sides of the cell are approximately four to five metres tall. The perimeter containment berm on the west is approximately two to three metres tall. The west berm is lower to allow operational access to the cell, and to allow for surface water run off to leave the cell when intermediate soil or geosynthetic cover is applied.

The two CWPE liners are anchored within the top of the perimeter containment berms. The anchor trench is approximately 0.75 m by 0.75 m and is shown in Figure 3.

6.3 Cover Soil

The existing intermediate cover soil consists of imported fill. The approximate 10,700 tonnes of soil used for cover were imported from the Salmon River Dam Decommissioning Project. The soil quality meets the Contaminated Site Residential Standards, as of September 2017.

The intermediate cover soil thickness ranges in depth across the Site, with a minimum of 0.3 m. The waste and cover soil is graded from east to west to allow for surface water runoff. The slope of the cover soil as of December 2017 is approximately one to two percent.

6.4 Leak detection Layer

The leak detection layer consists of a minimum of 0.3 m granular layer between the two CWPE layers. A white 100 mm PVC riser pipe is installed within the northeast corner of the cell. The riser pipe extends from within the granular layer at the toe of the slope of the north and east perimeter berms to the top of the berms. The leak detection layer riser pipe is accessible at the top of the berms and may be used to determine if water is present in the leak detection layer and take water level measurements, if applicable. A leak detection layer schematic is presented on Figure 3.

6.5 Leachate Extraction Chamber

A leachate extraction chamber is located within the lined cell near the west side of the cell. The leachate extraction chamber consists of a 0.6 m diameter corrugated HDPE pipe installed on end into drain rock. The top of the leachate extraction chamber projects above the cover soil surface and is covered with a temporary cover ballasted by pieces of wood. The leachate sump allows leachate to enter the chamber through the granular drain rock at the base of the sump. Leachate levels may be observed in the leachate sump. Leachate may also be extracted via the leachate sump. A PVC pipe is located along the northern berm and is available to pump leachate from the sump to the leachate storage tanks discussed below. A leachate extraction chamber schematic is presented on Figure 3.

6.6 Leachate Storage System

Three 2,500 US Gallon tanks are installed, partially buried, adjacent to the northeast corner of the lined cell. The three tanks are available for temporary leachate storage, as required.

6.7 Access Roads

There are numerous access roads throughout the Site. The main access road is a gravel perimeter road that runs from the Site office and Site entrance around the Pit. The waste management area is accessed via two smaller access roads that connect the main access road, and provide:

- Access into the cell
- Access to the storage shed area (runs around the south of the cell)

The waste management area access roads are gravel topped and relatively flat, except for a ramp into the cell. The roads provide all weather access roads to haul trucks, maintenance trucks, and equipment.

7. Existing Waste Types

7.1 Unlined Area Waste Types

The existing unlined area is located adjacent to the lined cell. The waste in the unlined area has an estimated thickness of up to 5 m. The estimated volume of waste is estimated as 35,000 cubic metres, as

reported in the Location and Volume of Existing Waste letter addressed to the MOE, dated May 12, 2017. The waste consists of the following types:

- Land clearing waste – approximately 25,000 cubic metres
- Combustion residue – approximately 10,000 cubic metres

7.2 Lined Cell Waste Types

The estimated volume of waste is 4,200 cubic metres, of the following types:

Table 7.1 Lined Cell Waste Type Volumes

Waste Type	Source Location	Approximate Tonnes	Approximate Volume (Cubic metres)	Year Imported to Site
Contaminated Soil	Squamish, BC	3,784	2,100	2015
Contaminated Soil	Campbell River, BC	724	480	July 2015
Contaminated Soil	Campbell River, BC	496	330	September 2015
Demolition Debris	Courtenay, BC	114	114	2017
Treated Wood/Demolition Debris	Campbell River, BC	1,275	1,275	August to October 2017

8. Water Management

Along the western edge of the lined cell, inside the berm, the intermediate cover soil is graded into a swale approximately 0.3 m deep. The swale collects surface water from the top of the cover soil. The surface water runoff drains out of the lined cell at the northwest corner. Water that infiltrates through the cover soil is may be extracted from the cell via the leachate extraction chamber.

9. Summary

This existing conditions report summarizes the construction of the existing lined cell, and the type and quantity of waste presently contained within the lined cell. Upland Contracting Ltd. constructed the double CWPE lined cell in 2015. The lined cell presently contains 4,200 cubic metres of waste. The waste includes soil, demolition debris, and treated wood. Intermediate cover soil has been applied to the waste within the lined cell. Surface water runoff from the top of the cover soil leaves the cell in northwest corner. Upland intends to relocate waste from the waste management area when an Operational Certificate is issued and the new engineered lined cell is constructed. Monitoring of both the leachate and leak detection water has been carried out.

10. Recommendations

Based on the existing conditions for the temporary lined cell as reported herein, the following recommendations are made for the protection of the environment:

- Carry out water quality monitoring for the waste management area as described in the 2017 Water Quality Monitoring report provided in Attachment A.
- Install one additional downgradient monitoring well in the southeast corner of the Site to increase the downgradient water quality monitoring for the existing waste management area. The proposed location of the downgradient monitoring well is shown on Figure 1.
- Increase the slope of the intermediate cover soil layer across the cell to promote increased surface water runoff.
- Improve the surface water drainage swale leading from the northwest corner of the lined cell to improve drainage and reduce surface water infiltration through the cover soil.
- Carry out monthly water level monitoring of the leachate collection sump and leak detection system to monitor the performance of the cell's liner system.
- Remove leachate from the leachate collection sump as required to eliminate the potential for leachate breakouts through the intermediate cover soil.
- Include monitoring of the surface water quality in the improved drainage cell during storm events to monitor for potential water quality concerns for the existing waste management area.

If you have any other questions, please do not hesitate to contact the undersigned.

Sincerely,

GHD

Gregory D. Ferraro, P.Eng. Shauna Sturgeon, P.Eng.

SS/cs/15

Encl.

cc: Terry Stuart – Upland Excavating Ltd.
Mark Stuart – Upland Excavating Ltd.
Brian Fagan – Upland Excavating Ltd.

LEGEND

- 165.00 — EXISTING MAJOR CONTOURS (m AMSL)
- EXISTING MINOR CONTOUR (m AMSL)
- UPLAND EXCAVATING LTD. PROPERTY LINE
- EXTENT OF DECEMBER 18, 2017 SURVEY
- APPROXIMATE EXTENT OF EXISTING LINED CELL
- LAKE
- WASTE MANAGEMENT AREA
- MAIN ACCESS ROADWAY
- ACCESS ROADWAY
- MW7-17 — GROUNDWATER MONITORING WELL
- MW5B-15 — 2017 GROUNDWATER SAMPLE LOCATION
- S02-17 — EXISTING LINED CELL LEACHATE SAMPLE LOCATION
- S01-17 — LEAK DETECTION LAYER SAMPLE LOCATION
- SW15-01 — SURFACE WATER SAMPLE LOCATION
- MW11 — PROPOSED MONITORING WELL LOCATION

McIVOR LAKE
SW15-01 (APPROXIMATELY 1 KM NORTH)
LOT 6 PLAN 31913
ARGONAUT ROAD
2047-R
112 OIP
137m 136-50-24
GOLD RIVER HIGHWAY
301.764m 65-58-15
LOT A PLAN 30709
MW9-17
104 OIP
OFFICE
WEIGH SCALE
SHED
236.236m 65-58-15
MW8-17
SHOP
LOT A PLAN 42515
MW1-14
MW6-17
MW7-17
STRATA LOT 1 PLAN VIS6756
STRATA LOT 2 PLAN VIS6756
K&D CONTRACTING LTD.
LOT C PLAN 42515
244.553m 2-22-42
WASH PLANT
MW4A-15
MW4B-15
MW2-14
MW2A-16
632m 2-35-48
110 OIP
EXISTING STORAGE BUILDING
LEACHATE STORAGE TANKS
S02-17
S01-17
MW10-17
SW15-02
RICO LAKE
243.443m 2-22-42
MW3-14
WASTE MANAGEMENT AREA
MW5A-15
MW5B-15
MW11
231.223m 271-28-27
105 OPP BCLS724
524.777m 271-28-27
113 OPP
NE 1/4 SEC.32 TP.2
W 1/2 OF NW 1/4 SEC. 33 TP. 2

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

0 40 80 120m

N

GHD

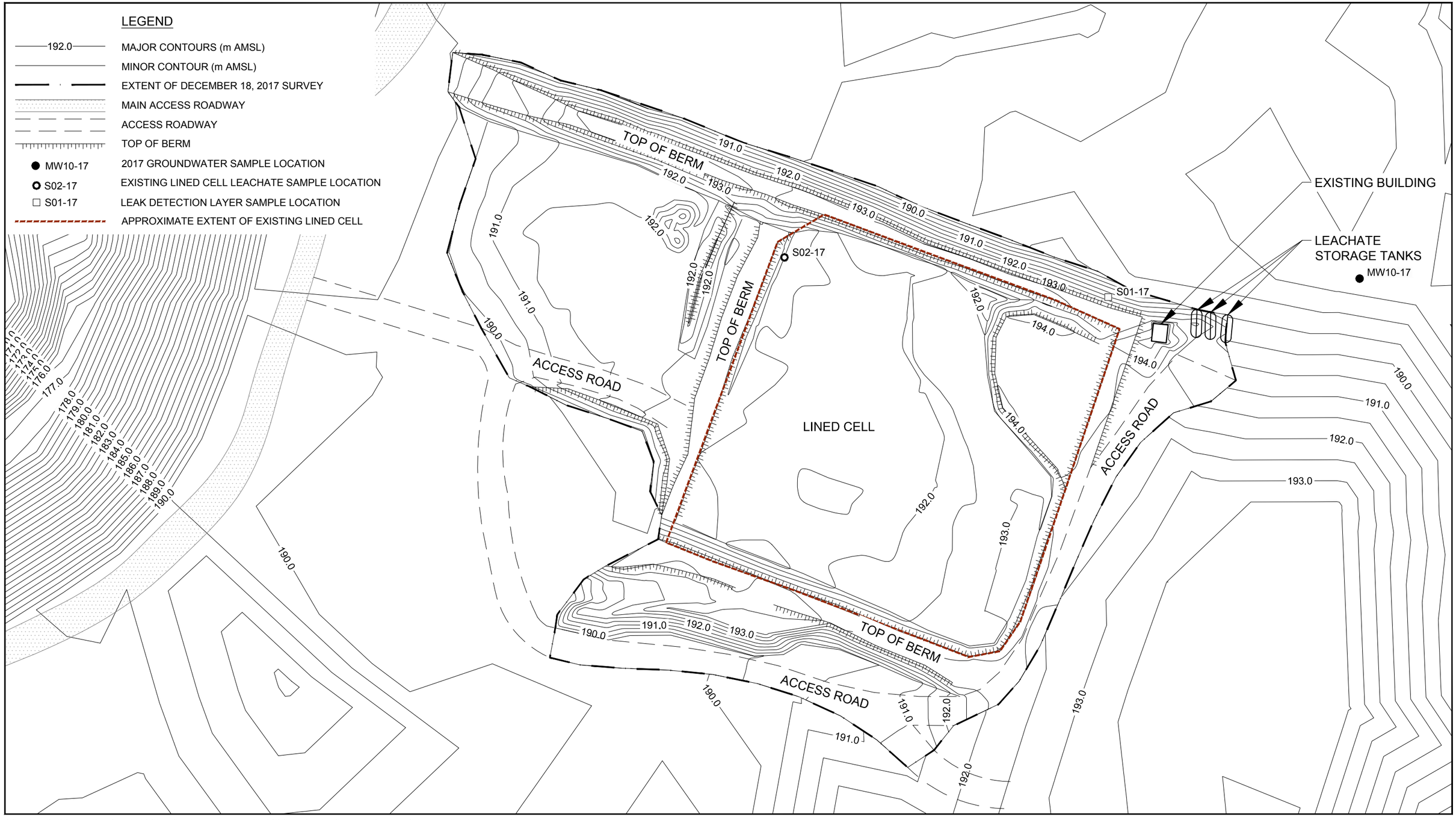
UPLAND EXCAVATING PROPERTY
2017 EXISTING CONDITIONS
SITE PLAN

88877-06

Jan 31, 2018

FIGURE 1

CAD File: 88877-05(LEUS016)GN-WA001.DWG



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

0 6 12 18 24m

GHD

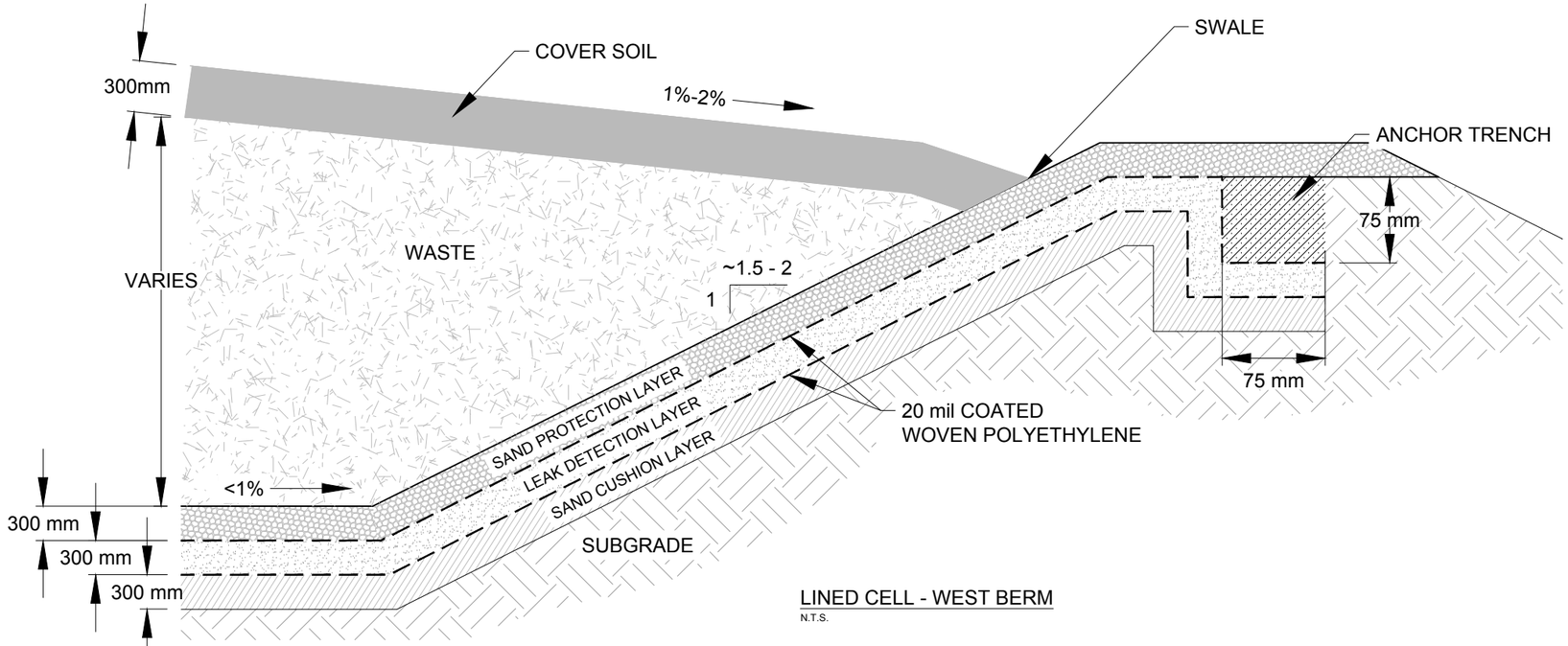
UPLAND EXCAVATING PROPERTY
2017 EXISTING CONDITIONS
WASTE MANAGEMENT AREA

88877-05

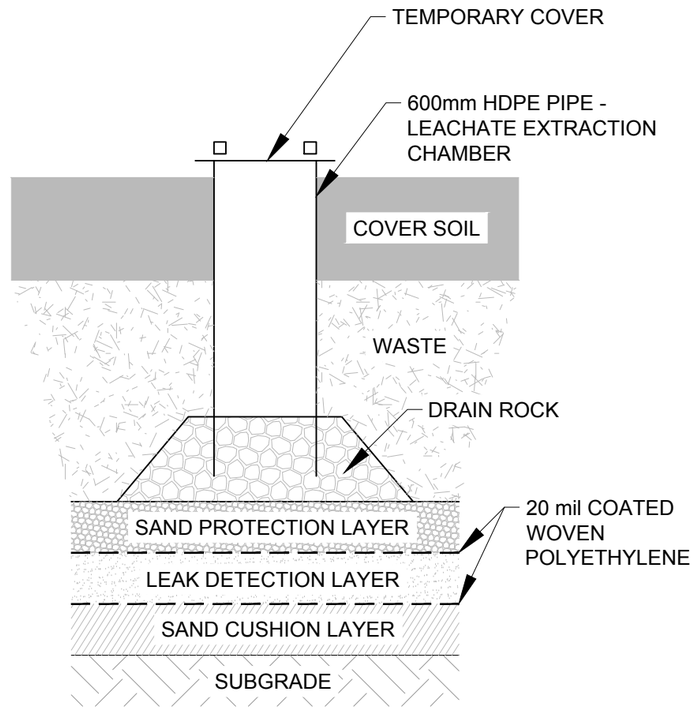
Jan 31, 2018

FIGURE 2

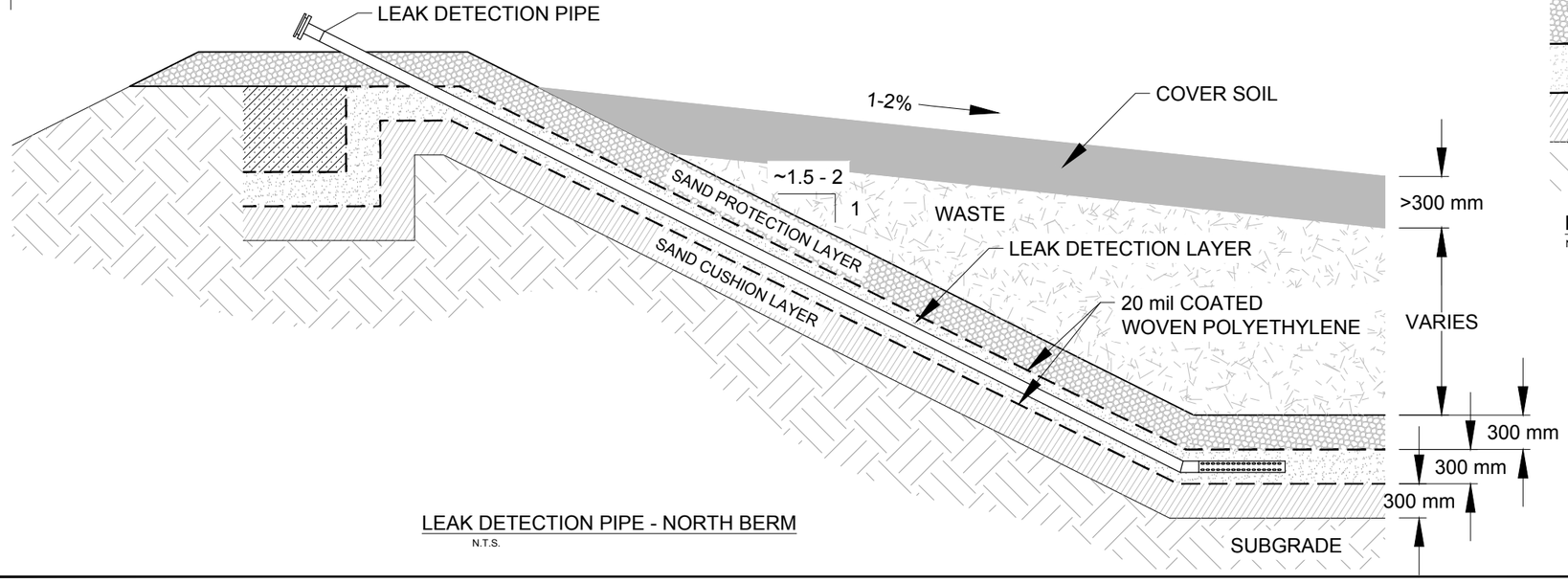
CAD File: 88877-05(LEUS016)GN-WA002.dwg



LINED CELL - WEST BERM
N.T.S.



LEACHATE EXTRACTION CHAMBER
N.T.S.



LEAK DETECTION PIPE - NORTH BERM
N.T.S.

ALL MEASUREMENTS ARE APPROXIMATE AND
AS REPORTED BY UPLAND EXCAVATING LTD.

GHD

UPLAND EXCAVATING PROPERTY
2017 EXISTING CONDITIONS
LINED CELL SCHEMATICS

88877-05
Jan 31, 2018

FIGURE 3

CAD File: 88877-05(LEUS016)GN-WA003.dwg

Attachment A
2017 Water Quality Monitoring Results

January 8, 2018 Reference No. 088877

Mr. Allan Leuschen
Senior Environmental Protection Officer
Authorizations – South
Environmental Protection Division
Ministry of Environment
2080 Labieux Road
Nanaimo, British Columbia
V9T 6J9

Dear Mr. Leuschen:

Re: 2017 Water Quality Monitoring Results
Upland Property Waste Management Area
Upland Excavating, Campbell River, British Columbia

1. Introduction

GHD has prepared this letter on behalf of Upland Excavating Ltd. (Upland) to summarize the 2017 water quality monitoring results for the existing waste management area located within the Upland property (Site). The water quality monitoring was carried out in response to an e-mail received from the Ministry of Environment (MOE) to Upland and GHD dated November 10, 2017.

2. Background

2.1 Existing Permit

The Site is currently authorized to accept and discharge inert municipal refuse under the Permit PR-10807 dated June 1, 1992 (Permit). The Permit allows for discharge of 3,200 cubic metres of waste per year, including stumps, trees, land clearing waste, selected building demolition debris, and residue of combustion from the open burning of wood waste. Four burns per year are permitted with a maximum volume of waste per burn being 750 cubic metres.

2.2 Site Location

The Site is located at 7295 Gold River Highway, approximately 7 kilometers southwest of Campbell River, BC. The Site is bounded 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 parcels use in the forestry industry. The limits of the Site are illustrated on Figure 1.

2.3 Site Layout

The Site encompasses approximately 48 hectares and the Site layout is presented in Figure 1. Access to the Site is to the north via an entrance from Gold River Highway. The Site encompasses a large sand and gravel pit (Pit) that has been in operation since 1969 under Mines Act Permit G-8-114 issued December 1989 (Last amended February 2014). The Pit is approximately 20 metres deep. A perimeter access road is located around the Pit. The access into the Pit is located near the northwest corner of the Site. The existing waste management area is located outside of the Pit near the southeast corner of the property as shown on Figure 1. The existing waste management area is accessed via an access road off the main access road, as shown in Figure 1.

2.4 Lined Cell

The existing lined cell is located within the waste management area of the Site and is approximately 7,000 square meters in size. The lined cell received waste intermittently. The lined cell is constructed with a double reinforced polyethylene (RPE) liner. The upper and lower liner is separated by a leak detection drainage material is composed of uniform medium sand. The drainage material was sourced from a local highway project. The leak detection system is equipped with a perforated pipe that extends to ground surface. Three above ground leachate storage tanks are located adjacent to the lined cell. Details on the lined cell construction and wastes contained within the lined cell are provided under the GHD report entitled *2017 Existing Conditions Report – Upland Property Waste Management Area* (Existing Conditions Report). The Existing Conditions Report is planned to be submitted to the MOE at the end of January 2018.

2.5 2017 Water Quality Monitoring – All Activities

Water quality monitoring was carried out at the Site during 2017. There are 13 groundwater monitoring wells presently located on and immediately adjacent (upgradient) to the Site. The monitoring well regime was established to complete the hydrogeological characterization of the Site and to investigate groundwater quality across the Site. (*Hydrogeology and Hydrology, Characterization Report, Proposed Upland Landfill, Campbell River, British Columbia, GHD May 2017 (*May 2017 Characterization Report*))*

The 2017 monitoring activities consisted of monitoring groundwater quality on and off-Site and surface water within two surface water bodies adjacent and upgradient of the Site. The water quality monitoring locations are provided on Figure 1.

The 2017 water quality monitoring activities consisted of the following:

- Monitoring of all on monitoring wells (on-Site and off-Site) April 6 and 7, 2017.
- Monitoring of surface water quality in adjacent surface water bodies April 6, 2017.
- Monitoring of waste management area monitoring wells November 27, 2017.
- Monitoring of lined cell leachate and leak detection system November 27, 2017.

This letter reports on the water quality monitoring results for the waste management area of the Site and includes the results for April and November monitoring events.

2.6 2017 Water Quality Monitoring - Waste Management Area

GHD conducted the following field tasks during 2017 for the waste management area monitoring events:

- Field parameter measurement and sample collection/submission at three upgradient groundwater monitoring wells: MW2-14, MW2A-16 and MW3-14 (two events April 6 and 7, 2017 and November 27, 2017).
- Field parameter measurement and sample collection/submission at on down/crossgradient groundwater monitoring well: MW10-17 (two events April 6 and 7, 2017 and November 27, 2017).
- Collection of one duplicate groundwater sample for quality assurance/quality control (November 27, 2017).
- Collection and submission of one leachate sample from the existing lined cell at SO2-17 (November 27, 2017).
- Collection and submission for analytical testing of one water sample from the leak detection system at SO1-17 (November 27, 2017).

3. Laboratory Analytical Services

All samples were submitted to Maxxam Analytics located in Burnaby BC (Maxxam). Maxxam is a Canadian Association for Laboratory Accreditation (CALA) accredited laboratory. Laboratory reports generated for the sampling events and associated field sample keys (FSKs) are included in Attachment A.

4. Data Quality Assessment and Validation

Upon receiving the laboratory results from Maxxam, a qualified GHD chemist completed data validation to assess laboratory and field QA/QC measures. The QA/QC memoranda presented in Attachment B indicate that data exhibited acceptable levels of accuracy and precision with the qualifications noted in the report (J - estimated concentration).

5. Groundwater Quality Results

Groundwater quality results were assessed for evidence of leachate derived alterations. Groundwater samples were analyzed for general chemistry parameters, nutrients, and dissolved metals. Analytical results are presented in Table 1.

As described in the GHD's May 2017 Characterization Report, a comprehensive review of the above standards and guidelines was completed in order to determine suitable evaluation criteria for water quality

at the Site. Based on the review, it was determined that the water quality criteria that apply to groundwater quality on Site are the Contaminated Sites Regulation (CSR) (BC Reg. 375/96) - Drinking Water (DW) Standards, Schedules 6 and 10. As the groundwater monitoring results for 2017 include both April and November monitoring events, the amendments to the CSR DW Standards brought into effect on November 1, 2017 have not been included in this assessment. The amended Standards will be used for as comparative criteria for assessing the water quality monitoring results for the Site commencing in 2018.

Groundwater quality results are discussed in the following sections.

5.1 Upgradient Groundwater Monitoring Wells

Water quality at the upgradient 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 total dissolved solids (TDS). Little variation was observed between the April and November monitoring events at the upgradient groundwater monitoring wells. No exceedances of the CSR Standards occurred.

5.2 Down/crossgradient Groundwater Monitoring Well

Water quality at the down/crossgradient well (MW10-17) is similar to the upgradient wells and is also characterized as relatively fresh water with low concentrations of alkalinity, hardness (moderately hard), chloride and total dissolved solids (TDS). Little variation was observed between the April and November monitoring events at the down/crossgradient groundwater monitoring well. No exceedances of the CSR Standards occurred.

6. Leachate Quality Results

A leachate sample was collected from within the existing lined cell at S02-17. In order to expose leachate and collect a sample, waste was temporarily excavated from the lined cell in the vicinity of S02-17 prior to sample collection. Leachate was sampled to determine leachate parameter concentrations and assess potential leachate derived alterations in the surrounding receiving environment.

The leachate sample was analyzed for general chemistry parameters, nutrients, total and dissolved metals, polyaromatic hydrocarbons (PAHs), petroleum products and volatile organic compounds (VOCs). Analytical results are shown on Table 2.

6.1 General Chemistry Parameters and Nutrients

When compared with upgradient groundwater quality at the Site, the leachate sample contained slightly elevated hydrogen sulfide, sulfate and chemical oxygen demand (COD) concentrations. The chloride levels were similar to upgradient groundwater quality. The concentrations of sulfide, sulfate, total suspended solids (TSS) that were detected are characteristic of a weak solid waste landfill leachate. The slightly elevated levels of these parameters may be indicative of the organic breakdown of wood wastes occurring within the lined cell.

6.2 Metals

Certain metal concentrations detected in the leachate sample were elevated relative upgradient groundwater samples. Only manganese dissolved and total manganese exceed their respective CSR Standard. Elevated manganese and iron concentrations are typical of landfill-affected water and may be due to the alteration of redox conditions caused by the organic breakdown of the dissolved organic matter (i.e. wood waste) and associated consumption of oxygen sources in the aqueous environment. Where conditions are reducing, naturally-occurring iron and manganese oxides within the geologic material can be reduced to more soluble forms.

6.3 PAHs and Petroleum Products

Detectable PAH concentrations are present in the leachate sample collected with a total PAH concentration of 710 µg/l. The PAH's are likely derived from the presence of creosote timbers within the lined cell.

Analytical results for total petroleum products were below detection limits indicating that waste present in the existing lined cells does not contain significant amounts of mobile petroleum products (e.g. gasoline, diesel, fuel oil, etc.).

6.4 VOCs

Certain VOCs (toluene, ethylbezene and xylenes) were detected in the leachate sample at relatively low concentrations below their respective CSR Standards. The VOCs detected are common constituents of hydrocarbon fuels and may also be derived from the creosote treated wood waste within the existing lined cell. No VOC exceedances of the CSR Standards occurred.

7. Leak Detection System Water Quality Results

A water sample was collected from the leak detection system via the leak detection pipe (S01-17). The leak detection system was sampled to assess the potential for leachate-derived alterations to occur below the upper liner of the lined cell.

The leak detection system sample was analyzed for general chemistry parameters, nutrients, total and dissolved metals, poly-aromatic hydrocarbons (PAHs), petroleum products and volatile organic compounds (VOCs). Analytical results for the leak detection system water sample are shown in Table 2.

7.1 General Chemistry Parameters and Nutrients

Mildly elevated concentrations of general chemistry and nutrients were detected in the leak detection system water sample including chloride, conductivity, total dissolved solids (TDS), biological oxygen demand (BOD) and sulfate. The concentrations of hydrogen sulfide and sulfide, which are indicator parameters of biological activity, are non-detect and below the levels that occur in the leachate. No

general chemistry parameter exceedances of the CSR Standards were identified in the leak detection system water.

7.2 Metals

Elevated concentrations of metals were detected in the leak detection system water sample when compared with upgradient groundwater.

The dissolved manganese concentration was greater in the leak detection water than in the leachate. Total iron and manganese concentrations were also greater in the leak detection system than in the leachate. The leak detection water sample had a relatively high total suspended solids (TSS) level. There is the potential that the iron and manganese levels are derived from the mineralogy of the granular soil used as drainage material within the leak detection system.

7.3 PAHs and Petroleum products

The majority of the PAH compounds were non-detect; only three PAH compounds were detected above laboratory detection levels. The level of total PAH's in the leak detection water was non-detect (0.10 µg/l).

Petroleum products were not detected in the leak detection system water sample.

7.4 VOCs

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

8. Water Quality Assessment

The following assessment is based on a single sampling event of the leachate and leak detection system. Further monitoring is required to further investigate the relationship between the leachate and leak detection system water.

Concentrations from groundwater analytical results were below the applicable CSR Standards in 2017. Groundwater quality for the upgradient and down/crossgradient monitoring wells is consistent with previous water quality monitoring results obtained for the Site.

Leachate is characterized as a weak leachate. The parameters present are indicative of the waste contained within the lined cell. Exceedances of the CSR DW Standards occurred only for sulphide, hydrogen sulphide, manganese and benzo-a-pyrene. No VOC's exceeded their respective CSR Standard. The occurrence of PAH’s in the leachate is likely derived from the presence of the creosote treated wood waste in the lined cell.

There is no significant evidence of leachate in the leak detection system. The levels of sulphide and PAH’s in the leak detection system are significantly below the levels occurring within the leachate. Several metals are present within the leak detection system at higher concentrations than in the leachate, which indicates the leachate detection system water is from a different source.

Within the leak detection system water only iron and manganese concentrations exceed their respective CSR DW Standard. The iron and manganese concentrations are above the levels present in the leachate and may be derived from the leak detection system drainage material. It is reported by Upland that the drainage material (uniform medium sand) was sourced from a local highway project and imported to the Site during construction of the lined cell. Chloride and sodium levels are also slightly elevated and are above the levels occurring in the leachate. This may be indicative of road salt impacts to the imported sand drainage material.

9. Recommendations

The recommendations below have been developed based on the results of the 2017 water quality monitoring events, hydrogeologic setting, and intermittent discharge of small volumes of waste.

- Transfer the leachate from the lined cell to the on-Site leachate storage tanks pending characterization and off-Site disposal. The periodic removal of leachate will reduce the potential for leachate seepage through the upper liner of the lined cell into the leak detection system.
- Maintain interim cover over the lined cell to minimize infiltration and the resulting leachate generation.
- Continue the groundwater quality monitoring within the upgradiant and down/crossgradiant monitoring wells on a biannual basis.
- Collect samples of leachate from the lined cell and the leak detection system water on a biannual basis.
- Monitor the leachate and leak detection system water levels monthly.

We trust this submission provides the information required with respect to water quality monitoring for the existing waste management area. If you have any other questions, please do not hesitate to contact the undersigned.

Sincerely,

GHD

Rose Marie Rocca, B.Sc.

Shauna Sturgeon, P. Eng.

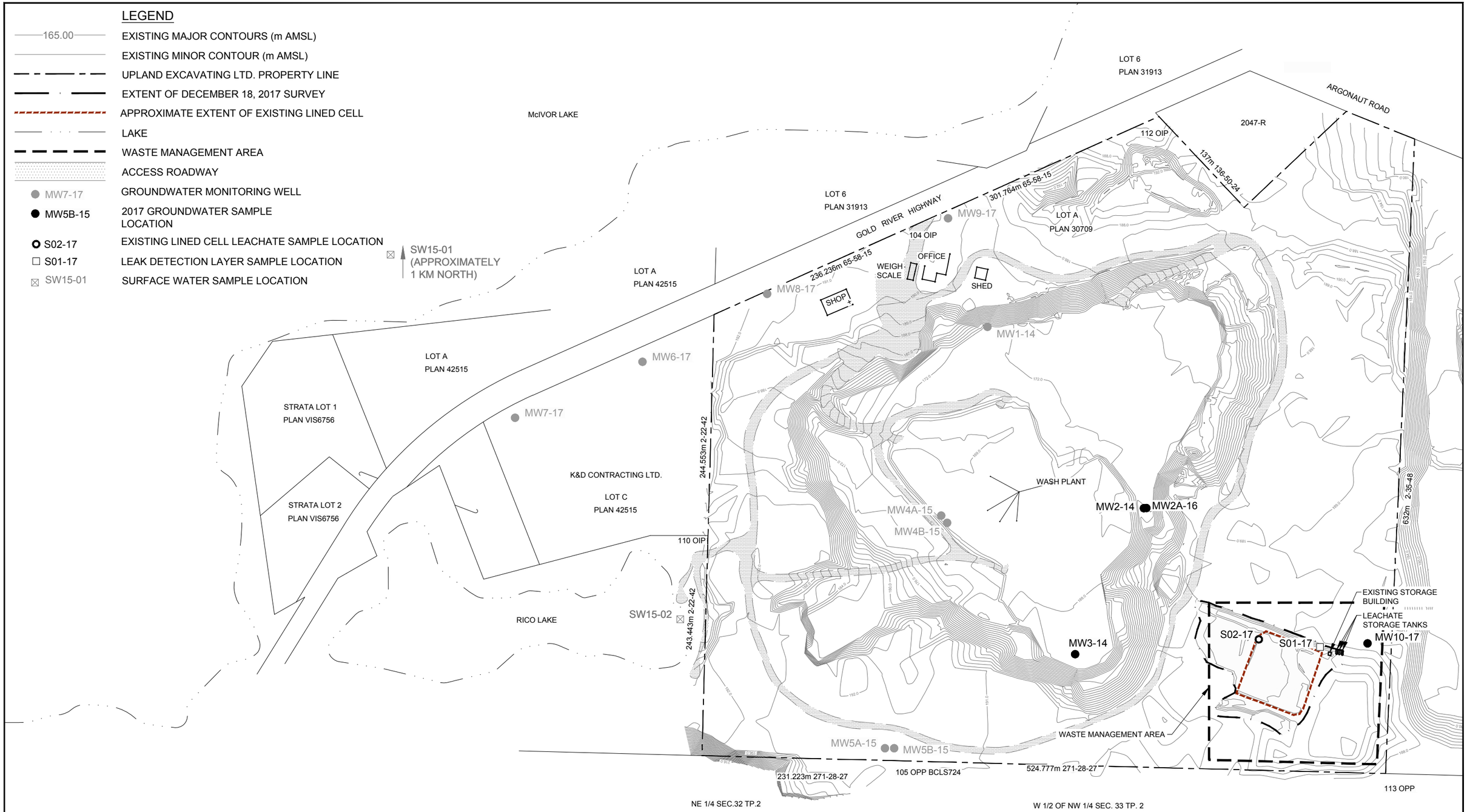
Gregory D. Ferraro, P.Eng.

TE/cs/16

cc: Terry Stuart – Upland Excavating Ltd.
Mark Stuart – Upland Excavating Ltd.
Brian Fagan – Upland Excavating Ltd.

LEGEND

- 165.00 — EXISTING MAJOR CONTOURS (m AMSL)
- EXISTING MINOR CONTOUR (m AMSL)
- UPLAND EXCAVATING LTD. PROPERTY LINE
- EXTENT OF DECEMBER 18, 2017 SURVEY
- APPROXIMATE EXTENT OF EXISTING LINED CELL
- LAKE
- WASTE MANAGEMENT AREA
- ACCESS ROADWAY
- MW7-17 — GROUNDWATER MONITORING WELL
- MW5B-15 — 2017 GROUNDWATER SAMPLE LOCATION
- S02-17 — EXISTING LINED CELL LEACHATE SAMPLE LOCATION
- S01-17 — LEAK DETECTION LAYER SAMPLE LOCATION
- SW15-01 — SURFACE WATER SAMPLE LOCATION



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

0 40 80 120m

N

GHD

88877-06

Jan 8, 2018

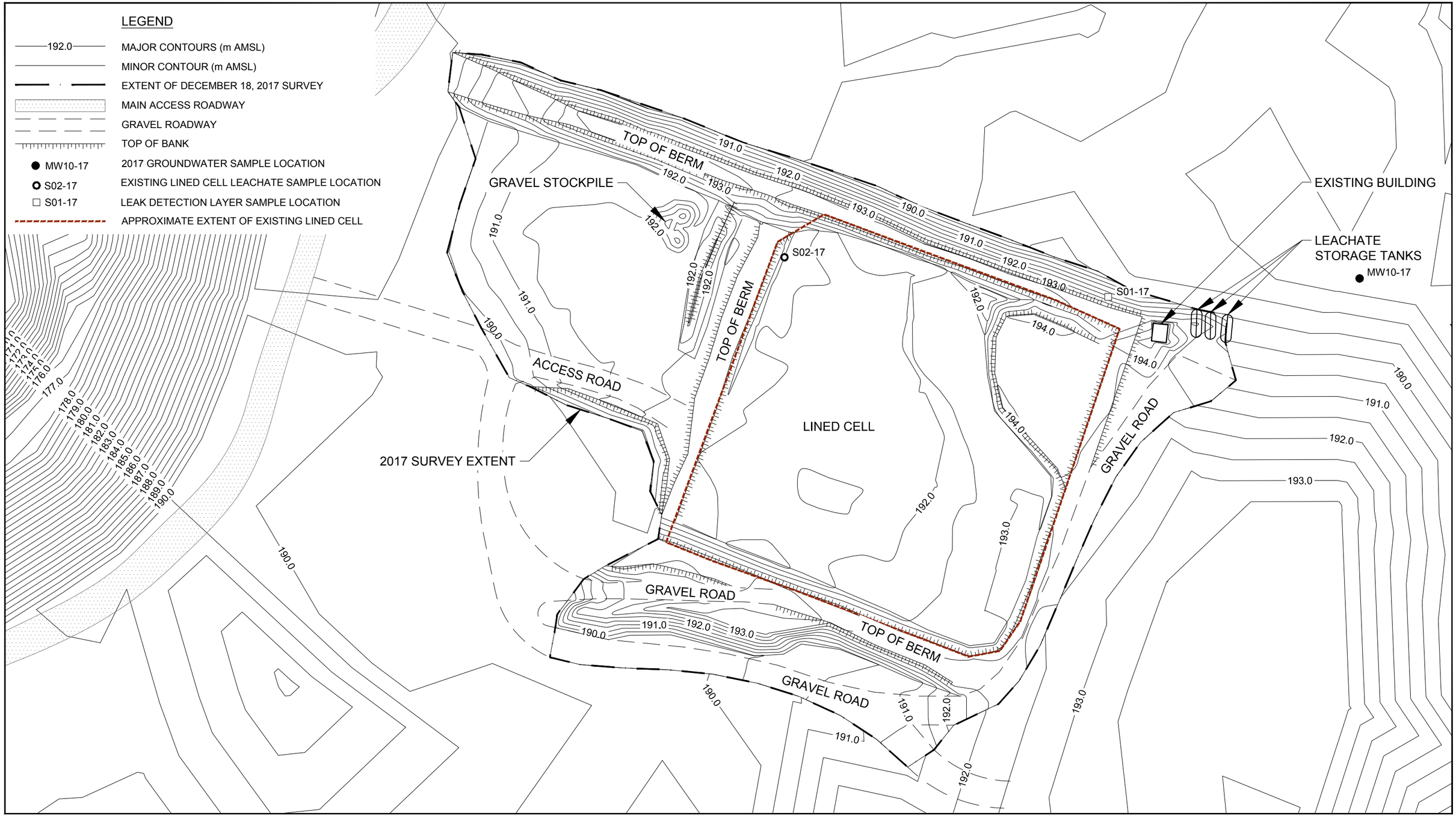
UPLAND EXCAVATING PROPERTY
WATER QUALITY MONITORING LOCATIONS

FIGURE 1

CAD File: 88877-05(LEUS016)GN-WA001.DWG

LEGEND

- 192.0 — MAJOR CONTOURS (m AMSL)
- MINOR CONTOUR (m AMSL)
- EXTENT OF DECEMBER 18, 2017 SURVEY
- MAIN ACCESS ROADWAY
- GRAVEL ROADWAY
- TOP OF BANK
- MW10-17 — 2017 GROUNDWATER SAMPLE LOCATION
- S02-17 — EXISTING LINED CELL LEACHATE SAMPLE LOCATION
- S01-17 — LEAK DETECTION LAYER SAMPLE LOCATION
- APPROXIMATE EXTENT OF EXISTING LINED CELL



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

0 6 12 18 24m

N

GHD

88877-05

Jan 8, 2018

UPLAND EXCAVATING PROPERTY
WASTE MANAGEMENT AREA

FIGURE 2

CAD File: 88877-05(LEUS016)GN-WA002.dwg

Table 1

Groundwater Analytical Results
Water Quality Data Summary
Existing Lined Cell
Upland Excavating Property, Campbell River, BC

Sample Location:				MW2-14	MW2-14	MW2A-16	MW2A-16
Sample ID:		BC CSR	BC CSR	WG-88877-060417-JS-04	WG-88877-271117-CR-05	WG-88877-070417-JS-09	WG-88877-271117-CR-03
Sample Date:		Schedule 6 DW	Schedule 10 DW	4/6/2017	11/27/2017	4/7/2017	11/27/2017
Parameters	**Units**	**a**	**b**				
Field Parameters							
Conductivity, field	mS/cm	-	-	0.143	0.144	0.072	0.105
Dissolved oxygen (DO), field	mg/L	-	-	8.11	9.12	8.42	11.43
Oxidation reduction potential (ORP), field	millivolts	-	-	233	236	233	213
pH, field	s.u.	-	-	7.34	6.84	7.39	7.33
Temperature, field	Deg C	-	-	11.63	9.72	10.99	10.29
Total dissolved solids, field (TDS)	ugL	-	-	0.093	0.093	0.047	0.068
Turbidity, field	NTU	-	-	71.4	14	63	44.3
General Chemistry							
Alkalinity (as CaCO3 pH=8.3)	mg/L	-	-	ND (0.50)	ND (1.0)	ND (0.50)	ND (1.0)
Alkalinity, total (as CaCO3)	mg/L	-	-	59.4	43.9	34.2	40.4
Bicarbonate (as CaCO3)	mg/L	-	-	72.5	53.5	41.7	49.3
Biochemical oxygen demand (BOD)	mg/L	-	-	ND (6.0)	-	ND (6.0)	-
Carbonate (as CaCO3)	mg/L	-	-	ND (0.50)	ND (1.0)	ND (0.50)	ND (1.0)
Chemical oxygen demand (COD)	mg/L	-	-	ND (10)	-	21	-
Chloride (dissolved)	mg/L	250	-	4.5	7.2	0.89	1.5
Conductivity	uS/cm	-	-	141	118	72.1	86.9
Hardness (dissolved)	mg/L	-	-	57.9	46.4	31.8	40.4
Hydrogen sulfide	mg/L	0.05	-	ND (0.0020)	ND (0.0019)	ND (0.0020)	ND (0.0019)
Hydroxide (as CaCO3)	mg/L	-	-	ND (0.50)	ND (1.0)	ND (0.50)	ND (1.0)
pH	s.u.	-	-	7.83 J	7.85 J	7.78 J	7.83 J
Phenolics (total)	mg/L	-	-	ND (0.0010)	-	ND (0.0010)	-
Sulfate (dissolved)	mg/L	500	-	7.12	5.6	3.9	2.9
Sulfide	mg/L	0.05	-	ND (0.0019)	ND (0.0019)	ND (0.0019)	ND (0.0019)
Total dissolved solids (TDS)	mg/L	-	-	76	66	44	68
Nutrients							
Ammonia-N	mg/L	-	-	0.043	ND (0.020)	0.022	ND (0.020)
Nitrate (as N)	mg/L	10	-	0.288	ND (0.10)	0.053	ND (0.10)
Nitrite (as N)	mg/L	3.2	-	ND (0.0050)	ND (0.10)	ND (0.0050)	ND (0.10)
Nitrite/Nitrate	mg/L	10	-	0.288	ND (0.10)	0.053	ND (0.10)
Nitrogen	mg/L	-	-	0.324	-	0.101	-
Orthophosphate	mg/L	-	-	0.0273	ND (0.10)	0.0268	ND (0.10)
Total kjeldahl nitrogen (TKN)	mg/L	-	-	0.037	-	0.048	-
Dissolved Metals							
Aluminum (dissolved)	ug/L	9500	-	ND (3.0)	ND (3.0)	15.9	8.8
Antimony (dissolved)	ug/L	6	-	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)
Arsenic (dissolved)	ug/L	10	-	0.13	0.12	0.97	0.76
Barium (dissolved)	ug/L	1000	-	1.6	1.2	6.3	5.5
Beryllium (dissolved)	ug/L	-	-	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)
Bismuth (dissolved)	ug/L	-	-	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Boron (dissolved)	ug/L	5000	-	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)
Calcium (dissolved)	ug/L	-	-	18000	14700	10500	13400
Chromium (dissolved)	ug/L	50	-	1.8	ND (1.0)	ND (1.0)	ND (1.0)
Cobalt (dissolved)	ug/L	-	-	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)
Copper (dissolved)	ug/L	1000	-	0.5	0.29	0.28	ND (0.20)
Iron (dissolved)	ug/L	6500	-	ND (5.0)	ND (5.0)	7.3	ND (5.0)
Lead (dissolved)	ug/L	10	-	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)
Lithium (dissolved)	ug/L	-	730	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)
Magnesium (dissolved)	ug/L	100000	-	3140	2370	1340	1700
Manganese (dissolved)	ug/L	550	550	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Mercury (dissolved)	ug/L	1	-	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)
Molybdenum (dissolved)	ug/L	250	-	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Nickel (dissolved)	ug/L	-	-	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Phosphorus (dissolved)	ug/L	-	-	12	-	27	-
Potassium (dissolved)	ug/L	-	-	269	238	314	247
Selenium (dissolved)	ug/L	10	-	0.15	0.12	0.1	ND (0.10)
Silicon (dissolved)	ug/L	-	-	6480	5750	4350	4330
Silver (dissolved)	ug/L	-	-	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)
Sodium (dissolved)	ug/L	200000	-	5240	4550	1040	1130
Strontium (dissolved)	ug/L	-	-	29.8	24.6	14.4	17.5
Sulfur (dissolved)	ug/L	-	-	ND (3000)	ND (3000)	ND (3000)	ND (3000)
Thallium (dissolved)	ug/L	-	-	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)
Tin (dissolved)	ug/L	-	22000	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)
Titanium (dissolved)	ug/L	-	-	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)
Uranium (dissolved)	ug/L	20	20	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)
Vanadium (dissolved)	ug/L	-	-	ND (5.0)	ND (5.0)	6.1	6.2
Zinc (dissolved)	ug/L	5000	-	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)

Notes:

Notes:

(2) Bristish Columbia Contaminated Sites Regulation (CSR)

d Exceeds BC CSR Schedule 6 Drinking Water (DW) Guideline.

e Exceeds BC CSR Schedule 10 Drinking Water (DW) Guideline.

23.9 Exceeds guideline.

ND Not detected at the associated reporting limit.

J The analyte was positively identified; the associated numerical value is the estimated concentration of the analyte in the sample.

\- Currently no Standard/Guideline.

Table 1

Groundwater Analytical Results
Water Quality Data Summary
Existing Lined Cell
Upland Excavating Property, Campbell River, BC

Sample Location:				MW2A-16	MW3-14	MW3-14	MW10-17
Sample ID:		BC CSR	BC CSR	WG-88877-271117-CR-04	WG-88877-070417-JS-10	WG-88877-271117-CR-02	WG-88877-060417-JS-01
Sample Date:		Schedule 6 DW	Schedule 10 DW	11/27/2017 Duplicate	4/7/2017	11/27/2017	4/6/2017
Parameters	**Units**	**a**	**b**				
Field Parameters							
Conductivity, field	mS/cm	-	-	0.105	0.104	0.165	0.131
Dissolved oxygen (DO), field	mg/L	-	-	11.43	9.74	11.67	9.97
Oxidation reduction potential (ORP), field	millivolts	-	-	213	255	229	214
pH, field	s.u.	-	-	7.33	7.21	6.35	7.74
Temperature, field	Deg C	-	-	10.29	7.65	9.97	10.39
Total dissolved solids, field (TDS)	ugL	-	-	0.068	0.068	0.109	0.085
Turbidity, field	NTU	-	-	44.3	72.5	7	24.3
General Chemistry							
Alkalinity (as CaCO3 pH=8.3)	mg/L	-	-	ND (1.0)	ND (0.50)	ND (1.0)	ND (0.50)
Alkalinity, total (as CaCO3)	mg/L	-	-	43.9	40.8	44.1	49.7
Bicarbonate (as CaCO3)	mg/L	-	-	53.6	49.7	53.8	60.7
Biochemical oxygen demand (BOD)	mg/L	-	-	-	ND (6.0)	-	ND (6.0)
Carbonate (as CaCO3)	mg/L	-	-	ND (1.0)	ND (0.50)	ND (1.0)	ND (0.50)
Chemical oxygen demand (COD)	mg/L	-	-	-	29	-	ND (10)
Chloride (dissolved)	mg/L	250	-	1.3	3.7	7.7	7.3
Conductivity	uS/cm	-	-	87.9	100	133	128
Hardness (dissolved)	mg/L	-	-	41.1	38.2	45.1	51.9
Hydrogen sulfide	mg/L	0.05	-	ND (0.0019)	ND (0.0020)	ND (0.0019)	ND (0.0020)
Hydroxide (as CaCO3)	mg/L	-	-	ND (1.0)	ND (0.50)	ND (1.0)	ND (0.50)
pH	s.u.	-	-	7.87 J	7.5 J	7.67 J	7.93 J
Phenolics (total)	mg/L	-	-	-	ND (0.0010)	-	ND (0.0010)
Sulfate (dissolved)	mg/L	500	-	2.7	3.75	5.9	5.19
Sulfide	mg/L	0.05	-	ND (0.0019)	ND (0.0019)	ND (0.0019)	ND (0.0019)
Total dissolved solids (TDS)	mg/L	-	-	66	62	100	74
Nutrients							
Ammonia-N	mg/L	-	-	ND (0.020)	0.035	ND (0.020)	0.037
Nitrate (as N)	mg/L	10	-	ND (0.10)	0.748	1.1	0.081
Nitrite (as N)	mg/L	3.2	-	ND (0.10)	ND (0.0050)	ND (0.10)	ND (0.0050)
Nitrite/Nitrate	mg/L	10	-	ND (0.10)	0.748	1.1	0.081
Nitrogen	mg/L	-	-	-	0.723	-	0.146
Orthophosphate	mg/L	-	-	ND (0.10)	0.005	ND (0.10)	0.0335
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	ND (0.020)	-	0.065
Dissolved Metals							
Aluminum (dissolved)	ug/L	9500	-	8.7	ND (3.0)	ND (3.0)	9.8
Antimony (dissolved)	ug/L	6	-	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)
Arsenic (dissolved)	ug/L	10	-	0.77	ND (0.10)	ND (0.10)	0.61
Barium (dissolved)	ug/L	1000	-	5.6	1.1	1.5	10.8
Beryllium (dissolved)	ug/L	-	-	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)
Bismuth (dissolved)	ug/L	-	-	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Boron (dissolved)	ug/L	5000	-	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)
Calcium (dissolved)	ug/L	-	-	13600	11000	13400	16500
Chromium (dissolved)	ug/L	50	-	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Cobalt (dissolved)	ug/L	-	-	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)
Copper (dissolved)	ug/L	1000	-	0.25	0.36	0.38	0.43
Iron (dissolved)	ug/L	6500	-	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)
Lead (dissolved)	ug/L	10	-	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)
Lithium (dissolved)	ug/L	-	730	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)
Magnesium (dissolved)	ug/L	100000	-	1720	2590	2830	2620
Manganese (dissolved)	ug/L	550	550	ND (1.0)	ND (1.0)	ND (1.0)	12.5
Mercury (dissolved)	ug/L	1	-	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)
Molybdenum (dissolved)	ug/L	250	-	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Nickel (dissolved)	ug/L	-	-	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Phosphorus (dissolved)	ug/L	-	-	-	ND (10)	-	15
Potassium (dissolved)	ug/L	-	-	242	191	271	491
Selenium (dissolved)	ug/L	10	-	0.1	0.17	0.35	0.2
Silicon (dissolved)	ug/L	-	-	4290	6010	6600	6300
Silver (dissolved)	ug/L	-	-	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)
Sodium (dissolved)	ug/L	200000	-	1150	5210	8530	4320
Strontium (dissolved)	ug/L	-	-	17.1	20.6	27.2	26.2
Sulfur (dissolved)	ug/L	-	-	ND (3000)	ND (3000)	ND (3000)	ND (3000)
Thallium (dissolved)	ug/L	-	-	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)
Tin (dissolved)	ug/L	-	22000	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)
Titanium (dissolved)	ug/L	-	-	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)
Uranium (dissolved)	ug/L	20	20	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)
Vanadium (dissolved)	ug/L	-	-	5.8	ND (5.0)	ND (5.0)	ND (5.0)
Zinc (dissolved)	ug/L	5000	-	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)

Notes:

Notes:

(2)	Bristish Columbia Contaminated Sites Regulation (CSR)
d	Exceeds BC CSR Schedule 6 Drinking Water (DW) Guideline.
e	Exceeds BC CSR Schedule 10 Drinking Water (DW) Guideline.
23.9	Exceeds guideline.
ND	Not detected at the associated reporting limit.
J	The analyte was positively identified; the associated numerical value is the estimated concentration of the analyte in the sample.
-	Currently no Standard/Guideline.

Table 1

Groundwater Analytical Results
Water Quality Data Summary
Existing Lined Cell
Upland Excavating Property, Campbell River, BC

Sample Location:				**MW10-17**
Sample ID:		**BC CSR**	**BC CSR**	**WG-88877-271117-CR-01**
Sample Date:		**Schedule 6 DW**	**Schedule 10 DW**	**11/27/2017**
Parameters	**Units**	**a**	**b**	
Field Parameters				
Conductivity, field	mS/cm	-	-	0.191
Dissolved oxygen (DO), field	mg/L	-	-	7.93
Oxidation reduction potential (ORP), field	millivolts	-	-	222
pH, field	s.u.	-	-	6.98
Temperature, field	Deg C	-	-	11.05
Total dissolved solids, field (TDS)	ugL	-	-	0.124
Turbidity, field	NTU	-	-	65.8
General Chemistry				
Alkalinity (as CaCO3 pH=8.3)	mg/L	-	-	ND (1.0)
Alkalinity, total (as CaCO3)	mg/L	-	-	60.5
Bicarbonate (as CaCO3)	mg/L	-	-	73.8
Biochemical oxygen demand (BOD)	mg/L	-	-	-
Carbonate (as CaCO3)	mg/L	-	-	ND (1.0)
Chemical oxygen demand (COD)	mg/L	-	-	-
Chloride (dissolved)	mg/L	250	-	7.8
Conductivity	uS/cm	-	-	155
Hardness (dissolved)	mg/L	-	-	66
Hydrogen sulfide	mg/L	0.05	-	ND (0.0019)
Hydroxide (as CaCO3)	mg/L	-	-	ND (1.0)
pH	s.u.	-	-	7.97 J
Phenolics (total)	mg/L	-	-	-
Sulfate (dissolved)	mg/L	500	-	6.6
Sulfide	mg/L	0.05	-	ND (0.0019)
Total dissolved solids (TDS)	mg/L	-	-	98
Nutrients				
Ammonia-N	mg/L	-	-	ND (0.020)
Nitrate (as N)	mg/L	10	-	0.26
Nitrite (as N)	mg/L	3.2	-	ND (0.10)
Nitrite/Nitrate	mg/L	10	-	0.26
Nitrogen	mg/L	-	-	-
Orthophosphate	mg/L	-	-	ND (0.10)
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-
Dissolved Metals				
Aluminum (dissolved)	ug/L	9500	-	5.4
Antimony (dissolved)	ug/L	6	-	ND (0.50)
Arsenic (dissolved)	ug/L	10	-	0.44
Barium (dissolved)	ug/L	1000	-	6.1
Beryllium (dissolved)	ug/L	-	-	ND (0.10)
Bismuth (dissolved)	ug/L	-	-	ND (1.0)
Boron (dissolved)	ug/L	5000	-	ND (50)
Cadmium (dissolved)	ug/L	5	-	ND (0.010)
Calcium (dissolved)	ug/L	-	-	21300
Chromium (dissolved)	ug/L	50	-	3.1
Cobalt (dissolved)	ug/L	-	-	ND (0.20)
Copper (dissolved)	ug/L	1000	-	0.31
Iron (dissolved)	ug/L	6500	-	ND (5.0)
Lead (dissolved)	ug/L	10	-	ND (0.20)
Lithium (dissolved)	ug/L	-	730	ND (2.0)
Magnesium (dissolved)	ug/L	100000	-	3090
Manganese (dissolved)	ug/L	550	550	ND (1.0)
Mercury (dissolved)	ug/L	1	-	ND (0.010)
Molybdenum (dissolved)	ug/L	250	-	ND (1.0)
Nickel (dissolved)	ug/L	-	-	ND (1.0)
Phosphorus (dissolved)	ug/L	-	-	-
Potassium (dissolved)	ug/L	-	-	413
Selenium (dissolved)	ug/L	10	-	0.17
Silicon (dissolved)	ug/L	-	-	6640
Silver (dissolved)	ug/L	-	-	ND (0.020)
Sodium (dissolved)	ug/L	200000	-	4870
Strontium (dissolved)	ug/L	-	-	31.6
Sulfur (dissolved)	ug/L	-	-	ND (3000)
Thallium (dissolved)	ug/L	-	-	ND (0.010)
Tin (dissolved)	ug/L	-	22000	ND (5.0)
Titanium (dissolved)	ug/L	-	-	ND (5.0)
Uranium (dissolved)	ug/L	20	20	ND (0.10)
Vanadium (dissolved)	ug/L	-	-	5
Zinc (dissolved)	ug/L	5000	-	ND (5.0)
Zirconium (dissolved)	ug/L	-	-	ND (0.10)

Notes:

Notes:

(2) Bristish Columbia Contaminated Sites Regulation (CSR)

d Exceeds BC CSR Schedule 6 Drinking Water (DW) Guideline.

e Exceeds BC CSR Schedule 10 Drinking Water (DW) Guideline.

23.9 Exceeds guideline.

ND Not detected at the associated reporting limit.

J The analyte was positively identified; the associated numerical value is the estimated concentration of the analyte in the sample.

\- Currently no Standard/Guideline.

Table 2

Leachate and Leak Detection System Analytical Results
Water Quality Data Summary
Existing Lined Cell
Upland Excavating Property, Campbell River, BC

Sample Location:				SO1-17	SO2-17
Sample ID:		BC CSR Schedule 6 DW	BC CSR Schedule 10 DW	WL-88877-271117-CR-02	WL-88877-271117-CR-01
Sample Date:				11/27/2017	11/27/2017
Parameters	**Units**	**a**	**b**		
Conductivity, field	mS/cm	-	-	0.436	0.526
Dissolved oxygen (DO), field	mg/L	-	-	2.96	3.30
Oxidation reduction potential (ORP), field	millivolts	-	-	90	34
pH, field	s.u.	-	-	5.71	6.04
Temperature, field	Deg C	-	-	10.79	7.77
Total dissolved solids, field (TDS)	ugL	-	-	0.283	0.34
Turbidity, field	NTU	-	-	27.0	4.47
General Chemistry					
Alkalinity (as CaCO3 pH=8.3)	mg/L	-	-	ND (1.0)	ND (1.0)
Alkalinity, total (as CaCO3)	mg/L	-	-	65	150
Bicarbonate (as CaCO3)	mg/L	-	-	79.2	182
Biochemical oxygen demand (BOD)	mg/L	-	-	56.4	67.6
Carbonate (as CaCO3)	mg/L	-	-	ND (1.0)	ND (1.0)
Chemical oxygen demand (COD)	mg/L	-	-	182	219
Chloride (dissolved)	mg/L	250	-	35	8
Conductivity	uS/cm	-	-	354	429
Hardness	mg/L	-	-	85.1	202
Hardness (dissolved)	mg/L	-	-	84.9	192
Hydrogen sulfide	mg/L	0.05	-	ND (0.0020)	**0.12**[a]
Hydroxide (as CaCO3)	mg/L	-	-	ND (1.0)	ND (1.0)
pH	s.u.	-	-	7.46 J	7.86 J
Sulfate (dissolved)	mg/L	500	-	50.1	51.5
Sulfide	mg/L	0.05	-	ND (0.0019)	**0.11**[a]
Total dissolved solids (TDS)	mg/L	-	-	194	306
Total suspended solids (TSS)	mg/L	-	-	187	20.5
Nutrients					
Ammonia-N	mg/L	-	-	0.18	ND (0.020)
Nitrate (as N)	mg/L	10	-	ND (0.10)	ND (0.10)
Nitrite (as N)	mg/L	3.2	-	ND (0.10)	ND (0.10)
Nitrite/Nitrate	mg/L	10	-	ND (0.10)	ND (0.10)
Dissolved Metals					
Aluminum (dissolved)	ug/L	9500	-	9.9	75.7
Antimony (dissolved)	ug/L	6	-	ND (0.50)	ND (0.50)
Arsenic (dissolved)	ug/L	10	-	0.23	2.49
Barium (dissolved)	ug/L	1000	-	17.1	12.4
Beryllium (dissolved)	ug/L	-	-	ND (0.10)	ND (0.10)
Bismuth (dissolved)	ug/L	-	-	ND (1.0)	ND (1.0)
Boron (dissolved)	ug/L	5000	-	60	ND (50)
Cadmium (dissolved)	ug/L	5	-	0.074	0.093
Calcium (dissolved)	ug/L	-	-	21700	60900
Chromium (dissolved)	ug/L	50	-	ND (1.0)	1.1
Cobalt (dissolved)	ug/L	-	-	43.5	3.35
Cobalt >1 and <=20 ug/L	ug/L				3.35
Copper (dissolved)	ug/L	1000	-	1.77	3.47
Iron (dissolved)	ug/L	6500	-	1290	1910
Lead (dissolved)	ug/L	10	-	ND (0.20)	0.37
Lithium (dissolved)	ug/L	-	730	ND (2.0)	ND (2.0)
Magnesium (dissolved)	ug/L	100000	-	7460	9630
Manganese (dissolved)	ug/L	550	550	**5930**[ab]	**1480**[ab]
Mercury (dissolved)	ug/L	1	-	ND (0.010)	ND (0.010)
Molybdenum (dissolved)	ug/L	250	-	ND (1.0)	1.7
Nickel (dissolved)	ug/L	-	-	7.2	3.7
Potassium (dissolved)	ug/L	-	-	4410	2200
Selenium (dissolved)	ug/L	10	-	ND (0.10)	0.24
Silicon (dissolved)	ug/L	-	-	5440	6240
Silver (dissolved)	ug/L	-	-	ND (0.020)	ND (0.020)
Sodium (dissolved)	ug/L	200000	-	27100	13300
Strontium (dissolved)	ug/L	-	-	104	174
Sulfur (dissolved)	ug/L	-	-	17900	20300
Thallium (dissolved)	ug/L	-	-	0.035	ND (0.010)
Tin (dissolved)	ug/L	-	22000	ND (5.0)	ND (5.0)
Titanium (dissolved)	ug/L	-	-	ND (5.0)	ND (5.0)
Uranium (dissolved)	ug/L	20	20	ND (0.10)	0.3
Vanadium (dissolved)	ug/L	-	-	ND (5.0)	ND (5.0)
Zinc (dissolved)	ug/L	5000	-	25.2	58.9
Zirconium (dissolved)	ug/L	-	-	ND (0.10)	0.37
Total Metals					
Aluminum	ug/L	9500	-	540	1740
Antimony	ug/L	6	-	ND (0.50)	ND (0.50)
Arsenic	ug/L	10	-	1.12	4.78
Barium	ug/L	1000	-	20.9	17.9
Beryllium	ug/L	-	-	ND (0.10)	ND (0.10)
Bismuth	ug/L	-	-	ND (1.0)	ND (1.0)
Boron	ug/L	5000	-	57	ND (50)
Cadmium	ug/L	5	-	0.106	1.31
Calcium	ug/L	-	-	21200	63800
Chromium	ug/L	50	-	ND (1.0)	3.2
Cobalt	ug/L	-	-	48.1[c]	4.39*
Copper	ug/L	1000	-	3.37	22.8
Iron	ug/L	6500	-	**15000**[a]	5430
Lead	ug/L	10	-	0.61	1.36
Lithium	ug/L	-	730	ND (2.0)	ND (2.0)
Magnesium	ug/L	100000	-	7840	10300
Manganese	ug/L	550	550	**6250**[ab]	**1460**[ab]

Leachate and Leak Detection System Analytical Results
Water Quality Data Summary
Existing Lined Cell
Upland Excavating Property, Campbell River, BC

Sample Location:				SO1-17	SO2-17
Sample ID:		BC CSR Schedule 6 DW	BC CSR Schedule 10 DW	WL-88877-271117-CR-02	WL-88877-271117-CR-01
Sample Date:				11/27/2017	11/27/2017
Parameters	**Units**	**a**	**b**		
Mercury	ug/L	1	-	ND (0.010)	ND (0.010)
Molybdenum	ug/L	250	-	ND (1.0)	1.9
Nickel	ug/L	-	-	8.5	5.4
Potassium	ug/L	-	-	4340	2360
Selenium	ug/L	10	-	0.13	0.35
Silicon	ug/L	-	-	5880	8370
Silver	ug/L	-	-	ND (0.020)	0.035
Sodium	ug/L	200000	-	28300	13500
Strontium	ug/L	-	-	108	183
Sulfur	ug/L	-	-	19500	22100
Thallium	ug/L	-	-	0.035	0.03
Tin	ug/L	-	22000	ND (5.0)	ND (5.0)
Titanium	ug/L	-	-	47.6	110
Uranium	ug/L	20	20	ND (0.10)	0.33
Vanadium	ug/L	-	-	ND (5.0)	9.6
Zinc	ug/L	5000	-	34.1	262
Zirconium	ug/L	-	-	0.37	0.55
PAH					
1-Methylnaphthalene	ug/L	-	-	ND (0.050)	86
2-Methylnaphthalene	ug/L	-	-	ND (0.10)	110
Acenaphthene	ug/L	-	-	ND (0.050)	76
Acenaphthylene	ug/L	-	-	ND (0.050)	1.4
Acridine	ug/L	-	-	ND (0.050)	3.8
Anthracene	ug/L	-	-	ND (0.010)	7.4
Benzo(a)anthracene	ug/L	-	-	ND (0.010)	2.1
Benzo(a)pyrene	ug/L	0.01	-	0.0054	**0.78**[a]
Benzo(b)fluoranthene/Benzo(j)fluoranthene	ug/L	-	-	ND (0.030)	1.2
Benzo(b)pyridine (Quinoline)	ug/L	-	-	ND (0.020)	63
Benzo(g,h,i)perylene	ug/L	-	-	ND (0.050)	0.12
Benzo(k)fluoranthene	ug/L	-	-	ND (0.050)	0.46
Chrysene	ug/L	-	-	ND (0.020)	2.9
Dibenz(a,h)anthracene	ug/L	-	-	ND (0.0030)	0.041
Fluoranthene	ug/L	-	-	0.028	16
Fluorene	ug/L	-	-	ND (0.050)	37
Indeno(1,2,3-cd)pyrene	ug/L	-	-	ND (0.050)	0.12
Naphthalene	ug/L	-	-	ND (0.10)	320
PAH high molecular weight	ug/L	-	-	0.062	38
PAH low molecular weight	ug/L	-	-	ND (0.10)	670
Phenanthrene	ug/L	-	-	ND (0.050)	58
Pyrene	ug/L	-	-	0.028	15
Total PAH	ug/L	-	-	ND (0.10)	710
Petroleum Products					
Total Petroleum Hydrocarbons VPH (C6-C10)LessBTEX	mg/L	-	-	ND (0.3)	ND (0.3)
Volatile Organic Compounds					
Benzene	ug/L	5	-	ND (0.40)	ND (0.40)
Ethylbenzene	ug/L	2.4	-	ND (0.40)	0.42
m&p-Xylenes	ug/L	-	-	ND (0.40)	0.79
Methyl tert butyl ether (MTBE)	ug/L	15	15	ND (4.0)	ND (4.0)
o-Xylene	ug/L	-	-	ND (0.40)	0.69
Styrene	ug/L	-	-	ND (0.40)	ND (0.40)
Toluene	ug/L	24	-	ND (0.40)	0.65
Total Petroleum Hydrocarbons VH (C6-C10)	ug/L	15000	-	ND (300)	ND (300)
Xylenes (total)	ug/L	300	-	ND (0.40)	1.5

Notes:

(2) Bristish Columbia Contaminated Sites Regulation (CSR)

d Exceeds BC CSR Schedule 6 Drinking Water (DW) Guideline.

e Exceeds BC CSR Schedule 10 Drinking Water (DW) Guideline.

23.9 Exceeds guideline.

ND Not detected at the associated reporting limit.

J The analyte was positively identified; the associated numerical value is the estimated concentration of the analyte in the sample.

\- Currently no Standard/Guideline.

Attachment A
Laboratory Reports and Field Sample Keys

GHD Field Sample Key (FSK)

Site	088877-03-07 Uplands
Sample Reason	Hydrogeo Investigation
Sampler Name	J. Stewart/M. Dyck
Sampling Company	GHD Ltd
Laboratory(s)	Maxxam Analytics

								pH	Temperature			Conductivity		Turbidity		DO		Eh / ORP	
Sample ID	Location	Sample Date (mm/dd/yyyy)	Sample Time (hh:mm)	Sample Type	Sample Matrix	Parent Sample ID for Field Dups	Footnote(s)	Volume of Water Purged	Field pH	Sample Temp.	TDS g/L	Temp Units	Conductivity	Conductivity Units	Turbidity	Turbidity Units	DO	DO Units	Eh/ORP	Eh/ORP Units
WG-88877-060417-JS-01	MW10-17	4/6/2017	10:00	N	WG			112	7.74	10.39	0.085	C	131	uS	24.3	ntu	9.97	mg/L	214	mV
WG-88877-060417-JS-04	MW2-14	4/6/2017	12:30	N	WG			48	7.34	11.63	0.093	C	143	uS	71.4	ntu	8.11	mg/L	233	mV
WG-88877-070417-JS-09	MW2A-16	4/7/2017	9:00	N	WG			208	7.39	10.99	0.047	C	72	uS	63	ntu	8.42	mg/L	233	mV
WG-88877-070417-JS-10	MW3-14	4/7/2017	9:30	N	WG			44	7.21	7.65	0.068	C	104	uS	72.5	ntu	9.74	mg/L	255	mV

Footnotes

All groundwater samples collected using convential Waterra sampling methodology.

Key

- Required Field
- Populate When Appropriate
- Field Data

GHD Field Sample Key (FSK)

Site 088877 Upland

Sample Reason November 2017 Groundwater Monitoring

Sampler Name Cassie Ragan/Tyler Dickens

Sampling Company GHD Ltd.

Laboratory(s) Maxxam Analytics

Sample ID	Location	Sample Date (mm/dd/yyyy)	Sample Time (hh:mm)	Sample Type	Sample Matrix	Grab or Composite	Parent Sample ID for Field Dups	Footnote(s)		Volume of Water Purged	pH	Conductivity	Conductivity Units	Turbidity	Turbidity Units	DO	DO Units	Temperature	Temp Units	Eh / ORP	Eh/ORP Units	TDS(g/L)
											Field pH	Conductivity	Conductivity Units	Turbidity	Turbidity Units	DO	DO Units	Sample Temp.	Temp Units	Eh/ORP	Eh/ORP Units	TDS(g/L)
WG-88877-271117-CR-01	MW10-17	11/27/2017	11:00	N	WG	grab				112	6.98	191	uS/cm	65.8	ntu	7.93	mg/L	11.05	C	222	mV	0.124
WG-88877-271117-CR-02	MW3-14	11/27/2017	12:30	N	WG	grab				36	6.35	165	uS/cm	7.0	ntu	11.67	mg/L	9.97	C	229	mV	0.109
WG-88877-271117-CR-03	MW2A-16	11/27/2017	13:00	N	WG	grab				80.5	7.33	105	uS/cm	44.3	ntu	11.43	mg/L	10.29	C	213	mV	0.068
WG-88877-271117-CR-04	MW2A-16	11/27/2017	13:00	FD	WG	grab	WG-88877-271117-CR-03			80.5	7.33	105	uS/cm	44.3	ntu	11.43	mg/L	10.29	C	213	mV	0.068
WG-88877-271117-CR-05	MW2-14	11/27/2017	13:30	N	WG	grab				40	6.84	144	uS/cm	14.0	ntu	9.12	mg/L	9.72	C	236	mV	0.093
Leachate																						
WL-88877-271117-CR-01	SO2-17	11/27/2017	14:30	N	WL	grab				-	6.04	526	uS/cm	4.47	ntu	3.30	mg/L	7.77	C	34	mV	0.34
WL-88877-271117-CR-02	SO1-17	11/27/2017	15:00	N	WL	grab				-	5.71	436	uS/cm	27.00	ntu	2.96	mg/L	10.79	C	90	mV	0.283

Footnotes

1. C #541990-01-01
2. C #542120-01-01

Key

- Required Field
- Populate When Appropriate
- Field Data

Maxxam
A Bureau Veritas Group Company

Success Through Science®

Your P.O. #: 73506780
Your Project #: 088877-02-01
Site Location: 7295 GOLD RIVER HIGHWAY
Your C.O.C. #: 520094-03-01, 520094-02-01

Attention: Airesse MacPhee

GHD Limited
651 COLBY DRIVE
WATERLOO, ON
CANADA N2V 1C2

Report Date: 2018/01/05
Report #: R2499019
Version: 4 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

MAXXAM JOB #: B726014
Received: 2017/04/07, 17:30

Sample Matrix: Water
Samples Received: 4

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity - Water	1	2017/04/08	2017/04/08	BBY6SOP-00026	SM 22 2320 B m
Alkalinity - Water	3	2017/04/08	2017/04/09	BBY6SOP-00026	SM 22 2320 B m
Biochemical Oxygen Demand	4	2017/04/08	2017/04/13	BBY6SOP-00045	SM 22 5210 B m
Chloride by Automated Colourimetry	4	N/A	2017/04/10	BBY6SOP-00011	SM 22 4500-Cl- E m
COD by Colorimeter	4	2017/04/11	2017/04/12	BBY6SOP-00024	SM 22 5220 D m
Conductance - water	1	2017/04/08	2017/04/08	BBY6SOP-00026	SM 22 2510 B m
Conductance - water	3	2017/04/08	2017/04/09	BBY6SOP-00026	SM 22 2510 B m
Sulphide (as H2S) (1)	4	N/A	2017/04/12	AB WI-00065	Auto Calc
Hardness (calculated as CaCO3)	4	N/A	2017/04/13	BBY WI-00033	Auto Calc
Mercury (Dissolved) by CVAF	4	N/A	2017/04/13	BBY7SOP-00015	BCMOE BCLM Oct2013 m
Na, K, Ca, Mg, S by CRC ICPMS (diss.)	4	N/A	2017/04/13	BBY WI-00033	Auto Calc
Elements by CRC ICPMS (dissolved)	4	N/A	2017/04/13	BBY7SOP-00002	EPA 6020b R2 m
Nitrogen (Total)	4	2017/04/11	2017/04/11	BBY6SOP-00016	SM 22 4500-N C m
Ammonia-N (Preserved)	4	N/A	2017/04/10	BBY6SOP-00009	EPA 350.1 m
Nitrate + Nitrite (N)	4	N/A	2017/04/08	BBY6SOP-00010	SM 22 4500-NO3- I m
Nitrite (N) by CFA	4	N/A	2017/04/08	BBY6SOP-00010	SM 22 4500-NO3- I m
Nitrogen - Nitrate (as N)	4	N/A	2017/04/12	BBY WI-00033	Auto Calc
Filter and HNO3 Preserve for Metals	4	N/A	2017/04/13	BBY7 WI-00004	BCMOE Reqs 08/14
pH Water (2)	1	2017/04/08	2017/04/08	BBY6SOP-00026	SM 22 4500-H+ B m
pH Water (2)	3	2017/04/08	2017/04/09	BBY6SOP-00026	SM 22 4500-H+ B m
Phenols (4-AAP)	4	N/A	2017/04/12	BBY6SOP-00008	SM 22 5530 D m
Orthophosphate by Konelab	4	N/A	2017/04/08	BBY6SOP-00013	SM 22 4500-P E m
Total Sulphide (1)	4	N/A	2017/04/12	AB SOP-00080	SM 22 4500 S2-A D F
Sulphate by Automated Colourimetry	4	N/A	2017/04/10	BBY6SOP-00017	SM 22 4500-SO42- E m
Total Dissolved Solids (Filt. Residue)	4	2017/04/12	2017/04/13	BBY6SOP-00033	SM 22 2540 C m
TKN (Calc. TN, N/N) total	4	N/A	2017/04/12	BBY WI-00033	Auto Calc

Remarks:

Maxxam Analytics' laboratories are accredited to ISO/IEC 17025:2005 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Maxxam are based upon recognized Provincial, Federal or US method compendia such as CCME, MDDELCC, EPA, APHA.

Your P.O. #: 73506780
Your Project #: 088877-02-01
Site Location: 7295 GOLD RIVER HIGHWAY
Your C.O.C. #: 520094-03-01, 520094-02-01

Attention: Airesse MacPhee

GHD Limited
651 COLBY DRIVE
WATERLOO, ON
CANADA N2V 1C2

Report Date: 2018/01/05
Report #: R2499019
Version: 4 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

MAXXAM JOB #: B726014
Received: 2017/04/07, 17:30

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Maxxam's profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Maxxam 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.

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

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.
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 Maxxam Edmonton Environmental
(2) The BC-MOE and APHA Standard Method require pH to be analysed within 15 minutes of sampling and therefore field analysis is required for compliance. All Laboratory pH analyses in this report are reported past the BC-MOE/APHA Standard Method holding time.

Encryption Key

Nahed Amer
Project Manager
05 Jan 2018 14:05:15

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
VJ Oco, Burnaby Project Manager
Email: VOco@maxxam.ca
Phone# (604)639-8422

==========

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Maxxam Job #: B726014
Report Date: 2018/01/05

GHD Limited
Client Project #: 088877-02-01
Site Location: 7295 GOLD RIVER HIGHWAY
Your P.O. #: 73506780
Sampler Initials: JS

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		QV8539	QV8539	QV8542		
Sampling Date		2017/04/06 10:00	2017/04/06 10:00	2017/04/06 12:30		
COC Number		520094-03-01	520094-03-01	520094-03-01		
	UNITS	WG-88877-060417-JS-01	WG-88877-060417-JS-01 Lab-Dup	WG-88877-060417-JS-04	RDL	QC Batch
ANIONS						
Nitrite (N)	mg/L	<0.0050	N/A	<0.0050	0.0050	8599503
Calculated Parameters						
Filter and HNO3 Preservation	N/A	FIELD	N/A	FIELD	N/A	ONSITE
Nitrate (N)	mg/L	0.081	N/A	0.288	0.020	8598442
Sulphide (as H2S)	mg/L	<0.0020	N/A	<0.0020	0.0020	8598256
Total Total Kjeldahl Nitrogen (Calc)	mg/L	0.065	N/A	0.037	0.020	8598538
Demand Parameters						
Biochemical Oxygen Demand	mg/L	<6.0	N/A	<6.0	6.0	8599382
Chemical Oxygen Demand	mg/L	<10	N/A	<10	10	8601312
Misc. Inorganics						
Alkalinity (Total as CaCO3)	mg/L	49.7	N/A	59.4	0.50	8599365
Alkalinity (PP as CaCO3)	mg/L	<0.50	N/A	<0.50	0.50	8599365
Bicarbonate (HCO3)	mg/L	60.7	N/A	72.5	0.50	8599365
Carbonate (CO3)	mg/L	<0.50	N/A	<0.50	0.50	8599365
Hydroxide (OH)	mg/L	<0.50	N/A	<0.50	0.50	8599365
Anions						
Dissolved Sulphate (SO4)	mg/L	5.19	5.25	7.12	0.50	8601048
Total Sulphide	mg/L	<0.0019	N/A	<0.0019	0.0019	8601794
Dissolved Chloride (Cl)	mg/L	7.3	7.3	4.5	0.50	8601046
Nutrients						
Orthophosphate (P)	mg/L	0.0335	N/A	0.0273	0.0050	8599445
Total Ammonia (N)	mg/L	0.037	N/A	0.043	0.0050	8600016
Nitrate plus Nitrite (N)	mg/L	0.081	N/A	0.288	0.020	8599502
Total Nitrogen (N)	mg/L	0.146	N/A	0.324	0.020	8601383
Misc. Organics						
Phenols	mg/L	<0.0010	N/A	<0.0010	0.0010	8602424
Physical Properties						
Conductivity	uS/cm	128	N/A	141	1.0	8599364
pH	pH	7.93	N/A	7.83	N/A	8599362

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

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Maxxam Job #: B726014
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GHD Limited
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RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		QV8539	QV8539	QV8542		
Sampling Date		2017/04/06 10:00	2017/04/06 10:00	2017/04/06 12:30		
COC Number		520094-03-01	520094-03-01	520094-03-01		
	UNITS	**WG-88877-060417-JS-01**	**WG-88877-060417-JS-01 Lab-Dup**	**WG-88877-060417-JS-04**	**RDL**	**QC Batch**
Physical Properties						
Total Dissolved Solids	mg/L	74	N/A	76	10	8602116

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

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Maxxam Job #: B726014
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GHD Limited
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RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		QV8547		QV8548		
Sampling Date		2017/04/07 09:00		2017/04/07 09:30		
COC Number		520094-03-01		520094-03-01		
	UNITS	WG-88877-070417-JS-09	QC Batch	WG-88877-070417-JS-10	RDL	QC Batch
ANIONS						
Nitrite (N)	mg/L	<0.0050	8599505	<0.0050	0.0050	8599505
Calculated Parameters						
Filter and HNO3 Preservation	N/A	FIELD	ONSITE	FIELD	N/A	ONSITE
Nitrate (N)	mg/L	0.053	8598442	0.748	0.020	8598442
Sulphide (as H2S)	mg/L	<0.0020	8598256	<0.0020	0.0020	8598256
Total Total Kjeldahl Nitrogen (Calc)	mg/L	0.048	8598538	<0.020	0.020	8598538
Demand Parameters						
Biochemical Oxygen Demand	mg/L	<6.0	8599382	<6.0	6.0	8599382
Chemical Oxygen Demand	mg/L	21	8601313	29	10	8601313
Misc. Inorganics						
Alkalinity (Total as CaCO3)	mg/L	34.2	8599368	40.8	0.50	8599349
Alkalinity (PP as CaCO3)	mg/L	<0.50	8599368	<0.50	0.50	8599349
Bicarbonate (HCO3)	mg/L	41.7	8599368	49.7	0.50	8599349
Carbonate (CO3)	mg/L	<0.50	8599368	<0.50	0.50	8599349
Hydroxide (OH)	mg/L	<0.50	8599368	<0.50	0.50	8599349
Anions						
Dissolved Sulphate (SO4)	mg/L	3.90	8601061	3.75	0.50	8601061
Total Sulphide	mg/L	<0.0019	8601794	<0.0019	0.0019	8601794
Dissolved Chloride (Cl)	mg/L	0.89	8601058	3.7	0.50	8601058
Nutrients						
Orthophosphate (P)	mg/L	0.0268	8599446	0.0050	0.0050	8599446
Total Ammonia (N)	mg/L	0.022	8600016	0.035	0.0050	8600016
Nitrate plus Nitrite (N)	mg/L	0.053	8599504	0.748	0.020	8599504
Total Nitrogen (N)	mg/L	0.101	8601383	0.723	0.020	8601383
Misc. Organics						
Phenols	mg/L	<0.0010	8602424	<0.0010	0.0010	8602424
Physical Properties						
Conductivity	uS/cm	72.1	8599367	100	1.0	8599348
pH	pH	7.78	8599366	7.50	N/A	8599347

RDL = Reportable Detection Limit
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Maxxam Job #: B726014
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RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		QV8547		QV8548		
Sampling Date		2017/04/07 09:00		2017/04/07 09:30		
COC Number		520094-03-01		520094-03-01		
	UNITS	WG-88877-070417-JS-09	QC Batch	WG-88877-070417-JS-10	RDL	QC Batch
Physical Properties						
Total Dissolved Solids	mg/L	44	8602116	62	10	8602116
RDL = Reportable Detection Limit						

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Sampler Initials: JS

CSR DISSOLVED METALS IN WATER WITH CV HG (WATER)

Maxxam ID		QV8539	QV8539	QV8542		
Sampling Date		2017/04/06 10:00	2017/04/06 10:00	2017/04/06 12:30		
COC Number		520094-03-01	520094-03-01	520094-03-01		
	UNITS	WG-88877-060417-JS-01	WG-88877-060417-JS-01 Lab-Dup	WG-88877-060417-JS-04	RDL	QC Batch
Calculated Parameters						
Dissolved Hardness (CaCO3)	mg/L	51.9	N/A	57.9	0.50	8598285
Elements						
Dissolved Mercury (Hg)	ug/L	<0.010	<0.010	<0.010	0.010	8603106
Dissolved Metals by ICPMS						
Dissolved Aluminum (Al)	ug/L	9.8	N/A	<3.0	3.0	8601126
Dissolved Antimony (Sb)	ug/L	<0.50	N/A	<0.50	0.50	8601126
Dissolved Arsenic (As)	ug/L	0.61	N/A	0.13	0.10	8601126
Dissolved Barium (Ba)	ug/L	10.8	N/A	1.6	1.0	8601126
Dissolved Beryllium (Be)	ug/L	<0.10	N/A	<0.10	0.10	8601126
Dissolved Bismuth (Bi)	ug/L	<1.0	N/A	<1.0	1.0	8601126
Dissolved Boron (B)	ug/L	<50	N/A	<50	50	8601126
Dissolved Cadmium (Cd)	ug/L	<0.010	N/A	<0.010	0.010	8601126
Dissolved Chromium (Cr)	ug/L	<1.0	N/A	1.8	1.0	8601126
Dissolved Cobalt (Co)	ug/L	<0.20	N/A	<0.20	0.20	8601126
Dissolved Copper (Cu)	ug/L	0.43	N/A	0.50	0.20	8601126
Dissolved Iron (Fe)	ug/L	<5.0	N/A	<5.0	5.0	8601126
Dissolved Lead (Pb)	ug/L	<0.20	N/A	<0.20	0.20	8601126
Dissolved Lithium (Li)	ug/L	<2.0	N/A	<2.0	2.0	8601126
Dissolved Manganese (Mn)	ug/L	12.5	N/A	<1.0	1.0	8601126
Dissolved Molybdenum (Mo)	ug/L	<1.0	N/A	<1.0	1.0	8601126
Dissolved Nickel (Ni)	ug/L	<1.0	N/A	<1.0	1.0	8601126
Dissolved Phosphorus (P)	ug/L	15	N/A	12	10	8601126
Dissolved Selenium (Se)	ug/L	0.20	N/A	0.15	0.10	8601126
Dissolved Silicon (Si)	ug/L	6300	N/A	6480	100	8601126
Dissolved Silver (Ag)	ug/L	<0.020	N/A	<0.020	0.020	8601126
Dissolved Strontium (Sr)	ug/L	26.2	N/A	29.8	1.0	8601126
Dissolved Thallium (Tl)	ug/L	<0.010	N/A	<0.010	0.010	8601126
Dissolved Tin (Sn)	ug/L	<5.0	N/A	<5.0	5.0	8601126
Dissolved Titanium (Ti)	ug/L	<5.0	N/A	<5.0	5.0	8601126

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

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GHD Limited
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CSR DISSOLVED METALS IN WATER WITH CV HG (WATER)

Maxxam ID		QV8539	QV8539	QV8542		
Sampling Date		2017/04/06 10:00	2017/04/06 10:00	2017/04/06 12:30		
COC Number		520094-03-01	520094-03-01	520094-03-01		
	UNITS	WG-88877-060417-JS-01	WG-88877-060417-JS-01 Lab-Dup	WG-88877-060417-JS-04	RDL	QC Batch
Dissolved Uranium (U)	ug/L	<0.10	N/A	<0.10	0.10	8601126
Dissolved Vanadium (V)	ug/L	<5.0	N/A	<5.0	5.0	8601126
Dissolved Zinc (Zn)	ug/L	<5.0	N/A	<5.0	5.0	8601126
Dissolved Zirconium (Zr)	ug/L	<0.10	N/A	<0.10	0.10	8601126
Dissolved Calcium (Ca)	mg/L	16.5	N/A	18.0	0.050	8598535
Dissolved Magnesium (Mg)	mg/L	2.62	N/A	3.14	0.050	8598535
Dissolved Potassium (K)	mg/L	0.491	N/A	0.269	0.050	8598535
Dissolved Sodium (Na)	mg/L	4.32	N/A	5.24	0.050	8598535
Dissolved Sulphur (S)	mg/L	<3.0	N/A	<3.0	3.0	8598535

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

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Maxxam Job #: B726014
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Sampler Initials: JS

CSR DISSOLVED METALS IN WATER WITH CV HG (WATER)

Maxxam ID		QV8547	QV8548		
Sampling Date		2017/04/07 09:00	2017/04/07 09:30		
COC Number		520094-03-01	520094-03-01		
	UNITS	WG-88877-070417-JS-09	WG-88877-070417-JS-10	RDL	QC Batch
Calculated Parameters					
Dissolved Hardness (CaCO3)	mg/L	31.8	38.2	0.50	8598285
Elements					
Dissolved Mercury (Hg)	ug/L	<0.010	<0.010	0.010	8603106
Dissolved Metals by ICPMS					
Dissolved Aluminum (Al)	ug/L	15.9	<3.0	3.0	8601126
Dissolved Antimony (Sb)	ug/L	<0.50	<0.50	0.50	8601126
Dissolved Arsenic (As)	ug/L	0.97	<0.10	0.10	8601126
Dissolved Barium (Ba)	ug/L	6.3	1.1	1.0	8601126
Dissolved Beryllium (Be)	ug/L	<0.10	<0.10	0.10	8601126
Dissolved Bismuth (Bi)	ug/L	<1.0	<1.0	1.0	8601126
Dissolved Boron (B)	ug/L	<50	<50	50	8601126
Dissolved Cadmium (Cd)	ug/L	<0.010	<0.010	0.010	8601126
Dissolved Chromium (Cr)	ug/L	<1.0	<1.0	1.0	8601126
Dissolved Cobalt (Co)	ug/L	<0.20	<0.20	0.20	8601126
Dissolved Copper (Cu)	ug/L	0.28	0.36	0.20	8601126
Dissolved Iron (Fe)	ug/L	7.3	<5.0	5.0	8601126
Dissolved Lead (Pb)	ug/L	<0.20	<0.20	0.20	8601126
Dissolved Lithium (Li)	ug/L	<2.0	<2.0	2.0	8601126
Dissolved Manganese (Mn)	ug/L	<1.0	<1.0	1.0	8601126
Dissolved Molybdenum (Mo)	ug/L	<1.0	<1.0	1.0	8601126
Dissolved Nickel (Ni)	ug/L	<1.0	<1.0	1.0	8601126
Dissolved Phosphorus (P)	ug/L	27	<10	10	8601126
Dissolved Selenium (Se)	ug/L	0.10	0.17	0.10	8601126
Dissolved Silicon (Si)	ug/L	4350	6010	100	8601126
Dissolved Silver (Ag)	ug/L	<0.020	<0.020	0.020	8601126
Dissolved Strontium (Sr)	ug/L	14.4	20.6	1.0	8601126
Dissolved Thallium (Tl)	ug/L	<0.010	<0.010	0.010	8601126
Dissolved Tin (Sn)	ug/L	<5.0	<5.0	5.0	8601126
Dissolved Titanium (Ti)	ug/L	<5.0	<5.0	5.0	8601126
Dissolved Uranium (U)	ug/L	<0.10	<0.10	0.10	8601126

RDL = Reportable Detection Limit

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CSR DISSOLVED METALS IN WATER WITH CV HG (WATER)

Maxxam ID		QV8547	QV8548		
Sampling Date		2017/04/07 09:00	2017/04/07 09:30		
COC Number		520094-03-01	520094-03-01		
	UNITS	WG-88877-070417-JS-09	WG-88877-070417-JS-10	RDL	QC Batch
Dissolved Vanadium (V)	ug/L	6.1	<5.0	5.0	8601126
Dissolved Zinc (Zn)	ug/L	<5.0	<5.0	5.0	8601126
Dissolved Zirconium (Zr)	ug/L	<0.10	<0.10	0.10	8601126
Dissolved Calcium (Ca)	mg/L	10.5	11.0	0.050	8598535
Dissolved Magnesium (Mg)	mg/L	1.34	2.59	0.050	8598535
Dissolved Potassium (K)	mg/L	0.314	0.191	0.050	8598535
Dissolved Sodium (Na)	mg/L	1.04	5.21	0.050	8598535
Dissolved Sulphur (S)	mg/L	<3.0	<3.0	3.0	8598535
RDL = Reportable Detection Limit					

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GENERAL COMMENTS

Results relate only to the items tested.

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Maxxam Job #: B726014
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QUALITY ASSURANCE REPORT

GHD Limited
Client Project #: 088877-02-01
Site Location: 7295 GOLD RIVER HIGHWAY
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Sampler Initials: JS

			Matrix Spike		Spiked Blank		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
8599347	pH	2017/04/08			101	97 - 103			0.28 (1)	20
8599348	Conductivity	2017/04/08			100	80 - 120	<1.0	uS/cm	0 (1)	20
8599349	Alkalinity (PP as CaCO3)	2017/04/08					<0.50	mg/L		
8599349	Alkalinity (Total as CaCO3)	2017/04/08	98	80 - 120	101	80 - 120	<0.50	mg/L		
8599349	Bicarbonate (HCO3)	2017/04/08					<0.50	mg/L		
8599349	Carbonate (CO3)	2017/04/08					<0.50	mg/L		
8599349	Hydroxide (OH)	2017/04/08					<0.50	mg/L		
8599362	pH	2017/04/09			101	97 - 103			0.37 (1)	20
8599364	Conductivity	2017/04/09			99	80 - 120	1.1, RDL=1.0	uS/cm	0.41 (1)	20
8599365	Alkalinity (PP as CaCO3)	2017/04/09					<0.50	mg/L	NC (1)	20
8599365	Alkalinity (Total as CaCO3)	2017/04/09	NC	80 - 120	99	80 - 120	<0.50	mg/L	0.32 (1)	20
8599365	Bicarbonate (HCO3)	2017/04/09					<0.50	mg/L	0.32 (1)	20
8599365	Carbonate (CO3)	2017/04/09					<0.50	mg/L	NC (1)	20
8599365	Hydroxide (OH)	2017/04/09					<0.50	mg/L	NC (1)	20
8599366	pH	2017/04/09			101	97 - 103			0.55 (1)	20
8599367	Conductivity	2017/04/09			100	80 - 120	<1.0	uS/cm	3.0 (1)	20
8599368	Alkalinity (PP as CaCO3)	2017/04/09					<0.50	mg/L	NC (1)	20
8599368	Alkalinity (Total as CaCO3)	2017/04/09	NC	80 - 120	101	80 - 120	<0.50	mg/L	6.7 (1)	20
8599368	Bicarbonate (HCO3)	2017/04/09					<0.50	mg/L	6.7 (1)	20
8599368	Carbonate (CO3)	2017/04/09					<0.50	mg/L	NC (1)	20
8599368	Hydroxide (OH)	2017/04/09					<0.50	mg/L	NC (1)	20
8599382	Biochemical Oxygen Demand	2017/04/13			104	85 - 115	<6.0	mg/L	NC (2)	20
8599445	Orthophosphate (P)	2017/04/08	92	80 - 120	94	80 - 120	<0.0050	mg/L	12 (1)	20
8599446	Orthophosphate (P)	2017/04/08	100 (3)	80 - 120	80	80 - 120	<0.0050	mg/L	13 (4)	20
8599502	Nitrate plus Nitrite (N)	2017/04/08	102	80 - 120	105	80 - 120	<0.020	mg/L	0.44 (1)	25
8599503	Nitrite (N)	2017/04/08	96	80 - 120	101	80 - 120	<0.0050	mg/L	NC (1)	20
8599504	Nitrate plus Nitrite (N)	2017/04/08	NC	80 - 120	105	80 - 120	<0.020	mg/L	0.13 (1)	25
8599505	Nitrite (N)	2017/04/08	98	80 - 120	103	80 - 120	<0.0050	mg/L	NC (1)	20
8600016	Total Ammonia (N)	2017/04/10	100	80 - 120	101	80 - 120	<0.0050	mg/L	1.5 (1)	20
8601046	Dissolved Chloride (Cl)	2017/04/10	111	80 - 120	97	80 - 120	<0.50	mg/L	0.055 (5)	20

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QUALITY ASSURANCE REPORT(CONT'D)

GHD Limited
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			Matrix Spike		Spiked Blank		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
8601048	Dissolved Sulphate (SO4)	2017/04/10	NC	80 - 120	93	80 - 120	<0.50	mg/L	1.1 (5)	20
8601058	Dissolved Chloride (Cl)	2017/04/10	106	80 - 120	97	80 - 120	<0.50	mg/L	0.89 (1)	20
8601061	Dissolved Sulphate (SO4)	2017/04/10	110	80 - 120	105	80 - 120	<0.50	mg/L	NC (1)	20
8601126	Dissolved Aluminum (Al)	2017/04/13	100	80 - 120	100	80 - 120	<3.0	ug/L	NC (1)	20
8601126	Dissolved Antimony (Sb)	2017/04/13	101	80 - 120	99	80 - 120	<0.50	ug/L	NC (1)	20
8601126	Dissolved Arsenic (As)	2017/04/13	102	80 - 120	101	80 - 120	<0.10	ug/L	NC (1)	20
8601126	Dissolved Barium (Ba)	2017/04/13	106	80 - 120	104	80 - 120	<1.0	ug/L	NC (1)	20
8601126	Dissolved Beryllium (Be)	2017/04/13	101	80 - 120	99	80 - 120	<0.10	ug/L	NC (1)	20
8601126	Dissolved Bismuth (Bi)	2017/04/13	102	80 - 120	101	80 - 120	<1.0	ug/L	NC (1)	20
8601126	Dissolved Boron (B)	2017/04/13	96	80 - 120	94	80 - 120	<50	ug/L	NC (1)	20
8601126	Dissolved Cadmium (Cd)	2017/04/13	106	80 - 120	101	80 - 120	<0.010	ug/L	NC (1)	20
8601126	Dissolved Chromium (Cr)	2017/04/13	100	80 - 120	103	80 - 120	<1.0	ug/L	NC (1)	20
8601126	Dissolved Cobalt (Co)	2017/04/13	100	80 - 120	102	80 - 120	<0.20	ug/L	NC (1)	20
8601126	Dissolved Copper (Cu)	2017/04/13	100	80 - 120	102	80 - 120	<0.20	ug/L	2.0 (1)	20
8601126	Dissolved Iron (Fe)	2017/04/13	105	80 - 120	105	80 - 120	<5.0	ug/L	NC (1)	20
8601126	Dissolved Lead (Pb)	2017/04/13	104	80 - 120	103	80 - 120	<0.20	ug/L	NC (1)	20
8601126	Dissolved Lithium (Li)	2017/04/13	98	80 - 120	99	80 - 120	<2.0	ug/L	NC (1)	20
8601126	Dissolved Manganese (Mn)	2017/04/13	100	80 - 120	102	80 - 120	<1.0	ug/L	NC (1)	20
8601126	Dissolved Molybdenum (Mo)	2017/04/13	101	80 - 120	98	80 - 120	<1.0	ug/L	NC (1)	20
8601126	Dissolved Nickel (Ni)	2017/04/13	101	80 - 120	103	80 - 120	<1.0	ug/L	NC (1)	20
8601126	Dissolved Phosphorus (P)	2017/04/13					<10	ug/L		
8601126	Dissolved Selenium (Se)	2017/04/13	106	80 - 120	101	80 - 120	<0.10	ug/L	NC (1)	20
8601126	Dissolved Silicon (Si)	2017/04/13					<100	ug/L	NC (1)	20
8601126	Dissolved Silver (Ag)	2017/04/13	104	80 - 120	104	80 - 120	<0.020	ug/L	NC (1)	20
8601126	Dissolved Strontium (Sr)	2017/04/13	97	80 - 120	102	80 - 120	<1.0	ug/L	NC (1)	20
8601126	Dissolved Thallium (Tl)	2017/04/13	101	80 - 120	100	80 - 120	<0.010	ug/L	NC (1)	20
8601126	Dissolved Tin (Sn)	2017/04/13	103	80 - 120	101	80 - 120	<5.0	ug/L	NC (1)	20
8601126	Dissolved Titanium (Ti)	2017/04/13	94	80 - 120	103	80 - 120	<5.0	ug/L	NC (1)	20
8601126	Dissolved Uranium (U)	2017/04/13	99	80 - 120	102	80 - 120	<0.10	ug/L	NC (1)	20
8601126	Dissolved Vanadium (V)	2017/04/13	100	80 - 120	100	80 - 120	<5.0	ug/L	NC (1)	20

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Maxxam Job #: B726014
Report Date: 2018/01/05

QUALITY ASSURANCE REPORT(CONT'D)

GHD Limited
Client Project #: 088877-02-01
Site Location: 7295 GOLD RIVER HIGHWAY
Your P.O. #: 73506780
Sampler Initials: JS

			Matrix Spike		Spiked Blank		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
8601126	Dissolved Zinc (Zn)	2017/04/13	105	80 - 120	103	80 - 120	<5.0	ug/L	NC (1)	20
8601126	Dissolved Zirconium (Zr)	2017/04/13					<0.10	ug/L	NC (1)	20
8601312	Chemical Oxygen Demand	2017/04/12	98	80 - 120	106	80 - 120	<10	mg/L	NC (1)	20
8601313	Chemical Oxygen Demand	2017/04/12	96	80 - 120	104	80 - 120	<10	mg/L	NC (1)	20
8601383	Total Nitrogen (N)	2017/04/11	100	80 - 120	96	80 - 120	<0.020	mg/L	3.7 (1)	20
8601794	Total Sulphide	2017/04/12			92	80 - 120	<0.0019	mg/L	NC (1)	20
8602116	Total Dissolved Solids	2017/04/13	99	80 - 120	86	80 - 120	<10	mg/L	3.6 (1)	20
8602424	Phenols	2017/04/12	95	80 - 120	104	80 - 120	<0.0010	mg/L	NC (1)	20
8603106	Dissolved Mercury (Hg)	2017/04/13	100 (6)	80 - 120	102	80 - 120	<0.010	ug/L	NC (7)	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) Duplicate Parent ID [QV8545-01]

(3) Matrix Spike Parent ID [QV8545-02]

(4) Duplicate Parent ID [QV8545-02]

(5) Duplicate Parent ID [QV8539-02]

(6) Matrix Spike Parent ID [QV8539-06]

(7) Duplicate Parent ID [QV8539-06]

Maxxam Analytics International Corporation o/a Maxxam Analytics Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

Maxxam Job #: B726014
Report Date: 2018/01/05

GHD Limited
Client Project #: 088877-02-01
Site Location: 7295 GOLD RIVER HIGHWAY
Your P.O. #: 73506780
Sampler Initials: JS

VALIDATION SIGNATURE PAGE

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

Andy Lu, Ph.D., P.Chem., Scientific Specialist

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

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Page 1 of 4

B726014_COC

INVOICE TO:		Report Information		Project Information	
Company Name	#163 GHD Limited	Company Name		Quotation #	B61466
Contact Name	Airesse MacPhee	Contact Name		P.O. #	73506780
Address	651 COLBY DRIVE WATERLOO ON N2V 1C2	Address		Project #	088877-02-01
Phone	(519) 884-0510 x Fax: (519) 725-1394 x	Phone	Fax:	Project Name	
Email	airesse.macphee@ghd.com; NationalEDDSupport@ma	Email		Site #	
				Sampled By	J. Stewart

Bottle Order #: 520094 — C#520094-03-01 — Project Manager: VJ Oco

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

Special Instructions

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

ANALYSIS REQUESTED (PLEASE BE SPECIFIC)

Turnaround Time (TAT) Required:

Please provide advance notice for rush projects

Regular (Standard) TAT: ☑
(will be applied if Rush TAT is not specified):
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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	Biochemical Oxygen Demand	COD	Chloride	Conductivity	~~Cyanide~~	pH	Total Phenols	Sulphate	Sulphide (w/ H2S)	# of Bottles	Comments
1		WG-88877-060417-JS-01	06/04/17	1000	W	Y	X	X	X	X	X		X	X	X	X	9	
2		-02		1045		Y											9	
3		-03		1130		Y											9	
4		-04		1230		Y											9	
5		-05		1430		Y											9	
6		-06		1500		Y											9	
7		-07		1505		Y											9	
8		WG-88877-060417-JS-08	06/04/17	1530		Y											9	
9		WG-88877-060417-JS-09	07/04/17	900		Y											9	
10		-10		930		Y											9	

RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted
James Stewart	17/04/07	1300	JWAHNE HOY	17/04/07	17:30	

Lab Use Only: Time Sensitive ☐ | Temperature (°C) on Receipt: 6,7,7 / 5,5,7 / 6,7,5 | Custody Seal Present on Cooler? ☐ Yes ☐ No

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B726014_COC

C#520094-03-02

INVOICE TO:		Report Information		Project Information	
Company Name	#163 GHD Limited	Company Name		Quotation #	B61466
Contact Name	Airesse MacPhee	Contact Name		P.O. #	73506780
Address	651 COLBY DRIVE WATERLOO ON N2V 1C2	Address		Project #	088877-02-01
Phone	(519) 884-0510 x Fax: (519) 725-1394 x	Phone	Fax:	Project Name	
Email	airesse.macphee@ghd.com; NationalEDDSupport@ma	Email		Site #	
				Sampled By	J. Stewart

se Only
Bottle Order #: 520094
Project Manager: VJ Oco

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

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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)	Total Dissolved Solids	Ammonia-N	Nitrite / Nitrate / Nitrogen	Orthophosphate	TKN	Dissolved Metals (inc Phophorus, Hg and Hardness)	LL Sulphide	Total Suspended Solids	Total Metals (inc Phosphorus, Hg and Hardness)	Dissolved Hardness	# of Bottles	Comments
1		WG-88877-060417-JS-01	06/04/17	1000	W	Y	X	X	X	X	X	X	X		X	X	9	
2		-02		1045		Y											9	
3		-03		1130		Y											9	
4		-04		1230		Y											9	
5		-05		1430		Y											9	
6		-06		1500		Y											9	
7		-07		1505		Y											9	
8		-08		1530		Y											9	
9		WG-88877-070417-JS-09	07/04/17	900		Y											9	
10		-10		930		Y											9	

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 on Cooler?
J. Stewart	17/04/07	1300	JUWAHINNE	2017/04/07	17:30		☐	6,7,7/5,5,7	☐ Yes ☐ No

6,7,5

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C#520094-02-01

INVOICE TO:		Report Information		Project Information	
Company Name	#163 GHD Limited	Company Name		Quotation #	B61466
Contact Name	Airesse MacPhee	Contact Name		P.O. #	73506780
Address	651 COLBY DRIVE	Address		Project #	088877-02-01
	WATERLOO ON N2V 1C2			Project Name	
Phone	(519) 884-0510 x Fax: (519) 725-1394 x	Phone	Fax:	Site #	
Email	airesse.macphee@ghd.com; NationalEDDSupport@ma	Email		Sampled By	J. Stewart

Lab Use Only
Bottle Order #: 520094
Project Manager: VJ Oco

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

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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	Biochemical Oxygen Demand	COD	Chloride	Conductivity	Cyanide	pH	Total Phenols	Sulphate	Sulphide (w/ H2S)	# of Bottles	Comments
1		WG-88877-070417-JS-11	07/04/17	1000	U	Y	X	X	X	X	X		X	X	X	X	9	
2		↓ -12	↓	1030	W	Y	X	X	X	X	X		X	X	X	X	9	
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
James Stewart	17/04/07	13:00	JWAHNNE MOY	2017/04/07	17:30	

Lab Use Only: Time Sensitive [ ] | Temperature (°C) on Receipt: 6,7,7/5,5,7 | Custody Seal Intact on Cooler? [ ] Yes [ ] No | N/A

6,7,5

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C#520094-01-02

INVOICE TO:

Company Name: #163 GHD Limited
Contact Name: Airesse MacPhee
Address: 651 COLBY DRIVE, WATERLOO ON N2V 1C2
Phone: (519) 884-0510 x Fax: (519) 725-1394 x
Email: airesse.macphee@ghd.com; NationalEDDSupport@ma

Report Information

Company Name:
Contact Name:
Address:
Phone: Fax:
Email:

Project Information

Quotation #: B61466
P.O. #: 73506780
Project #: 088877-02-01
Project Name:
Site #:
Sampled By: J. Stewart

Lab Use Only

Bottle Order #: 520094
Project Manager: VJ Oco

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

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	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Metals Field Filtered ? (Y / N)	Total Dissolved Solids	Ammonia-N	Nitrite / Nitrate / Nitrogen	Orthophosphate	TKN	Dissolved Metals (inc Phophorus, Hg and Hardness)	LL Sulphide	Total Suspended Solids	Total Metals (inc Phosphorus, Hg and Hardness)	Dissolved Hardness	# of Bottles	Comments
1		WG-088877-070417-JS-11	07/04/17	1000	W	Y	✓	✓	✓	✓	✓	✓	✓	~~✓~~		✓	9	
2		↓ -12	↓	1030	W	Y	✓	✓	✓	✓	✓	✓	✓	~~✓~~		✓	9	
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?
James Stewart	17/04/07	1300	JWATHNE	2017/04/07	17:30		☐	6,7,7/5,5,7 / 6,7,5	☐ Yes ☐ No

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Maxxam
A Bureau Veritas Group Company

Success Through Science®

Your P.O. #: 73506780
Your Project #: 088877
Site Location: UPLAND LANDFILL 7295 GOLD RIVER HIGHWAY
Your C.O.C. #: 541990-01-01

Attention:Airesse MacPhee

GHD Limited
651 COLBY DRIVE
WATERLOO, ON
CANADA N2V 1C2

Report Date: 2017/12/04
Report #: R2486270
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B7A5901
Received: 2017/11/29, 08:30

Sample Matrix: Water
Samples Received: 5

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity - Water	5	2017/11/29	2017/11/30	BBY6SOP-00026	SM 22 2320 B m
Chloride by Automated Colourimetry	5	N/A	2017/11/29	BBY6SOP-00011	SM 22 4500-Cl- E m
Conductance - water	5	2017/11/29	2017/11/30	BBY6SOP-00026	SM 22 2510 B m
Sulphide (as H2S) Calculation - total	5	N/A	2017/12/01	BBY6SOP-00006	SM 22 4500-S2-D m
Hardness (calculated as CaCO3)	5	N/A	2017/12/02	BBY WI-00033	Auto Calc
Mercury (Dissolved) by CVAF	5	N/A	2017/11/30	BBY7SOP-00015	BCMOE BCLM Oct2013 m
Na, K, Ca, Mg, S by CRC ICPMS (diss.)	5	N/A	2017/12/02	BBY7SOP-00002	EPA 6020B R2 m
Elements by CRC ICPMS (dissolved)	5	N/A	2017/12/01	BBY7SOP-00002	EPA 6020B R2 m
Ammonia-N (Preserved)	5	N/A	2017/11/30	BBY6SOP-00009	EPA 350.1 m
Nitrate + Nitrite (N) (highlevel)	5	N/A	2017/11/29	BBY6SOP-00010	SM 22 4500-NO3- I m
Nitrite (N) by CFA (highlevel)	5	N/A	2017/11/29	BBY6SOP-00010	SM 22 4500-NO3- I m
Nitrogen - Nitrate (as N)	5	N/A	2017/11/30	BBY WI-00033	Auto Calc
Filter and HNO3 Preserve for Metals	3	N/A	2017/11/30	BBY7 WI-00004	BCMOE Reqs 08/14
Filter and HNO3 Preserve for Metals	2	N/A	2017/12/01	BBY7 WI-00004	BCMOE Reqs 08/14
pH Water (2)	5	2017/11/29	2017/11/30	BBY6SOP-00026	SM 22 4500-H+ B m
Orthophosphate by Konelab (highlevel)	5	N/A	2017/11/29	BBY6SOP-00013	SM 22 4500-P E m
Total Sulphide (1)	5	N/A	2017/12/01	AB SOP-00080	SM 22 4500 S2-A D F
Sulphate by Automated Colourimetry	5	N/A	2017/11/29	BBY6SOP-00017	SM 22 4500-SO42- E m
Total Dissolved Solids (Filt. Residue)	5	2017/11/30	2017/12/01	BBY6SOP-00033	SM 22 2540 C m

Remarks:

Maxxam Analytics' laboratories are accredited to ISO/IEC 17025:2005 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Maxxam are based upon recognized Provincial, Federal or US method compendia such as CCME, MDDELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Maxxam's profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Maxxam 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.

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

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Your P.O. #: 73506780
Your Project #: 088877
Site Location: UPLAND LANDFILL 7295 GOLD RIVER HIGHWAY
Your C.O.C. #: 541990-01-01

Attention:Airesse MacPhee

GHD Limited
651 COLBY DRIVE
WATERLOO, ON
CANADA N2V 1C2

Report Date: 2017/12/04
Report #: R2486270
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B7A5901
Received: 2017/11/29, 08:30
agreed in writing.

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.

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 Maxxam Edmonton Environmental
(2) The BC-MOE and APHA Standard Method require pH to be analysed within 15 minutes of sampling and therefore field analysis is required for compliance. All Laboratory pH analyses in this report are reported past the BC-MOE/APHA Standard Method holding time.

Encryption Key

Nahed Amer
Project Manager
04 Dec 2017 14:44:56

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Nahed Amer, Project Manager
Email: NAmer@maxxam.ca
Phone# (604) 734 7276
==========
Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Maxxam Job #: B7A5901
Report Date: 2017/12/04

GHD Limited
Client Project #: 088877
Site Location: UPLAND LANDFILL 7295 GOLD RIVER HIGHWAY
Your P.O. #: 73506780
Sampler Initials: CR

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		SO6393		SO6394	SO6394		
Sampling Date		2017/11/27 11:00		2017/11/27 12:30	2017/11/27 12:30		
COC Number		541990-01-01		541990-01-01	541990-01-01		
	UNITS	WG-88877-271117-CR-01	QC Batch	WG-88877-271117-CR-02	WG-88877-271117-CR-02 Lab-Dup	RDL	QC Batch
Misc. Inorganics							
Alkalinity (Total as CaCO3)	mg/L	60.5	8846986	44.1	42.5	1.0	8846986
Alkalinity (PP as CaCO3)	mg/L	<1.0	8846986	<1.0	<1.0	1.0	8846986
Bicarbonate (HCO3)	mg/L	73.8	8846986	53.8	51.8	1.0	8846986
Carbonate (CO3)	mg/L	<1.0	8846986	<1.0	<1.0	1.0	8846986
Hydroxide (OH)	mg/L	<1.0	8846986	<1.0	<1.0	1.0	8846986
Anions							
Total Sulphide	mg/L	<0.0019	8848637	<0.0019	N/A	0.0019	8848637
Nutrients							
Total Ammonia (N)	mg/L	<0.020	8848342	<0.020	N/A	0.020	8848342
Physical Properties							
Conductivity	uS/cm	155	8846974	133	133	2.0	8846974
pH	pH	7.97	8846969	7.67	7.68	N/A	8846969
Physical Properties							
Total Dissolved Solids	mg/L	98	8847630	100	N/A	10	8847643

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

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Maxxam Job #: B7A5901
Report Date: 2017/12/04

GHD Limited
Client Project #: 088877
Site Location: UPLAND LANDFILL 7295 GOLD RIVER HIGHWAY
Your P.O. #: 73506780
Sampler Initials: CR

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		SO6395	SO6396	SO6397		
Sampling Date		2017/11/27 13:00	2017/11/27 13:05	2017/11/27 13:30		
COC Number		541990-01-01	541990-01-01	541990-01-01		
	UNITS	WG-88877-271117-CR-03	WG-88877-271117-CR-04	WG-88877-271117-CR-05	RDL	QC Batch
Misc. Inorganics						
Alkalinity (Total as CaCO3)	mg/L	40.4	43.9	43.9	1.0	8846986
Alkalinity (PP as CaCO3)	mg/L	<1.0	<1.0	<1.0	1.0	8846986
Bicarbonate (HCO3)	mg/L	49.3	53.6	53.5	1.0	8846986
Carbonate (CO3)	mg/L	<1.0	<1.0	<1.0	1.0	8846986
Hydroxide (OH)	mg/L	<1.0	<1.0	<1.0	1.0	8846986
Anions						
Total Sulphide	mg/L	<0.0019	<0.0019	<0.0019	0.0019	8848637
Nutrients						
Total Ammonia (N)	mg/L	<0.020	<0.020	<0.020	0.020	8848342
Physical Properties						
Conductivity	uS/cm	86.9	87.9	118	2.0	8846974
pH	pH	7.83	7.87	7.85	N/A	8846969
Physical Properties						
Total Dissolved Solids	mg/L	68	66	66	10	8847643

RDL = Reportable Detection Limit
N/A = Not Applicable

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Maxxam Job #: B7A5901
Report Date: 2017/12/04

GHD Limited
Client Project #: 088877
Site Location: UPLAND LANDFILL 7295 GOLD RIVER HIGHWAY
Your P.O. #: 73506780
Sampler Initials: CR

MISCELLANEOUS (WATER)

Maxxam ID		SO6393	SO6394	SO6395		
Sampling Date		2017/11/27 11:00	2017/11/27 12:30	2017/11/27 13:00		
COC Number		541990-01-01	541990-01-01	541990-01-01		
	UNITS	WG-88877-271117-CR-01	WG-88877-271117-CR-02	WG-88877-271117-CR-03	RDL	QC Batch
MISCELLANEOUS						
Total Sulphide (as H2S)	mg/L	<0.0019	<0.0019	<0.0019	0.0019	8846296
RDL = Reportable Detection Limit						

Maxxam ID		SO6396	SO6397		
Sampling Date		2017/11/27 13:05	2017/11/27 13:30		
COC Number		541990-01-01	541990-01-01		
	UNITS	WG-88877-271117-CR-04	WG-88877-271117-CR-05	RDL	QC Batch
MISCELLANEOUS					
Total Sulphide (as H2S)	mg/L	<0.0019	<0.0019	0.0019	8846296
RDL = Reportable Detection Limit					

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Maxxam Job #: B7A5901
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GHD Limited
Client Project #: 088877
Site Location: UPLAND LANDFILL 7295 GOLD RIVER HIGHWAY
Your P.O. #: 73506780
Sampler Initials: CR

HIGH LEVEL ANIONS PACKAGE (WATER)

Maxxam ID		SO6393	SO6394	SO6395		
Sampling Date		2017/11/27 11:00	2017/11/27 12:30	2017/11/27 13:00		
COC Number		541990-01-01	541990-01-01	541990-01-01		
	UNITS	WG-88877-271117-CR-01	WG-88877-271117-CR-02	WG-88877-271117-CR-03	RDL	QC Batch
ANIONS						
Nitrite (N)	mg/L	<0.10	<0.10	<0.10	0.10	8847728
Calculated Parameters						
Nitrate (N)	mg/L	0.26	1.10	<0.10	0.10	8846334
Anions						
Dissolved Sulphate (SO4)	mg/L	6.6	5.9	2.9	1.0	8846968
Dissolved Chloride (Cl)	mg/L	7.8	7.7	1.5	1.0	8846967
Nutrients						
Orthophosphate (P)	mg/L	<0.10	<0.10	<0.10	0.10	8846838
Nitrate plus Nitrite (N)	mg/L	0.26	1.10	<0.10	0.10	8847726

RDL = Reportable Detection Limit

Maxxam ID		SO6396	SO6397	SO6397		
Sampling Date		2017/11/27 13:05	2017/11/27 13:30	2017/11/27 13:30		
COC Number		541990-01-01	541990-01-01	541990-01-01		
	UNITS	WG-88877-271117-CR-04	WG-88877-271117-CR-05	WG-88877-271117-CR-05 Lab-Dup	RDL	QC Batch
ANIONS						
Nitrite (N)	mg/L	<0.10	<0.10	<0.10	0.10	8847728
Calculated Parameters						
Nitrate (N)	mg/L	<0.10	<0.10	N/A	0.10	8846334
Anions						
Dissolved Sulphate (SO4)	mg/L	2.7	5.6	N/A	1.0	8846968
Dissolved Chloride (Cl)	mg/L	1.3	7.2	N/A	1.0	8846967
Nutrients						
Orthophosphate (P)	mg/L	<0.10	<0.10	<0.10	0.10	8846838
Nitrate plus Nitrite (N)	mg/L	<0.10	<0.10	<0.10	0.10	8847726

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

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Maxxam Job #: B7A5901
Report Date: 2017/12/04

GHD Limited
Client Project #: 088877
Site Location: UPLAND LANDFILL 7295 GOLD RIVER HIGHWAY
Your P.O. #: 73506780
Sampler Initials: CR

CSR DISSOLVED METALS IN WATER WITH CV HG (WATER)

Maxxam ID		SO6393	SO6394	SO6395		
Sampling Date		2017/11/27 11:00	2017/11/27 12:30	2017/11/27 13:00		
COC Number		541990-01-01	541990-01-01	541990-01-01		
	UNITS	WG-88877-271117-CR-01	WG-88877-271117-CR-02	WG-88877-271117-CR-03	RDL	QC Batch
Calculated Parameters						
Filter and HNO3 Preservation	N/A	FIELD	FIELD	FIELD	N/A	ONSITE
Misc. Inorganics						
Dissolved Hardness (CaCO3)	mg/L	66.0	45.1	40.4	0.50	8845884
Elements						
Dissolved Mercury (Hg)	ug/L	<0.010	<0.010	<0.010	0.010	8847569
Dissolved Metals by ICPMS						
Dissolved Aluminum (Al)	ug/L	5.4	<3.0	8.8	3.0	8847607
Dissolved Antimony (Sb)	ug/L	<0.50	<0.50	<0.50	0.50	8847607
Dissolved Arsenic (As)	ug/L	0.44	<0.10	0.76	0.10	8847607
Dissolved Barium (Ba)	ug/L	6.1	1.5	5.5	1.0	8847607
Dissolved Beryllium (Be)	ug/L	<0.10	<0.10	<0.10	0.10	8847607
Dissolved Bismuth (Bi)	ug/L	<1.0	<1.0	<1.0	1.0	8847607
Dissolved Boron (B)	ug/L	<50	<50	<50	50	8847607
Dissolved Cadmium (Cd)	ug/L	<0.010	<0.010	<0.010	0.010	8847607
Dissolved Chromium (Cr)	ug/L	3.1	<1.0	<1.0	1.0	8847607
Dissolved Cobalt (Co)	ug/L	<0.20	<0.20	<0.20	0.20	8847607
Dissolved Copper (Cu)	ug/L	0.31	0.38	<0.20	0.20	8847607
Dissolved Iron (Fe)	ug/L	<5.0	<5.0	<5.0	5.0	8847607
Dissolved Lead (Pb)	ug/L	<0.20	<0.20	<0.20	0.20	8847607
Dissolved Lithium (Li)	ug/L	<2.0	<2.0	<2.0	2.0	8847607
Dissolved Manganese (Mn)	ug/L	<1.0	<1.0	<1.0	1.0	8847607
Dissolved Molybdenum (Mo)	ug/L	<1.0	<1.0	<1.0	1.0	8847607
Dissolved Nickel (Ni)	ug/L	<1.0	<1.0	<1.0	1.0	8847607
Dissolved Selenium (Se)	ug/L	0.17	0.35	<0.10	0.10	8847607
Dissolved Silicon (Si)	ug/L	6640	6600	4330	100	8847607
Dissolved Silver (Ag)	ug/L	<0.020	<0.020	<0.020	0.020	8847607
Dissolved Strontium (Sr)	ug/L	31.6	27.2	17.5	1.0	8847607
Dissolved Thallium (Tl)	ug/L	<0.010	<0.010	<0.010	0.010	8847607
Dissolved Tin (Sn)	ug/L	<5.0	<5.0	<5.0	5.0	8847607
Dissolved Titanium (Ti)	ug/L	<5.0	<5.0	<5.0	5.0	8847607

RDL = Reportable Detection Limit
N/A = Not Applicable

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Maxxam Job #: B7A5901
Report Date: 2017/12/04

GHD Limited
Client Project #: 088877
Site Location: UPLAND LANDFILL 7295 GOLD RIVER HIGHWAY
Your P.O. #: 73506780
Sampler Initials: CR

CSR DISSOLVED METALS IN WATER WITH CV HG (WATER)

Maxxam ID		SO6393	SO6394	SO6395		
Sampling Date		2017/11/27 11:00	2017/11/27 12:30	2017/11/27 13:00		
COC Number		541990-01-01	541990-01-01	541990-01-01		
	UNITS	WG-88877-271117-CR-01	WG-88877-271117-CR-02	WG-88877-271117-CR-03	RDL	QC Batch
Dissolved Uranium (U)	ug/L	<0.10	<0.10	<0.10	0.10	8847607
Dissolved Vanadium (V)	ug/L	5.0	<5.0	6.2	5.0	8847607
Dissolved Zinc (Zn)	ug/L	<5.0	<5.0	<5.0	5.0	8847607
Dissolved Zirconium (Zr)	ug/L	<0.10	<0.10	<0.10	0.10	8847607
Dissolved Calcium (Ca)	mg/L	21.3	13.4	13.4	0.050	8845887
Dissolved Magnesium (Mg)	mg/L	3.09	2.83	1.70	0.050	8845887
Dissolved Potassium (K)	mg/L	0.413	0.271	0.247	0.050	8845887
Dissolved Sodium (Na)	mg/L	4.87	8.53	1.13	0.050	8845887
Dissolved Sulphur (S)	mg/L	<3.0	<3.0	<3.0	3.0	8845887
RDL = Reportable Detection Limit						

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Maxxam Job #: B7A5901
Report Date: 2017/12/04

GHD Limited
Client Project #: 088877
Site Location: UPLAND LANDFILL 7295 GOLD RIVER HIGHWAY
Your P.O. #: 73506780
Sampler Initials: CR

CSR DISSOLVED METALS IN WATER WITH CV HG (WATER)

Maxxam ID		SO6396	SO6397		
Sampling Date		2017/11/27 13:05	2017/11/27 13:30		
COC Number		541990-01-01	541990-01-01		
	UNITS	WG-88877-271117-CR-04	WG-88877-271117-CR-05	RDL	QC Batch
Calculated Parameters					
Filter and HNO3 Preservation	N/A	FIELD	FIELD	N/A	ONSITE
Misc. Inorganics					
Dissolved Hardness (CaCO3)	mg/L	41.1	46.4	0.50	8845884
Elements					
Dissolved Mercury (Hg)	ug/L	<0.010	<0.010	0.010	8847569
Dissolved Metals by ICPMS					
Dissolved Aluminum (Al)	ug/L	8.7	<3.0	3.0	8847607
Dissolved Antimony (Sb)	ug/L	<0.50	<0.50	0.50	8847607
Dissolved Arsenic (As)	ug/L	0.77	0.12	0.10	8847607
Dissolved Barium (Ba)	ug/L	5.6	1.2	1.0	8847607
Dissolved Beryllium (Be)	ug/L	<0.10	<0.10	0.10	8847607
Dissolved Bismuth (Bi)	ug/L	<1.0	<1.0	1.0	8847607
Dissolved Boron (B)	ug/L	<50	<50	50	8847607
Dissolved Cadmium (Cd)	ug/L	<0.010	<0.010	0.010	8847607
Dissolved Chromium (Cr)	ug/L	<1.0	<1.0	1.0	8847607
Dissolved Cobalt (Co)	ug/L	<0.20	<0.20	0.20	8847607
Dissolved Copper (Cu)	ug/L	0.25	0.29	0.20	8847607
Dissolved Iron (Fe)	ug/L	<5.0	<5.0	5.0	8847607
Dissolved Lead (Pb)	ug/L	<0.20	<0.20	0.20	8847607
Dissolved Lithium (Li)	ug/L	<2.0	<2.0	2.0	8847607
Dissolved Manganese (Mn)	ug/L	<1.0	<1.0	1.0	8847607
Dissolved Molybdenum (Mo)	ug/L	<1.0	<1.0	1.0	8847607
Dissolved Nickel (Ni)	ug/L	<1.0	<1.0	1.0	8847607
Dissolved Selenium (Se)	ug/L	0.10	0.12	0.10	8847607
Dissolved Silicon (Si)	ug/L	4290	5750	100	8847607
Dissolved Silver (Ag)	ug/L	<0.020	<0.020	0.020	8847607
Dissolved Strontium (Sr)	ug/L	17.1	24.6	1.0	8847607
Dissolved Thallium (Tl)	ug/L	<0.010	<0.010	0.010	8847607
Dissolved Tin (Sn)	ug/L	<5.0	<5.0	5.0	8847607
Dissolved Titanium (Ti)	ug/L	<5.0	<5.0	5.0	8847607

RDL = Reportable Detection Limit
N/A = Not Applicable

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Maxxam Job #: B7A5901
Report Date: 2017/12/04

GHD Limited
Client Project #: 088877
Site Location: UPLAND LANDFILL 7295 GOLD RIVER HIGHWAY
Your P.O. #: 73506780
Sampler Initials: CR

CSR DISSOLVED METALS IN WATER WITH CV HG (WATER)

Maxxam ID		SO6396	SO6397		
Sampling Date		2017/11/27 13:05	2017/11/27 13:30		
COC Number		541990-01-01	541990-01-01		
	UNITS	WG-88877-271117-CR-04	WG-88877-271117-CR-05	RDL	QC Batch
Dissolved Uranium (U)	ug/L	<0.10	<0.10	0.10	8847607
Dissolved Vanadium (V)	ug/L	5.8	<5.0	5.0	8847607
Dissolved Zinc (Zn)	ug/L	<5.0	<5.0	5.0	8847607
Dissolved Zirconium (Zr)	ug/L	<0.10	<0.10	0.10	8847607
Dissolved Calcium (Ca)	mg/L	13.6	14.7	0.050	8845887
Dissolved Magnesium (Mg)	mg/L	1.72	2.37	0.050	8845887
Dissolved Potassium (K)	mg/L	0.242	0.238	0.050	8845887
Dissolved Sodium (Na)	mg/L	1.15	4.55	0.050	8845887
Dissolved Sulphur (S)	mg/L	<3.0	<3.0	3.0	8845887
RDL = Reportable Detection Limit					

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Maxxam Job #: B7A5901
Report Date: 2017/12/04

GHD Limited
Client Project #: 088877
Site Location: UPLAND LANDFILL 7295 GOLD RIVER HIGHWAY
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GENERAL COMMENTS

Results relate only to the items tested.

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QUALITY ASSURANCE REPORT

GHD Limited
Client Project #: 088877
Site Location: UPLAND LANDFILL 7295 GOLD RIVER HIGHWAY
Your P.O. #: 73506780
Sampler Initials: CR

			Matrix Spike		Spiked Blank		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
8846838	Orthophosphate (P)	2017/11/29	106 (1)	80 - 120	103	80 - 120	<0.10	mg/L	NC (2)	20
8846967	Dissolved Chloride (Cl)	2017/11/29	107	80 - 120	96	80 - 120	<1.0	mg/L	3.0 (3)	20
8846968	Dissolved Sulphate (SO4)	2017/11/29	110	80 - 120	97	80 - 120	<1.0	mg/L	4.1 (3)	20
8846969	pH	2017/11/30			101	97 - 103			0.13 (4)	20
8846974	Conductivity	2017/11/30			101	80 - 120	<2.0	uS/cm	0.38 (4)	20
8846986	Alkalinity (PP as CaCO3)	2017/11/30					<1.0	mg/L	NC (4)	20
8846986	Alkalinity (Total as CaCO3)	2017/11/30	93 (5)	80 - 120	101	80 - 120	<1.0	mg/L	3.9 (4)	20
8846986	Bicarbonate (HCO3)	2017/11/30					<1.0	mg/L	3.9 (4)	20
8846986	Carbonate (CO3)	2017/11/30					<1.0	mg/L	NC (4)	20
8846986	Hydroxide (OH)	2017/11/30					<1.0	mg/L	NC (4)	20
8847569	Dissolved Mercury (Hg)	2017/11/30	91	80 - 120	93	80 - 120	<0.010	ug/L	NC (3)	20
8847607	Dissolved Aluminum (Al)	2017/12/01	108	80 - 120	106	80 - 120	<3.0	ug/L	NC (3)	20
8847607	Dissolved Antimony (Sb)	2017/12/01	104	80 - 120	99	80 - 120	<0.50	ug/L	NC (3)	20
8847607	Dissolved Arsenic (As)	2017/12/01	105	80 - 120	99	80 - 120	<0.10	ug/L	NC (3)	20
8847607	Dissolved Barium (Ba)	2017/12/01	101	80 - 120	101	80 - 120	<1.0	ug/L	1.9 (3)	20
8847607	Dissolved Beryllium (Be)	2017/12/01	97	80 - 120	96	80 - 120	<0.10	ug/L	NC (3)	20
8847607	Dissolved Bismuth (Bi)	2017/12/01	100	80 - 120	97	80 - 120	<1.0	ug/L	NC (3)	20
8847607	Dissolved Boron (B)	2017/12/01	98	80 - 120	94	80 - 120	<50	ug/L	NC (3)	20
8847607	Dissolved Cadmium (Cd)	2017/12/01	103	80 - 120	99	80 - 120	<0.010	ug/L	NC (3)	20
8847607	Dissolved Chromium (Cr)	2017/12/01	97	80 - 120	101	80 - 120	<1.0	ug/L	NC (3)	20
8847607	Dissolved Cobalt (Co)	2017/12/01	100	80 - 120	99	80 - 120	<0.20	ug/L	NC (3)	20
8847607	Dissolved Copper (Cu)	2017/12/01	96	80 - 120	102	80 - 120	<0.20	ug/L	NC (3)	20
8847607	Dissolved Iron (Fe)	2017/12/01	101	80 - 120	104	80 - 120	<5.0	ug/L	NC (3)	20
8847607	Dissolved Lead (Pb)	2017/12/01	98	80 - 120	100	80 - 120	<0.20	ug/L	NC (3)	20
8847607	Dissolved Lithium (Li)	2017/12/01	93	80 - 120	94	80 - 120	<2.0	ug/L	NC (3)	20
8847607	Dissolved Manganese (Mn)	2017/12/01	101	80 - 120	102	80 - 120	<1.0	ug/L	NC (3)	20
8847607	Dissolved Molybdenum (Mo)	2017/12/01	104	80 - 120	102	80 - 120	<1.0	ug/L	NC (3)	20
8847607	Dissolved Nickel (Ni)	2017/12/01	95	80 - 120	97	80 - 120	<1.0	ug/L	NC (3)	20
8847607	Dissolved Selenium (Se)	2017/12/01	104	80 - 120	103	80 - 120	<0.10	ug/L	NC (3)	20
8847607	Dissolved Silicon (Si)	2017/12/01					<100	ug/L	7.6 (3)	20

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Maxxam Job #: B7A5901
Report Date: 2017/12/04

QUALITY ASSURANCE REPORT(CONT'D)

GHD Limited
Client Project #: 088877
Site Location: UPLAND LANDFILL 7295 GOLD RIVER HIGHWAY
Your P.O. #: 73506780
Sampler Initials: CR

			Matrix Spike		Spiked Blank		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
8847607	Dissolved Silver (Ag)	2017/12/01	112	80 - 120	107	80 - 120	<0.020	ug/L	NC (3)	20
8847607	Dissolved Strontium (Sr)	2017/12/01	NC	80 - 120	99	80 - 120	<1.0	ug/L	2.7 (3)	20
8847607	Dissolved Thallium (Tl)	2017/12/01	100	80 - 120	100	80 - 120	<0.010	ug/L	NC (3)	20
8847607	Dissolved Tin (Sn)	2017/12/01	103	80 - 120	105	80 - 120	<5.0	ug/L	NC (3)	20
8847607	Dissolved Titanium (Ti)	2017/12/01	100	80 - 120	104	80 - 120	<5.0	ug/L	NC (3)	20
8847607	Dissolved Uranium (U)	2017/12/01	100	80 - 120	99	80 - 120	<0.10	ug/L	NC (3)	20
8847607	Dissolved Vanadium (V)	2017/12/01	100	80 - 120	101	80 - 120	<5.0	ug/L	NC (3)	20
8847607	Dissolved Zinc (Zn)	2017/12/01	98	80 - 120	93	80 - 120	<5.0	ug/L	NC (3)	20
8847607	Dissolved Zirconium (Zr)	2017/12/01	95	80 - 120	97	80 - 120	<0.10	ug/L	NC (3)	20
8847630	Total Dissolved Solids	2017/12/01	99	80 - 120	104	80 - 120	<10	mg/L	4.1 (3)	20
8847643	Total Dissolved Solids	2017/12/01	99	80 - 120	109	80 - 120	<10	mg/L	5.6 (3)	20
8847726	Nitrate plus Nitrite (N)	2017/11/29	95 (1)	80 - 120	92	80 - 120	<0.10	mg/L	NC (2)	25
8847728	Nitrite (N)	2017/11/29	99 (1)	80 - 120	96	80 - 120	<0.10	mg/L	NC (2)	20
8848342	Total Ammonia (N)	2017/11/30	112	80 - 120	99	80 - 120	<0.020	mg/L	5.0 (3)	20
8848637	Total Sulphide	2017/12/01			89	80 - 120	<0.0019	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) Matrix Spike Parent ID [SO6397-01]

(2) Duplicate Parent ID [SO6397-01]

(3) Duplicate Parent ID

(4) Duplicate Parent ID [SO6394-01]

(5) Matrix Spike Parent ID [SO6395-01]

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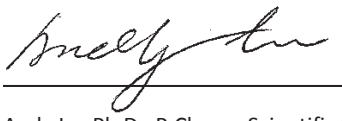
Maxxam Job #: B7A5901
Report Date: 2017/12/04

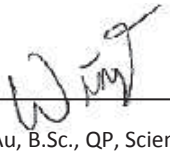
GHD Limited
Client Project #: 088877
Site Location: UPLAND LANDFILL 7295 GOLD RIVER HIGHWAY
Your P.O. #: 73506780
Sampler Initials: CR

VALIDATION SIGNATURE PAGE

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



Andy Lu, Ph.D., P.Chem., Scientific Specialist



Winnie Au, B.Sc., QP, Scientific Specialist

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

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Maxxam Analytics International Corporation o/a Maxxam Analytics
4606 Canada Way, Burnaby, British Columbia Canada V5G 1K5 Tel:(604) 734 7276 Toll-free 800-563-6266 Fax:(604) 731 2386 www.maxxam.ca

B7A5901_COC

Page 1 of 1

Use Only

Bottle Order #: 541990

Chain Of Custody Record: C#541990-01-01

Project Manager: Nahed Amer

INVOICE TO:		Report Information		Project Information	
Company Name	#163 GHD Limited	Company Name		Quotation #	B61466
Contact Name	Airesse MacPhee	Contact Name		P.O. #	73506780
Address	651 COLBY DRIVE WATERLOO ON N2V 1C2	Address		Project #	088877
				Project Name	
Phone	(519) 884-0510 x Fax: (519) 725-1394 x	Phone	Fax:	Site #	
Email	airesse.macphee@ghd.com; NationalEDDSupport@ma	Email		Sampled By	C.RAGAN/T.DICKENS

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

Special Instructions:

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

ANALYSIS REQUESTED (PLEASE BE SPECIFIC)

Turnaround Time (TAT) Required:

Please provide advance notice for rush projects

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

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

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Metals Field Filtered ? (Y / N)	Alkalinity	Conductivity	pH	Total Dissolved Solids	Ammonia-N	Low Level Sulphide (H2S)	High-Level Anions (NO2, NO3, SO4, Cl, PO4)	CSR Dissolved Metals in Water with CV Hg, Diss. Hardness	# of Bottles	Comments
1		WG-88877-27117-CR-01	Nov 27 2017	11:00	W	Y	X	X	X	X	X	X	X	X	6	
2		-02		12:30												
3		-03		13:00												
4		-04		13:05												
5		-05		13:30												
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?
C.RAGAN	17/11/27	17:15	ALDEAN ANCANOU	17/11/29	08:30	NA	[ ]	3,2,3	NA [ ] Yes [ ] No

* UNLESS OTHERWISE AGREED TO IN WRITING, WORK SUBMITTED ON THIS CHAIN OF CUSTODY IS SUBJECT TO MAXXAM'S STANDARD TERMS AND CONDITIONS. SIGNING OF THIS CHAIN OF CUSTODY DOCUMENT IS ACKNOWLEDGMENT AND ACCEPTANCE OF OUR TERMS WHICH ARE AVAILABLE FOR VIEWING AT WWW.MAXXAM.CA/TERMS.
* 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: Maxxam Yellow: Client

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Success Through Science®

Your P.O. #: 73506780-1
Your Project #: 088877
Your C.O.C. #: 542120-01-01

Attention:Airesse MacPhee

GHD Limited
651 COLBY DRIVE
WATERLOO, ON
CANADA N2V 1C2

Report Date: 2017/12/07
Report #: R2488242
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B7A6368
Received: 2017/11/30, 08:40

Sample Matrix: Water
Samples Received: 2

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity - Water	2	2017/12/01	2017/12/01	BBY6SOP-00026	SM 22 2320 B m
Biochemical Oxygen Demand	2	2017/11/30	2017/12/05	BBY6SOP-00045	SM 22 5210 B m
BTEX/MTBE LH, VH, F1 SIM/MS	2	N/A	2017/12/05	BBY8SOP-00010/11/12	BC Lab Manual 2017 m
Chloride by Automated Colourimetry	2	N/A	2017/12/01	BBY6SOP-00011	SM 22 4500-Cl- E m
COD by Colorimeter	2	2017/11/30	2017/12/01	BBY6SOP-00024	SM 22 5220 D m
Conductance - water	2	2017/12/01	2017/12/01	BBY6SOP-00026	SM 22 2510 B m
Sulphide (as H2S) (1)	2	N/A	2017/12/01	AB WI-00065	Auto Calc
Hardness Total (calculated as CaCO3) (2)	2	N/A	2017/12/05	BBY WI-00033	Auto Calc
Hardness (calculated as CaCO3)	2	N/A	2017/12/06	BBY WI-00033	Auto Calc
Mercury (Dissolved) by CVAF	2	N/A	2017/12/05	BBY7SOP-00015	BCMOE BCLM Oct2013 m
Mercury (Total) by CVAF	2	2017/12/05	2017/12/05	BBY7SOP-00015	BCMOE BCLM Oct2013 m
Na, K, Ca, Mg, S by CRC ICPMS (diss.)	2	N/A	2017/12/06	BBY7SOP-00002	EPA 6020B R2 m
Elements by CRC ICPMS (dissolved)	2	N/A	2017/12/05	BBY7SOP-00002	EPA 6020B R2 m
Na, K, Ca, Mg, S by CRC ICPMS (total)	2	2017/11/30	2017/12/05	BBY7SOP-00002	EPA 6020B R2 m
Elements by CRC ICPMS (total)	2	2017/12/02	2017/12/05	BBY7SOP-00003,	BCLM2005,EPA6020bR2m
Ammonia-N (Preserved)	2	N/A	2017/12/01	BBY6SOP-00009	EPA 350.1 m
Nitrate + Nitrite (N) (highlevel)	2	N/A	2017/11/30	BBY6SOP-00010	SM 22 4500-NO3- I m
Nitrite (N) by CFA (highlevel)	2	N/A	2017/11/30	BBY6SOP-00010	SM 22 4500-NO3- I m
Nitrogen - Nitrate (as N)	2	N/A	2017/12/01	BBY WI-00033	Auto Calc
PAH in Water by GC/MS (SIM)	2	2017/12/05	2017/12/06	BBY8SOP-00021	EPA 8270d R5 m
Total LMW, HMW, Total PAH Calc	2	N/A	2017/12/07	BBY WI-00033	Auto Calc
Filter and HNO3 Preserve for Metals	2	N/A	2017/11/30	BBY7 WI-00004	BCMOE Reqs 08/14
pH Water (3)	2	2017/12/01	2017/12/01	BBY6SOP-00026	SM 22 4500-H+ B m
Total Sulphide (1)	2	N/A	2017/12/01	AB SOP-00080	SM 22 4500 S2-A D F
Sulphate by Automated Colourimetry	2	N/A	2017/12/01	BBY6SOP-00017	SM 22 4500-SO42- E m
Total Dissolved Solids (Filt. Residue)	2	2017/12/04	2017/12/05	BBY6SOP-00033	SM 22 2540 C m
Total Suspended Solids	2	2017/11/30	2017/12/01	BBY6SOP-00034	SM 22 2540 D
Volatile HC-BTEX	2	N/A	2017/12/06	BBY WI-00033	Auto Calc

Remarks:

Maxxam Analytics' laboratories are accredited to ISO/IEC 17025:2005 for specific parameters on scopes of accreditation. Unless otherwise noted,

Maxxam Analytics International Corporation o/a Maxxam Analytics Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

Your P.O. #: 73506780-1
Your Project #: 088877
Your C.O.C. #: 542120-01-01

Attention:Airesse MacPhee

GHD Limited
651 COLBY DRIVE
WATERLOO, ON
CANADA N2V 1C2

Report Date: 2017/12/07
Report #: R2488242
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B7A6368
Received: 2017/11/30, 08:40

procedures used by Maxxam are based upon recognized Provincial, Federal or US method compendia such as CCME, MDDELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Maxxam's profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Maxxam 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.

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

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.
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 Maxxam 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) The BC-MOE and APHA Standard Method require pH to be analysed within 15 minutes of sampling and therefore field analysis is required for compliance. All Laboratory pH analyses in this report are reported past the BC-MOE/APHA Standard Method holding time.

Encryption Key [redacted]
Dan Woolger
Project Manager
07 Dec 2017 16:54:38

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

==========

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Maxxam Job #: B7A6368
Report Date: 2017/12/07

GHD Limited
Client Project #: 088877
Your P.O. #: 73506780-1
Sampler Initials: CR

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		SO9098		SO9099	SO9099		
Sampling Date		2017/11/27 14:30		2017/11/27 15:00	2017/11/27 15:00		
COC Number		542120-01-01		542120-01-01	542120-01-01		
	UNITS	WL-88877-271117-CR-01	RDL	WL-88877-271117-CR-02	WL-88877-271117-CR-02 Lab-Dup	RDL	QC Batch
Calculated Parameters							
Filter and HNO3 Preservation	N/A	LAB	N/A	LAB	N/A	N/A	8847787
Sulphide (as H2S)	mg/L	0.12	0.0020	<0.0020	N/A	0.0020	8847664
Demand Parameters							
Biochemical Oxygen Demand	mg/L	67.6	6.0	56.4	N/A	6.0	8847790
Chemical Oxygen Demand	mg/L	219	10	182	N/A	10	8847633
Misc. Inorganics							
Alkalinity (Total as CaCO3)	mg/L	150	1.0	65.0	N/A	1.0	8849715
Alkalinity (PP as CaCO3)	mg/L	<1.0	1.0	<1.0	N/A	1.0	8849715
Bicarbonate (HCO3)	mg/L	182	1.0	79.2	N/A	1.0	8849715
Carbonate (CO3)	mg/L	<1.0	1.0	<1.0	N/A	1.0	8849715
Hydroxide (OH)	mg/L	<1.0	1.0	<1.0	N/A	1.0	8849715
Anions							
Total Sulphide	mg/L	0.11	0.0019	<0.0019	<0.0019	0.0019	8849043
Nutrients							
Total Ammonia (N)	mg/L	<0.020	0.020	0.18	N/A	0.020	8849717
Physical Properties							
Conductivity	uS/cm	429	2.0	354	N/A	2.0	8849712
pH	pH	7.86	N/A	7.46	N/A	N/A	8849711
Physical Properties							
Total Suspended Solids	mg/L	20.5	4.0	187 (1)	N/A	11	8848274
Total Dissolved Solids	mg/L	306	10	194	N/A	10	8851169

RDL = Reportable Detection Limit
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable
(1) RDL raised due to high concentration of solids in the sample.

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Maxxam Job #: B7A6368
Report Date: 2017/12/07

GHD Limited
Client Project #: 088877
Your P.O. #: 73506780-1
Sampler Initials: CR

HIGH LEVEL ANIONS PACKAGE (WATER)

Maxxam ID		SO9098	SO9099		
Sampling Date		2017/11/27 14:30	2017/11/27 15:00		
COC Number		542120-01-01	542120-01-01		
	UNITS	WL-88877-271117-CR-01	WL-88877-271117-CR-02	RDL	QC Batch
ANIONS					
Nitrite (N)	mg/L	<0.10	<0.10	0.10	8849024
Calculated Parameters					
Nitrate (N)	mg/L	<0.10	<0.10	0.10	8847380
Anions					
Dissolved Sulphate (SO4)	mg/L	51.5	50.1	1.0	8849716
Dissolved Chloride (Cl)	mg/L	8.0	35	1.0	8849713
Nutrients					
Nitrate plus Nitrite (N)	mg/L	<0.10	<0.10	0.10	8849023
RDL = Reportable Detection Limit					

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Maxxam Job #: B7A6368
Report Date: 2017/12/07

GHD Limited
Client Project #: 088877
Your P.O. #: 73506780-1
Sampler Initials: CR

CSR BTEX/VPH IN WATER (WATER)

Maxxam ID		SO9098	SO9099		
Sampling Date		2017/11/27 14:30	2017/11/27 15:00		
COC Number		542120-01-01	542120-01-01		
	UNITS	WL-88877-271117-CR-01	WL-88877-271117-CR-02	RDL	QC Batch
Volatiles					
VPH (VHW6 to 10 - BTEX)	ug/L	<300	<300	300	8847460
Methyl-tert-butylether (MTBE)	ug/L	<4.0	<4.0	4.0	8852182
Benzene	ug/L	<0.40	<0.40	0.40	8852182
Toluene	ug/L	0.65	<0.40	0.40	8852182
Ethylbenzene	ug/L	0.42	<0.40	0.40	8852182
m & p-Xylene	ug/L	0.79	<0.40	0.40	8852182
o-Xylene	ug/L	0.69	<0.40	0.40	8852182
Styrene	ug/L	<0.40	<0.40	0.40	8852182
Xylenes (Total)	ug/L	1.5	<0.40	0.40	8852182
VH C6-C10	ug/L	<300	<300	300	8852182
Surrogate Recovery (%)					
1,4-Difluorobenzene (sur.)	%	106	110	N/A	8852182
4-Bromofluorobenzene (sur.)	%	107	104	N/A	8852182
D4-1,2-Dichloroethane (sur.)	%	102	109	N/A	8852182

RDL = Reportable Detection Limit
N/A = Not Applicable

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Maxxam Job #: B7A6368
Report Date: 2017/12/07

GHD Limited
Client Project #: 088877
Your P.O. #: 73506780-1
Sampler Initials: CR

CSR DISSOLVED METALS IN WATER WITH CV HG (WATER)

Maxxam ID		SO9098	SO9099		
Sampling Date		2017/11/27 14:30	2017/11/27 15:00		
COC Number		542120-01-01	542120-01-01		
	UNITS	WL-88877-271117-CR-01	WL-88877-271117-CR-02	RDL	QC Batch
Misc. Inorganics					
Dissolved Hardness (CaCO3)	mg/L	192	84.9	0.50	8847273
Elements					
Dissolved Mercury (Hg)	ug/L	<0.010	<0.010	0.010	8852353
Dissolved Metals by ICPMS					
Dissolved Aluminum (Al)	ug/L	75.7	9.9	3.0	8849009
Dissolved Antimony (Sb)	ug/L	<0.50	<0.50	0.50	8849009
Dissolved Arsenic (As)	ug/L	2.49	0.23	0.10	8849009
Dissolved Barium (Ba)	ug/L	12.4	17.1	1.0	8849009
Dissolved Beryllium (Be)	ug/L	<0.10	<0.10	0.10	8849009
Dissolved Bismuth (Bi)	ug/L	<1.0	<1.0	1.0	8849009
Dissolved Boron (B)	ug/L	<50	60	50	8849009
Dissolved Cadmium (Cd)	ug/L	0.093	0.074	0.010	8849009
Dissolved Chromium (Cr)	ug/L	1.1	<1.0	1.0	8849009
Dissolved Cobalt (Co)	ug/L	3.35	43.5	0.20	8849009
Dissolved Copper (Cu)	ug/L	3.47	1.77	0.20	8849009
Dissolved Iron (Fe)	ug/L	1910	1290	5.0	8849009
Dissolved Lead (Pb)	ug/L	0.37	<0.20	0.20	8849009
Dissolved Lithium (Li)	ug/L	<2.0	<2.0	2.0	8849009
Dissolved Manganese (Mn)	ug/L	1480	5930	1.0	8849009
Dissolved Molybdenum (Mo)	ug/L	1.7	<1.0	1.0	8849009
Dissolved Nickel (Ni)	ug/L	3.7	7.2	1.0	8849009
Dissolved Selenium (Se)	ug/L	0.24	<0.10	0.10	8849009
Dissolved Silicon (Si)	ug/L	6240	5440	100	8849009
Dissolved Silver (Ag)	ug/L	<0.020	<0.020	0.020	8849009
Dissolved Strontium (Sr)	ug/L	174	104	1.0	8849009
Dissolved Thallium (Tl)	ug/L	<0.010	0.035	0.010	8849009
Dissolved Tin (Sn)	ug/L	<5.0	<5.0	5.0	8849009
Dissolved Titanium (Ti)	ug/L	<5.0	<5.0	5.0	8849009
Dissolved Uranium (U)	ug/L	0.30	<0.10	0.10	8849009
Dissolved Vanadium (V)	ug/L	<5.0	<5.0	5.0	8849009
Dissolved Zinc (Zn)	ug/L	58.9	25.2	5.0	8849009
Dissolved Zirconium (Zr)	ug/L	0.37	<0.10	0.10	8849009
RDL = Reportable Detection Limit					

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Report Date: 2017/12/07

GHD Limited
Client Project #: 088877
Your P.O. #: 73506780-1
Sampler Initials: CR

CSR DISSOLVED METALS IN WATER WITH CV HG (WATER)

Maxxam ID		SO9098	SO9099		
Sampling Date		2017/11/27 14:30	2017/11/27 15:00		
COC Number		542120-01-01	542120-01-01		
	UNITS	WL-88877-271117-CR-01	WL-88877-271117-CR-02	RDL	QC Batch
Dissolved Calcium (Ca)	mg/L	60.9	21.7	0.050	8847274
Dissolved Magnesium (Mg)	mg/L	9.63	7.46	0.050	8847274
Dissolved Potassium (K)	mg/L	2.20	4.41	0.050	8847274
Dissolved Sodium (Na)	mg/L	13.3	27.1	0.050	8847274
Dissolved Sulphur (S)	mg/L	20.3	17.9	3.0	8847274
RDL = Reportable Detection Limit					

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GHD Limited
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CSR TOTAL METALS IN WATER WITH CV HG (WATER)

Maxxam ID		SO9098	SO9099		
Sampling Date		2017/11/27 14:30	2017/11/27 15:00		
COC Number		542120-01-01	542120-01-01		
	UNITS	WL-88877-271117-CR-01	WL-88877-271117-CR-02	RDL	QC Batch
Calculated Parameters					
Total Hardness (CaCO3)	mg/L	202	85.1	0.50	8847272
Elements					
Total Mercury (Hg)	ug/L	<0.010	<0.010	0.010	8852162
Total Metals by ICPMS					
Total Aluminum (Al)	ug/L	1740	540	3.0	8849932
Total Antimony (Sb)	ug/L	<0.50	<0.50	0.50	8849932
Total Arsenic (As)	ug/L	4.78	1.12	0.10	8849932
Total Barium (Ba)	ug/L	17.9	20.9	1.0	8849932
Total Beryllium (Be)	ug/L	<0.10	<0.10	0.10	8849932
Total Bismuth (Bi)	ug/L	<1.0	<1.0	1.0	8849932
Total Boron (B)	ug/L	<50	57	50	8849932
Total Cadmium (Cd)	ug/L	1.31	0.106	0.010	8849932
Total Chromium (Cr)	ug/L	3.2	<1.0	1.0	8849932
Total Cobalt (Co)	ug/L	4.39	48.1	0.20	8849932
Total Copper (Cu)	ug/L	22.8	3.37	0.50	8849932
Total Iron (Fe)	ug/L	5430	15000	10	8849932
Total Lead (Pb)	ug/L	1.36	0.61	0.20	8849932
Total Lithium (Li)	ug/L	<2.0	<2.0	2.0	8849932
Total Manganese (Mn)	ug/L	1460	6250	1.0	8849932
Total Molybdenum (Mo)	ug/L	1.9	<1.0	1.0	8849932
Total Nickel (Ni)	ug/L	5.4	8.5	1.0	8849932
Total Selenium (Se)	ug/L	0.35	0.13	0.10	8849932
Total Silicon (Si)	ug/L	8370	5880	100	8849932
Total Silver (Ag)	ug/L	0.035	<0.020	0.020	8849932
Total Strontium (Sr)	ug/L	183	108	1.0	8849932
Total Thallium (Tl)	ug/L	0.030	0.035	0.010	8849932
Total Tin (Sn)	ug/L	<5.0	<5.0	5.0	8849932
Total Titanium (Ti)	ug/L	110	47.6	5.0	8849932
Total Uranium (U)	ug/L	0.33	<0.10	0.10	8849932
Total Vanadium (V)	ug/L	9.6	<5.0	5.0	8849932
Total Zinc (Zn)	ug/L	262	34.1	5.0	8849932
Total Zirconium (Zr)	ug/L	0.55	0.37	0.10	8849932
RDL = Reportable Detection Limit					

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CSR TOTAL METALS IN WATER WITH CV HG (WATER)

Maxxam ID		SO9098	SO9099		
Sampling Date		2017/11/27 14:30	2017/11/27 15:00		
COC Number		542120-01-01	542120-01-01		
	UNITS	WL-88877-271117-CR-01	WL-88877-271117-CR-02	RDL	QC Batch
Total Calcium (Ca)	mg/L	63.8	21.2	0.050	8847275
Total Magnesium (Mg)	mg/L	10.3	7.84	0.050	8847275
Total Potassium (K)	mg/L	2.36	4.34	0.050	8847275
Total Sodium (Na)	mg/L	13.5	28.3	0.050	8847275
Total Sulphur (S)	mg/L	22.1	19.5	3.0	8847275
RDL = Reportable Detection Limit					

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CSR PAH IN WATER BY GC-MS (WATER)

Maxxam ID		SO9098		SO9099		
Sampling Date		2017/11/27 14:30		2017/11/27 15:00		
COC Number		542120-01-01		542120-01-01		
	UNITS	WL-88877-271117-CR-01	RDL	WL-88877-271117-CR-02	RDL	QC Batch
Polycyclic Aromatics						
Low Molecular Weight PAH`s	ug/L	670	0.50	<0.10	0.10	8847458
High Molecular Weight PAH`s	ug/L	38	0.10	0.062	0.050	8847458
Total PAH	ug/L	710	0.50	<0.10	0.10	8847458
Quinoline	ug/L	63 (1)	0.10	<0.020	0.020	8852518
Naphthalene	ug/L	320 (1)	0.50	<0.10	0.10	8852518
1-Methylnaphthalene	ug/L	86 (1)	0.25	<0.050	0.050	8852518
2-Methylnaphthalene	ug/L	110 (1)	0.50	<0.10	0.10	8852518
Acenaphthylene	ug/L	1.4	0.050	<0.050	0.050	8852518
Acenaphthene	ug/L	76 (1)	0.25	<0.050	0.050	8852518
Fluorene	ug/L	37 (1)	0.25	<0.050	0.050	8852518
Phenanthrene	ug/L	58 (1)	0.25	<0.050	0.050	8852518
Anthracene	ug/L	7.4	0.010	<0.010	0.010	8852518
Acridine	ug/L	3.8	0.050	<0.050	0.050	8852518
Fluoranthene	ug/L	16 (1)	0.10	0.028	0.020	8852518
Pyrene	ug/L	15 (1)	0.10	0.028	0.020	8852518
Benzo(a)anthracene	ug/L	2.1	0.010	<0.010	0.010	8852518
Chrysene	ug/L	2.9	0.020	<0.020	0.020	8852518
Benzo(b&j)fluoranthene	ug/L	1.2	0.030	<0.030	0.030	8852518
Benzo(k)fluoranthene	ug/L	0.46	0.050	<0.050	0.050	8852518
Benzo(a)pyrene	ug/L	0.78	0.0050	0.0054	0.0050	8852518
Indeno(1,2,3-cd)pyrene	ug/L	0.12	0.050	<0.050	0.050	8852518
Dibenz(a,h)anthracene	ug/L	0.041	0.0030	<0.0030	0.0030	8852518
Benzo(g,h,i)perylene	ug/L	0.12	0.050	<0.050	0.050	8852518
Surrogate Recovery (%)						
D10-ANTHRACENE (sur.)	%	89	N/A	91	N/A	8852518
D8-ACENAPHTHYLENE (sur.)	%	104	N/A	102	N/A	8852518
D8-NAPHTHALENE (sur.)	%	75	N/A	93	N/A	8852518
TERPHENYL-D14 (sur.)	%	75	N/A	79	N/A	8852518

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

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GENERAL COMMENTS

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

Matrix Spike Elements by CRC ICPMS (total): RDL raised due to concentration over linear range, sample dilution required

Results relate only to the items tested.

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QUALITY ASSURANCE REPORT

GHD Limited
Client Project #: 088877
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Sampler Initials: CR

			Matrix Spike		Spiked Blank		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
8852182	1,4-Difluorobenzene (sur.)	2017/12/05	104	70 - 130	99	70 - 130	103	%		
8852182	4-Bromofluorobenzene (sur.)	2017/12/05	99	70 - 130	103	70 - 130	106	%		
8852182	D4-1,2-Dichloroethane (sur.)	2017/12/05	102	70 - 130	93	70 - 130	96	%		
8852518	D10-ANTHRACENE (sur.)	2017/12/05	107	50 - 140	90	50 - 140	96	%		
8852518	D8-ACENAPHTHYLENE (sur.)	2017/12/05	112	50 - 140	100	50 - 140	102	%		
8852518	D8-NAPHTHALENE (sur.)	2017/12/05	103	50 - 140	90	50 - 140	94	%		
8852518	TERPHENYL-D14 (sur.)	2017/12/05	89	50 - 140	78	50 - 140	79	%		
8847633	Chemical Oxygen Demand	2017/12/01	NC	80 - 120	99	80 - 120	<10	mg/L	0.0097 (1)	20
8847790	Biochemical Oxygen Demand	2017/12/05			97	85 - 115	<6.0	mg/L	1.2 (1)	20
8848274	Total Suspended Solids	2017/12/01	103	80 - 120	98	80 - 120	<4.0	mg/L	3.1 (1)	20
8849009	Dissolved Aluminum (Al)	2017/12/05	114	80 - 120	115	80 - 120	<3.0	ug/L	NC (1)	20
8849009	Dissolved Antimony (Sb)	2017/12/05	104	80 - 120	98	80 - 120	<0.50	ug/L	NC (1)	20
8849009	Dissolved Arsenic (As)	2017/12/05	110	80 - 120	101	80 - 120	<0.10	ug/L	13 (1)	20
8849009	Dissolved Barium (Ba)	2017/12/05	NC	80 - 120	103	80 - 120	<1.0	ug/L	3.0 (1)	20
8849009	Dissolved Beryllium (Be)	2017/12/05	111	80 - 120	105	80 - 120	<0.10	ug/L	NC (1)	20
8849009	Dissolved Bismuth (Bi)	2017/12/05	91	80 - 120	101	80 - 120	<1.0	ug/L	NC (1)	20
8849009	Dissolved Boron (B)	2017/12/05	NC	80 - 120	108	80 - 120	<50	ug/L	1.5 (1)	20
8849009	Dissolved Cadmium (Cd)	2017/12/05	102	80 - 120	98	80 - 120	<0.010	ug/L	NC (1)	20
8849009	Dissolved Chromium (Cr)	2017/12/05	93	80 - 120	100	80 - 120	<1.0	ug/L	NC (1)	20
8849009	Dissolved Cobalt (Co)	2017/12/05	93	80 - 120	100	80 - 120	<0.20	ug/L	NC (1)	20
8849009	Dissolved Copper (Cu)	2017/12/05	87	80 - 120	97	80 - 120	<0.20	ug/L	NC (1)	20
8849009	Dissolved Iron (Fe)	2017/12/05	NC	80 - 120	106	80 - 120	<5.0	ug/L	0.25 (1)	20
8849009	Dissolved Lead (Pb)	2017/12/05	91	80 - 120	99	80 - 120	<0.20	ug/L	NC (1)	20
8849009	Dissolved Lithium (Li)	2017/12/05	95	80 - 120	97	80 - 120	<2.0	ug/L	NC (1)	20
8849009	Dissolved Manganese (Mn)	2017/12/05	NC	80 - 120	100	80 - 120	<1.0	ug/L	0.15 (1)	20
8849009	Dissolved Molybdenum (Mo)	2017/12/05	NC	80 - 120	97	80 - 120	<1.0	ug/L	NC (1)	20
8849009	Dissolved Nickel (Ni)	2017/12/05	89	80 - 120	99	80 - 120	<1.0	ug/L	NC (1)	20
8849009	Dissolved Selenium (Se)	2017/12/05	112	80 - 120	96	80 - 120	<0.10	ug/L	NC (1)	20
8849009	Dissolved Silicon (Si)	2017/12/05					<100	ug/L	0.21 (1)	20
8849009	Dissolved Silver (Ag)	2017/12/05	101	80 - 120	107	80 - 120	<0.020	ug/L	NC (1)	20

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QUALITY ASSURANCE REPORT(CONT'D)

GHD Limited
Client Project #: 088877
Your P.O. #: 73506780-1
Sampler Initials: CR

			Matrix Spike		Spiked Blank		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
8849009	Dissolved Strontium (Sr)	2017/12/05	NC	80 - 120	95	80 - 120	<1.0	ug/L	0.48 (1)	20
8849009	Dissolved Thallium (Tl)	2017/12/05	93	80 - 120	101	80 - 120	<0.010	ug/L	NC (1)	20
8849009	Dissolved Tin (Sn)	2017/12/05	90	80 - 120	96	80 - 120	<5.0	ug/L	NC (1)	20
8849009	Dissolved Titanium (Ti)	2017/12/05	97	80 - 120	98	80 - 120	<5.0	ug/L	NC (1)	20
8849009	Dissolved Uranium (U)	2017/12/05	99	80 - 120	100	80 - 120	<0.10	ug/L	NC (1)	20
8849009	Dissolved Vanadium (V)	2017/12/05	96	80 - 120	99	80 - 120	<5.0	ug/L	NC (1)	20
8849009	Dissolved Zinc (Zn)	2017/12/05	120	80 - 120	100	80 - 120	<5.0	ug/L	NC (1)	20
8849009	Dissolved Zirconium (Zr)	2017/12/05	101	80 - 120	99	80 - 120	<0.10	ug/L	NC (1)	20
8849023	Nitrate plus Nitrite (N)	2017/11/30			105	80 - 120	<0.10	mg/L		
8849024	Nitrite (N)	2017/11/30			104	80 - 120	<0.10	mg/L		
8849043	Total Sulphide	2017/12/01			111	80 - 120	<0.0019	mg/L	NC (2)	20
8849711	pH	2017/12/02			102	97 - 103			0 (1)	20
8849712	Conductivity	2017/12/02			100	80 - 120	<2.0	uS/cm	0.51 (1)	20
8849713	Dissolved Chloride (Cl)	2017/12/01			103	80 - 120	<1.0	mg/L	0.96 (1)	20
8849715	Alkalinity (PP as CaCO3)	2017/12/02					<1.0	mg/L	0.61 (1)	20
8849715	Alkalinity (Total as CaCO3)	2017/12/02			100	80 - 120	<1.0	mg/L	1.3 (1)	20
8849715	Bicarbonate (HCO3)	2017/12/02					<1.0	mg/L	NC (1)	20
8849715	Carbonate (CO3)	2017/12/02					<1.0	mg/L	4.6 (1)	20
8849715	Hydroxide (OH)	2017/12/02					<1.0	mg/L	0.52 (1)	20
8849716	Dissolved Sulphate (SO4)	2017/12/01			99	80 - 120	<1.0	mg/L		
8849717	Total Ammonia (N)	2017/12/01	NC	80 - 120	110	80 - 120	<0.020	mg/L	1.6 (1)	20
8849932	Total Aluminum (Al)	2017/12/05	115	80 - 120	106	80 - 120	<3.0	ug/L		
8849932	Total Antimony (Sb)	2017/12/05	97	80 - 120	97	80 - 120	<0.50	ug/L		
8849932	Total Arsenic (As)	2017/12/05	117	80 - 120	100	80 - 120	<0.10	ug/L		
8849932	Total Barium (Ba)	2017/12/05	NC	80 - 120	98	80 - 120	<1.0	ug/L		
8849932	Total Beryllium (Be)	2017/12/05	104	80 - 120	99	80 - 120	<0.10	ug/L		
8849932	Total Bismuth (Bi)	2017/12/05	88	80 - 120	103	80 - 120	<1.0	ug/L		
8849932	Total Boron (B)	2017/12/05	NC	80 - 120	96	80 - 120	<50	ug/L		
8849932	Total Cadmium (Cd)	2017/12/05	98	80 - 120	98	80 - 120	<0.010	ug/L		
8849932	Total Chromium (Cr)	2017/12/05	101	80 - 120	102	80 - 120	<1.0	ug/L		

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QUALITY ASSURANCE REPORT(CONT'D)

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			Matrix Spike		Spiked Blank		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
8849932	Total Cobalt (Co)	2017/12/05	96	80 - 120	103	80 - 120	<0.20	ug/L		
8849932	Total Copper (Cu)	2017/12/05	91	80 - 120	101	80 - 120	<0.50	ug/L		
8849932	Total Iron (Fe)	2017/12/05	113	80 - 120	109	80 - 120	<10	ug/L		
8849932	Total Lead (Pb)	2017/12/05	92	80 - 120	98	80 - 120	<0.20	ug/L		
8849932	Total Lithium (Li)	2017/12/05	NC	80 - 120	95	80 - 120	<2.0	ug/L		
8849932	Total Manganese (Mn)	2017/12/05	90	80 - 120	99	80 - 120	<1.0	ug/L		
8849932	Total Molybdenum (Mo)	2017/12/05	125 (3)	80 - 120	97	80 - 120	<1.0	ug/L		
8849932	Total Nickel (Ni)	2017/12/05	NC	80 - 120	101	80 - 120	<1.0	ug/L		
8849932	Total Selenium (Se)	2017/12/05	NC	80 - 120	100	80 - 120	<0.10	ug/L		
8849932	Total Silicon (Si)	2017/12/05					<100	ug/L		
8849932	Total Silver (Ag)	2017/12/05	93	80 - 120	107	80 - 120	<0.020	ug/L		
8849932	Total Strontium (Sr)	2017/12/05	NC	80 - 120	93	80 - 120	<1.0	ug/L		
8849932	Total Thallium (Tl)	2017/12/05	101	80 - 120	100	80 - 120	<0.010	ug/L		
8849932	Total Tin (Sn)	2017/12/05	NC	80 - 120	98	80 - 120	<5.0	ug/L		
8849932	Total Titanium (Ti)	2017/12/05	101	80 - 120	107	80 - 120	<5.0	ug/L		
8849932	Total Uranium (U)	2017/12/05	NC	80 - 120	99	80 - 120	<0.10	ug/L		
8849932	Total Vanadium (V)	2017/12/05	105	80 - 120	99	80 - 120	<5.0	ug/L		
8849932	Total Zinc (Zn)	2017/12/05	NC	80 - 120	93	80 - 120	<5.0	ug/L		
8849932	Total Zirconium (Zr)	2017/12/05	89	80 - 120	95	80 - 120	<0.10	ug/L		
8851169	Total Dissolved Solids	2017/12/05	99	80 - 120	97	80 - 120	<10	mg/L	NC (1)	20
8852162	Total Mercury (Hg)	2017/12/05	97	80 - 120	99	80 - 120	<0.010	ug/L	NC (1)	20
8852182	Benzene	2017/12/05	109	70 - 130	99	70 - 130	<0.40	ug/L	NC (1)	30
8852182	Ethylbenzene	2017/12/05	97	70 - 130	100	70 - 130	<0.40	ug/L	NC (1)	30
8852182	m & p-Xylene	2017/12/05	90	70 - 130	94	70 - 130	<0.40	ug/L	NC (1)	30
8852182	Methyl-tert-butylether (MTBE)	2017/12/05	110	70 - 130	97	70 - 130	<4.0	ug/L	NC (1)	30
8852182	o-Xylene	2017/12/05	94	70 - 130	97	70 - 130	<0.40	ug/L	NC (1)	30
8852182	Styrene	2017/12/05	97	70 - 130	98	70 - 130	<0.40	ug/L	NC (1)	30
8852182	Toluene	2017/12/05	97	70 - 130	94	70 - 130	<0.40	ug/L	NC (1)	30
8852182	VH C6-C10	2017/12/05			100	70 - 130	<300	ug/L	NC (1)	30
8852182	Xylenes (Total)	2017/12/05					<0.40	ug/L	NC (1)	30

Maxxam Analytics International Corporation o/a Maxxam Analytics Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

Maxxam Job #: B7A6368
Report Date: 2017/12/07

QUALITY ASSURANCE REPORT(CONT'D)

GHD Limited
Client Project #: 088877
Your P.O. #: 73506780-1
Sampler Initials: CR

			Matrix Spike		Spiked Blank		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
8852353	Dissolved Mercury (Hg)	2017/12/05	93	80 - 120	95	80 - 120	<0.010	ug/L		
8852518	1-Methylnaphthalene	2017/12/05	101	50 - 140	83	50 - 140	<0.050	ug/L		
8852518	2-Methylnaphthalene	2017/12/06	103	50 - 140	85	50 - 140	<0.10	ug/L	NC (1)	40
8852518	Acenaphthene	2017/12/06	106	50 - 140	90	50 - 140	<0.050	ug/L	NC (1)	40
8852518	Acenaphthylene	2017/12/06	107	50 - 140	90	50 - 140	<0.050	ug/L	NC (1)	40
8852518	Acridine	2017/12/06	104	50 - 140	99	50 - 140	<0.050	ug/L	NC (1)	40
8852518	Anthracene	2017/12/06	107	50 - 140	91	50 - 140	<0.010	ug/L	NC (1)	40
8852518	Benzo(a)anthracene	2017/12/06	100	50 - 140	84	50 - 140	<0.010	ug/L	NC (1)	40
8852518	Benzo(a)pyrene	2017/12/06	101	50 - 140	87	50 - 140	<0.0050	ug/L	NC (1)	40
8852518	Benzo(b&j)fluoranthene	2017/12/06	102	50 - 140	86	50 - 140	<0.030	ug/L	NC (1)	40
8852518	Benzo(g,h,i)perylene	2017/12/06	97	50 - 140	83	50 - 140	<0.050	ug/L	NC (1)	40
8852518	Benzo(k)fluoranthene	2017/12/06	102	50 - 140	87	50 - 140	<0.050	ug/L	NC (1)	40
8852518	Chrysene	2017/12/06	100	50 - 140	84	50 - 140	<0.020	ug/L	NC (1)	40
8852518	Dibenz(a,h)anthracene	2017/12/06	100	50 - 140	85	50 - 140	<0.0030	ug/L	NC (1)	40
8852518	Fluoranthene	2017/12/06	102	50 - 140	85	50 - 140	<0.020	ug/L	NC (1)	40
8852518	Fluorene	2017/12/06	104	50 - 140	88	50 - 140	<0.050	ug/L	NC (1)	40
8852518	Indeno(1,2,3-cd)pyrene	2017/12/06	98	50 - 140	83	50 - 140	<0.050	ug/L	NC (1)	40
8852518	Naphthalene	2017/12/06	105	50 - 140	86	50 - 140	<0.10	ug/L	NC (1)	40
8852518	Phenanthrene	2017/12/06	104	50 - 140	86	50 - 140	<0.050	ug/L	NC (1)	40
8852518	Pyrene	2017/12/06	106	50 - 140	88	50 - 140	<0.020	ug/L	NC (1)	40

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Maxxam Job #: B7A6368
Report Date: 2017/12/07

QUALITY ASSURANCE REPORT(CONT'D)

GHD Limited
Client Project #: 088877
Your P.O. #: 73506780-1
Sampler Initials: CR

			Matrix Spike		Spiked Blank		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
8852518	Quinoline	2017/12/06	117	50 - 140	113	50 - 140	<0.020	ug/L	NC (1)	40

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) Duplicate Parent ID [SO9099-11]

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

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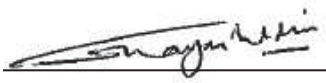
Maxxam Job #: B7A6368
Report Date: 2017/12/07

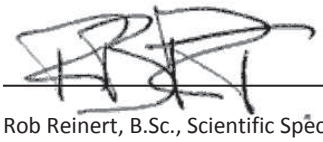
GHD Limited
Client Project #: 088877
Your P.O. #: 73506780-1
Sampler Initials: CR

VALIDATION SIGNATURE PAGE

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



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



Rob Reinert, B.Sc., Scientific Specialist

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

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Maxxam Analytics International Corporation o/a Maxxam Analytics
4606 Canada Way, Burnaby, British Columbia Canada V5G 1K5 Tel:(604) 734 7276 Toll-free:800-563-6266 Fax:(604) 731 2386 www.maxxam.ca

B7A6368_COC

Bottle Order #: 542120

Project Manager: Nahed Amer

C#542120-01-01

INVOICE TO:		Report Information		Project Information	
Company Name	#163 GHD Limited	Company Name		Quotation #	B61466
Contact Name	Airesse MacPhee	Contact Name		P.O. #	73506780
Address	651 COLBY DRIVE WATERLOO ON N2V 1C2	Address		Project #	088877
				Project Name	
Phone	(519) 884-0510 x Fax: (519) 725-1394 x	Phone	Fax:	Site #	
Email	airesse.macphee@ghd.com; NationalEDDSupport@ma	Email		Sampled By	C.RAGAN/T. DICKENS

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

Special Instructions

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

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Metals Field Filtered ? (Y / N)	Alkalinity, TDS	Conductivity	pH	Total Suspended Solids	Ammonia-N	Low Level Sulphide (H2S)	CSR TOTAL METALS & HARD IN WATER + Hg	High-Level Anions (NO2,NO3,SO4,CL)	PAH	CSR Diss. Metals + Hg + Hardness	# of Bottles	Comments
1		WL-88877-271117-GR-01	Nov 27 2017	14:30	W	N	X	X	X	X	X	X	X	X	X	X	12	Diss. Metals +Hg → Preservative rinsed out. NOT field filtered.
2		WL-88877-271117-GR-02	Nov 27 2017	15:00	W		X	X	X	X	X	X	X	X	X	X	12.	Diss. Metals +Hg → Field filtered + preserved.
3																		
4																		
5																		
6																		
7																		
8																		
9																		
10																		

Turnaround Time (TAT) Required:

Please provide advance notice for rush projects

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

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

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	* RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted	Lab Use Only: Time Sensitive	Temperature (°C) on Receipt	Custody Seal Intact on Cooler?
C.RAGAN	17/11/29	11:00		17/11/29	10:45		☐	4, 3, 4	N/A ☐ Yes ☐ No
	17/11/29	15:00	ANDREW MACKINNON	17/11/30	08:40				

* UNLESS OTHERWISE AGREED TO IN WRITING, WORK SUBMITTED ON THIS CHAIN OF CUSTODY IS SUBJECT TO MAXXAM'S STANDARD TERMS AND CONDITIONS. SIGNING OF THIS CHAIN OF CUSTODY DOCUMENT IS ACKNOWLEDGMENT AND ACCEPTANCE OF OUR TERMS WHICH ARE AVAILABLE FOR VIEWING AT WWW.MAXXAM.CA/TERMS.

* 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: Maxxam Yellow: Client

2, 4, 3
1, 1, 3 / 2, 3, 2
100 → 103

Maxxam Analytics International Corporation o/a Maxxam Analytics
#8606 Canada Way, Burnaby, British Columbia Canada V5G 1K5 Tel (604) 734 7276 Toll-free 800-563-6266 Fax (604) 731 2386 www.maxxam.ca

Chain Of Custody Record

Page 1 of 1

INVOICE TO:		Report Information		Project Information		Laboratory Use Only	
Company Name	#163 GHD Limited	Company Name		Quotation #	B61468	Maxxam Job #	Bottle Order #:
Contact Name	Airesse MacPhee	Contact Name		P.O. #	73506760		542120
Address	651 COLBY DRIVE WATERLOO ON N2V 1C2	Address		Project #	088877	Chain Of Custody Record	Project Manager
Phone	(519) 884-0510 x Fax (519) 725-1394 x	Phone	Fax	Project Name		C#542120-01-01	Nahed Amer
Email	airesse.macphee@ghd.com; NationalEDDSupport@ma	Email		Site #			
				Sampled By	C.RAGAN/T. DICKENS		

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

Special Instructions

Turnaround Time (TAT) Required:

Please provide advance notice for rush projects

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

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

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

ANALYSIS REQUESTED (PLEASE BE SPECIFIC)

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Metals Field Filtered? (Y/N)	Alkalinity, TDS	Conductivity	pH	Total Suspended Solids	Ammonia-N	Low Level Sulphide (H2S)	CSR TOTAL METALS & DISS. HARD IN WATER +Hg TOTAL	High-Level Anions (NO2,NO3,SO4,Cl)	PAH	CSR Diss. Metals+Hg + Hardness	# of Bottles	Comments
1	WL-88877-271117-CR-01		Nov 27 2017	14:30	W	N	X	X	X	X	X	X	X	X	X	X	12	Diss. metals +Hg → Reservative rinsed out. NOT field filtered.
2	WL-88877-271117-CR-02		Nov 27 2017	15:00	W		X	X	X	X	X	X	X	X	X	X	12.	Diss. metals +Hg → Field filtered + preserved.
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?
C.RAGAN	17/11/29	11:00	Michael Wunsch	17/11/29	10:45		☐	4, 3, 4	☐ Yes ☐ No
Michael Wunsch	17/11/29	15:00						6, 4, 3	

* UNLESS OTHERWISE AGREED TO IN WRITING, WORK SUBMITTED ON THIS CHAIN OF CUSTODY IS SUBJECT TO MAXXAM'S STANDARD TERMS AND CONDITIONS. SIGNING OF THIS CHAIN OF CUSTODY DOCUMENT IS ACKNOWLEDGMENT AND ACCEPTANCE OF OUR TERMS WHICH ARE AVAILABLE FOR VIEWING AT WWW.MAXXAM.CA/TERMS.

* 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: Maxxam Yellow: Client

Maxxam Analytics International Corporation o/a Maxxam Analytics

Attachment B
Data Quality Assessment and Validation

Memorandum

January 5, 2018

To:	Cassandra Ragan, Shauna Sturgeon, Thomas Elliott	Ref. No.:	088877
From:	Airesse MacPhee/al/5		604-248-3661

Subject: Data Quality Assessment and Validation

Laboratory:	Maxxam Analytics International Corporation	Date(s) Sampled:	April 6-7, 2017
Lab Job No.:	B726014		
Sampled By:	James Stewart		
Media Sampled:	Groundwater		

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 exceedance:

Lab Report #	Sample Date (mm/dd/yyyy)	Sample ID	Analyte	Result	Qualifier	Units
B726014	04/06/2017	WG-88877-060417-JS-01	pH	7.93	J	s.u.
B726014	04/06/2017	WG-88877-060417-JS-04	pH	7.83	J	s.u.
B726014	04/07/2017	WG-88877-070417-JS-09	pH	7.78	J	s.u.
B726014	04/07/2017	WG-88877-070417-JS-10	pH	7.50	J	s.u.

Notes:
J - Estimated concentration
s.u. - Standard pH Units

Memorandum

December 19, 2017

To:	Cassandra Ragan, Shauna Sturgeon	Ref. No.:	088877
From:	Airesse MacPhee/al/4		

Subject: **Data Quality Assessment and Validation**

Laboratory:	Maxxam Analytics International Corporation	Date(s) Sampled:	November 27, 2017
Lab Job No.:	B7A5901, B7A6368		
Sampled By:	Cassandra Ragan		
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 exceedance:

Lab Report #	Sample Date (mm/dd/yyyy)	Sample ID	Analyte	Result	Qualifier	Units
B7A5901	11/27/2017	WG-88877-271117-CR-01	pH	7.97	J	s.u.
B7A5901	11/27/2017	WG-88877-271117-CR-02	pH	7.67	J	s.u.
B7A5901	11/27/2017	WG-88877-271117-CR-03	pH	7.83	J	s.u.
B7A5901	11/27/2017	WG-88877-271117-CR-04	pH	7.87	J	s.u.
B7A5901	11/27/2017	WG-88877-271117-CR-05	pH	7.85	J	s.u.
B7A6368	11/27/2017	WL-88877-271117-CR-01	pH	7.86	J	s.u.
B7A6368	11/27/2017	WL-88877-271117-CR-02	pH	7.46	J	s.u.

Notes:

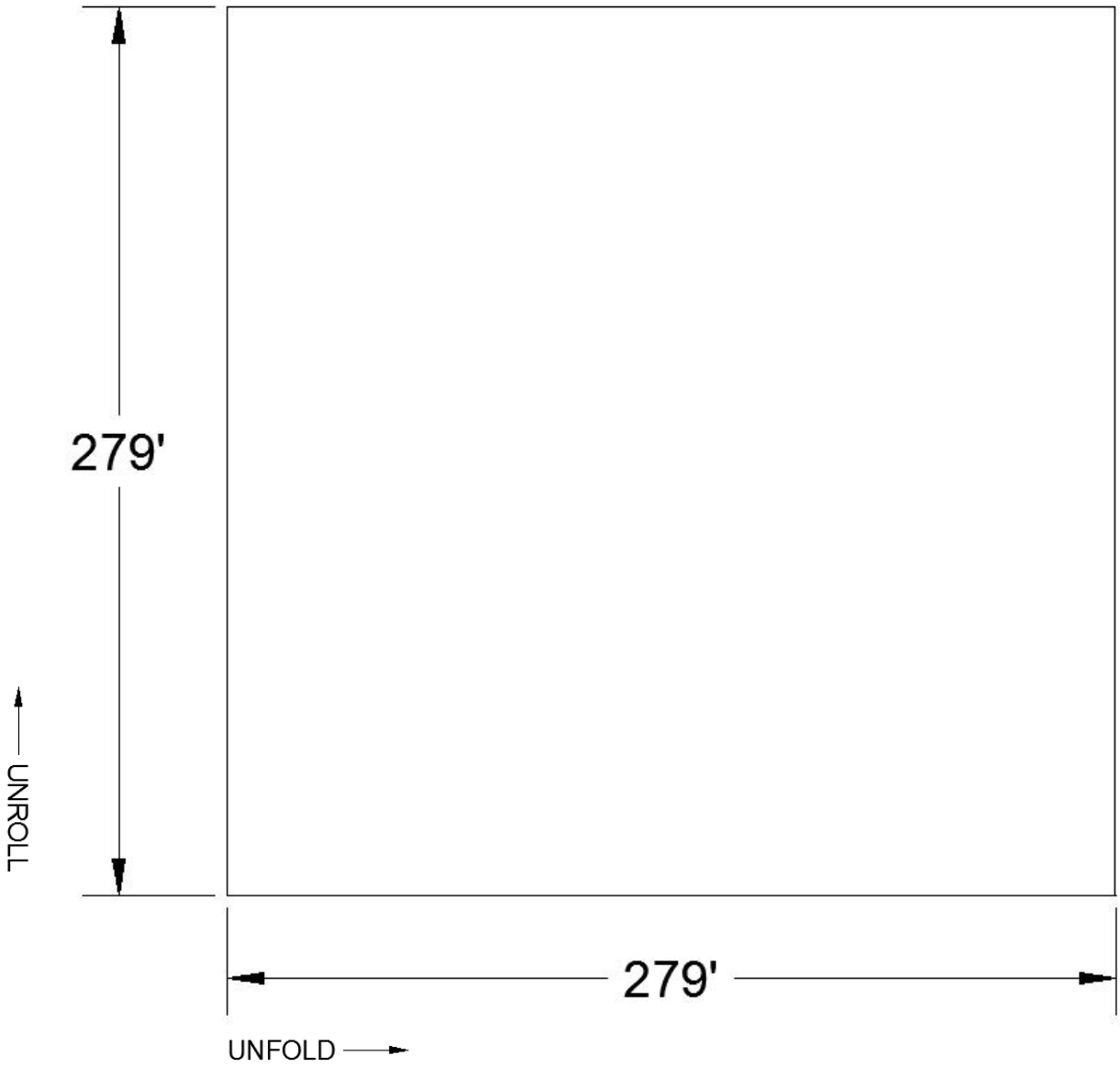
J - Estimated concentration
s.u. - Standard pH Units

Attachment B
QAQC Liner Documentation

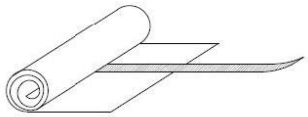
WESTERN TANK & LINING LTD.

Uplands Contracting
Liner #1

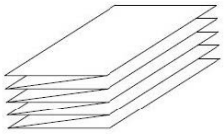
279' x 279' Standard Fan Folded
20mil Coated Woven Polyethylene



STANDARD ROLL WITH WEBBING
INCLUDE 2" WEBBING WITH 10' SLACK ON END
TO ASSIST WITH UNROLLING. (RUNS ENTIRE LENGTH OF LINER)



STANDARD FAN FOLD



VANCOUVER: **7192 Vantage Way, Delta, BC V4G 1K7 T: 604-241-9487 F: 604-241-9485**
CALGARY: **105 Stockton Pt., Okotoks, AB T1S 1A5 T: 403-938-4361 F: 403-938-4371**

1-800-551-4355

WTL Liner and F.S. Quality Control Audit

Inspector	NATHAN	Crew	PAUL	Date	6/12/2015

Work Order #	L15-042412	Size / Style	Length	Width	Style
			279	279	LINER

Customer Name: **Uplands Contracting**

Width Calculator (enter for size ordered) Sizes are expressed in Decimal feet

Liner Length (feet)	Liner width (Feet)	Roll Width (Inches)	Weld Width (Inches)	Calculated Panels Needed	Even Panel no. (rounded up)	Total Width of Even Panels (Feet)	Material Size removed from Even Panel count	Number of Cut Welds	Total Width Calculated
279	279	72	2	47.82857	49	286		13	281.6667

1st panel length verification	281' NA	Actual Finished Length	279	Actual Finished Width	281.667

Stepped Panel lengths: NA

Step inset: NA

Secondary measurements (Material added for cut welds, or other material that was removed and replaced)

13 CUT WELDS ADDED EXTRA PANEL TO GET 281.667 WIDTH

Special Instructions

Material: 20MIL LGB Color Out: BLACK

Rolling		Folding	
Standard Roll		Standard Fan	X
Standard Roll with Webbing	X	Butterfly Fold	
Scroll Rolled center mark W/Webbing		Fan Fold to center 2" web markers	

Core Type Used: Metal X Cardboard Other

(Standard = mil, size, unroll and unfold arrow)

Standard Information Written on Item: X Other:

refer to E.I.C for standards

Packaging Wrap/ Color : Standard Liner: X Other:

refer to E.I.C for standards

Standard Package Labeling: X Other:

Packaging Approved By: NATHAN

Notes: Liner #1

Tensile Test Report

Date: 6/12/2015 Time of Day: 5:07 PM

Work Order # L15-042412 Crew: PAUL

Customer: Uplands Contracting Size / Style: Length 279 Width 279 Style LINER

Unless otherwise noted, tensiometer speeds are set at 12 inches per minute *Size expressed in decimal feet*

Welder	JUAN C.			Liner #	1		
QA	NATHAN						
Welder#	D-2	Test #					
Temp.	840	1	Warp	Weft	Weft	Weld	
Speed	999	1	211		133	132	
Mil	20	2	192		191	117	
Color	LG/B	3	208		164	145	
Roll#	14	total	611		488	394	
Loom#	NA	avg.	203.667		162.667	131.333	
PO#	14L-0721						
MFG. Date	1/21/2015	Weft avg used:		162.67		Fail Code	
Manf.	HC	Weld Percent:		81%		SE1	

Welder	JUAN C.			Liner #	1		
QA	NATHAN						
Welder#	D-2	Test #					
Temp.	840	2	Warp	Weft	Weft	Weld	
Speed	999	1			138	151	
Mil	20	2			174	168	
Color	LG/B	3			166	167	
Roll#	14	total			478	486	
Loom#	NA	avg.			159.333	162	
PO#	14L-0721						
MFG. Date	1/21/2015	Weft avg used:		159.33		Fail Code	
Manf.	HC	Weld Percent:		102%		SE1	

Welder	JUAN C.			Liner #	1		
QA	NATHAN						
Welder#	D-2	Test #					
Temp.	840	3	Warp	Weft	Weft	Weld	
Speed	999	1			136	138	
Mil	20	2			151	141	
Color	LG/B	3			147	151	
Roll#	14	total			434	430	
Loom#	NA	avg.			144.667	143.333	
PO#	14L-0721						
MFG. Date	1/21/2015	Weft avg used:		144.67		Fail Code	
Manf.	HC	Weld Percent:		99%		SE1	

Welder	JUAN C.			Liner #	1		
QA	NATHAN						
Welder#	D-2	Test #					
Temp.	840	4	Warp	Weft	Weft	Weld	
Speed	999	1			153	149	
Mil	20	2			153	175	
Color	LG/B	3			213	156	
Roll#	12	total			519	480	
Loom#	NA	avg.			173	160	
PO#	14L-0721						
MFG. Date	1/21/2015	Weft avg used:		173		Fail Code	
Manf.	HC	Weld Percent:		92%		SE1	

NOTES:

Tensile Test Report

Date: 6/12/2015 Time of Day: 10:00 PM

Work Order # L15-042412 Crew: PAUL

Customer: Uplands Contracting Size / Style: Length 279 Width 279 Style LINER

Unless otherwise noted, tensiometer speeds are set at 12 inches per minute *Size expressed in decimal feet*

Welder	JUAN C.			Liner #	1		
QA	NATHAN						
Welder#	D-2	Test #					
Temp.	840	5	Warp	Weft	Weft	Weld	
Speed	999	1			154	139	
Mil	20	2			159	146	
Color	LG/B	3			167	143	
Roll#	12	total			480	428	
Loom#	NA	avg.			160	142.667	
PO#	14L-0721						
MFG. Date	1/21/2015	Weft avg used:		160		Fail Code	
Manf.	HC	Weld Percent:		89%		SE1	

Welder	JUAN C.			Liner #			
QA	NATHAN						
Welder#	D-2	Test #					
Temp.	840	6	Warp	Weft	Weft	Weld	
Speed	999	1			175	134	
Mil	20	2			166	147	
Color	LG/B	3			118	164	
Roll#	12	total			459	445	
Loom#	NA	avg.			153	148.333	
PO#	14L-0721						
MFG. Date	1/21/2015	Weft avg used:		153		Fail Code	
Manf.	HC	Weld Percent:		97%		SE1	

Welder	JUAN C.			Liner #	1		
QA	NATHAN						
Welder#	D-2	Test #					
Temp.	840	7	Warp	Weft	Weft	Weld	
Speed	999	1			148	152	
Mil	20	2			178	151	
Color	LG/B	3			189	160	
Roll#	13	total			515	463	
Loom#	NA	avg.			171.667	154.333	
PO#	14L-0721						
MFG. Date	1/21/2015	Weft avg used:		171.67		Fail Code	
Manf.	HC	Weld Percent:		90%		SE1	

Welder	JUAN C.			Liner #	1		
QA	NATHAN						
Welder#	D-2	Test #					
Temp.	840	8	Warp	Weft	Weft	Weld	
Speed	999	1			186	150	
Mil	20	2			187	157	
Color	LG/B	3			185	148	
Roll#	13	total			558	455	
Loom#	NA	avg.			186	151.667	
PO#	14L-0721						
MFG. Date	1/21/2015	Weft avg used:		186		Fail Code	
Manf.	HC	Weld Percent:		82%		SE1	

NOTES:

Tensile Test Report

Date: 6/12/2015 Time of Day: 12:19 AM

Work Order # L15-042412 Crew: PAUL

Customer: Uplands Contracting Size / Style: Length 279 Width 279 Style LINER

Unless otherwise noted, tensiometer speeds are set at 12 inches per minute

Size expressed in decimal feet

Welder	JUAN C.			Liner #	1		
QA	NATHAN						
Welder#	D-2	Test #					
Temp.	840	9	Warp	Weft	Weft	Weld	
Speed	999	1			209	154	
Mil	20	2			145	143	
Color	LG/B	3			164	158	
Roll#	13	total			518	455	
Loom#	NA	avg.			172.667	151.667	
PO#	14L-0721						
MFG. Date	1/21/2015	Weft avg used:		172.67		Fail Code	
Manf.	HC	Weld Percent:		88%		SE1	

Welder	JUAN C.			Liner #	1		
QA	NATHAN						
Welder#	D-2	Test #					
Temp.	840	10	Warp	Weft	Weft	Weld	
Speed	999	1			121	131	
Mil	20	2			154	144	
Color	LG/B	3			147	144	
Roll#	12	total			422	419	
Loom#	16	avg.			140.667	139.667	
PO#	14L-0721						
MFG. Date	1/21/2015	Weft avg used:		140.67		Fail Code	
Manf.	HC	Weld Percent:		99%		SE1	

Welder	JUAN C.			Liner #	1		
QA	NATHAN						
Welder#	D-2	Test #					
Temp.	840	11	Warp	Weft	Weft	Weld	
Speed	999	1			177	166	
Mil	20	2			148	154	
Color	LG/B	3			136	137	
Roll#	12	total			461	457	
Loom#	16	avg.			153.667	152.333	
PO#	14L-0721						
MFG. Date	1/21/2015	Weft avg used:		153.67		Fail Code	
Manf.	HC	Weld Percent:		99%		SE1	

Welder	JUAN C.			Liner #	1		
QA	NATHAN						
Welder#	D-2	Test #					
Temp.	840	12	Warp	Weft	Weft	Weld	
Speed	999	1			137	132	
Mil	20	2			168	132	
Color	LG/B	3			177	138	
Roll#	12	total			482	402	
Loom#	16	avg.			160.667	134	
PO#	14L-0721						
MFG. Date	1/21/2015	Weft avg used:		160.67		Fail Code	
Manf.	HC	Weld Percent:		83%		SE1	

NOTES:

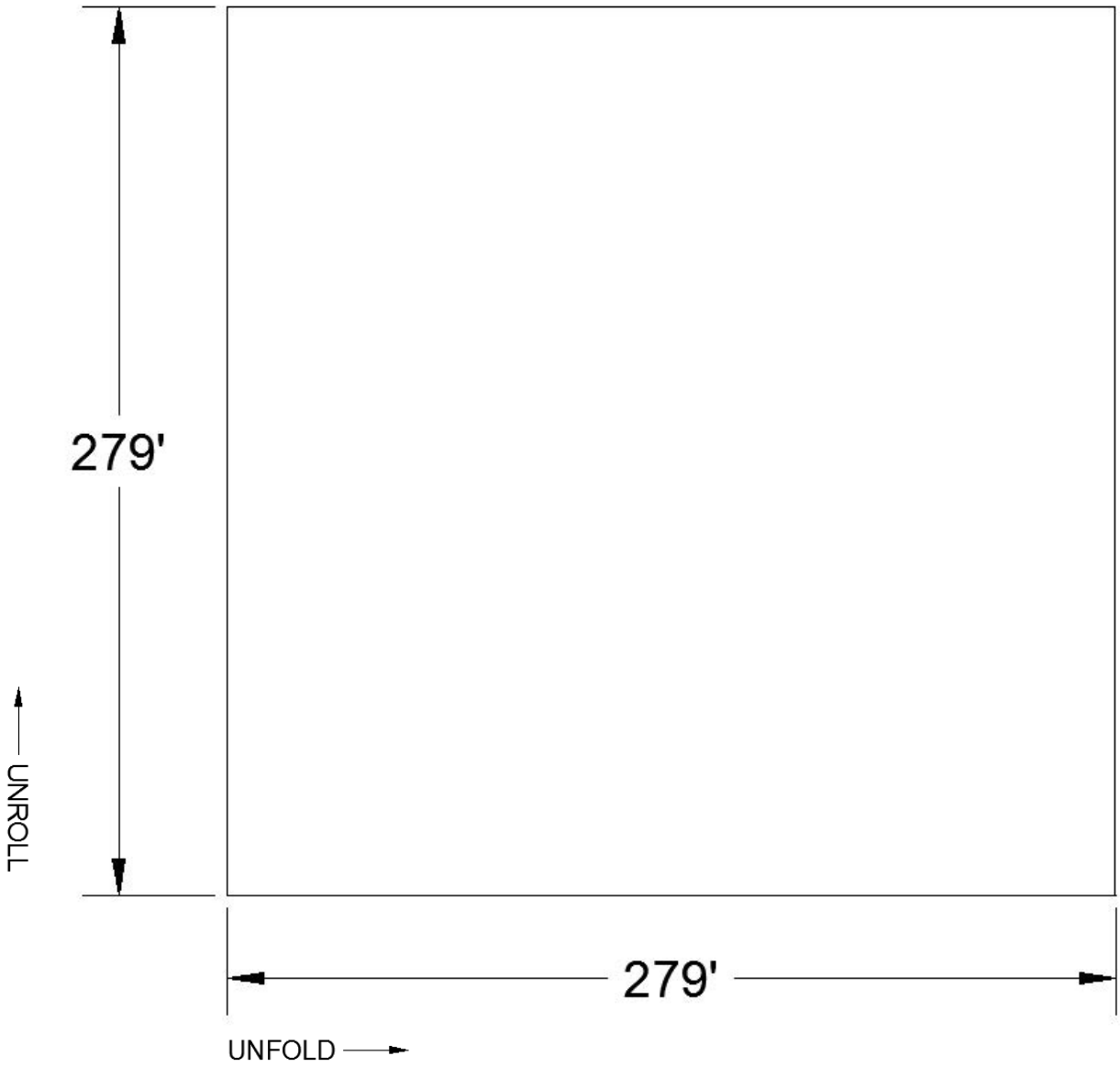
ASTM D 1777 option 1 MATERIAL THICKNESS

Test Date	Mil	Color	Type	Manf. Manf. Date	Roll #	Loom #	Lot # or PO#	Sample area	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	Avg.	QA
06/12/15	20	LGB	CW	01/21/15	14	NA	14L-0721	B	21.7	22.5	22.5	23.2	24.5	20.4	22.6	22.1	24.9	22.5	22.69	DEANNA
06/12/15	20	LGB	CW	01/21/15	12	N/A	14L-0721	B	23.1	25	23.4	24.4	24.1	23.2	24	24.4	23.6	24.2	23.94	NATHAN
06/12/15	20	LGB	CW	01/21/15	13	N/A	14L-0721	B	23.7	23.2	24.5	23.6	22.6	24.1	22	23.5	25.3	23.3	23.58	NATHAN
06/12/15	20	LGB	CW	01/21/15	12	16	14L-0721	B	23	22.8	20.5	22.3	22.7	22.3	22.3	25.3	20.7	24	22.59	NATHAN
06/13/15	20	LGB	CW	01/21/15	17	NA	14L-0721	B	24.7	25.2	24.9	22.7	24.8	24.7	23.3	25	24.1	24.9	24.43	DEANNA
06/13/15	20	LGB	CW	NA	NA	NA	NA	B	23.2	24.2	27	22.4	26.3	23.3	24.7	23.5	22.6	21.1	23.83	DEANNA
06/13/15	20	LGB	CW	01/21/15	2	NA	14L-0721	B	23.8	25.7	24	23.6	23.9	23.4	23.9	25.9	23.5	23	24.07	DEANNA
06/13/15	20	LGB	CW	01/21/15	2	NA	14L-0721	S	21.8	24	21.8	22.7	23.1	22.7	22.6	24	23.5	20.1	22.63	DEANNA

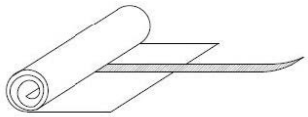
WESTERN TANK & LINING LTD.

Uplands Contracting
Liner #2

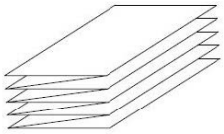
279' x 279' Standard Fan Folded
20mil Coated Woven Polyethylene



STANDARD ROLL WITH WEBBING
INCLUDE 2" WEBBING WITH 10' SLACK ON END
TO ASSIST WITH UNROLLING. (RUNS ENTIRE LENGTH OF LINER)



STANDARD FAN FOLD



VANCOUVER: **7192 Vantage Way, Delta, BC V4G 1K7 T: 604-241-9487 F: 604-241-9485**
CALGARY: **105 Stockton Pt., Okotoks, AB T1S 1A5 T: 403-938-4361 F: 403-938-4371**

1-800-551-4355

WTL Liner and F.S. Quality Control Audit

Inspector	DEANNA	Crew	PAUL	Date	6/13/2015

Work Order #	L15-042412	Size / Style	Length	Width	Style
			279	279	LINER

Customer Name: **Uplands Contracting**

Width Calculator (enter for size ordered) Sizes are expressed in Decimal feet

Liner Length (feet)	Liner width (Feet)	Roll Width (Inches)	Weld Width (Inches)	Calculated Panels Needed	Even Panel no. (rounded up)	Total Width of Even Panels (Feet)	Material Size removed from Even Panel count	Number of Cut Welds	Total Width Calculated
279	279	72	2	47.82857	48	280.16667			280.1667

1st panel length verification	279'	Actual Finished Length	279	Actual Finished Width	278.833

Stepped Panel lengths: NA

Step inset: NA

Secondary measurements (Material added for cut welds, or other material that was removed and replaced)

4 CUT WELDS

Special Instructions: NONE

Material: 20MIL LGB Color Out: Black

Rolling		Folding	
Standard Roll		Standard Fan	X
Standard Roll with Webbing	X	Butterfly Fold	
Scroll Rolled center mark W/Webbing		Fan Fold to center 2" web markers	

Core Type Used: Metal X Cardboard Other

(Standard = mil, size, unroll and unfold arrow)

Standard Information Written on Item: X Other:

refer to E.I.C for standards

Packaging Wrap/ Color : Standard Liner: X Other:

refer to E.I.C for standards

Standard Package Labeling: X Other:

Packaging Approved By: Deanna

Notes: Liner #2

Tensile Test Report

Date: 6/13/2015 | Time of Day: 4PM

Work Order # L15-042412 | Crew: PAUL

Customer: Uplands Contracting | Size / Style: Length 279, Width 279, Style LINER

Unless otherwise noted, tensiometer speeds are set at 12 inches per minute

Size expressed in decimal feet

Welder	FREDDY			Liner #	2	
QA	DEANNA	6/13/2015 4PM				
Welder#	D2	Test #				
Temp.	840	1	Warp	Weft	Weft	Weld
Speed	999	1	222		123	111
Mil	20	2	208		159	133
Color	LGB	3	218		120	122
Roll#	17	total	648		402	366
Loom#	NA	avg.	216		134	122
PO#	14L-0721					
MFG. Date	1/21/2015	Weft avg used:		134		*Fail Code*
Manf.	HC	Weld Percent:		91%		SE1

Welder	FREDDY			Liner #	2	
QA	DEANNA					
Welder#	D2	Test #				
Temp.	840	2	Warp	Weft	Weft	Weld
Speed	999	1			130	130
Mil	20	2			126	121
Color	LGB	3			163	130
Roll#	17	total			419	381
Loom#	NA	avg.			139.667	127
PO#	14L-0721					
MFG. Date	1/21/2015	Weft avg used:		139.67		*Fail Code*
Manf.	HC	Weld Percent:		91%		SE1

Welder	FREDDY			Liner #	2	
QA	DEANNA					
Welder#	D2	Test #				
Temp.	840	3	Warp	Weft	Weft	Weld
Speed	999	1			166	145
Mil	20	2			125	155
Color	LGB	3			111	130
Roll#	17	total			402	430
Loom#	NA	avg.			134	143.333
PO#	14L-0721					
MFG. Date	1/21/2015	Weft avg used:		134		*Fail Code*
Manf.	HC	Weld Percent:		107%		SE1

Welder	FREDDY			Liner #	2	
QA	DEANNA					
Welder#	D2	Test #				
Temp.	840	4	Warp	Weft	Weft	Weld
Speed	999	1			174	144
Mil	20	2			161	154
Color	LGB	3			190	147
Roll#	17	total			525	445
Loom#	NA	avg.			175	148.333
PO#	14L-0721					
MFG. Date	1/21/2015	Weft avg used:		175		*Fail Code*
Manf.	HC	Weld Percent:		85%		SE1

NOTES:

Tensile Test Report

Date: 6/13/2015 | Time of Day: 6PM

Work Order # L15-042412 | Crew: PAUL

Customer: Uplands Contracting | Size / Style: Length 279, Width 279, Style LINER

Unless otherwise noted, tensiometer speeds are set at 12 inches per minute

Size expressed in decimal feet

Welder	FREDDY			Liner #	2		
QA	DEANNA						
Welder#	D2	Test #					
Temp.	840	5	Warp	Weft	Weft	Weld	
Speed	999	1			200	131	
Mil	20	2			165	136	
Color	LGB	3			141	149	
Roll#	17	total			506	416	
Loom#	NA	avg.			168.667	138.667	
PO#	14L-0721						
MFG. Date	1/21/2015	Weft avg used:		168.67		Fail Code	
Manf.	HC	Weld Percent:		82%		SE1	

Welder	FREDDY			Liner #	2		
QA	DEANNA						
Welder#	D2	Test #					
Temp.	840	6	Warp	Weft	Weft	Weld	
Speed	999	1			154	150	
Mil	20	2			160	140	
Color	LGB	3			156	156	
Roll#	NA	total			470	446	
Loom#	NA	avg.			156.667	148.667	
PO#	NA						
MFG. Date	NA	Weft avg used:		156.67		Fail Code	
Manf.	HC	Weld Percent:		95%		SE1	

Welder	FREDDY			Liner #	2		
QA	DEANNA						
Welder#	D2	Test #					
Temp.	840	7	Warp	Weft	Weft	Weld	
Speed	999	1			185	154	
Mil	20	2			179	152	
Color	LGB	3			162	148	
Roll#	NA	total			526	454	
Loom#	NA	avg.			175.333	151.333	
PO#	NA						
MFG. Date	NA	Weft avg used:		175.33		Fail Code	
Manf.	HC	Weld Percent:		86%		SE1	

Welder	FREDDY			Liner #	2		
QA	DEANNA						
Welder#	D2	Test #					
Temp.	840	8	Warp	Weft	Weft	Weld	
Speed	999	1			173	164	
Mil	20	2			190	151	
Color	LGB	3			156	157	
Roll#	NA	total			519	472	
Loom#	NA	avg.			173	157.333	
PO#	NA						
MFG. Date	NA	Weft avg used:		173		Fail Code	
Manf.	HC	Weld Percent:		91%		SE1	

NOTES:

Tensile Test Report

Date: 6/13/2015 Time of Day: 10PM

Work Order # L15-042412 Crew: PAUL

Customer: Uplands Contracting Size / Style: Length 279 Width 279 Style LINER

Unless otherwise noted, tensiometer speeds are set at 12 inches per minute *Size expressed in decimal feet*

Welder	FREDDY			Liner #	2		
QA	DEANNA						
Welder#	D2	Test #					
Temp.	840	9	Warp	Weft	Weft	Weld	
Speed	999	1			179	115	
Mil	20	2			167	143	
Color	LGB	3			128	125	
Roll#	2	total			474	383	
Loom#	NA	avg.			158	127.667	
PO#	14L-0721						
MFG. Date	1/21/2015	Weft avg used:		158		Fail Code	
Manf.	HC	Weld Percent:		81%		SE1	

Welder	FREDDY			Liner #	2		
QA	DEANNA						
Welder#	D2	Test #					
Temp.	840	10	Warp	Weft	Weft	Weld	
Speed	999	1			153	112	
Mil	20	2			134	121	
Color	LGB	3			159	127	
Roll#	2	total			446	360	
Loom#	NA	avg.			148.667	120	
PO#	14L-0721						
MFG. Date	1/21/2015	Weft avg used:		148.67		Fail Code	
Manf.	HC	Weld Percent:		81%		SE1	

Welder	FREDDY			Liner #	2		
QA	DEANNA						
Welder#	D2	Test #					
Temp.	840	11	Warp	Weft	Weft	Weld	
Speed	999	1			171	125	
Mil	20	2			179	143	
Color	LGB	3			153	134	
Roll#	2	total			503	402	
Loom#	NA	avg.			167.667	134	
PO#	14L-0721						
MFG. Date	1/21/2015	Weft avg used:		167.67		Fail Code	
Manf.	HC	Weld Percent:		80%		SE1	

Welder	FREDDY			Liner #	2		
QA	DEANNA						
Welder#	D2	Test #					
Temp.	840	12	Warp	Weft	Weft	Weld	
Speed	999	1			178	164	
Mil	20	2			182	151	
Color	LGB	3			196	143	
Roll#	2	total			556	458	
Loom#	NA	avg.			185.333	152.667	
PO#	14L-0721						
MFG. Date	1/21/2015	Weft avg used:		185.33		Fail Code	
Manf.	HC	Weld Percent:		82%		SE1	

NOTES:

ASTM D 1777 option 1 MATERIAL THICKNESS

Test Date	Mil	Color	Type	Manf. Manf. Date	Roll #	Loom #	Lot # or PO#	Sample area	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	Avg.	QA
06/12/15	20	LGB	CW	01/21/15	14	NA	14L-0721	B	21.7	22.5	22.5	23.2	24.5	20.4	22.6	22.1	24.9	22.5	22.69	DEANNA
06/12/15	20	LGB	CW	01/21/15	12	N/A	14L-0721	B	23.1	25	23.4	24.4	24.1	23.2	24	24.4	23.6	24.2	23.94	NATHAN
06/12/15	20	LGB	CW	01/21/15	13	N/A	14L-0721	B	23.7	23.2	24.5	23.6	22.6	24.1	22	23.5	25.3	23.3	23.58	NATHAN
06/12/15	20	LGB	CW	01/21/15	12	16	14L-0721	B	23	22.8	20.5	22.3	22.7	22.3	22.3	25.3	20.7	24	22.59	NATHAN
06/13/15	20	LGB	CW	01/21/15	17	NA	14L-0721	B	24.7	25.2	24.9	22.7	24.8	24.7	23.3	25	24.1	24.9	24.43	DEANNA
06/13/15	20	LGB	CW	NA	NA	NA	NA	B	23.2	24.2	27	22.4	26.3	23.3	24.7	23.5	22.6	21.1	23.83	DEANNA
06/13/15	20	LGB	CW	01/21/15	2	NA	14L-0721	B	23.8	25.7	24	23.6	23.9	23.4	23.9	25.9	23.5	23	24.07	DEANNA
06/13/15	20	LGB	CW	01/21/15	2	NA	14L-0721	S	21.8	24	21.8	22.7	23.1	22.7	22.6	24	23.5	20.1	22.63	DEANNA

Attachment C
Photolog

Photo 1 - Subgrade Preparation – Looking Northeast - 2015

Photo 2 - Sand Protection Layer – Looking East - 2015

Lined Cell Photographs

Photo 3 - Compaction of Sand Protection Layer – Looking Southeast - 2015

Photo 4 - Top of North Berm During Construction – Looking East- 2015

Photo 5 - Bottom Liner and Leak Detection Layer Installation – Looking South - 2015

Photo 6 - Leak detection layer installation – Looking West - 2015

Photo 7 - Leak Detection Layer Installation – Looking South - 2015

Photo 8 - Liner Installation – Looking Northeast - 2015

Photo 9 - Liner Installation – Looking Southwest - 2015

Photo 10 - Completed Lined Cell with Covered Waste – Looking Southwest - 2015

Photo 11 - Completed Lined Cell with Covered Waste – Looking West - 2015

Photo 12 - Cover Soil Application over Waste Timber – Looking Northwest - 2017

Photo 13 - Cover Soil Application over Waste Timber – Looking North - 2017

Photo 14 - Disposal of Construction and Demolition Waste – Looking Northeast - November 2017

Photo 15 - Graded Intermediate Cover over Lined Cell – Looking East - December 2017