



2017 Operations and Monitoring Report

Campbell River Waste Management Centre
Campbell River, British Columbia

Comox Strathcona Waste Management

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Executive Summary

GHD Limited (GHD) was retained by Comox-Strathcona Waste Management (CSWM), a function of the Comox Valley Regional District (CVRD), to complete the 2017 water quality monitoring and prepare this Annual Operations and Monitoring Report (Annual Report) for the Campbell River Waste Management Centre (Site or CRWMC). The objective of this Annual Report is to summarize the developmental progress and environmental monitoring for the Site during the 2017 calendar year (Reporting Period). The Annual Report contains the information required by Section 10.6 of the Landfill Criteria for Municipal Solid Waste (Landfill Criteria), Section 25.3 of the 2012 Comox-Strathcona Solid Waste Management Plan (SWMP), and Section 3.2 of the Operational Certificate (OC) MR-02401.

The Site is located on Crown Lands within the city limits of Campbell River, British Columbia (BC) at 6700 Argonaut Road approximately 7.5 kilometres (km) west of the city centre. The Site is owned by the CVRD and operated by Berry and Vale under contract with the CVRD. The authorized works include the municipal solid waste landfill and related appurtenances.

Site Operations and Development

During the 2017 calendar year, approximately 25,363 tonnes of waste was landfilled at the Site, resulting in an updated per capita disposal rate estimate of 0.59 tonnes/year. Approximately 2,166 tonnes of clean fill was used as cover, and approximately 2,000 tonnes of waste was diverted from the landfill. At the end of the Reporting Period, approximately 231,874 m³ of airspace remains under the current design.

In 2017, an updated Design, Operations, and Closure Plan (2017 DOCP) for the Site was developed by GHD. As indicated in the 2017 DOCP, the landfill at the Site is scheduled to be closed in 2023, which includes the installation of a landfill gas collection system. At this time landfill gas is not collected at the Site.

On June 15, 2017, the BC Ministry of Environment and Climate Change Strategy (ENV), the CVRD, and GHD attended a meeting to discuss the key points provided in the 2017 DOCP, which included a schedule of the monitoring well network expansion. In this schedule, the two monitoring wells recommended in the 2016 Operations and Monitoring Report were scheduled to be installed in spring/summer 2018.

Construction of the surface water management pond in Block J commenced at the Site in 2017 including land clearing activities.

Environmental Monitoring

Groundwater was observed to flow towards the east across the Site based on water levels measured during the reporting period which is consistent with previous years.

Downward vertical gradients were observed at nested wells EBA04-6 and EBA04-7 in 2017. Vertical gradients at EBA04-6 and EBA04-7 have historically been consistently downward.



Analytical results for groundwater and surface water samples are compared to the BC Contaminated Sites Regulation (CSR) (BC Reg. 375/96 including amendments up to BC Reg. 253/2016, November 1, 2017) Schedule 3.2 Column 3 (Aquatic Life - Freshwater) (FAW) and Schedule 3.2 Column 6 (Drinking Water) (DW).

Surface water analytical results are compared to the British Columbia Approved Water Quality Guidelines: Aquatic Life, Wildlife & Agriculture (BC MOE, 2017), BC Source Drinking Water Quality Guidelines (ENV, 2017), and BC Working Water Quality Guidelines: Aquatic Life, Wildlife & Agriculture (MOE, 2017) (WQG) for drinking water (DW) the protection of freshwater aquatic life (FWAL).

Groundwater quality upgradient of the Site at MW01-16 continues to be similar to AM02-01 and is representative of background groundwater conditions. Groundwater sampling was conducted at 22 groundwater monitoring locations in 2017. Based on the 2017 groundwater analytical results, municipal solid waste (MSW) leachate impacts continue to be present in groundwater samples from the monitoring wells adjacent to and immediately downgradient of the landfill footprint. These wells include HBT94-3, HBT94-1, HBT94-2, EBA04-7, EBA04-6. In general, groundwater quality in the shallower wells adjacent to the landfill footprint were observed to display higher levels of leachate impact as compared to the deeper wells.

From comparison of background groundwater conditions and typical leachate concentrations from literature, alkalinity, ammonia, chloride, conductivity, hardness, iron, and manganese appear to be suitable indicator parameters for detecting MSW leachate impact in groundwater in the vicinity of the Site.

Chloride concentrations in groundwater collected from EBA04-7 were notably higher than historical results during the September and November 2017 monitoring events, however other leachate indicator parameter (e.g. hardness, alkalinity, or manganese) concentrations in groundwater at EBA04-7 are similar to historical results. Chloride concentrations and other leachate indicator parameters at deep nested well EBA04-6 were consistent with historical results. Further monitoring is required to determine if chloride concentrations continue to increase at EBA04-7.

Minimal impacts are observed in shallow downgradient wells: EBA11-1, EBA11-2, AG99-06, and EBA11-4. Downgradient well, EBA04-3, installed deeper in the overburden aquifer shows mild leachate impacts.

Chloride concentrations in groundwater quality at EBA11-3 during the November 2017 monitoring event were significantly higher than historical analytical results at this location. It is noted that other leachate indicator parameters (e.g. alkalinity, iron and manganese) are similar to background levels. Further monitoring is required to determine the source of the increased chloride concentrations in groundwater at this monitoring location.

Leachate impact has historically been observed at shallow well HBT94-5, however this monitoring location has been dry since mid-2000. Minimal leachate impact is apparent in groundwater quality at nearby deep southeast monitoring locations AG99-01, AG99-02, AG99-04, and AG99-05.

Manganese concentrations were above applicable CSR standards in wells located directly southeast of the landfill footprint during one or more sampling event: HBT94-1, HBT94-2, and



HBT94-3. Ammonia concentrations in groundwater samples collected from HBT94-3 were significantly higher than historical ranges during the May 2016 monitoring event with a concentration of 150 mg/L, however ammonia concentrations in 2017 returned to historical ranges for this monitoring location.

Surface water monitoring was conducted at three locations in 2017. SW-1 is located approximately 1,100 m east of the landfill footprint on an ephemeral tributary of Cold Creek, which drains into the Quinsam River. SW-2 is located approximately 750 m northeast of the landfill footprint on a seasonal pond. SW03-17 is located on a pond approximately 1 km east of the landfill footprint, which is located upstream of SW-1. SW03-17 was added to the monitoring program in 2017.

Leachate indicator parameter concentrations observed at all surface water monitoring locations sampled in 2017 were generally low indicating no leachate impacts are apparent at this time.

Parameter concentrations were greater than the applicable WQG at SW-1, SW-2, and SW03-17 during one or more monitoring events in 2017 for total copper, total iron, total manganese, and/or total zinc. These parameters are naturally occurring within surface water (Kangasniemi, 1989).

Dissolved metals analytical results in surface water were generally below the applicable WQG with the exception of dissolved aluminum at SW-1, SW-2, and SW03-17 during one or more monitoring events in 2017. Further monitoring is required to better trend dissolved aluminum concentrations at these surface water monitoring locations as dissolved metals analysis commenced at these locations in 2016.

Recommendations

Based on the findings of the 2017 Annual Operations and Monitoring Report, the following recommendations are made:

- Continue quarterly monitoring of groundwater and surface water quality for general chemistry, nutrients, and metals to identify trends in water quality at the Site.
- Repair the steel casing on AG99-06 so it can be locked securely
- Repair the riser pipes of HBT1-94, HBT2-94, and HBT3-94
- Place intermediate cover over the areas of the landfill that have reached final contours as indicated in the 2017 DOCP
- Continue landfilling in accordance with the phased filling plan as prescribed in the 2017 DOCP until final Landfill closure in 2023.
- Decommission monitoring well EBA04-4 as it appears to be damaged beyond repair.
- Install two (2) shallow monitoring wells east-southeast of the landfill footprint nested with HBT94-5 and AG99-05. These wells will allow for monitoring off-Site within the shallow portion of the overburden aquifer at these locations between the landfill footprint and the surface water tributaries east of the Site. Based on the groundwater monitoring results from these two proposed monitoring locations, further expansion of the monitoring well network may be warranted.



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1. Introduction

GHD was retained by Comox-Strathcona Waste Management (CSWM), a function of the Comox Valley Regional District (CVRD), to complete the 2017 water quality monitoring and prepare this Annual Operations and Monitoring Report (Annual Report) for the Campbell River Waste Management Centre (CRWMC or Site).

1.1 Objectives and Scope

The purpose of this Annual Report is to summarize the Site operations and development activities carried out during the reporting period and to provide and assess the Site environmental monitoring data for the 2017 calendar year (Reporting Period). The Annual Report contains the following information in accordance with Section 10.6 of the Landfill Criteria for Municipal Solid Waste (Landfill Criteria) (BC MOE, 2016), Section 25.3 of the 2012 Comox Strathcona Solid Waste Management Plan (SWMP) (AECOM, 2013), and Section 3.2 of the Site's Operational Certificate (OC) MR-02401 (attached as Appendix A):

- A review of the preceding year of operation, plans for the next year and any new information or proposed changes relating to the facility (Sections 3.2, 3.3, 3.11)
- A summary of the landfill operation equipment (Section 3.1).
- Closure works completed (Section 3.3.2)
- Summary of complaints received and the actions taken as a result of the complaint (Section 3.4)
- Identification of non-compliance items and proposed action plan and schedule to reach compliance (if applicable). (Section 3.5)
- Progress report on efforts to resolve previously identified non-compliance items (if applicable). (Section 3.5)
- Landfill gas quantities collected, flared, and utilized (Section 3.6)
- The tonnage of each type of waste discharged into the landfill or diverted (Section 3.7).
- An updated estimate of the municipal solid waste (MSW) per capita disposal rate (Section 3.7.1).
- A waste area population table including adjusted projected population for the estimated facility life (Section 3.7).
- A survey including volume changes, on required frequency (Section 3.8).
- The remaining site life and capacity update (Section 3.9).
- Update to the closure and post-closure liability fund estimate (Section 3.10).
- Comparison of the water quality monitoring data with the performance criteria in Section 4 of the Landfill Criteria for Municipal Solid Waste and the Guidelines for Environmental Monitoring at Municipal Solid Waste Landfills, interpretation of the monitoring data, identification and



interpretation or irregularities and trends, recommendations, and any proposed changes to the monitoring program (Section 5.0).

1.2 Regulatory Settings

The landfill currently operates under OC MR-02401, issued on December 2, 2003 by the British Columbia Ministry of Environment (MOE). OC MR-02401 replaced the original permit, which was issued in November 1973 and last amended in July 1992 (CH2MHILL, 2009). A copy of OC MR-02401 is included in Appendix A. Refuse authorized for disposal at the Site is characterized as “municipal solid waste as defined under the Waste Management Act”.

Groundwater quality for the Site has been historically compared to the BC Contaminated Sites Regulation (CSR) (BC Reg. 375/96 including amendments) Schedule 10 (Schedule 10) Column V (Drinking Water) (DW) and Schedule 6 (Schedule 6) Column II (Aquatic Life, Freshwater) (FAW) and Column V (Drinking Water) (DW). On November 1, 2017, the Stage 10 (Omnibus) and Stage 11 (Housekeeping) amendments came into effect, thus replacing the CSR Standards listed above. The CSR standards applied in this Annual Report are:

- Schedule 3.2 Generic Numerical Water Standards Column 3 (Aquatic Life, Freshwater [FAW])
- Schedule 3.2 Generic Numerical Water Standards Column 6 (Drinking Water [DW])

The appropriate groundwater standards that apply to the Site depend on the current and future potential groundwater and surface water uses in the vicinity of the Site and the potential for groundwater or surface water at the Site to flow to surface water bodies that support aquatic life in the vicinity of the Site. The BC Ministry of Environment and Climate Change Strategy (ENV) (formerly the BC MOE) Protocol 21 Water Use Determination provides the criteria for selecting the appropriate CSR standards for water quality.

BC MOE document *Technical Guidance 6 - Assessment of Hydraulic Properties for Water Use Determinations* (TG 6) specifies that Aquatic Life (AW) standards apply to groundwater quality at sites located within a 500 metre (m) radius of a surface water body. According to BC Water Resource Atlas, accessed March 26, 2018, the Site is located less than 500 m from two fresh surface water bodies: McIvor Lake and an ephemeral tributary of Cold Creek. McIvor Lake is upgradient of the Site and is not a receptor of any groundwater discharge from the Site. The tributary of Cold Creek is downgradient of the Site and may potentially be a receptor of groundwater discharge from the Site. Therefore freshwater AW standards apply to groundwater at the Site.

Based on the information obtained from BC Water Resource Atlas, accessed February 26, 2018, two water supply wells are located within a 500 m radius from the Site listed for Private Domestic use; therefore DW standards apply to the Site in accordance with TG 6.

Surface water analytical results are also compared to the ,British Columbia Approved Water Quality Guidelines: Aquatic Life, Wildlife & Agriculture (BC MOE, 2017), BC Source Drinking Water Quality Guidelines (ENV, 2017), and BC Working Water Quality Guidelines: Aquatic Life, Wildlife & Agriculture (MOE, 2017) (WQG) for drinking water (DW) the protection of freshwater aquatic life (FWAL).



1.3 Annual Report Organization

The Annual Report is organized into the following sections:

- Section 1. Introduction
- Section 2. Site Background
- Section 3. Site Operations and Development
- Section 4. Environmental Monitoring Program
- Section 5. Environmental Monitoring Results
- Section 6. Summary
- Section 7. Recommendations
- Section 8. References

2. Site Background

2.1 Site Location

The Site is located on Crown Lands within the city limits of Campbell River, BC at 6700 Argonaut Road, approximately 7.5 kilometres (km) west of the city centre. The legal description for the southern half of the Site is Block C, together with that part of Block A, and that part of Block K, all part of District Lot 85, Sayward District. The legal description of the northern portion of the Site is Block J, all part of District Lot 85, Sayward District.

The total Site area is 29.7 hectares. The Site is currently zoned as Industrial Four (I-4) under the City of Campbell River Bylaw No. 3250, 2006 (last amended September 18, 2017). A Site location map is presented on Figure 2.1 and a Site Plan is presented on Figure 2.2. Figure 2.3 presents the land uses in the area surrounding the Site.

Island Ready Mix is located immediately to the west of the Site and houses operations and equipment for concrete manufacturing and a gravel pit. West Shore Aggregates Ltd. operates a gravel pit immediately to the south of the Site. The West Shore Aggregates property also has a landfill permitted to discharge refuse from "dryland log sorting, land clearing, construction and demolition operations" under permit PR-07730.

Mature forests situated on Crown Land are located to the north and east of the Site. There are three residential dwellings located approximately 500 meters (m) to the northeast of the landfill footprint. The property immediately to the east of Block J is occupied by a single dwelling residential lot

There are also several active and historical industrial operations in the vicinity of the Site. Active industrial operations include an auto scrap yard, three construction landfills (permits PR-07730, PR-10807, and PR-9081), aggregate extraction pits, an asphalt paving plant, and an Emcon facility, which includes a salt storage shed. Historical operations in the area include a crane operation, which housed facilities for cleaning copper coated fish farm nets, and a metal scrap yard.



2.2 Landfill Development

Prior to waste disposal operations at the Site, the Site operated as an aggregate extraction facility in the 1950s. According to CH2MHILL's 2009 closure plan, the Site was then used as an unregulated dump site prior to the 1970s. Waste burning took place at the Site as well as disposal of liquid wastes (EBA, 2014). The City of Campbell River took over Site operations in the mid 1970s until ownership was transferred to the CVRD in 1999 (EBA, 2014). A private contractor, Berry and Vale, has operated the Site under contract with the CVRD since 1996.

According to the SWMP, the Site was projected to reach its capacity in early 2012. A transfer station was constructed in 2011 to divert certain incoming waste streams to the Comox Valley Waste Management Centre (CVWMC). In 2014, a mechanically stabilized earth wall (MSE wall) was constructed along the southeastern Site boundary with the aim of addressing slope re-grading concerns and adding approximately five years of Site life.

Landfilling currently occurs on Blocks C, A and K. Block J is primarily utilized for extraction of sand and gravel for use as cover material within the landfill. An updated 2017 Design, Operations, and Closure Plan (2017 DOCP) (GHD, 2017) was prepared in 2017 and was submitted to ENV in March 2018. The 2017 DOCP provides final contours and a closure plan for the Site. The 2017 DOCP includes updated plans for the management of landfill gas and surface water. A surface water management pond (SWM pond) will be constructed in Block J in 2018. Final closure of the Site is scheduled for 2023.

Figure 2.2 presents a site plan for the Site.

2.3 Topography and Drainage

Topography in the vicinity of the Site generally slopes downward to the east from McIvor Lake, (approximately 400 m to the west of the landfill footprint), flattening out approximately 500 m to the east of the Site. The Site is located on the north side of a local valley. The narrow valley floor slopes to the east/northeast following the course of Argonaut Road. The valley appears to have been expanded laterally by historical soil extraction operations at the Site and to the southwest of the Site across Argonaut Road.

There are no natural watercourses on the Site. A constructed surface water infiltration swale is located along the southeast boundary of the landfill footprint, which collects surface runoff from the southeast side of the landfill footprint. During periods of heavy rainfall, surface water has been observed to flow northeast along the swale infiltrating into the ground within approximately 500 m of the landfill footprint.

The closest natural surface water channel is located 400 m northeast of the Site and is one of several ephemeral tributaries of Cold Creek. Cold Creek discharges into the Quinsam River approximately 3 km northeast of the Site. Quinsam Hatchery, a salmon hatchery, is located at the confluence of Cold Creek and the Quinsam River. Quinsam River ultimately drains into the Campbell River approximately 2.3 km downstream of the confluence of Cold Creek and Quinsam River.



McIvor Lake, which is contiguous with Campbell Lake, is located approximately 400 m to the west of the Site with a lake elevation of approximately 180 metres above mean sea level (m AMSL) well above the inferred original ground surface elevation of the Site (140 m AMSL). A drainage map illustrating surface water drainage in the area of the Site is presented in Figure 2.4.

2.4 Geologic Setting

2.4.1 Regional Geology

Vancouver Island is part of the Wrangellia Terrane, which includes most of Vancouver Island, Haida Gwaii, and parts of central Alaska. The Wrangellia Terrane is composed mostly of widespread, late Triassic aged flood basalts (Greene, Scoates and Weis, 2005). Regional bedrock geology in the vicinity of the Site is composed of the Vancouver Group of mid to late Triassic age (Guthrie, 2003). The Vancouver Group is composed of undivided sedimentary rocks, marine sedimentary volcanic rocks, and small amounts of siltstones.

At several time periods during the Pleistocene Epoch, Vancouver Island was believed to be glaciated with ice thicknesses up to 2,000 m. During the recession of the last glaciation approximately 14,000 years ago, glacial and glacio-fluvial sediments were deposited, and in some cases reworked and redeposited, to make up many of the present surficial deposits of Vancouver Island. These deposits consist of till, which is deposited directly by glacial activity and consist of larger clasts supported in a matrix of fine grained sediment, and of glacial outwash, which consists primarily of poorly sorted, coarse grained (sand and gravel) sediments deposited by glacial melt water (Greene, Scoates and Weis, 2005). The overburden at the Site consists of glacio-fluvial and outwash deposits of sand and gravel.

2.4.2 Site Geology

The understanding of the Site geology presented in the following sections is based on existing Site borehole logs for the monitoring wells, provided in Appendix B, regional mapping, previous reports, and well completion logs from nearby private wells.

2.4.2.1 Overburden Geology

Overburden geology at the Site is relatively homogeneous and is primarily composed of deposits of fine to medium grained sand interbedded with deposits of fine to medium grained sand and medium subrounded gravel. Lenses of silt and fine grained sand up to four metres in thickness are present in an irregular distribution across the Site. Decommissioned monitoring well EBA04-5 was the deepest boring within the Site boundaries with a depth of 67 metres below ground surface. Bedrock was not encountered at monitoring well EBA04-5. The boring locations (monitoring wells) are illustrated on Figure 2.2.

2.4.2.2 Bedrock Geology

Based on Site borehole logs and private water supply well stratigraphy logs, bedrock has not been encountered in any boreholes advanced within the Site or immediately to the north and west of the Site, which are up to 67 metres deep. Bedrock is also not encountered at private water supply wells,



which are approximately 60 metres deep and located approximately three km to the northeast to the Site. Bedrock is encountered at a depth of approximately 1.8 metres bgs approximately 1.5 km to the southwest of the Site based on well stratigraphy log for private water supply well (well tag 98020) adjacent to Mclvor Lake. The bedrock lithology was not indicated on the well log.

2.5 Hydrogeologic Setting

The BC aquifer classification system lists Aquifer 975 to be evident over the extent of the Site. Aquifer 975 is classified as a sand and gravel aquifer of moderate productivity, high vulnerability, and low demand.

The Site is located on an unconfined aquifer primarily composed of sands and gravels. Groundwater within this aquifer flows to the east northeast across the Site. Hydraulic monitoring results are presented in Table 4.2. A hydrograph including historical data is presented on Figures 5.1a, 5.1b, 5.1c, and 5.1d. From examination of the aforementioned figures, groundwater elevations appear to have regionally decreased by approximately 2 to 4 metres between 1995 and 2003. The cause of this groundwater elevation decrease is unknown at this time.

Figure 5.2 presents groundwater contours for the November 2017 monitoring event. Based on GHD field measurements, the water table in the vicinity of the landfill is encountered at depths ranging from 20 to 30 m below ground surface (m BGS). Seasonal water table fluctuations in the ranging from 0.6 m to 3.4 m were observed, in 2017. The lowest groundwater elevations were measured in August during the 2017 monitoring year.

Further details of the results of the 2017 hydraulic monitoring program at the Site are presented in Section 5.2.

2.6 Potential Receptors

Surface water bodies located within a 500 m radius of the Site are Mclvor Lake and Cold Creek. Based on the local topography and interpreted groundwater flow direction, Mclvor Lake is located upgradient from the Site; therefore it is an unlikely receptor of groundwater or surface water from the Site. The ephemeral tributary of Cold Creek is located northeast of the Site boundary (750 m northeast of the waste footprint). Based on local topography, groundwater and surface water elevations and hydrogeologic conditions (i.e., unconfined sand and gravel aquifer) of the area, the nearest tributary of Cold Creek is downgradient of the Site. There are no surface water drainages from the Site to the tributary. Groundwater discharge to this tributary is not confirmed as groundwater elevations in the vicinity of the ephemeral tributary is not known. Surface water sampling is carried out on the Cold Creek tributaries east and northeast of the Site. (SW-1 located on a tributary of Cold Creek located approximately 1,100 m east of the Site and SW-2 located approximately 750 m northeast of the Site on a seasonal pond.)

Based on a search of the iMapBC (accessed March 26, 2018), there are seven water wells and one surface water point of diversion located within a 500 m radius of the Site. Two of the seven water wells are listed for Private Domestic use and the remaining wells are listed as Commercial/Industrial or as Unknown. The surface water point of diversion license 32774 is listed for industrial (gravel washing) use. The well licenses and surface water point of diversion licenses



are included in Appendix C. A map indicating the well and surface water point of diversion locations is also included in Appendix C.

Well tag 84136 was included in the 2017 environmental monitoring program (EMP) under the label EBA04-1. It should be noted the BC Water Resource Atlas indicates that well tag 84136 (labeled EBA04-1) is located at the southeast side of the landfill footprint, however, it is actually located at the southwest corner of the Site.

Well tag 109728 was installed in January 2015 and appears to be located southeast of the landfill footprint on the south side of Argonaut Road.

Well tags 39950, 73577, 74191, 74207, and 93413 appear to be located hydraulically upgradient from the Site; therefore it is unlikely that MSW leachate from the Site to migrate to these well locations.

3. Site Operations and Development

3.1 Site Operations

The Site operates 7 days a week from 8:30 a.m. to 5:30 p.m., with the exception of Christmas Day and New Year's Day. The authorized works include entrance facilities, sanitary landfill, recycling and waste drop off/storage areas, and related appurtenances.

Entrance Facilities

The Site entrance is equipped with a lockable and electrified gate system, posted signs, power, and phone connection. The Site receives waste primarily from the Campbell River wasteshed, which includes the City of Campbell River and the surrounding communities. Waste collected from transfer stations in Gold River and Cortes Island are also transferred to the Site. A weigh scale and scalehouse with a full-time attendant are located near the entrance.

Sanitary Landfill

The sanitary landfill (Landfill) is located to the northeast of the entrance facilities. It is a single-cell unlined natural attenuation landfill (CH2MHILL, 2009).

Transfer Station

The transfer station at the Site currently accepts the following types of waste:

- Household waste (non-recyclable)
- Construction and demolition materials
- Clean wood waste
- Yard waste



Management of Recyclable Materials

The selected recyclables that are accepted at the Site are:

- Glass
- Tin cans
- Cardboard
- Mixed paper
- Plastic containers (types 1-7)
- Car and household batteries
- Tires
- Appliances
- Scrap metal
- Household hazardous waste
- Electrical items
- Propane tanks

Fencing

The entrance facilities and landfill area are surrounded by an electric fence operated year-round. The fence was partially decommissioned around the southeastern perimeter of the Site to allow for construction of the MSE wall in 2014.

In 2015, a new electrical fence was constructed around the perimeter of the site.

3.2 Changes from Approved Reports, Plans, and Specifications

In 2017 an updated Design, Operations, and Closure Plan (2017 DOCP) for the Site was developed and prepared by GHD. The 2017 DOCP was submitted to ENV on March 2, 2018.

3.3 Site Development

Normal operations and landfiling activities occurred in 2017.

3.3.1 Closure Works Completed

No closure works were completed in 2017.

3.3.2 Surface Water Management Pond

Construction of the surface water management pond in Block J commenced at the Site in 2017.

3.4 Complaints

No complaints were received in 2017.



3.5 Emergencies or Non-Compliance Items

No emergencies or non-compliance items were reported in 2017.

3.6 Landfill Gas Collection

Landfill gas (LFG) was not collected in 2017 as there is no LFG collection system at the Site at this time.

As part of the 2017 DOCP, GHD updated the most recent Landfill Gas Generation Assessment (Conestoga-Rovers and Associates, 2010) to assist the development of the conceptual design of the landfill gas (LFG) collection system for the Site. The updated LFG generation assessment estimated the Site produced approximately 1,490 tonnes of methane in 2017 (GHD, 2017). As indicated in the 2017 DOCP, the detailed design of the LFG collection system is scheduled to occur in 2020. Construction of LFG collection system for the Site is currently scheduled to commence in concurrence with the closure of the Landfill in 2022-2023.

3.7 Waste Tonnage

Table 3.1 presents tonnages of each type of waste received and discharged to the Landfill in 2017. Approximately 29,529 tonnes was received at the Site. Approximately 4,166 tonnes of waste were diverted from the Landfill resulting in a total of 25,363 tonnes discharged to Landfill at the Site in 2017.

3.7.1 Estimate of MSW Disposal Per Capita

Table 3.2 presents the current and projected population of the Campbell River watershed until the estimated date of Site closure. Based on a landfilled waste total of 25,393 tonnes and a population of 43,036 in the Campbell River watershed in 2017, the updated 2017 municipal solid waste per capita estimate is 0.59 tonnes.

3.8 Volume Survey

A ground survey was completed on November 11, 2017 at the Site. Based on the results of the survey, GHD estimates approximately 231,874 cubic metres (m³) of airspace remain as of the date of the survey to achieve the design contours as of December 31, 2017.

3.9 Remaining Capacity and Estimated Site Life

As stated in Section 3.8, GHD estimates 231,874 m³ of airspace remains at the Landfill as of December 31, 2017.

Based on an estimated airspace consumption rate of 56,600 m³ between December 31, 2016 and December 31, 2017 (GHD, 2017 and GHD, 2018), an estimated 4 years of Site life remains; however it is noted that this estimate is based only on the 2017 filling rate. As indicated in the 2017 DOCP, the Site will cease to accept waste from walking floor trailers in 2019, thus reducing the volume of waste landfilled each year until final Landfill closure in 2023.



3.10 Closure and Post-Closure Fund Estimate

Forecast costs and associated closure and post-closure fund estimates for the landfill were prepared for the CVRD under separate cover. The memorandum delivered to the CVRD detailing the forecast costs also included the costs for the Comox Valley Waste Management Centre, Gold Landfill, Tahsis Landfill, and Zeballos Landfill. A version of the memorandum with the sections pertinent to the Site is included in Appendix D.

3.11 Monitoring Well Network Expansion

In the 2016 Operations and Monitoring Report (GHD, 2017), GHD provided the recommendation to install two additional monitoring wells to assist in monitoring the shallow overburden aquifer southeast of the Landfill. GHD indicated the two wells should be installed prior to commencing the 2018 environmental monitoring program.

On June 15, 2017 ENV, the CVRD, and GHD attended a meeting to discuss the key points provided in the draft 2017 DOCP, which included presentation of a schedule of the monitoring well network expansion. In this schedule, the two monitoring wells recommended in the 2016 Operations and Monitoring Report are scheduled to be installed in spring/summer 2018.

3.12 Operational Plan for the Next 12 Months

The operational plan for 2018 is to continue landfilling as outlined in the 2017 DOCP. Construction of surface water management infrastructure including the storm water management pond in Block J at the Site is scheduled to continue in 2018.

The installation of two additional groundwater monitoring wells to monitor groundwater quality in the shallow portion of the overburden aquifer downgradient of the Site is scheduled to occur in spring/summer 2018. The proposed well locations are presented on Figure 2.2.

4. Environmental Monitoring Program

The water quality monitoring program for the Site was developed based on previous water quality monitoring reports and the requirements for monitoring municipal landfills as provided in Guidelines for Environmental Monitoring and Municipal Solid Waste Landfills (BC MOE, 1996). The objective of the program is to identify potential impacts (if any) the Landfill has on the receiving groundwater and surface water.

Four water quality monitoring events were conducted during the reporting period: February, May, September, and November.

During the reporting period, water quality monitoring was conducted by GHD personnel with analytical services provided by Canadian Association for Laboratory Accreditation (CALA) accredited laboratory Maxxam Analytics, located in Burnaby, BC. Water quality monitoring locations are presented on Figure 2.2. Monitoring specifications including analytical parameters and monitoring frequency for 2017 are included in Appendix E.



4.1 Groundwater Monitoring Program

The objective of the groundwater monitoring program is to monitor groundwater quality within the Site area and to identify, if any, the extent, magnitude and temporal trends of landfill derived impacts to groundwater quality.

The field component of the groundwater monitoring program consists of both hydraulic monitoring and groundwater sampling at 21 locations in the Site area. Groundwater monitoring wells (MWs) are located as shown in Figure 2.2. The 2017 groundwater monitoring program included sampling individual monitoring wells as follows:

- Background wells: AM02-01, MW01-16.
- Landfill Wells, located within the landfill footprint or on or near the Site boundary adjacent to the landfill footprint. For discussion purposes in this report, the Landfill Wells are further divided between their screened locations in the shallow (<15 metres below the water table) or deep portions (>15 metres below the water table) of the overburden aquifer:
 - Shallow: EBA04-7, HBT94-1, HBT94-3.
 - Deep: EBA04-1, EBA04-4, EBA04-6, HBT94-2.
- Downgradient Wells located east of the Landfill. The Downgradient Wells are further divided between the areas northeast of the landfill footprint or southeast of the landfill footprint as well as their screen locations in the shallow or deep portions of the overburden aquifer:
 - Northeast downgradient shallow: AG99-06, EBA11-1, EBA11-2, EBA11-3, EBA11-4, GLL93-4.
 - Northeast downgradient deep: EBA04-3.
 - Southeast downgradient shallow: HBT94-5.
 - Southeast downgradient deep: AG99-01, AG99-02, AG99-04, AG99-05, Domestic Well 109728

Domestic Well 109728 was sampled once in 2017 as a one-time sampling event. Well 109728 is located on the aggregate extraction property owned by West Shore Aggregates located to the southeast of the Site. Water from well 109278 is used for aggregate washing. From review of the borehole log obtained from the WELLS database maintained by ENV, Well 109728 is approximately 66 m deep (Appendix C).

The lid for the protective casing of AG99-06 is broken and requires repair to enable the well to be securely locked.

The PVC riser pipe for monitoring wells HBT1-94, HBT2-94, and HBT3-94 appear to be bent or broken approximately 1 m below the top of the riser and require repair.

EBA04-1 is sampled from a tap near the Site scale house upgradient of the estimated limit of waste but has been examined with landfill wells due to its close proximity to the estimated limit of waste.



Groundwater samples are collected quarterly as outlined in Table 4.1 and analyzed for various general chemistry parameters, nutrients, dissolved metals, and volatile organic compounds (VOCs) at select locations, with the following exceptions:

- GLL93-4 and HBT94-5 were dry for all 2017 monitoring events. These monitoring wells have been historically dry.
- AM02-01 was dry during the February, May, and November monitoring events in 2017.
- EBA04-4 was found to be damaged during the February, May, September, and November monitoring events in 2017, preventing it from being sampled. As per the 2017 DOCP, approximately 1 to 2 m of additional material is to be placed in the vicinity of this well.

Well completion details including screened intervals for each groundwater monitoring well are included in Table 4.2.

4.2 Surface Water Monitoring Program

The objective of the surface water monitoring program is to identify the extent, magnitude (if any) and temporal trends of potential landfill derived impacts to surface water quality.

Surface water monitoring locations are located downstream from the Site as shown on Figure 2.2. The 2017 surface water monitoring program included sampling of three surface water monitoring locations as follows:

- SW-1 is located on an ephemeral tributary of Cold Creek, which drains into the Quinsam River. SW-1 was sampled during the February, May and November monitoring events. SW-1 was not sampled during the September sampling event as the tributary was dry.
- SW-2 is located approximately 750 m northeast of the Site on an ephemeral pond, which at times may be linked to a tributary of Cold Creek. SW-2 was sampled during the February and November monitoring events. SW-2 was not sampled during the September sampling event as the pond was dry.
- SW03-17 is located approximately 1 km east of the Site on a pond, which at times drains into to the same ephemeral tributary of Cold Creek that SW-1 is located on. SW03-17 was sampled during the May and November sampling events.

4.3 Leachate Monitoring Program

As there is no leachate collection system at the Site, no leachate monitoring program is currently in place. The Site was originally developed as a natural attenuation landfill.

4.4 Sampling Methodology

Groundwater sampling was conducted in general accordance with BC Field Sampling Manual (MOE, 2013) and consisted of the following methodology:

- Well identification and inspection.
- Water level monitoring followed by well volume calculation.



- Well purging and stabilization monitoring. Purging was completed using a dedicated bailer or dedicated Waterra™ tubing. A minimum three well volumes were purged at wells with good recovery. Wells with insufficient yield were purged dry and allowed to recover followed by sample collection. Field measurements included pH, conductivity, temperature, turbidity, and oxidation-reduction potential.
- Sample collection using dedicated sampling equipment (bailer or Waterra™).
- Equipment decontamination.

Surface water samples were collected by directly dipping a pre-cleaned unpreserved sample container below the water surface and then transferring to the appropriate preserved container when necessary. Field measurements included pH, conductivity, temperature, turbidity, oxidation-reduction potential, and dissolved oxygen.

Sampling domestic wells, purging for a period of 20 minutes was completed at an outside tap followed by direct sample collection. Field measurements included pH, conductivity, temperature, turbidity, and oxidation-reduction potential.

All samples were collected in the appropriate laboratory-supplied sample containers, preserved as required, packaged in an ice-chilled cooler, and delivered to the laboratory under chain-of-custody protocol. Groundwater samples designated for dissolved metals analysis were field filtered when possible.

4.5 Quality Assurance/Quality Control

In order to ensure adequate quality control for water quality samples, the following quality assurance/quality control (QA/QC) practices were employed during the reporting period:

- Activities performed by qualified and trained personnel.
- Daily field equipment calibration.
- Field QA/QC practices included field duplicate, field blank, and trip blank analysis.
- Data validation was completed by a qualified GHD chemist to assess laboratory and field QA/QC practices and to determine if the data exhibited acceptable levels of accuracy and precision.

5. Environmental Monitoring Results

This section presents hydraulic monitoring results, water quality monitoring results, and a review of the QA/QC practices conducted to ensure available field and analytical data are suitable for their intended use. Field data collected during the reporting period is included in Appendix F. Field sample keys and laboratory reports are also provided in Appendix F.

5.1 Data Quality Assessment and Validation

Analytical data generated during the reporting period was reviewed by a qualified GHD chemist to assess laboratory and field QA/QC.



Laboratory QA/QC practices were evaluated by analyzing laboratory holding time periods, method blank samples, control samples, replicate sample and calibration check samples in general accordance with USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (EPA-540/R-99/008, October 1999) and USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review (EPA-540/R-04-004, October, 2004).

Field QA/QC practices were monitored by analyzing field blank, trip blank, and duplicate samples. The maximum criterion used to assess overall precision for field duplicates is a relative percent difference (RPD) of 30 percent.

Qualifications were made to the analytical data presented in the following sections based on the quality assessment and validation results. Overall the data were found to exhibit acceptable levels of accuracy and precision and are suitable for their intended use with noted qualifiers presented in Appendix G.

5.2 Hydraulic Monitoring Results

Hydraulic monitoring data was collected on a quarterly basis in 2017. Results are tabulated and presented in Table 4.2. Historical and 2017 groundwater elevation data is also presented as a hydrograph on Figures 5.1a, 5.1b, 5.1c, and 5.1d.

Groundwater elevation data collected in 2017 was compared with historical Site data. Groundwater was encountered at elevations ranging from approximately 157 m AMSL at the upgradient wells to 112 m AMSL in the downgradient wells in the Site area. Mean groundwater elevation is approximately 117 m AMSL. The highest groundwater elevations are found in background wells AM02-01 and MW01-16, located approximately 400 metres to the west of the Site property boundary. In general, groundwater elevation data collected in 2017 continues to be within historical ranges at each monitored location.

Groundwater elevations at MW01-16 and AM02-01 were unseasonably high during the September 2017 monitoring event. It is suspected that groundwater elevations were influenced by a higher water level in McIvor Lake, which is partially controlled by the Ladore Dam.

The riser pipe of monitoring well EBA04-4 located in the landfill was extended in summer 2015 as the surrounding area was filled. EBA04-4 appears to have been damaged as additional landfill lifts were placed around EBA04-4 and requires repair or decommissioning.

Groundwater contours were generated for the Site using groundwater elevation data collected in November and are presented on Figure 5.2. From examination of Figure 5.2, groundwater flows towards the east northeast across the Site. The 2017 groundwater contours appear to be generally consistent with previous years.

To determine groundwater flow in the vertical direction, the water levels measured in nested monitoring wells (situated together with varying screen depths) were compared to each other. Upward gradients represent groundwater flow from deeper elevations to shallower elevations while downwards gradients represent flow from shallower elevations to deeper elevations.



Groundwater elevation data from nested wells EBA04-6/EBA04-7 show a downward gradient during each 2017 monitoring event ranging from 0.01 to 0.1 (over a screen separation of 7.6 meters). A slight downward gradient has historically been observed at these monitoring locations.

5.3 Groundwater Quality Monitoring Results

Groundwater analytical data collected in 2017 was compared to the BC CSR water quality standards Schedule 3.2 and is presented in Tables 5.10 and 5.11. Table notes for Tables 5.10 and 5.11 are provided in Table 5.13.

The following sections present an assessment of groundwater quality during the reporting period and provides a summary of where groundwater parameter concentrations were detected above the applicable BC CSR standards. MSW leachate derived impacts to groundwater are identified based on the concentrations of MSW leachate parameters compared with Site background groundwater quality data.

To assist in the assessment of potential MSW leachate derived impacts, groundwater chemistry results have been separated into the following groundwater zones:

5.3.2 Background Overburden Aquifer Quality: AM02-01, MW01-16

5.3.3 Landfill Overburden Aquifer Quality:

Shallow wells: HBT94-1, HBT94-3, EBA04-7

Deep wells: EBA04-1, EBA04-4, HBT94-2, EBA04-6

5.3.4 Downgradient Overburden Aquifer Quality:

Northeast shallow wells: EBA11-1, EBA11-2, AG99-06, EBA11-4, and EBA11-3

Northeast deep wells: EBA04-3

Southeast shallow wells: HBT94-5

Southeast deep wells: Domestic well 109728, AG99-02, AG99-01, AG99-04, and AG99-05.

5.3.1 MSW Leachate Indicators

Selected parameters (MSW leachate parameters) were examined in groundwater quality to assess the presence of leachate in groundwater at or near the Site. Due to the lack of site-specific leachate chemistry data, typical leachate indicator parameters and their respective range of concentrations as determined by monitoring data with similar landfills (CRA, 2014), and literature values (Dydo et. al., 2005 and US EPA, 1986), were used to represent MSW leachate. Typical leachate parameters and their associated concentration ranges are presented in Table 5.1 below.



Table 5.1 Typical MSW Leachate Parameter Concentration Ranges

Parameter	Concentration
Alkalinity (mg/L) ⁽¹⁾	71 – 3,340
Ammonia (mg/L) ⁽¹⁾	84.3 - 449
Boron (ug/L) ⁽¹⁾	3,200 – 4,680
Chloride (mg/L) ⁽¹⁾	150 – 506
Conductivity (uS/cm) ⁽¹⁾	161 – 8,126
Iron (ug/L) ⁽¹⁾	940 – 40,440
Hardness (mg/L) ⁽²⁾	0.1 - 36,000
Manganese (ug/L) ⁽¹⁾	1,250 - 7,250
pH ⁽²⁾	3.5 - 8.5
Sulphate (mg/L) ⁽²⁾	25 - 500
Notes:	
(1) CRA, 2014	
(2) Dydo et. al., 2005 and US EPA, 1986	

5.3.2 Background Groundwater Quality

Groundwater monitoring locations AM02-01 and MW01-16 were used to characterize background groundwater quality conditions at the Site. AM02-01 and MW01-16 were selected as background locations based on their upgradient position relative to the Landfill and historical groundwater chemistry results. It is noted that 2017 was the first full year of monitoring at MW01-16, therefore there is a limited dataset available for this monitoring well at this time. The following table presents ranges of leachate indicator parameter concentrations observed in 2017 at AM02-01 and MW01-16. Indicator parameters concentration ranges in typical MSW leachate are also included in Table 5.2 to illustrate the relative difference between Site background groundwater and leachate chemistry.

Table 5.2 Leachate Indicator Parameter Concentrations at Background Locations

Parameter	Alkalinity (mg/L)	Ammonia (mg/L)	Boron (µg/L)	Chloride (mg/L)	Cond. (µS/cm)	Hardness (mg/L)	Iron (µg/L)	Manganese (µg/L)	pH	Sulphate (mg/L)
Typical MSW Leachate	71 – 3,340	84.3 - 449	3,200 – 4,680	150 - 506	161 – 8,126	0.1 – 36,000	940 – 40,440	1,250 – 7,250	3.5 – 8.5	25 - 500
MW01-16	32.7 – 47.8	ND – 0.013	ND	ND – 1.3	62.2 – 93.6	28.7 – 44.7	ND	ND	6.60 – 7.32	2.0 – 2.81
AM02-01	44.0	ND	ND	1.0	92.9	40.6	ND	ND	6.83	2.4
ND – Parameter concentration below laboratory detection limit. Cond. - Conductivity										

Detailed Background Area groundwater analytical results are presented in Tables 5.10 and 5.11. Historical Background Area groundwater chemistry trend plots of selected leachate indicator parameters are presented in Appendix H (Figures H-1 and H-2). Historical data from private



residential water well EBA06-1 has also been included in Figures H-1 and H-2; however, it is no longer included in the monitoring program.

From examination of historical data presented in Figures H-1 and H-2 and 2017 data presented in the above table, GHD observed the following:

- Groundwater quality at AM02-01 and MW01-16 is generally characterized by low and stable concentrations of MSW leachate indicator parameters.
- AM02-01 continued to be periodically dry in 2017 preventing consistent collection of groundwater samples for field monitoring and laboratory analysis.
- VOC analytical results from AM02-01 and MW01-16 were below the laboratory detection limits in 2017.

Background Area Groundwater Assessment

Analytical results for groundwater samples collected from AM02-01 and MW01-16 were below applicable CSR standards for all parameters tested in 2017.

At this time, no landfill derived impacts are apparent at AM02-01 or MW01-16 and groundwater quality at these wells is considered to be representative of background groundwater quality for the Site.

5.3.3 Landfill Groundwater Quality

5.3.3.1 Landfill Shallow Groundwater Quality

Groundwater quality in the shallow portion of the overburden aquifer in the immediate vicinity of the landfill footprint (Landfill Area) is monitored by the following wells:

- Nested wells HBT94-1 and HBT94-3 located at the toe of the landfill directly to the southeast of the landfill footprint. These wells monitor groundwater in the shallow portion of the overburden aquifer. HBT94-2 is nested with the HBT94-1 and HBT94-3 and monitors the deep portion of the aquifer.
- EBA04-7 located immediately to northeast of the landfill footprint. EBA04-7 is nested with deep well EBA04-6.

The following Table 5.3 presents ranges of leachate indicator parameter concentrations observed in 2017 at Landfill Area shallow wells. Typical MSW leachate concentration ranges are provided on Table 5.3 to illustrate the observed reductions in leachate parameter concentrations due to attenuation occurring through the unsaturated zone and mixing within the groundwater beneath the landfill footprint. Background concentrations are provided to illustrate leachate parameter concentrations in groundwater above background levels. The table is arranged from highest concentrations to lowest.



Table 5.3 Leachate Indicator Parameter Concentrations at Shallow Landfill Area Wells

Parameter	Alk. (mg/L)	NH ₄ (mg/L)	Bo (µg/L)	Cl ⁻ (mg/L)	Cond. (µS/cm)	Hardness (mg/L)	Fe (µg/L)	Mn (µg/L)	pH (S.U)	SO ₄ (mg/L)
Typical MSW Leachate	71 – 3,340	84.3 - 449	3,200 – 4,680	150 -506	161 – 8,126	0.1 – 36,000	940 – 40,440	1,250 – 7,250	3.5 – 8.5	25 - 500
HBT94-3	324 - 373	15 - 18	321 - 509	46 - 51	776 - 867	214 - 275	2,620 – 3,070	2,120 – 2,590	6.76 – 6.90	ND – 2.6
HBT94-1	223 - 262	2.8 – 4.1	172 - 246	17 - 35	478 - 575	199 - 221	6.9 – 3,660	1,890 – 2,410	6.93 – 7.30	ND - 4.90
EBA04-7	301 - 420	ND – 0.064	212 - 275	19 - 67	678 - 901	321 - 438	1.58 – 3.39	51.6 – 68.9	6.94 – 7.33	12.0 – 15.9
Background	32.7 – 47.8	ND – 0.013	ND	ND – 1.3	62.2 – 93.6	28.7 – 44.7	ND	ND	6.60 – 7.32	2.0 – 2.81

ND – Parameter concentration below laboratory detection limit, Alk: alkalinity, NH₄: Ammonia, Bo: boron, Cl⁻: chloride, Fe: iron, Mn: manganese, SO₄: sulphate, Cond: Conductivity

Landfill Area shallow groundwater analytical results are presented in Table 5.10 and 5.11. Historical Landfill Area groundwater chemistry trend plots of select leachate indicator parameters are presented in Appendix H (Figures H-3, H-4, H-5, and H-6).

Based on historical data presented in Figures H-3, H-4, H-5, and H-6 and 2017 water quality data presented in the above table, GHD observed the following:

- Groundwater quality at nested wells HBT94-1 and HBT94-3 continues to show the presence of leachate due to elevated levels of ammonia, chloride, conductivity, iron, manganese, and alkalinity as compared to background groundwater conditions.
- The reduction in leachate parameter concentrations at HBT94-1 and HBT94-3 as compared to typical MSW leachate concentrations is parameter dependent but generally a reduction of one to two orders of magnitude below the raw leachate concentrations is observed. This reduction indicates an attenuation factor of 10 to 100 may be occurring between the base of the landfill and the downgradient edge of the landfill footprint.
- Leachate indicator parameter concentrations in groundwater quality at nested wells HBT94-1 and HBT94-3 are generally observed to decrease with aquifer depth based on decreasing concentrations of leachate indicator parameters with monitoring well depth. This observation is consistent with historical results.
- In 2015, iron and cadmium concentrations at HBT94-1 were notably higher than historical ranges during one or more monitoring events. In 2016, iron and cadmium concentrations at HBT94-1 returned back to historical ranges. It is suspected the elevated iron and cadmium concentrations observed in May 2015 are due to the ground disturbance from the construction of the MSE wall in 2014. In 2017, iron concentrations in groundwater at HBT94-1 were greater



than historical ranges, but less than the May 2015 concentration of 10 mg/L. Further monitoring is required to determine if there are on-going changes in groundwater quality at HBT94-1.

- During the May 2016 monitoring event, ammonia concentrations at HBT94-3 were significantly higher than historical ranges at this monitoring location, with a concentration of 150 mg/L. In 2017, ammonia concentrations in groundwater samples from HBT94-3 were similar to historical ranges. The May 2016 ammonia result from HBT94-3 may be anomalous, however further monitoring is required to confirm this observation.
- Prior to 2014, ammonia concentrations in groundwater at HBT94-1 have consistently been greater than background levels but were less than the applicable standards and generally stable. In 2014, a generally increasing trend in ammonia concentrations was observed in groundwater at HBT94-1 however, ammonia concentrations have been stable since 2015. This trend continues to be observed in 2017.
- Chloride concentrations in groundwater collected from EBA04-7 were notably higher than historical results during the September and November 2017 monitoring events. However, other leachate indicator parameter (e.g. hardness, alkalinity, or manganese) concentrations in groundwater at EBA04-7 are similar to historical results.
- VOC concentrations were below laboratory detection limits (with the exception of chlorobenzene) in groundwater quality at the shallow Landfill Area wells in 2017.

Landfill Area Shallow Groundwater Assessment

Parameter concentrations were less than applicable CSR standards in groundwater in the shallow portion of the overburden aquifer Landfill Area wells for all parameters tested in 2017 except the following:

Manganese

Manganese concentrations were greater than the CSR DW standard in groundwater samples collected from HBT94-1 and HBT94-3 for all monitoring events in 2017.

Manganese concentrations in groundwater quality at HBT94-1 and HBT94-3 have historically been greater than background concentrations and the applicable CSR standards. Manganese concentrations observed at HBT94-1 and HBT94-3 in 2017 are generally within historical ranges.

5.3.3.2 Landfill Area Deep Groundwater Quality

Groundwater quality in the deep portion of the overburden aquifer within the immediate vicinity of the landfill footprint (Landfill Area) is monitored by the following wells:

- EBA04-1 located at the southwest corner of the landfill footprint. EBA04-1 is a domestic water supply well used by Site staff for non-potable uses.
- EBA04-4 located at the northeast corner of the landfill footprint. It should be noted that EBA04-4 appears to be damaged; therefore it could not be monitored in 2017.
- HBT94-2 located at the toe of the landfill footprint directly to the southeast of the landfill footprint. HBT94-2 is nested with shallow wells HBT93-1 and HBT94-3.



- EBA04-6 located approximately 60 m northeast of the landfill footprint. EBA04-6 is nested with shallow well EBA04-7.

The following table presents concentration ranges of leachate indicator parameters observed in 2017 at Landfill Area deep wells. Typical MSW leachate concentrations are provided on Table 5.4 to illustrate the observed reductions in leachate parameter concentrations due to attenuation through the unsaturated zone and mixing within the groundwater beneath the landfill footprint. Background concentrations are provided to illustrate leachate parameter concentrations in groundwater above background levels. Table 5.4 is arranged from highest to lowest concentrations.

Table 5.4 Leachate Indicator Parameter Concentrations at Deep Landfill Area Wells

Parameter	Alk. (mg/L)	NH ₄ (mg/L)	Bo (µg/L)	Cl ⁻ (mg/L)	Cond. (µS/cm)	Hardnes s (mg/L)	Fe (µg/L)	Mn (µg/L)	pH (S.U)	SO ₄ (mg/L)
Typical MSW Leachate	71 – 3,340	84.3 - 449	3,200 – 4,680	150 - 506	161 – 8,126	0.1 – 36,000	940 – 40,440	1,250 – 7,250	3.5 – 8.5	25 - 500
HBT94-2	129 - 610	1.6 - 15	187 - 702	19 - 56	281 – 1,250	ND	268 – 1,650	623 – 5,030	6.88 – 7.18	1.9 – 2.98
EBA04-6	295 - 361	ND – 0.022	ND	4.0 – 7.6	499 - 699	255 - 363	ND	ND	7.24 – 7.31	1.5 – 13.6
EBA04-1	39.8 – 42.9	ND – 0.024	ND	ND – 1.1	85.4 – 86.1	38.2 – 40.7	ND – 43.4	ND	7.85 – 8.56	1.9 – 3.4
Background	32.7 – 47.8	ND – 0.013	ND	ND – 1.3	62.2 – 93.6	28.7 – 44.7	ND	ND	6.60 – 7.32	2.0 – 2.81
ND – Parameter concentration below laboratory detection limit, Alk: alkalinity, NH ₄ : Ammonia, Bo: boron, Cl ⁻ : chloride, Fe: iron, Mn: manganese, SO ₄ : sulphate, Cond: Conductivity										

Deep Landfill Area groundwater well analytical results are presented in Tables 5.10 and 5.11. Historical Landfill Area groundwater chemistry trend plots of select leachate indicator parameters are presented in Appendix H (Figures H-3, H-4, H-5, and H-6).

Based on historical data presented in Figures H-3, H-4, H-5, and H-6 and the 2017 data presented in the above table GHD observed the following:

- Groundwater quality at HBT94-2 continues to show the presence of leachate in groundwater due to elevated alkalinity, boron, chloride, hardness, iron, and manganese concentrations compared to background groundwater conditions.
- Similar to the concentrations observed in the shallow portion of the aquifer, the leachate parameter concentrations are generally one to two orders of magnitude below typical MSW leachate concentrations indicating significant attenuation is occurring within both the unsaturated and saturated zones directly beneath the landfill footprint.
- During the August 2016 monitoring event, conductivity, hardness, alkalinity, iron, and manganese levels at HBT94-2 were markedly higher than historical ranges. Similar results were



observed in groundwater quality at HBT94-2 for the May 2017 monitoring event. This may be indicative of a seasonal effect. Further monitoring is required to determine if this trend continues.

- EBA04-6 continues to low level leachate impacts based on slightly elevated levels of boron, chloride, hardness, alkalinity, and conductivity when compared to background groundwater conditions. MSW leachate impacts at EBA04-6 continue to be lower than leachate impacts observed at deep well HBT94-2. Analytical results at EBA04-6 in 2017 were generally consistent with historical results.
- Groundwater chemistry at EBA04-6 indicates lower leachate parameter concentrations compared to shallow nested well EBA04-7. This indicates additional leachate attenuation is occurring between the shallow and deeper portions of the overburden aquifer. This observation is consistent with historical results. Unlike groundwater quality at shallow well EBA04-7, chloride concentrations in groundwater at EBA04-6 were similar to historical results.
- EBA04-4 could not be monitored in 2017 as it appears to have been damaged.
- EBA04-1 continues to show little to no landfill derived impacts based on leachate indicator concentrations similar to background groundwater conditions. Analytical results for groundwater quality at EBA04-1 in 2017 were similar to historical results. EBA04-1 is a water supply well used by the landfill workers for non-potable purposes.
- VOC concentrations were below laboratory detection limits at all landfill wells (with the exception of chlorobenzene) in groundwater at the sampled deep overburden Landfill Area wells in 2017.

Landfill Area Deep Groundwater Assessment

Parameter concentrations were below applicable standards in deep Landfill Area wells for all parameters tested in 2017 except the following:

Manganese

Manganese concentrations were greater than the CSR DW standard at monitoring well HBT94-2 during the February, May, and September monitoring events in 2017.

5.3.4 Downgradient Groundwater Quality

Groundwater quality in the area downgradient of the landfill footprint is monitored at 11 monitoring wells. To facilitate the discussion of groundwater quality downgradient of the Site in this report, the discussion is further split between monitoring wells located to the northeast or southeast of the landfill footprint as listed in Section 5.3. The monitoring wells located to the southeast of the landfill footprint (AG99-01, AG99-02, AG99-04, AG99-05, and HBT94-5) were previously interpreted to be hydraulically cross-gradient to the Site. After further review of historical groundwater elevations at decommissioned monitoring wells and refining of the groundwater contours with MW01-16 groundwater elevation data, it appears AG99-01, AG99-02, AG99-04, AG99-05, and HBT94-5 are located downgradient to cross-gradient of the landfill footprint.



5.3.4.1 Northeast Downgradient Shallow Groundwater Quality

Groundwater quality in the shallow portion of the overburden aquifer northeast of the landfill footprint is monitored by five monitoring wells as follows (from closest to furthest from the landfill footprint): EBA11-1, EBA11-2, AG99-06, EBA11-4, and EBA11-3.

The following table presents ranges of leachate indicator parameter concentrations observed in 2017 at northeast shallow wells compared to background groundwater quality to illustrate the difference, if any, in groundwater quality between these two areas. If leachate indicator concentrations are greater in the northeast wells compared to background groundwater conditions, it may be indicative of MSW leachate impact to groundwater quality downgradient of the landfill footprint. The table is arranged from closest to furthest from the landfill footprint.

Table 5.5 Leachate Indicator Parameter Concentrations at Northeast Downgradient Shallow Wells

Parameter	Alk. (mg/L)	NH ₄ (mg/L)	Bo (µg/L)	Cl ⁻ (mg/L)	Cond. (µS/cm)	Hardness (mg/L)	Fe (µg/L)	Mn (µg/L)	pH (S.U)	SO ₄ (mg/L)
EBA11-1	98.9 - 167	ND – 0.024	82 - 117	4.3 – 4.9	218 - 352	101 - 176	ND – 11.7	ND	7.57 – 7.69	6.0 – 14.7
EBA11-2	108 - 128	ND – 0.029	ND	5.0 – 7.1	104 - 259	101 - 121	ND	ND	6.61 – 7.81	2.1 – 3.48
AG99-06	95.9 - 132	ND – 0.027	ND	5.5 - 37	234 - 321	128 - 140	ND	ND – 1.9	7.02 – 7.58	3.01 – 4.0
EBA11-4	50.5 – 53.3	ND – 0.026	ND	4.7 – 9.5	118 - 137	49.5 – 54.8	ND	ND	6.57 – 7.85	1.3 – 3.0
EBA11-3	44.1 – 50.6	ND -0.043	ND	2.0 – 100	99.7 - 452	44.4 - 180	ND	ND	7.78 – 7.98	2.7 – 3.48
Background	32.7 – 47.8	ND – 0.013	ND	ND – 1.3	62.2 – 93.6	28.7 – 44.7	ND	ND	6.60 – 7.32	2.0 – 2.81

ND – Parameter concentration below laboratory detection limit, Alk: alkalinity, NH₄: Ammonia, Bo: boron, Cl⁻: chloride, Fe: iron, Mn: manganese, SO₄: sulphate

Detailed Northeast Downgradient Area groundwater analytical results are presented in Tables 5.10 and 5.11. Historical Downgradient Area groundwater chemistry trend plots of selected leachate indicator parameters are presented in Appendix H (Figures H-9 and H-10).

Based on historical data presented in Figures H-9 and H-10, and the 2017 data presented in the above table, the following conclusions regarding groundwater quality at the Downgradient Area wells have been developed:

- Groundwater quality at EBA11-1 and EBA11-2 continues to show generally stable, mild leachate impacts based on slightly elevated levels of alkalinity, conductivity, hardness, and sulphate when compared to background conditions.
- Iron concentrations in groundwater at EBA11-1 and EBA11-2 during the May 2016 monitoring event were higher than historical ranges for both of these monitoring locations, however iron concentrations in 2017 at these locations were similar to historical results. Further monitoring is



required to determine if the May 2016 iron concentrations in groundwater collected from EBA11-1 and EBA11-2 were anomalous.

- From Figure H-10, chloride concentrations in groundwater at AG99-06 appears to have been increasing since 2016, however other leachate indicator parameter concentrations appear to be stable in groundwater at AG99-06. Further monitoring is required to determine if this increasing trend continues.
- Chloride concentrations in groundwater at EBA11-3 were significantly higher than historical chloride ranges at this monitoring location during the November 2017 monitoring event. However, concentrations of other leachate indicator parameters appear to be similar to historical results in groundwater quality at EBA11-3. A piper plot was generated using November 2017 monitoring results and is presented on Figure 5.3. From review of Figure 5.3, EBA11-3 is a clear outlier compared to background groundwater conditions and groundwater conditions adjacent to the limit of waste at HBT94-3. GHD understands a salt storage shed is located approximately 700 m to the west of this monitoring location, which could potentially leach salts into the local groundwater. Further monitoring is required to determine the potential source of increased chloride concentrations in groundwater at EBA11-3.
- Groundwater quality at EBA11-4 is generally similar to background groundwater conditions with only slightly elevated levels of chloride, conductivity, alkalinity, and hardness compared to background groundwater quality. Minimal leachate impacts are apparent in groundwater at EBA11-4. Analytical results from EBA11-4 were generally consistent with historical results.
- VOC analytical results continued to be below the laboratory detection limits (with the exception of methylene chloride at AG99-06) at northeast shallow overburden wells in 2017.

Northeast Downgradient Shallow Groundwater Assessment

Parameter concentrations were below applicable CSR standards at the northeast shallow overburden groundwater wells for all parameters tested in 2017.

5.3.4.2 Northeast Downgradient Deep Groundwater Quality

Groundwater quality in the deep portion of the overburden aquifer northeast of the landfill footprint is monitored by EBA04-3.

The following table presents ranges of leachate indicator parameter concentrations observed in 2017 at EBA04-3 compared to background groundwater quality to illustrate the potential relative impact of landfilling operations on deep overburden groundwater northeast of the landfill footprint.

Table 5.6 Leachate Indicator Parameter Concentrations at Northeast Downgradient Area Deep Well

Parameter	Alk. (mg/L)	NH ₄ (mg/L)	Bo (µg/L)	Cl ⁻ (mg/L)	Cond. (µS/cm)	Hardness (mg/L)	Fe (µg/L)	Mn (µg/L)	pH (S.U)	SO ₄ (mg/L)
EBA04-3	191 - 303	ND – 0.031	ND	5.0 – 22	431 – 590	213 – 302	ND	ND	6.54 – 7.44	4.50 – 13.1
Background	32.7 – 47.8	ND – 0.013	ND	ND – 1.3	62.2 – 93.6	28.7 – 44.7	ND	ND	6.60 – 7.32	2.0 – 2.81

ND – Parameter concentration below laboratory detection limit, Alk: alkalinity, NH₄: Ammonia, Bo: boron, Cl⁻: chloride, Fe: iron, Mn: manganese, SO₄: sulphate

Detailed groundwater analytical results for EBA04-3 are presented in Tables 5.10 and 5.11. Historical groundwater quality data and graphs of selected leachate indicator parameters for EBA04-3 are presented in Appendix H (Figures H-9 and H-10).

Based on historical data presented in Figures H-9 and H-10, and 2017 data presented in the above table, the following conclusions regarding groundwater quality at EBA04-3 have been developed:

- Groundwater quality at EBA04-3 continues to show generally stable, mild leachate impacts based on slightly elevated alkalinity, conductivity, and hardness levels compared to background groundwater conditions. Analytical results at EBA04-3 in 2017 were similar to historical results.

Northeast Downgradient Deep Groundwater Assessment

Parameter concentrations were below applicable CSR water quality standards at the deep overburden northeast monitoring well EBA04-3 for all parameters tested in 2017.

5.3.4.3 Southeast Downgradient Shallow Groundwater Quality

Groundwater quality in the shallow portion of the overburden aquifer southeast of the Site is monitored by HBT94-5. Groundwater monitoring at HBT94-5 has not been possible since 2000 as the well has gone dry. As stated in Section 2.5, groundwater elevations in the vicinity of the Site have decreased by approximately 2 – 4 metres between 1995 and 2003. This apparent regional groundwater elevation decrease is likely the cause for the HBT94-5 going dry. Historical analytical results for HBT94-5 are provided in Appendix I and concentrations versus time graphs for selected leachate indicator parameters are presented in Figures H-7 and H-8 in Appendix H.

The following table presents concentration ranges of leachate indicator parameters historically observed at HBT94-5 between 1994 to 2000 as compared to background groundwater conditions for the Site. The purpose of the table is to illustrate the potential landfill derived impact on shallow overburden groundwater quality southeast of the Site.



Table 5.7 Leachate Indicator Parameter Concentrations at Southeast Downgradient Shallow Well

Parameter	Alk. (mg/L)	NH ₄ (mg/L)	Bo (µg/L)	Cl ⁻ (mg/L)	Cond. (µS/cm)	Hardness (mg/L)	Fe (µg/L)	Mn (µg/L)	pH (S.U)	SO ₄ (mg/L)
HBT94-5	67.9 - 189	ND – 0.04	ND – 110	2.9 – 22.6	153 – 484	53.2 – 185	-	1 – 400	5.78 – 7.27	3.3 – 67
Background	32.7 – 47.8	ND – 0.013	ND	ND – 1.3	62.2 – 93.6	28.7 – 44.7	ND	ND	6.60 – 7.32	2.0 – 2.81

ND – Parameter concentration below laboratory detection limit, Alk: alkalinity, NH₄: Ammonia, Bo: boron, Cl⁻: chloride, Fe: iron, Mn: manganese, SO₄: sulphate

From review of Table 5.7 as well as Figures H-7 and H-8, it appears that mild to moderate landfill derived impact were apparent at HBT94-5 in the late 1990s based on elevated concentrations of alkalinity, chloride, sulphate, hardness, and manganese compared to background groundwater conditions. Current shallow groundwater conditions southeast of the landfill footprint cannot be assessed at this time as there is no usable shallow groundwater monitoring location in this area.

5.3.4.4 Southeast Downgradient Deep Groundwater Quality

Groundwater quality in the deep portion of the overburden aquifer southeast of the Site is monitored by monitoring wells AG99-02, AG99-01, AG99-04, and AG99-05. As stated in Section 4.1, a one-time sampling event was completed at Well 109728. The water quality results from Well 109728 are also discussed in this section.

The following table presents ranges of leachate indicator parameter concentrations observed in 2017 at southeast deep wells compared to background groundwater quality to illustrate the potential relative impact of landfilling operations on southeast deep groundwater quality. The table is arranged by increasing distance from the landfill footprint.

Table 5.8 Leachate Indicator Parameter Concentrations at Southeast Downgradient Deep Wells

Parameter	Alk. (mg/L)	NH ₄ (mg/L)	Bo (µg/L)	Cl ⁻ (mg/L)	Cond. (µS/cm)	Hardness (mg/L)	Fe (µg/L)	Mn (µg/L)	pH (S.U)	SO ₄ (mg/L)
Well 109728	104	0.032	ND	2.9	211	106	6.3	ND	8.3	3.23
AG99-01	98.4 - 114	ND – 0.022	ND	2.0 – 2.8	197 - 230	97.0 - 114	ND	ND	7.28 – 7.51	3.1 – 4.79
AG99-02	94.7 - 207	ND – 0.023	ND	1.4 – 1.9	190 - 305	90.9 - 204	ND	ND	7.12 – 8.23	3.1 – 4.21
AG99-04	47.6 – 54.4	ND – 0.013	ND	1.1 – 1.4	94.7 – 110	44.0 – 53.7	ND	ND	7.05 – 7.94	2.1 – 3.41



Table 5.8 Leachate Indicator Parameter Concentrations at Southeast Downgradient Deep Wells

AG99-05	46.5 - 115	ND – 0.011	ND – 69	ND – 5.7	98.1 – 235	41.2 - 108	ND	ND	7.51 – 8.14	1.9 – 3.30
Background	32.7 – 47.8	ND – 0.013	ND	ND – 1.3	62.2 – 93.6	28.7 – 44.7	ND	ND	6.60 – 7.32	2.0 – 2.81
ND – Parameter concentration below laboratory detection limit, Alk: alkalinity, NH ₄ : Ammonia, Bo: boron, Cl: chloride, Fe: iron, Mn: manganese, SO ₄ : sulphate										

Detailed southeast deep groundwater analytical results are presented in Tables 5.10 and 5.11. Historical southeast deep overburden groundwater quality data and graphs of selected leachate indicator parameters are presented in Appendix H (Figures H-7 and H-8).

Based on historical data presented in Figures H-7 and H-8, and 2017 data presented in the above table, the following conclusions regarding groundwater quality at Well 109728, AG99-01, AG99-02, AG99-04, and AG99-05 have been developed:

- Groundwater quality at AG99-02 continues to show slightly elevated levels of alkalinity, conductivity, and hardness compared to background groundwater conditions indicating slight presence of leachate. This observation is consistent with previous monitoring years.
- Groundwater quality at Well 109728 appears to be similar to AG99-01 with low concentrations of leachate indicator parameters chloride, alkalinity, and hardness.
- Groundwater quality at AG99-01, AG99-04, and AG99-05 continues to demonstrate stable groundwater quality similar to background conditions indicating minimal to no leachate impacts are present in the deep portion of the overburden aquifer southeast of the landfill footprint.
- In general, it appears that groundwater quality in the deep portion of the overburden aquifer southeast of the landfill footprint is minimally impacted by leachate. As indicated in Section 5.3.3.2, groundwater quality in the shallow portion of the overburden aquifer adjacent to the landfill footprint shows higher concentrations of leachate indicator parameters compared to the deep portion of the overburden aquifer adjacent to the landfill footprint. No groundwater monitoring wells monitor the shallow portion of the overburden aquifer southeast the Site. Additional monitoring wells would need to be installed southeast of the landfill footprint to monitor the shallow groundwater quality in this area.

Southeast Downgradient Deep Groundwater Assessment

Groundwater analytical results for southeast deep groundwater wells were below the applicable CSR standards in 2017.

5.4 Surface Water Quality Monitoring Results

Site surface water quality is monitored at three surface water locations to the east of the landfill footprint:

- SW-1 on a tributary of Cold Creek approximately 1,100 m east of the landfill



- SW-2 on a seasonal pond approximately 750 m east of the landfill
- SW03-17 a pond located upstream of SW-1

As previously discussed, there is no direct surface water discharge to the ephemeral tributaries from the Site. The depth of groundwater in the vicinity of the tributaries is not known and as such the discharge of groundwater to the tributaries cannot be confirmed without further investigation. The monitoring wells closest to the Cold Creek tributaries included in the Site's monitoring program are AG99-05 and AG99-06. AG99-05 is approximately 900 m west of SW-1 and groundwater levels at AG99-05 ranged from 18.1 to 19.3 m BTOR in 2017. AG99-06 is approximately 500 m west of SW-2 and groundwater levels at AG99-06 ranged from 19.3 to 21.2 m BTOR in 2017. However, as previously stated, the depth to groundwater adjacent to the Cold Creek tributaries has not been investigated.

The following table presents the 2017 surface water results for leachate indicator parameters indicated in Section 5.3.1 of this report. These parameters are selected to best indicate potential MSW leachate impacts in surface water near the Site.

Table 5.9 Surface Water Results Summary

Parameter	Alk. (mg/L)	NH ₄ (µg/L)	Bo (µg/L)	Cl ⁻ (mg/L)	Cond. (µS/cm)	Hardness (mg/L)	Fe (µg/L)	Mn (µg/L)	pH (S.U)	SO ₄ (mg/L)
SW-1 (tributary of Cold Creek)	7.16 – 27.6	ND – 0.094	ND	3.1 – 3.6	29.3 – 35.7	8.57 – 11.7	67.2 - 275	4.01 – 50.8	5.50 – 7.84	ND – 1.42
SW-2 (Seasonal Pond)	16.0 – 27.6	ND – 0.041	ND	3.2 – 6.3	64.5 – 76.8	24.3 - 31.8	133 - 1100	44.0 - 104	6.81 – 7.83	ND – 2.9
SW03-17 (Pond upstream of SW-1)	7.7 – 8.16	ND – 0.046	ND	3.1 – 3.8	29.5 – 31.2	9.07 – 9.09	62.4 - 104	5.29 – 11.4	5.87 – 7.73	ND
ND – Parameter concentration below laboratory detection limit, Alk: alkalinity, NH ₄ : Ammonia, Bo: Boron, Cl ⁻ : chloride, Fe: iron, Mn: manganese, SO ₄ : sulphate										

Detailed surface water analytical results are presented in Table 5.12. Historical surface water quality data and graphs (Figures H-11 and H-12) of the selected parameters are presented in Appendix H.

Based on historical data presented in Figures H-11 and H-12, and 2017 data presented in the above table GHD has concluded the following:

- At SW-1, SW-2, and SW03-17, the presence of leachate was not detected, based on low level of leachate indicator parameters including alkalinity, ammonia, chloride, and conductivity levels.
- SW03-17 was added to the monitoring program in 2017, therefore a limited dataset exists for this monitoring location.
- Water quality data collected from the Quinsam River upstream of the confluence of the Quinsam River and Cold Creek periodically displayed similar levels of aluminum, copper, iron, and manganese (Kangasniemi, 1989) compared to water quality observed at SW-1, SW-2, and



SW03-17 in 2017. It appears that the aluminum, copper, iron, and manganese concentrations observed at SW-1, SW-2, and SW03-17 are naturally occurring.

Surface Water Assessment

WQGs include both acute (short term) and chronic (long term) guidelines for most parameters analyzed at surface water monitoring locations on Site. For screening purposes, analytical results presented in Table 5.12 have been compared to the most stringent available guideline (typically the chronic (long term) guideline). Identified analytical results elevated above the most stringent WQG have been examined in more depth below to determine compliance with the WQG:

Aluminum

The FWAL WQG criteria for aluminum are based on dissolved phase metals to most effectively represent bioavailable aluminum concentrations. Aluminum concentrations in surface water samples collected in 2017 were greater than the WQGs as follows:

- SW-1 – February (long term) and May (short term and long term)
- SW-2 – May (long term) and November (short term and long term)
- SW03-17 May (long term)

Aluminum is weathered into surface water bodies from clay minerals and naturally occurs in surface water bodies at concentrations of 1000 ug/L or less throughout much of the province (BC MOE, 1988). It is most likely that the observed aluminum concentrations are a result of natural weathering of clay minerals. GHD will continue to sample both the dissolved and total phases metals in 2017 to better trend the dissolved aluminum concentration with time, and compare the values to the dissolved FWAL WQGs.

Copper

Total copper concentrations were greater than the 30-day average FWAL WQG, but less than the instantaneous FWAL WQG in surface water quality at SW-2 (3.43 ug/L) and SW03-17 (2.02 ug/L) during the November 2017 sampling event.

Copper typically occurs naturally in surface water in concentrations up to 5 ug/L due to erosion of geologic formations (BC MOE, 1987). Copper concentrations in groundwater quality adjacent to the Site in 2017 ranged from less than the laboratory detection limit to 1.22 ug/L. Surface water quality studies conducted by the BC MOE indicate that background copper concentrations are approximately 2 ug/L, have been observed in the Quinsam River region (Kangasniemi, 1989). It is suspected that the copper concentrations observed at SW-2 and SW03-17 during the November 2017 monitoring event are naturally occurring.

Iron

Total iron concentrations in surface water quality at SW-2 during the May 2017 monitoring event were greater than the FWAL and DW WQGs. Dissolved iron concentrations in surface water quality at SW-2 were greater than the FWAL WQG during the May 2017 monitoring event. As noted above, the iron concentrations in surface water quality at SW-2 were uncharacteristically high compared to



historical results. Further monitoring is required to determine if an increasing trend in iron is occurring.

It is noted that the DW WQG for iron an aesthetic objective and has been prepared to protect primarily from objectionable taste and staining of plumbing and laundry (Health Canada, 1978).

Manganese

Total manganese concentrations were greater than the DW WQG in surface water quality at SW-1 during the May 2017 sampling event and for the May and November sampling events at SW-2. Total manganese concentrations were less than chronic and acute FWAL WQG for all surface water monitoring events in 2017 at the Site.

The DW WQG for manganese an aesthetic objective and has been prepared to protect primarily from objectionable taste and staining of plumbing and laundry (Health Canada, 1987).

Zinc

Total zinc concentrations at in surface water quality at SW-1 (7.9 ug/L) and SW03-17 (7.85 ug/L) were greater than the 30-day FWAL WQG (7.5 ug/L), but less than the instantaneous FWAL WQG (33 ug/L) during the November 2017 monitoring event. It is noted that the technical appendix for the zinc WQG indicates the dissolved fraction should be used if it is suspected that the sample may be affected by particulate matter (BC MOE, 1999). The dissolved zinc results for surface water samples collected from SW-1 and SW03-17 were below the FWAL WQG with concentrations of 0.77 ug/L and 0.72 ug/L, respectively.

6. Summary

The following summarizes the findings of the annual report:

- Approximately 25,363 tonnes of waste was landfilled at the Site in 2017.
- The updated municipal solid waste disposal per capita estimate for 2017 is 0.59 tonnes/year.
- Approximately 231,874 m³ of airspace remains as of December 31, 2017, resulting in 4 years of site life remaining based on the 2017 filling rate. The CVRD plans to commence diverting some waste to the Comox Valley Waste Management Centre in 2019. As per the 2017 DOCP, the Landfill is scheduled to be closed in 2023.
- Groundwater monitoring was conducted at 22 groundwater monitoring locations in 2017.
- Groundwater was observed to flow towards the east across the Site based on water levels measured during the reporting period which is consistent with previous years.
- A downward vertical gradient was observed at nested wells EBA04-6 and EBA04-7 in 2017. This is consistent with historical results.
- No landfill derived impacts were observed in groundwater quality at background monitoring wells AM02-01 and MW01-16. Groundwater quality at the background wells is considered to be representative of background groundwater quality at the Site.



- Leachate impacts continue to be observed at wells located at the edge of the landfill footprint (and Site property line) at monitoring wells HBT94-1, HBT94-2 and HBT94-3. Manganese concentrations were above applicable CSR standards at wells located immediately adjacent of the landfill footprint during one or more monitoring event: HBT94-1, HBT94-2, and HBT94-3. The horizontal extent of leachate impacts at the eastern limit of waste cannot be determined at this time as no other monitoring wells are located along the eastern limit of waste. This will be addressed with the expansion of the monitoring well network in 2018.
- Chloride concentrations in groundwater collected from EBA04-7 were notably higher than historical results during the September and November 2017 monitoring events, however other leachate indicator parameter (e.g. hardness, alkalinity, or manganese) concentrations in groundwater at EBA04-7 are similar to historical results. Chloride concentrations and other leachate indicator parameters at deep nested well EBA04-6 were consistent with historical results. Analytical results for groundwater samples collected from these monitoring wells in 2017 were below the applicable CSR water quality standards.
- At this time, the extent of a potential leachate impact observed at EBA04-7 cannot be delineated as the current well network does not monitor the shallow portion of the overburden aquifer to the east-southeast of the Site. This will be addressed with the expansion of the monitoring well network in 2018.
- Shallow and deep downgradient groundwater quality northeast of the landfill footprint is generally stable with minimal leachate impacts observed at EBA11-1, EBA11-2, EBA11-4, EBA04-3, and AG99-06. Downgradient northeast groundwater quality results were below the applicable CSR standards at EBA11-1, EBA11-2, EBA11-3, EBA11-4, EBA04-3, and AG99-06 for the parameters analyzed in 2017.
- Chloride concentrations in groundwater quality at EBA11-3 during the November 2017 monitoring event were significantly higher than historical analytical results at this location. The piper plot provided on Figure 5.3 indicates groundwater at EBA11-3 is influenced by another source. Further monitoring is required to determine the source of the increased chloride concentrations in groundwater at this monitoring location.
- Shallow downgradient groundwater quality southeast of the Site at HBT94-5 has historically shown evidence of mild leachate impact; however this monitoring location has been dry since 2000. Groundwater in the shallow portion of the overburden aquifer southeast of the landfill footprint is not monitored by the current groundwater monitoring program. This will be addressed with the expansion of the monitoring well network in 2018.
- Deep downgradient groundwater quality southeast of the Site at AG99-01, AG99-02, AG99-04, and AG99-05 is generally stable with minimal leachate impacts observed. Downgradient southeast groundwater quality results were below the applicable CSR standards at AG99-01, AG99-02, AG99-04, and AG99-05 for the parameters analyzed in 2017.
- Leachate indicator parameter concentrations were low at surface water sampling locations indicating no leachate impacts are currently present in surface water near the Site.
- Parameter concentrations were greater than the applicable WQG at SW-1, SW-2, and SW03-17 during one or more monitoring events for total copper, total iron, total manganese,



and/or total zinc. The source of elevated total metals that exceeded historic concentrations and applicable WQG's is likely due to naturally occurring conditions.

- Dissolved metals analytical results in surface water were generally below the applicable WQG with the exception of dissolved aluminum at SW-1, SW-2, and SW03-17 during one or more monitoring events in 2017. Further monitoring is required to better trend dissolved aluminum concentrations at these surface water monitoring locations as dissolved metals analysis commenced at these locations in 2016.

7. Recommendations

Based on the findings of the 2017 Annual Operations and Monitoring Report, GHD recommends the following:

- Continue quarterly monitoring of groundwater and surface water quality for general chemistry, nutrients, and metals to identify trends in water quality at the Site.
- Repair the steel casing on AG99-06 so it can be locked securely
- Repair the riser pipes of HBT1-94, HBT2-94, and HBT3-94
- Place intermediate cover over the areas of the landfill that have reached final contours as indicated in the 2017 DOCP
- Continue landfilling in accordance with the phased filling plan as prescribed in the 2017 DOCP until final Landfill closure in 2023.
- Decommission monitoring well EBA04-4 as it appears to be damaged beyond repair.
- Install two (2) shallow monitoring wells east-southeast of the landfill footprint nested with HBT94-5 and AG99-05. These wells will allow for monitoring off-Site within the shallow portion of the overburden aquifer at these locations between the landfill footprint and the surface water tributaries east of the Site. Based on the groundwater monitoring results from these two proposed monitoring locations, further expansion of the monitoring well network may be warranted.



All of which is Respectfully Submitted,
GHD

A handwritten signature in black ink that reads "Michaela Dyck".

Michaela Dyck, G.I.T.

A handwritten signature in black ink that reads "Gregory D. Ferraro".

Gregory D. Ferraro, P.Eng.

A handwritten signature in black ink that reads "K. Lindsay".

Kathryn Lindsay, P.Geo., M.Sc.



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Source: ESRI Topographic Basemap, Accessed 2018

0 1,000 2,000 3,000
Meters
Coordinate System:
NAD 1983 UTM Zone 10N



2017 OPERATIONS AND MONITORING REPORT
CAMPBELL RIVER WASTE MANAGEMENT CENTRE
COMOX STRATHCONA WASTE MANAGEMENT

056484-02
Jan 23, 2018

SITE LOCATION

FIGURE 2.1

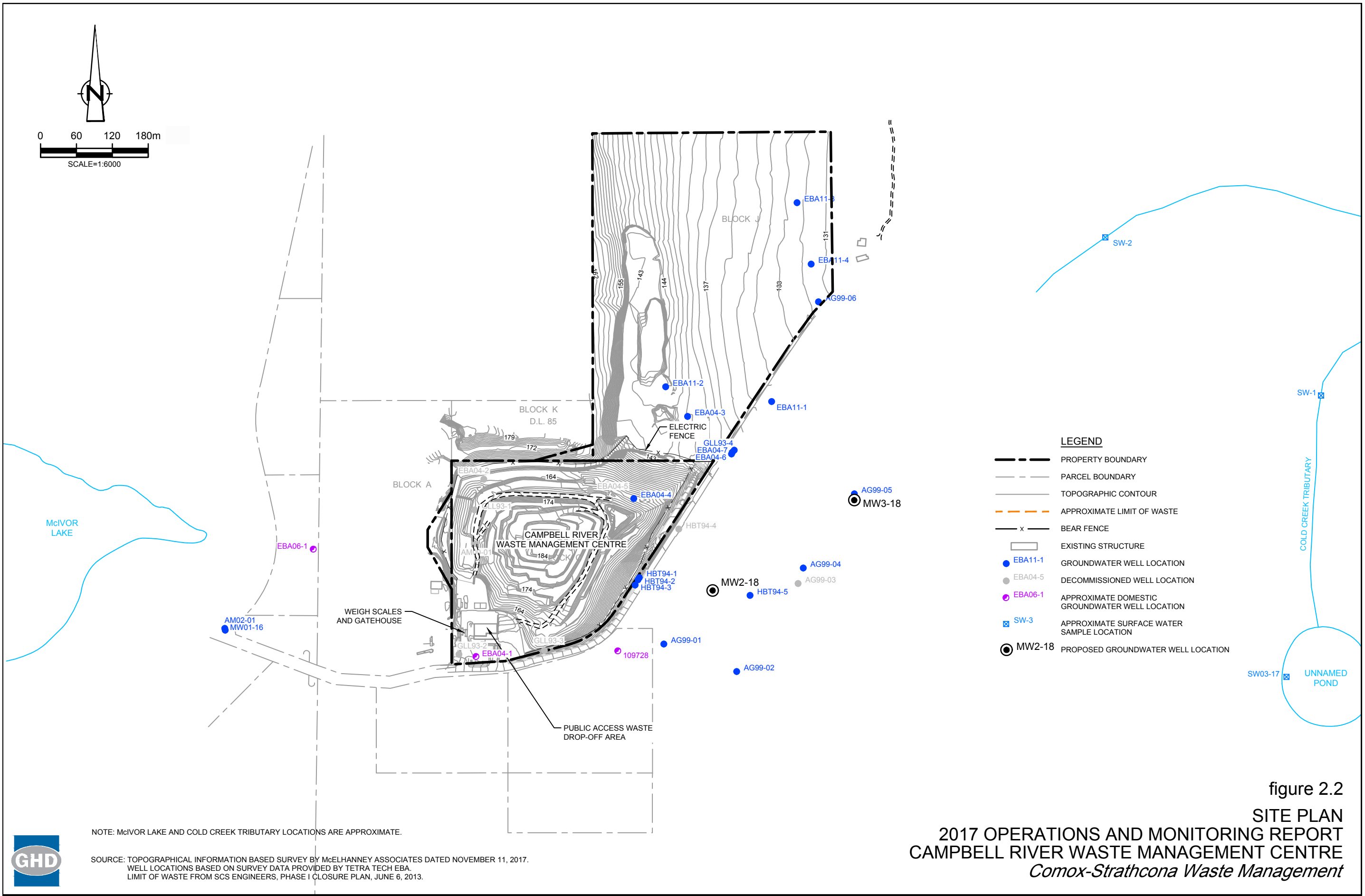
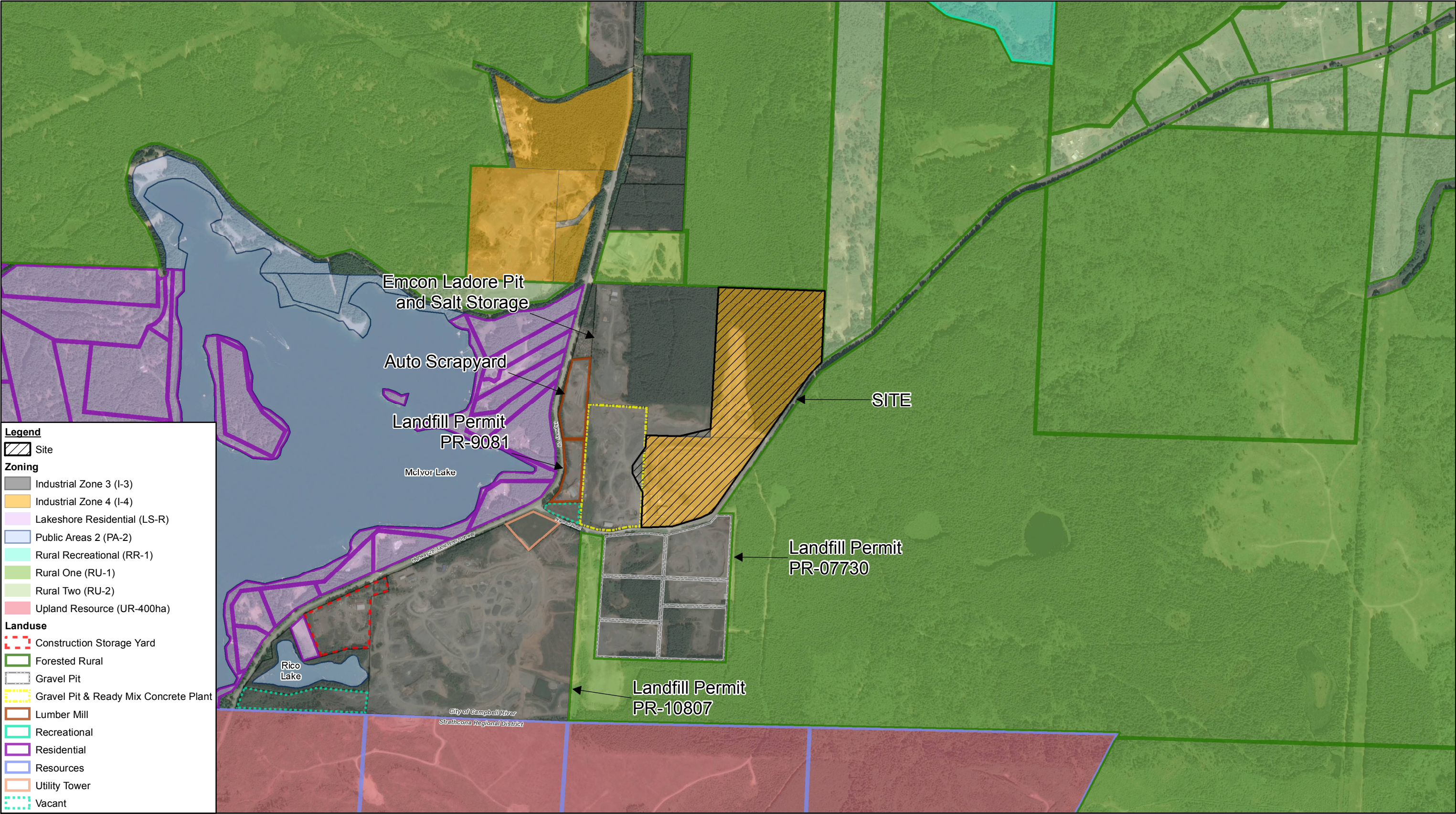
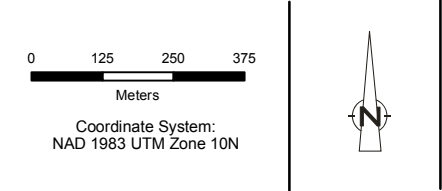


figure 2.2
 SITE PLAN
 2017 OPERATIONS AND MONITORING REPORT
 CAMPBELL RIVER WASTE MANAGEMENT CENTRE
Comox-Strathcona Waste Management





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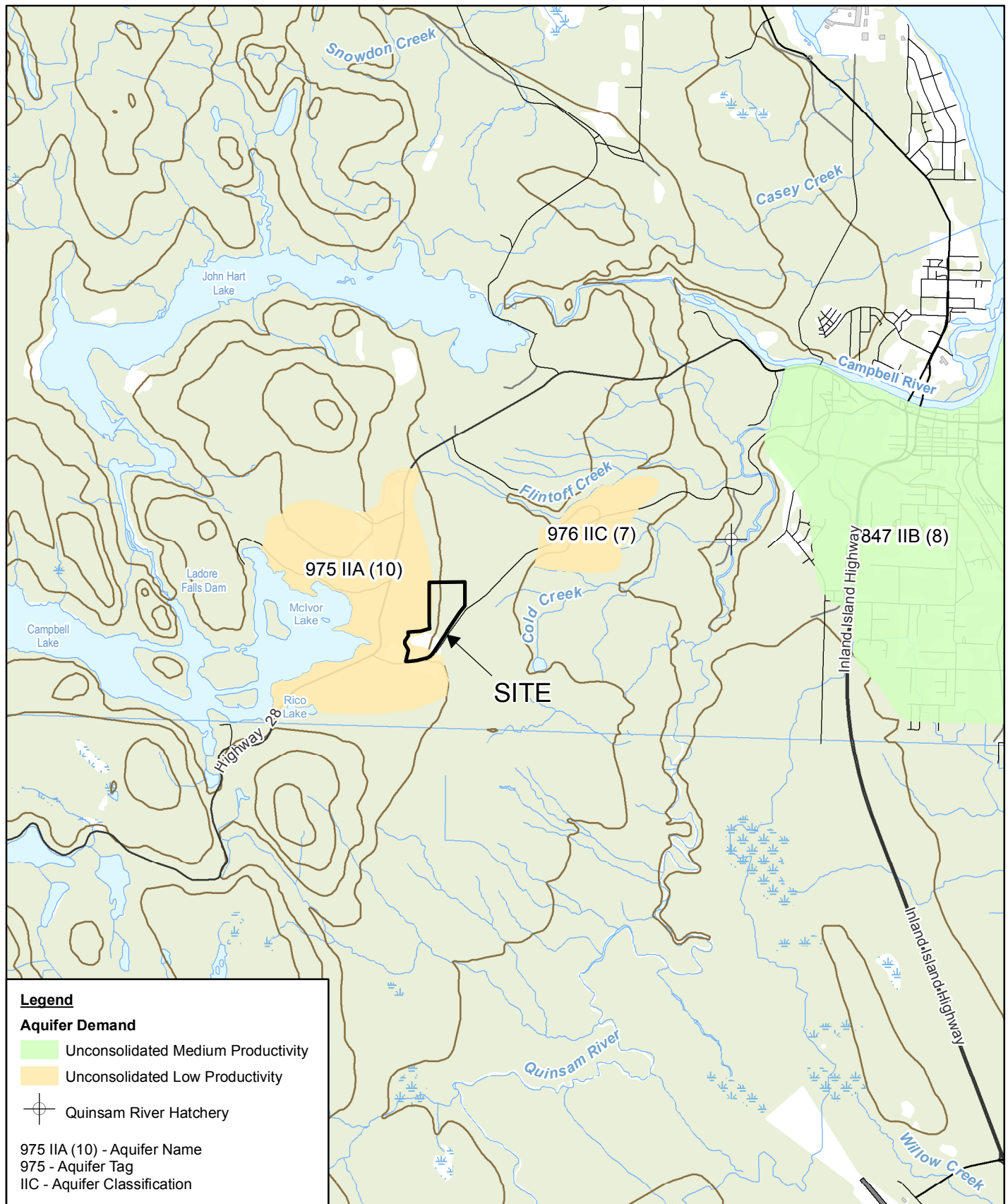


COMOX-STRATHCONA WASTE MANAGEMENT
CAMPBELL RIVER WASTE MANAGEMENT CENTRE
2017 OPERATIONS AND MONITORING REPORT

SITE AREA ZONING AND LAND USE

056484-02
Apr 12, 2018

FIGURE 2.3



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0 600 1,200 1,800
 Meters
 Coordinate System:
 NAD 1983 UTM Zone 10N



2017 OPERATIONS AND MONITORING REPORT
 CAMPBELL RIVER WASTE MANAGEMENT CENTRE
 COMOX STRATHCONA WASTE MANAGEMENT

056484-02
 Apr 12, 2018

DRAINAGE MAP

FIGURE 2.4

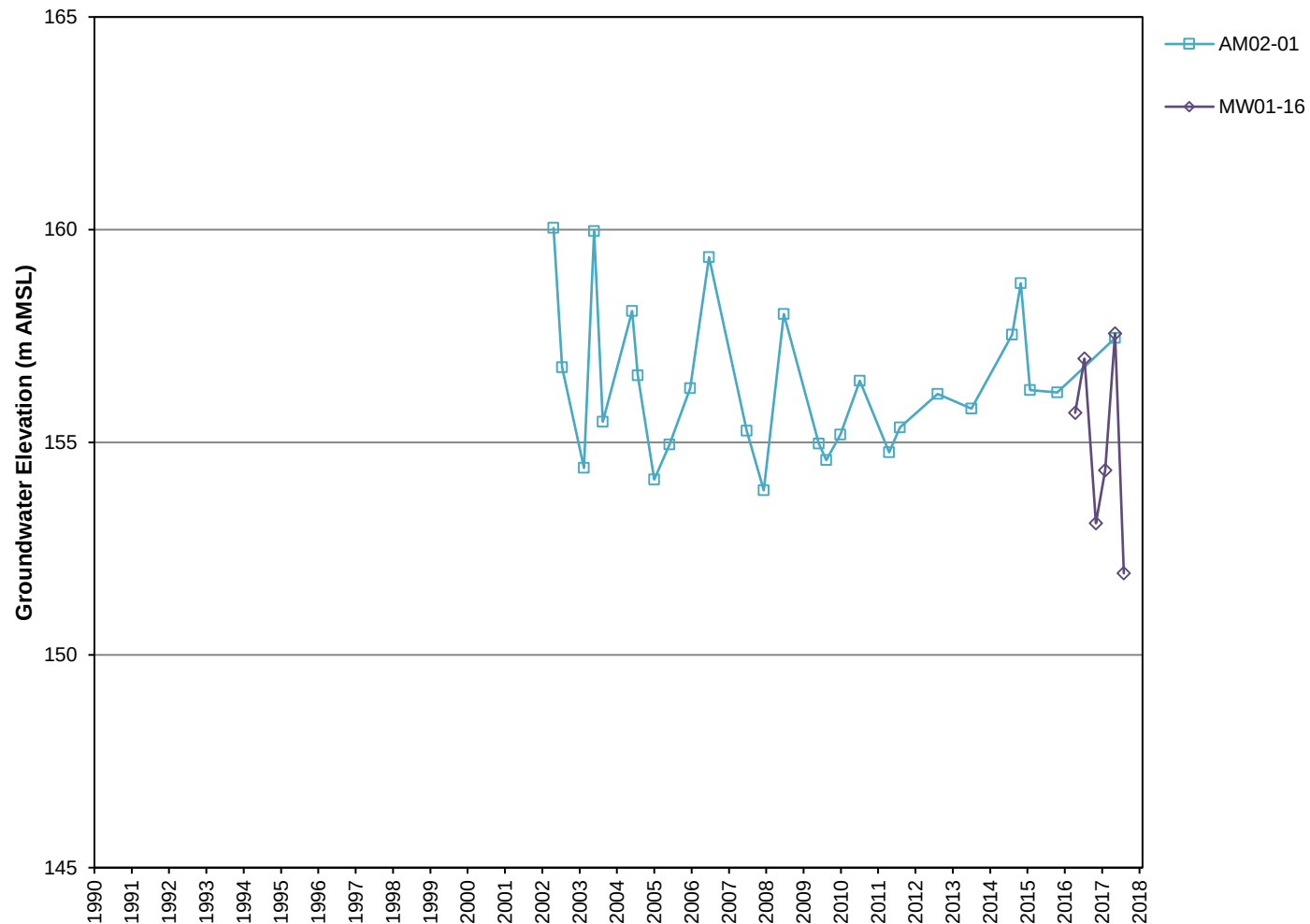


figure 5.1a

HYDROGRAPH 1993 - 2017 - BACKGROUND WELLS
 2017 OPERATIONS AND MONITORING REPORT
 CAMPBELL RIVER WASTE MANAGEMENT CENTRE
Comox Strathcona Waste Management



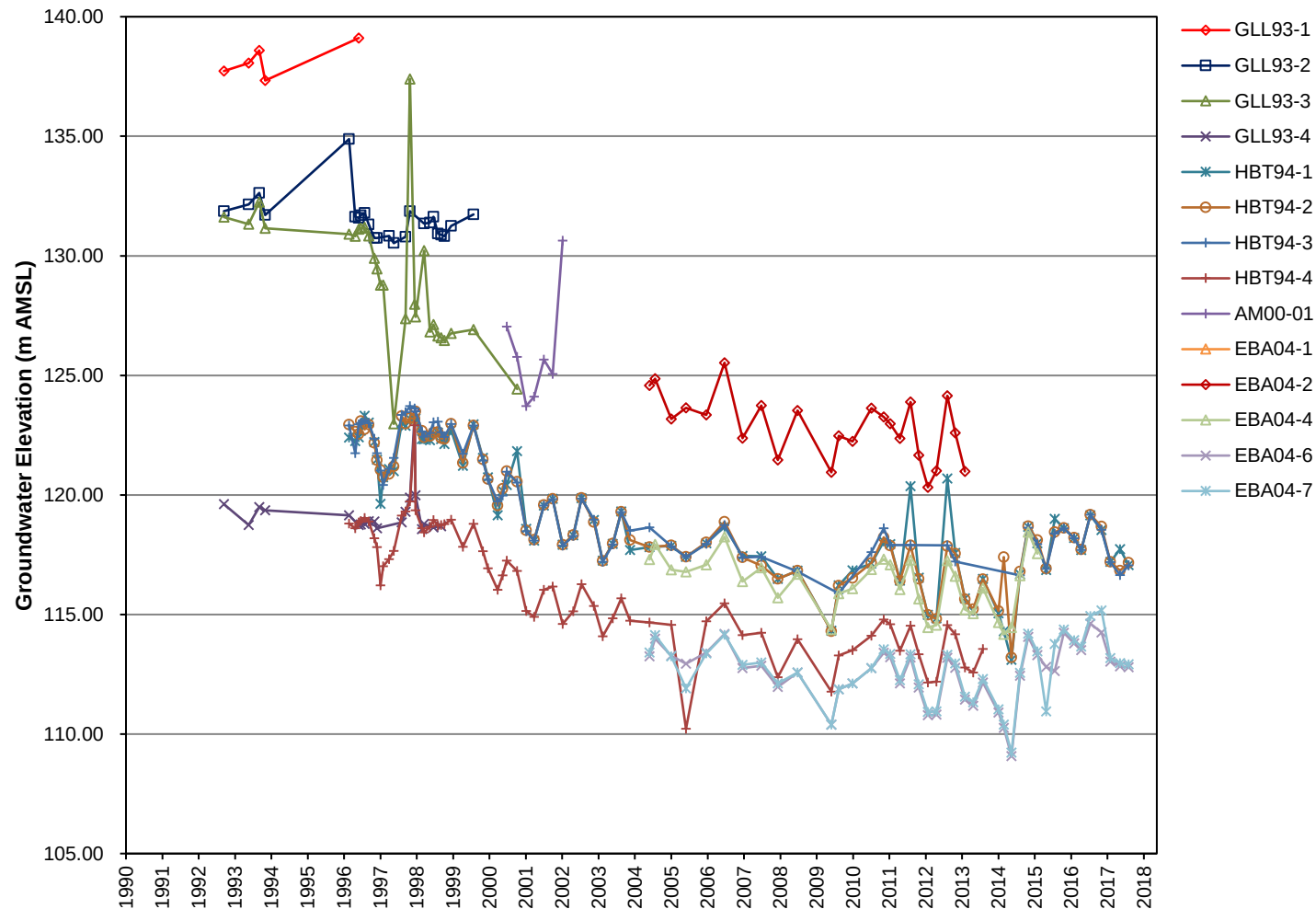


figure 5.1b

HYDROGRAPH 1993 - 2017 - LANDFILL WELLS
 2017 OPERATIONS AND MONITORING REPORT
 CAMPBELL RIVER WASTE MANAGEMENT CENTRE
Comox Strathcona Waste Management



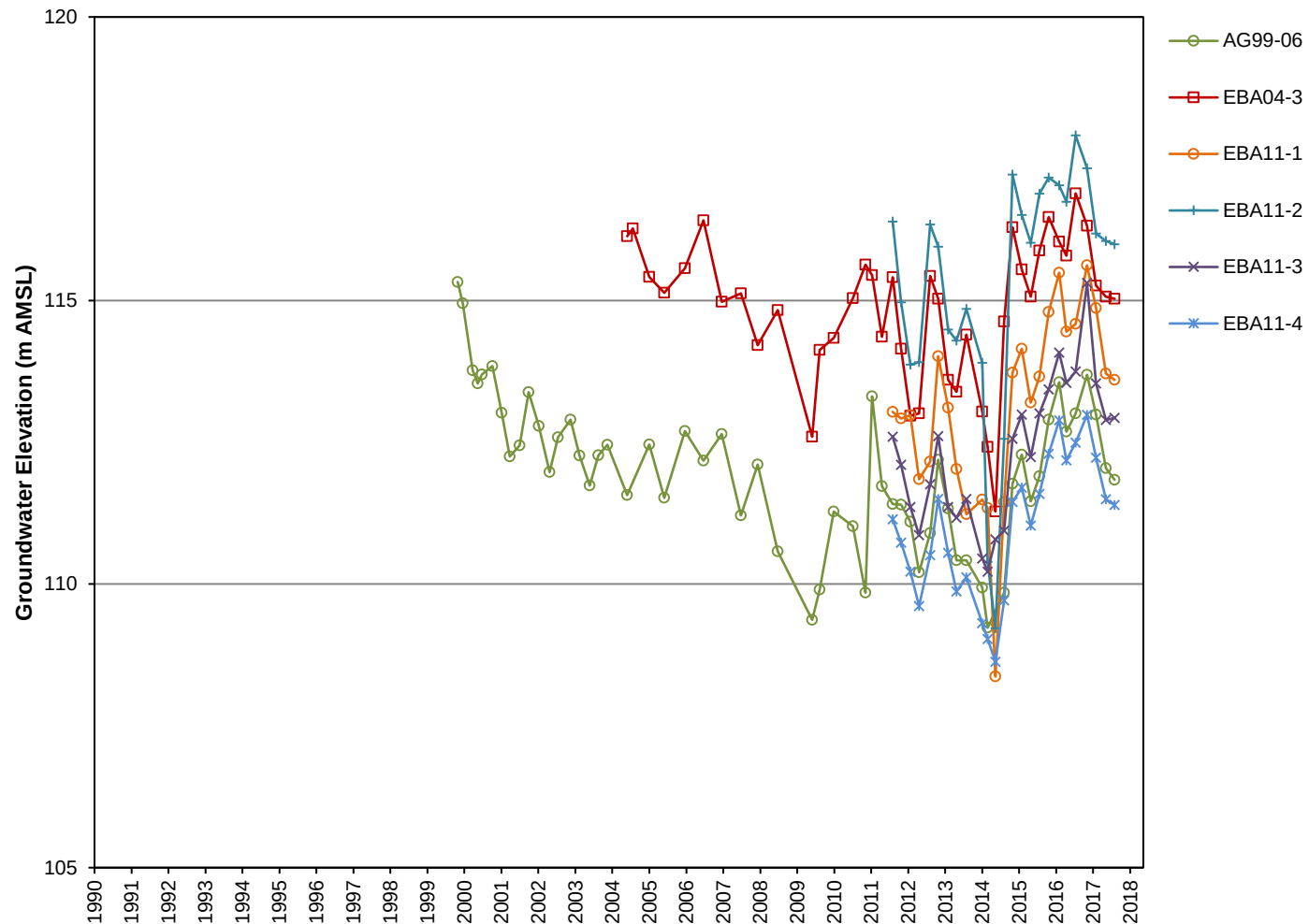


figure 5.1c

HYDROGRAPH 1993 - 2017 - NORTHEAST WELLS
 2017 OPERATIONS AND MONITORING REPORT
 CAMPBELL RIVER WASTE MANAGEMENT CENTRE
Comox Strathcona Waste Management



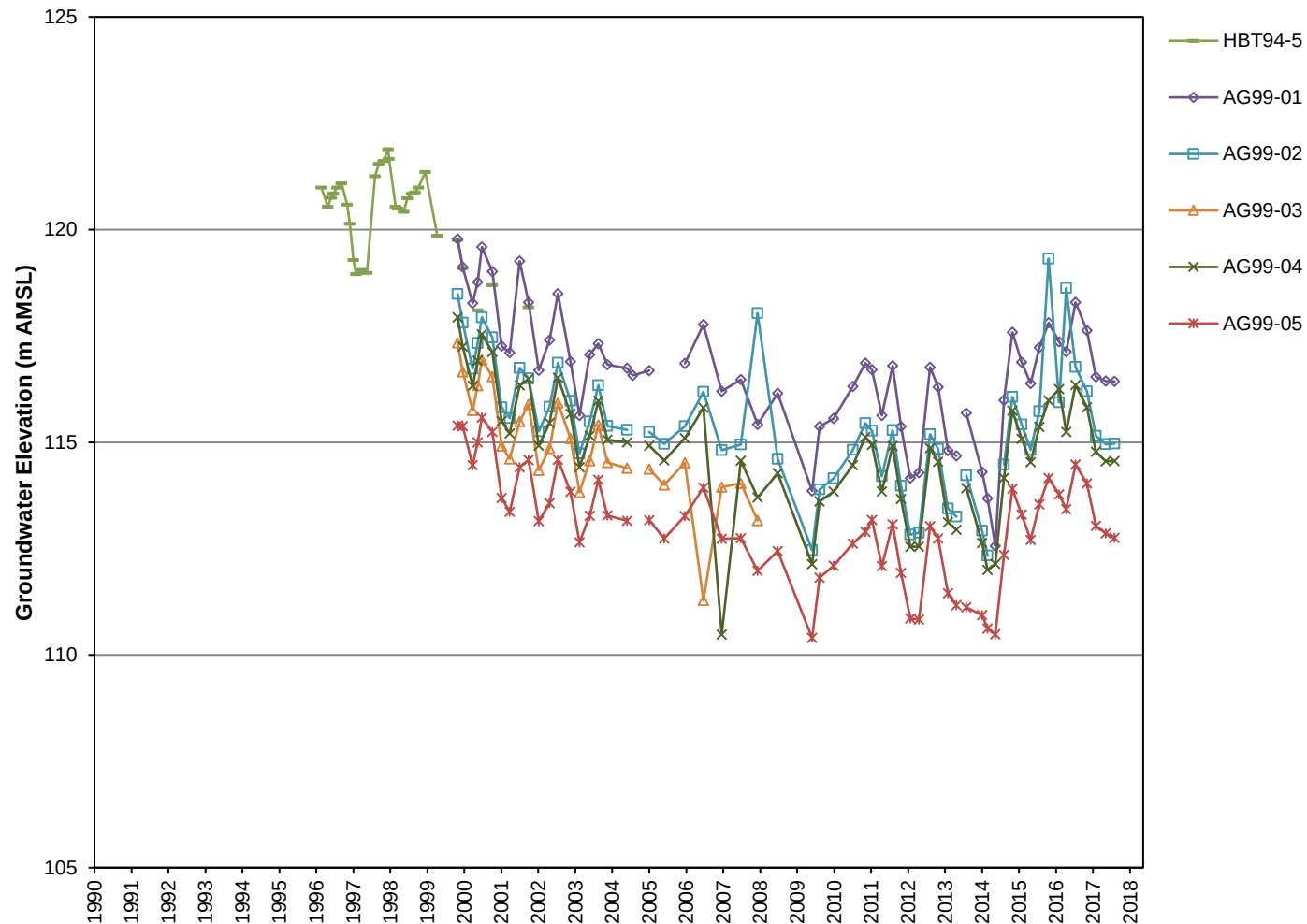


figure 5.1d

HYDROGRAPH 1993 - 2017 - SOUTHEAST WELLS
 2017 OPERATIONS AND MONITORING REPORT
 CAMPBELL RIVER WASTE MANAGEMENT CENTRE
Comox Strathcona Waste Management



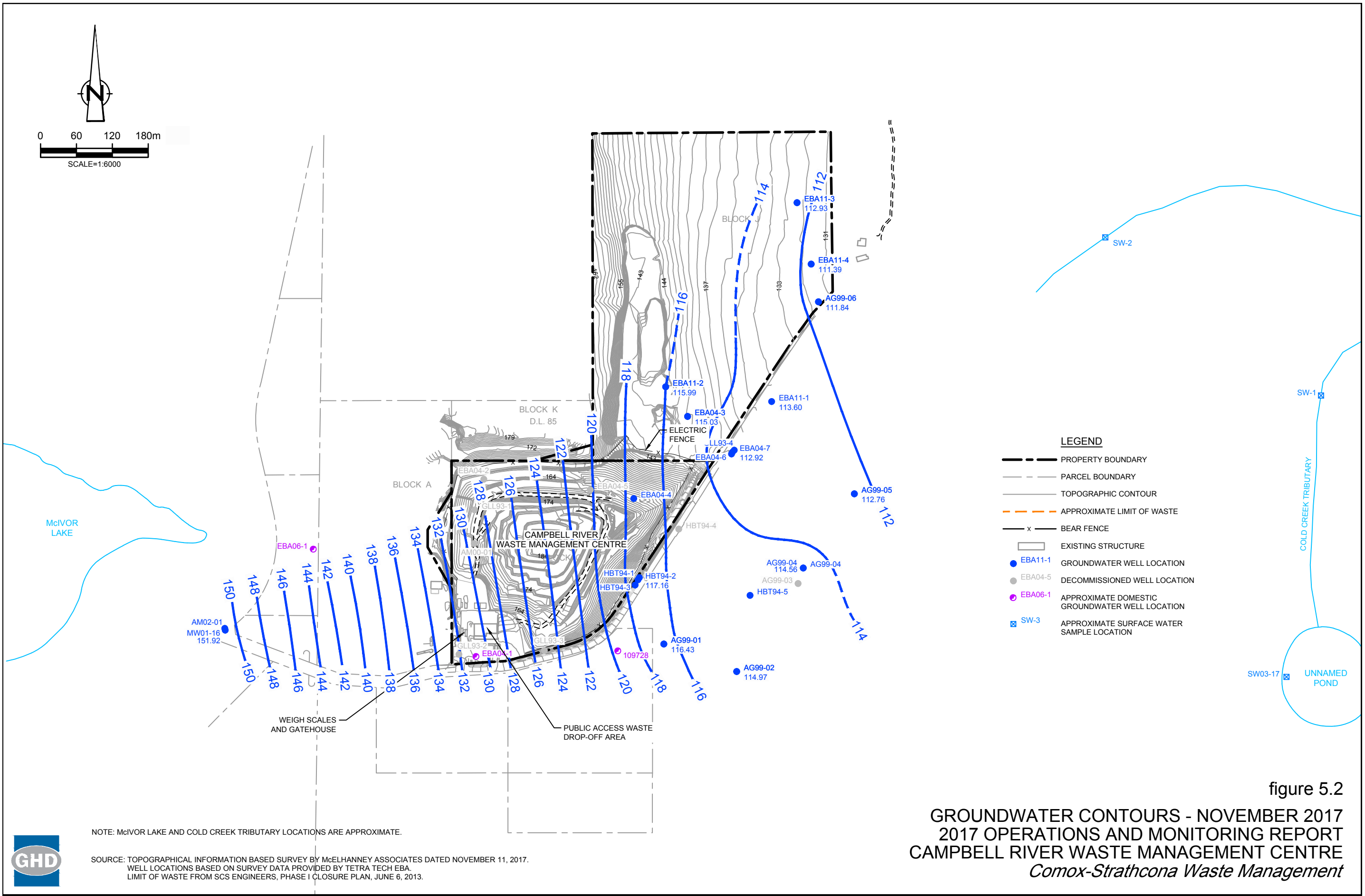


figure 5.2
GROUNDWATER CONTOURS - NOVEMBER 2017
2017 OPERATIONS AND MONITORING REPORT
CAMPBELL RIVER WASTE MANAGEMENT CENTRE
Comox-Strathcona Waste Management



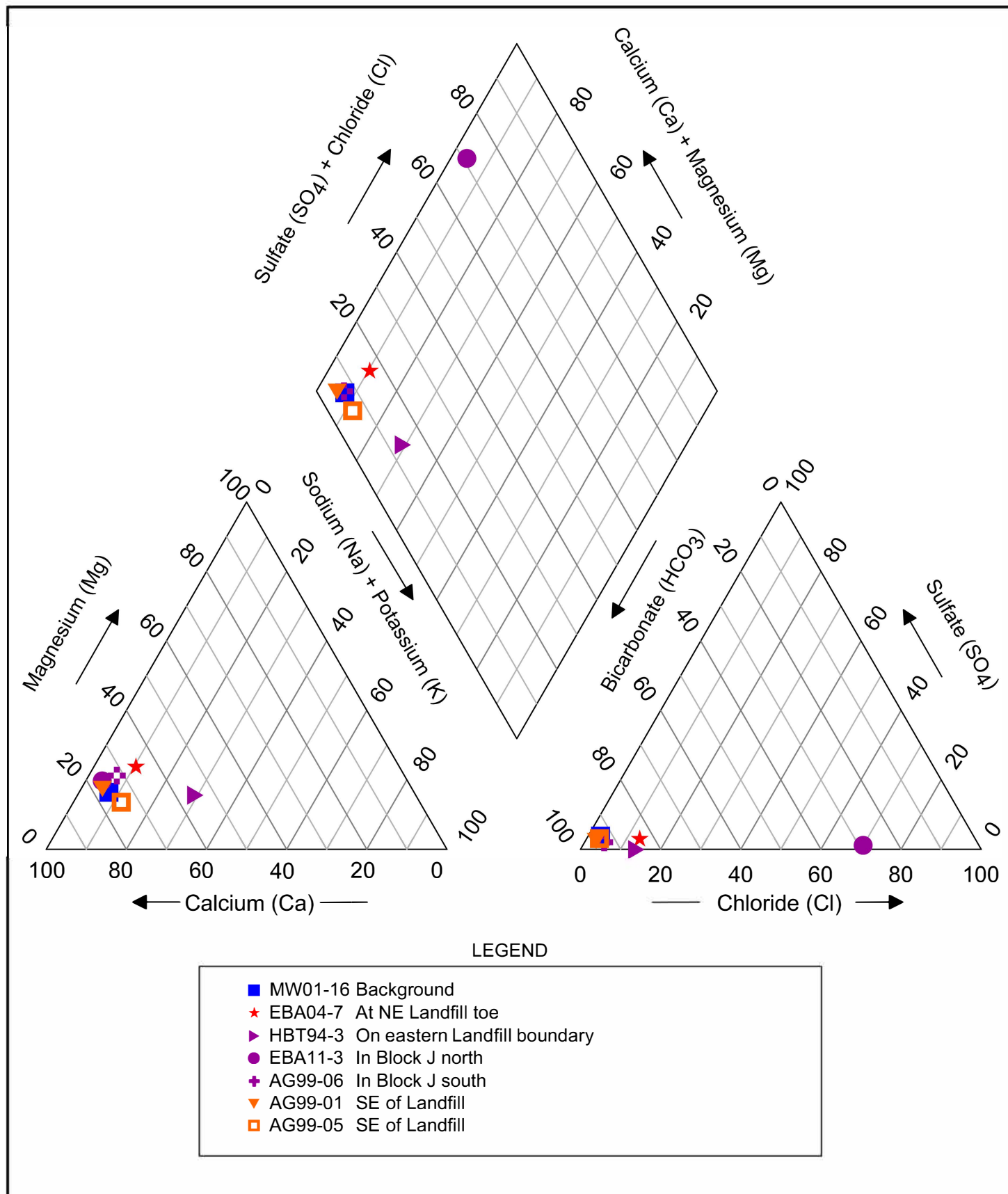


Table 3.1

**Waste Tonnage and Diversion
2017 Operations and Monitoring Report
Campbell River Waste Management Centre
Comox Strathcona Waste Management**

	Units	2017
WASTE DISCHARGED TO LANDFILL ⁽¹⁾		
Waste from CRWMC wasteshed		
Carcasses & Offal/controlled waste	tonnes	41
Construction Waste	tonnes	2,443
ICI & Household	tonnes	17,639
Mixed Waste with Recyclables	tonnes	211
Municipal Waste by Contract	tonnes	4,670
Volunteer Clean Up	tonnes	83
Asbestos	tonnes	274
Illegal dumping	tonnes	2
Total Waste Discharged to Landfill		25,363
RECYLED/DIVERTED MATERIAL ⁽¹⁾		
Battery Sales	tonnes	22
Clean Wood Waste	tonnes	285
Cut Grass & Raked Leaves	tonnes	96
Drywall/Gypsum waste	tonnes	486
Refrigerators/CFCs	tonnes	32
Scrap Metal Sales	tonnes	601
Weigh only (tires etc)	tonnes	92
Yard Waste	tonnes	386
Total Recycled/Diverted Material		2,000
Clean fill used as cover		2,166
Total Material Delivered		29,529

Notes:

- (1) Campbell River Waste Management Centre Yearly Tonnage Summary
CRWMC - Campbell River Waste Management Centre

Table 3.2

**Waste Area Population and Projected Population
2017 Operations and Monitoring Report
Campbell River Waste Management Centre
Comox Strathcona Waste Management**

Year	Estimated Population⁽¹⁾⁽²⁾
2017	43,036
2018	43,269
2019	43,502
2020	43,737
2021	43,973
2022	44,211
2023	44,449

Notes

⁽¹⁾ 2016 population sourced from Stats Canada for City of Campbell River, Village of Sayward, Village of Gold River, and Strathcona electoral areas A, B, C, and D

⁽²⁾ Annual population growth rate of 0.7% (Stats Canada, 2016)

Table 4.1

Monitoring Locations and Sampling Frequency
2017 Operations and Monitoring Report
Campbell River Waste Management Centre
Comox Strathcona Waste Management

Monitoring Location	February	May	September	November
Groundwater				
MW01-16	√	√	√	√
AG99-01	√	√	√	√
AG99-02	√	√	√	√
AG99-04	√	√	√	√
AG99-05	√	√	√	√
AG99-06	√	√	√	√
AM02-01	Dry	Dry	Dry	Dry
EBA04-1	√	√	√	√
EBA04-3	√	√	√	√
EBA04-4	Damaged	Damaged	Damaged	Damaged
EBA04-6	√	√	√	√
EBA04-7	√	√	√	√
EBA11-1	√	√	√	√
EBA11-2	√	√	√	√
EBA11-3	√	√	√	√
EBA11-4	√	√	√	√
GLL93-4	Dry	Dry	Dry	Dry
HBT94-1	√	√	√	√
HBT94-2	√	√	√	√
HBT94-3	√	√	√	√
HBT94-5	Dry	Dry	Dry	Dry
Domestic Well 109728	-	√	-	-
Surface Water				
SW-1	√	√	Dry	√
SW-2	√	√	Dry	√
SW03-17	-	√	-	√

Notes

- √ - Sample collected and submitted for laboratory analysis
- Not included in sampling event

Table 4.2

Well Completion Details and Hydraulic Monitoring
2017 Operations and Monitoring Report
Campbell River Waste Management Centre
Comox Strathcona Waste Management

Location	Total Depth	Top of Riser	Screened Interval				Screen Length	Water Levels								Screened Unit	Screened Lithology
	(m BTOR)	(m AMSL) ⁽¹⁾	(m BTOR)	(m AMSL)	(m)	28-Feb-17		29-May-17		4-Sep-17		28-Nov-17					
MW01-16	43.17	186.69	38.60	41.64	145.10	148.15	3.05	153.10	33.59	154.34	32.35	157.56	29.13	151.92	34.77	Shallow overburden	Sand and gravel
AG99-01	48.50	144.19	46.50	48.50	97.69	95.69	2	117.63	26.56	116.54	27.65	116.44	27.75	116.43	27.76	Deep overburden	Gravel
AG99-02	51.51	139.85	49.00	51.00	90.85	88.85	2	116.20	23.65	115.15	24.70	114.96	24.89	114.97	24.88	Deep overburden	Gravel, some sand and cobbles
AG99-04	45.42	136.44	38.00	45.00	98.44	91.44	7	115.82	20.62	114.78	21.66	114.56	21.89	114.56	21.88	Deep overburden	Gravel, some sand and cobbles
AG99-05	50.90	132.09	44.00	50.00	88.09	82.09	6	114.03	18.06	113.04	19.06	112.86	19.24	112.76	19.34	Deep overburden	Sand, trace silt
AG99-06	45.11	133.03	22.00	25.00	111.03	108.03	3	113.69	19.34	112.99	20.04	112.05	20.99	111.84	21.19	Shallow overburden	Sand, trace silt
AM02-01	33.20	186.59	19.00	34.00	167.59	152.59	15	Dry	-	Dry	-	157.45	29.14	Dry	-	Shallow overburden	Sand
EBA04-1	68.30	164.74	62.90	65.50	101.84	99.24	2.6	Water Tap	-	Water Tap	-	Water Tap	-	Water Tap	-	Deep overburden	Sand and gravel
EBA04-3	41.20	142.20	38.10	41.20	104.10	101.00	3.1	116.32	25.88	115.27	26.94	115.07	27.13	115.03	27.17	Deep overburden	Sand and gravel
EBA04-4	53.40	163.27*	50.20	53.30	113.07	109.97	3.1	Damaged	-	Damaged	-	Damaged	-	Damaged	-	Deep overburden	Sand, sand and gravel interlayers
EBA04-6	39.60	136.34	38.10	39.60	98.24	96.74	1.5	114.24	22.10	113.02	23.32	112.83	23.52	112.80	23.55	Deep overburden	Sand and gravel
EBA04-7	32.00	136.40	30.50	32.00	105.90	104.40	1.5	115.17	21.23	113.17	23.23	112.96	23.44	112.92	23.48	Shallow overburden	Sand and gravel
EBA11-1	28.96	134.77	25.60	28.70	109.17	106.07	3.1	115.62	19.15	114.87	19.91	113.71	21.06	113.60	21.17	Shallow overburden	Sand, trace/some silt
EBA11-2	35.00	141.55	32.00	35.00	109.55	106.55	3	117.33	24.22	116.18	25.37	116.05	25.50	115.99	25.56	Shallow overburden	Sand, gravelly, trace silt
EBA11-3	30.18	134.19	27.10	30.18	107.09	104.01	3.08	115.31	18.88	113.54	20.65	112.90	21.30	112.93	21.26	Shallow overburden	Sand, trace gravel
EBA11-4	29.57	133.13	25.90	29.00	107.23	104.13	3.1	112.99	20.15	112.23	20.90	111.50	21.63	111.39	21.74	Shallow overburden	Sand, trace gravel, trace/some silt
GLL93-4	19.40	137.39	16.50	19.40	120.89	117.99	2.9	Dry	-	Dry	-	Dry	-	Dry	-	Shallow overburden	Sand
HBT94-1	34.00	141.90	31.00	34.00	110.90	107.90	3	118.53	23.37	117.20	24.70	117.73	24.18	117.06	24.84	Shallow overburden	Sand, trace silt and gravel
HBT94-2	44.00	141.98	41.00	43.00	100.98	98.98	2	118.68	23.31	117.20	24.78	116.83	25.15	117.16	24.82	Deep overburden	Sand, some silt
HBT94-3	27.00	142.32	25.00	27.00	117.32	115.32	2	118.54	23.78	117.19	25.13	116.65	25.67	117.05	25.27	Shallow overburden	Gravel
HBT94-5	32.00	138.29	20.00	22.00	118.29	116.29	2	Dry	-	Dry	-	Dry	-	Dry	-	Shallow overburden	Sand, silty

Notes

⁽¹⁾ Hydrogeologic Assessment and Closure Plan, Piteau Associates Engineering Ltd., April 1998

m BTOR metres below top of riser

m AMSL metres above mean sea level

- not applicable/not measured

* Top of riser elevation no longer accurate, monitoring well to be resurveyed

Table 5.10

**Groundwater Analytical Results
2017 Operations and Monitoring Report
Campbell River Waste Management Centre
Comox Strathcona Waste Management**

Sample Location:				109728	AG99-01	AG99-01	AG99-01	AG99-01	AG99-02	AG99-02	AG99-02	AG99-02	AG99-04	AG99-04	AG99-04	AG99-04	AG99-05	AG99-05	AG99-05	
Sample ID:	CSR			WG-56484-	WG-56484-	WG-56484-	WG-56484-	WG-56484-	WG-56484-	WG-56484-	WG-56484-	WG-56484-	WG-56484-	WG-56484-	WG-56484-	WG-56484-	WG-56484-	WG-56484-	WG-56484-	
	Schedule 3.2 ⁽¹⁾			290517-CR-06	010317-JS-18	290517-CR-07	040917-CR-03	261117-CR-03	280217-JS-14	290517-CR-08	050917-CR-17	261117-CR-04	010317-JS-17	290517-CR-09	050917-CR-18	271117-CR-05	010317-JS-19	300517-CR-10	050917-CR-16	
Sample Date:	FAW			DW	5/29/2017	3/1/2017	5/29/2017	9/4/2017	11/26/2017	2/28/2017	5/29/2017	9/5/2017	11/26/2017	3/1/2017	5/29/2017	9/5/2017	11/27/2017	3/1/2017	5/30/2017	9/5/2017
Parameters	Units	a	b																	
Field Parameters																				
Dissolved Oxygen, Field	mg/L	-	-	-	8.08	-	5.18	11.34	8.43	-	7.76	8.86	6.57	-	7.37	6.20	6.58	-	9.26	
ORP, Field	millivolts	-	-	184	264	202	234	216	105	235	222	198	242	234	242	174	238	196	201	
pH, Field	s.u.	-	-	7.65	7.51	7.50	7.40	7.28	8.23	7.12	7.89	7.98	7.64	7.05	7.94	7.11	7.51	7.73	7.53	
Specific Conductance, Field	uS/cm	-	-	199	224	219	226	230	224	219	226	230	115	91	109	133	239	227	103	
Temperature, Field	Deg C	-	-	14.22	8.59	14.16	13.36	11.80	8.31	13.40	13.27	10.90	9.42	14.92	12.1	9.13	8.24	13.75	13.79	
Total Dissolved Solids, Field	g/L	-	-	0.129	0.145	0.142	0.147	0.150	0.244	0.137	0.132	0.300	0.075	0.059	0.071	0.086	0.155	0.148	0.067	
Turbidity, Field	NTU	-	-	0.5	2.8	39.5	31	4.0	0	0.8	0.9	0.8	0	0.5	0	0.6	4.5	0.7	3.3	
General Chemistry																				
Alkalinity as CaCO3 Ph=8.3	mg/L	-	-	0.63	ND (0.50)	ND (0.50)	ND (1.0)	ND (1.0)	ND (0.50)	0.85	ND (1.0)	1.7	ND (0.50)	ND (0.50)	ND (1.0)	ND (1.0)	ND (0.50)	1.65	ND (1.0)	
Alkalinity, Bicarbonate (as CaCO3)	mg/L	-	-	125	120	139	129	122	193	136	116	249	60.1	58.0	59.8	66.4	133	136	56.8	
Alkalinity, Carbonate (as CaCO3)	mg/L	-	-	0.76	ND (0.50)	ND (0.50)	ND (1.0)	ND (1.0)	ND (0.50)	1.02	ND (1.0)	2.1	ND (0.50)	ND (0.50)	ND (1.0)	ND (1.0)	ND (0.50)	1.98	ND (1.0)	
Alkalinity, Hydroxide (as CaCO3)	mg/L	-	-	ND (0.50)	ND (0.50)	ND (0.50)	ND (1.0)	ND (1.0)	ND (0.50)	ND (0.50)	ND (1.0)	ND (1.0)	ND (0.50)	ND (0.50)	ND (1.0)	ND (1.0)	ND (0.50)	ND (0.50)	ND (1.0)	
Alkalinity, Total (as CaCO3)	mg/L	-	-	104	98.4	114	106	100	158	113	94.7	207	49.3	47.6	49.0	54.4	109	115	46.5	
Chloride (Dissolved)	mg/L	1500	250	2.9	2.0	2.7	2.8	2.1	1.4	1.5	1.7	1.9	1.1	1.3	1.2	1.4	1.7	4.8	ND (1.0)	
Fluoride	mg/L	[b]	1.5	ND (0.016)	ND (0.025)	0.017	0.029	ND (0.020)	ND (0.020)	0.015	0.031	ND (0.020)	ND (0.023)	0.017	0.024	0.020	ND (0.032)	ND (0.014)	0.024	
Hardness (Dissolved)	mg/L	-	-	106	104	114	97.7	97.0	160	101	90.9	204	51.8	44.0	47.8	53.7	107	108	41.2	
pH, Lab	s.u.	-	-	8.30 J	7.86 J	8.27 J	8.18 J	8.10 J	8.14 J	8.32 J	8.21 J	8.32 J	7.68 J	7.98 J	7.98 J	7.95 J	8.17 J	8.34 J	8.00 J	
Specific Conductance, Lab	uS/cm	-	-	211	200	230	209	197	305	219	190	381	104	94.7	101	110	229	235	98.1	
Sulphate (Dissolved)	mg/L	[b]	500	3.23	4.79	3.57	3.1	3.2	4.21	3.38	3.1	3.1	3.41	2.70	2.1	2.9	3.30	2.97	2.1	
Nutrients																				
Ammonia-N	mg/L	[a]	-	0.032	ND (0.022)	0.022	ND (0.020)	0.029	ND (0.024)	0.023	ND (0.020)	ND (0.020)	ND (0.024)	0.013	ND (0.020)	ND (0.020)	ND (0.042)	0.011	ND (0.020)	
Nitrate (as N)	mg/L	400	10	0.294	0.217	0.306	0.250 J	0.182	0.230	0.153	0.174 J	0.259	0.118	0.124	0.154 J	0.102	0.055	0.123	0.072 J	
Nitrite (as N)	mg/L	[c]	1	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050) J	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050) J	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050) J	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050) J	
Nitrite/Nitrate	mg/L	400	10	0.294	0.217	0.306	0.250 J	0.182	0.230	0.153	0.174 J	0.259	0.118	0.124	0.154 J	0.102	0.055	0.123	0.072 J	
Dissolved Metals																				
Aluminum	ug/L	-	9500	ND (3.6)	3.3	ND (6.8)	9.5	3.3	4.7	ND (9.6)	6.7	4.4	6.7	ND (7.1)	5.7	6.0	5.0	ND (6.0)	6.3	
Antimony	ug/L	90	6	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	
Arsenic	ug/L	50	10	0.25	0.89	0.80	0.73	0.82	2.03	2.10	2.08	1.81	0.42	0.49	0.35	0.38	0.45	0.44	0.59	
Barium	ug/L	10000	1000	2.5	1.9	2.2	2.0	ND (1.8)	8.1	5.2	4.6	ND (10.0)	ND (1.0)	ND (1.0)	2.5	ND (1.0)	1.6	1.7	ND (1.0)	
Beryllium	ug/L	1.5	8	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	
Bismuth	ug/L	-	-	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	
Boron	ug/L	12000	5000	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	69	ND (50)	
Cadmium	ug/L	[b]	5	ND (0.010)	ND (0.010)	ND (0.010)	0.016	ND (0.010)	ND (0.010)	0.021	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	
Calcium	ug/L	-	-	35900	33500	36800	31400	ND (31700)	51400	32300	29100	ND (66400)	17900	15000	16400	ND (18600)	36200	36100	13900	
Chromium Total	ug/L	10	50	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	
Cobalt	ug/L	40	[i]	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	
Copper	ug/L	[b]	1500	0.22	ND (0.20)	0.66	0.26	ND (0.20)	0.26	0.35	0.23	0.39	ND (0.20)	0.39	ND (0.20)	0.22	1.21	2.07	0.22	
Iron	ug/L	-	6500	6.3	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	
Lead	ug/L	[b]	10	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	0.24	ND (0.20)	ND (0.20)	ND (0.20)	
Lithium	ug/L	-	8	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	
Magnesium	ug/L	-	-	4110	4850	5300	4680	ND (4360)	7790	4950	4450	ND (9140)	1750	1610	1690	ND (1770)	4040	4400	1580	
Manganesee	ug/L	-	1500	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	
Mercury	ug/L	0.25	1	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	
Molybdenum	ug/L	-	250	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	
Nickel	ug/L	[b]	80	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	
Phosphorus	ug/L	-	-	ND (10)	16	15	37	15	36	53	34	31	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	10	
Potassium	ug/L	-	-	647	727	797	778	ND (754)	1540	1260	1170	1800	328	313	274	ND (323)	549	604	382	
Selenium	ug/L	20	10	0.11	0.12	0.12	0.12	0.12	0.16	0.17	0.17	0.11	0.12	ND (0.10)	0.11	0.13	ND (0.10)	ND (0.10)	ND (0.10)	
Silicon	ug/L	-	-	6780	6480	6900	6540	ND (6290)	5700	5630	5280	ND (5940)	4730	4190	4170	ND (4150)	4470	4930	4360	
Silver	ug/L	[b]	20	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)	
Sodium	ug/L	-	200000	1840	1840	1890	1930	1600	1540	1600	1540	ND (2250)	1530	1340	1320	ND (1360)	2360	2520	2390	
Strontium	ug/L	-	2500	62.1	52.3	59.7	52.1	ND (50.0)	68.4	44.2	36.8	ND (84.0)	26.8	24.1	24.1	ND (29.0)	59.8	62.6	22.1	
Sulphur	ug/L	-	-	ND (3000)	ND (3000)	ND (3000)	ND (3000)	ND (3000)	ND (3000)	ND (3000)	ND (3000)	ND (3000)	ND (3000)	ND (3000)	ND (3000)	ND (3000)	ND (3000)	ND (3000)	ND (3000)	
Thallium	ug/L	3	-	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	
Tin	ug/L	-	2500	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	
Titanium	ug/L	1000	-	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	
Uranium	ug/L	85	20	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	0.53	0.35	0.24	0.62	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	0.11	0.15	ND (0.10)	
Vanadium	ug/L	-	20	ND (5.0)	6.0	5.3	5.4	5.8	18.2	17.8	18.5	17.4	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	
Zinc	ug/L	[b]	3000	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	
Zirconium	ug/L	-	-	ND (0.10)	ND (0.50)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.50)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.50)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.50)	ND (0.10)	ND (0.10)	

Table 5.10

Groundwater Analytical Results

2017 Operations and Monitoring Report

Campbell River Waste Management Centre

Comox Strathcona Waste Management

Sample Location:	CSR		AG99-05	AG99-06	AG99-06	AG99-06	AG99-06	AM02-01	EBA04-1	EBA04-1	EBA04-1	EBA04-1	EBA04-3	EBA04-3	EBA04-3	EBA04-3	EBA04-6	EBA04-6
Sample ID:	Schedule 3.2 ⁽¹⁾		WG-56484-	WG-56484-	WG-56484-	WG-56484-	WG-56484-	WG-56484-	WG-56484-	WG-56484-	WG-56484-	WG-56484-	WG-56484-	WG-56484-	WG-56484-	WG-56484-	WG-56484-	WG-56484-
Sample Date:	FAW	DW	281117-CR-10	280217-JS-10	300517-CR-14	040917-CR-11	281117-CR-06	040917-CR-02	280217-JS-16	290517-CR-04	040917-CR-06	281117-CR-13	280217-JS-06	290517-CR-02	040917-CR-05	281117-CR-12	280217-JS-03	300517-CR-20
Sample Date:	11/28/2017	2/28/2017	5/30/2017	9/4/2017	11/28/2017	9/4/2017	2/28/2017	5/29/2017	9/4/2017	11/28/2017	2/28/2017	5/29/2017	9/4/2017	11/28/2017	2/28/2017	5/30/2017	9/4/2017	11/28/2017
Parameters	Units	a	b															
Field Parameters																		
Dissolved Oxygen, Field	mg/L	-	-	11.60	11.54	-	11.29	9.82	8.16	6.75	-	15.1	12.23	4.27	-	8.15	5.89	14.9
ORP, Field	millivolts	-	-	193	254	244	216	217	211	105	175	108	240	235	244	221	221	91
pH, Field	s.u.	-	-	8.14	7.58	7.06	7.02	7.54	6.83	8.56	7.85	8.05	8.44	7.44	6.54	6.67	7.32	7.28
Specific Conductance, Field	uS/cm	-	-	105	253	303	325	301	99	120	81	89	98	545	582	624	576	628
Temperature, Field	Deg C	-	-	9.92	7.21	12.38	10.31	8.34	11.57	7.67	14.03	15.57	8.41	8.59	13.35	12.78	9.19	12.20
Total Dissolved Solids, Field	g/L	-	-	0.069	0.183	0.197	0.211	0.196	0.065	0.078	0.052	0.059	0.063	0.348	0.373	0.4	0.370	0.432
Turbidity, Field	NTU	-	-	3.2	16.3	13.7	15.9	9.0	8.8	0	0.3	0.2	0.4	0.1	3.5	2.4	1.1	1.4
General Chemistry																		
Alkalinity as CaCO3 Ph=8.3	mg/L	-	-	ND (1.0)	ND (0.50)	ND (0.50)	ND (1.0)	ND (1.0)	ND (1.0)	ND (0.50)	ND (0.50)	ND (1.0)	ND (1.0)	ND (0.50)	ND (0.50)	ND (1.0)	ND (1.0)	ND (0.50)
Alkalinity, Bicarbonate (as CaCO3)	mg/L	-	-	56.8	135	117	155	161	53.7	48.5	50.8	52.4	50.3	233	370	366	326	441
Alkalinity, Carbonate (as CaCO3)	mg/L	-	-	ND (1.0)	ND (0.50)	ND (0.50)	ND (1.0)	ND (1.0)	ND (1.0)	ND (0.50)	ND (0.50)	ND (1.0)	ND (1.0)	ND (0.50)	ND (0.50)	ND (1.0)	ND (1.0)	ND (0.50)
Alkalinity, Hydroxide (as CaCO3)	mg/L	-	-	ND (1.0)	ND (0.50)	ND (0.50)	ND (1.0)	ND (1.0)	ND (1.0)	ND (0.50)	ND (0.50)	ND (1.0)	ND (1.0)	ND (0.50)	ND (0.50)	ND (1.0)	ND (1.0)	ND (0.50)
Alkalinity, Total (as CaCO3)	mg/L	-	-	46.6	111	95.9	127	132	44.0	39.8	41.7	42.9	41.3	191	303	300	267	361
Chloride (Dissolved)	mg/L	1500	250	1.2	6.9	37	16	5.5	1.0	0.99	1.1	ND (1.0)	ND (1.0)	22	6.2	5.0	6.9	7.6
Fluoride	mg/L	[b]	1.5	ND (0.020)	ND (0.030)	0.023	0.030	0.024	0.025	ND (0.026)	0.019	0.022	0.022	ND (0.019)	0.015	ND (0.020)	ND (0.020)	0.013
Hardness (Dissolved)	mg/L	-	-	43.7	128	134	140	129	40.6	38.7	38.2	39.8	216	302	302	281	255	363
pH, Lab	s.u.	-	-	7.99 J	7.91 J	8.16 J	8.27 J	8.14 J	7.91 J	7.67 J	7.97 J	7.83 J	7.64 J	8.15 J	8.21 J	8.24 J	8.19 J	8.13 J
Specific Conductance, Lab	uS/cm	-	-	98.2	234	321	298	273	92.9	85.6	86.1	85.4	85.5	431	590	563	512	699
Sulphate (Dissolved)	mg/L	[b]	500	1.9	3.01	3.27	4.0	3.7 J	2.4	3.12	2.87	1.9	3.4	4.50	13.1	10.3	5.2	10.9
Nutrients																		
Ammonia-N	mg/L	[a]	-	ND (0.020)	ND (0.035)	0.026	ND (0.020)	0.027	ND (0.020)	ND (0.053)	0.024	ND (0.020)	ND (0.020)	ND (0.025)	0.031	ND (0.020)	ND (0.020)	0.022
Nitrate (as N)	mg/L	400	10	0.071	0.068	0.377	0.182 J	0.060	0.091 J	0.053	0.062	0.068 J	0.047	0.422	0.530	0.323 J	0.416	2.66
Nitrite (as N)	mg/L	[c]	1	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050) J	ND (0.0050)	ND (0.0050) J	ND (0.0050)	ND (0.0050)	ND (0.0050) J	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050) J	ND (0.0050)	ND (0.0050)
Nitrite/Nitrate	mg/L	400	10	0.071	0.068	0.377	0.182 J	0.060	0.091 J	0.053	0.062	0.068 J	0.047	0.422	0.530	0.323 J	0.416	2.66
Dissolved Metals																		
Aluminum	ug/L	-	9500	7.3	ND (3.0)	ND (5.6)	ND (3.0)	4.1	ND (3.0)	6.9	ND (8.4)	6.5	11.0	ND (3.0)	ND (3.0)	ND (3.0)	ND (3.0)	ND (3.0)
Antimony	ug/L	90	6	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)
Arsenic	ug/L	50	10	0.58	ND (0.10)	ND (0.10)	0.10	0.11	ND (0.10)	0.85	0.79	0.33	0.61	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)
Barium	ug/L	10000	1000	ND (1.0)	ND (1.0)	2.3	ND (1.0)	1.3	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	7.6	10.7	10.2	6.5	9.7
Beryllium	ug/L	1.5	8	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)
Bismuth	ug/L	-	-	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Boron	ug/L	12000	5000	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	122
Cadmium	ug/L	[b]	5	ND (0.010)	0.022	0.032	0.011	0.023	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	0.013
Calcium	ug/L	-	-	14800	40600	41400	43800	39700	13100	13300	12100	12500	13100	72300	101000	100000	94300	110000
Chromium Total	ug/L	10	50	ND (1.0)	1.2	ND (1.0)	ND (1.0)	1.2	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	1.1
Cobalt	ug/L	40	[j]	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)
Copper	ug/L	[b]	1500	0.23	ND (0.20)	0.28	0.77	0.61	ND (0.20)	1.97	0.91	0.90	1.69	ND (0.20)	0.22	ND (0.20)	ND (0.20)	1.15
Iron	ug/L	-	6500	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	5.7 J	ND (5.0)	33.9	43.4	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)
Lead	ug/L	[b]	10	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)
Lithium	ug/L	-	8	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)
Magnesium	ug/L	-	-	1650	6520	7380	7450	7180	1890	1850	2080	1720	1720	8540	12100	12400	11000	14800
Manganese	ug/L	-	1500	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	1.9	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Mercury	ug/L	0.25	1	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)
Molybdenum	ug/L	-	250	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Nickel	ug/L	[b]	80	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Phosphorus	ug/L	-	-	13	27	27	28	33	ND (10)	17	16	ND (10)	13	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)
Potassium	ug/L	-	-	404	386	450	460	478	162	275	300	235	256	785	950	914	936	1260
Selenium	ug/L	20	10	ND (0.10)	0.21	0.16	0.15	0.16	0.15	0.12	0.14	0.10	0.12	0.19	0.11	ND (0.10)	0.18	ND (0.10)
Silicon	ug/L	-	-	4440	5400	4940	4870	4580	5620	6010	6220	3570	4920	6720	8020	7710	7930	13000
Silver	ug/L	[b]	20	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)
Sodium	ug/L	-	200000	2540	3510	3550	4080	3900	2740	1360	1410	995	1260	2880	3380	3700	3920	6610
Strontium	ug/L	-	2500	22.5	87.5	112	113	100	22.4	19.1	19.9	19.6	20.4	149	218	205	189	266
Sulphur	ug/L	-	-	ND (3000) / ND (3000)	ND (3000)	ND (3000)	ND (3000)	ND (3000) / ND (3000)	ND (3000)	ND (3000)	ND (3000)	ND (3000)	ND (3000)	ND (3000)	4900	3700	ND (3000)	ND (3000)
Thallium	ug/L	3	-	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)
Tin	ug/L	-	2500	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)
Titanium	ug/L	1000	-	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)
Uranium	ug/L	85	20	ND (0.10)	0.14	0.15	0.26	0.21	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	0.14	0.26	0.22	0.17	0.36
Vanadium	ug/L	-	20	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	6.0	5.7	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)
Zinc	ug/L	[b]	3000	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	6.7	10.5	14.7	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)
Zirconium	ug/L	-	-	ND (0.10)	ND (0.50)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.50)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.50)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)

Table 5.10

**Groundwater Analytical Results
2017 Operations and Monitoring Report
Campbell River Waste Management Centre
Comox Strathcona Waste Management**

Sample Location:				EBA04-6	EBA04-6	EBA04-6	EBA04-7	EBA04-7	EBA04-7	EBA04-7	EBA04-7	EBA11-1	EBA11-1	EBA11-1	EBA11-1	EBA11-2	EBA11-2	EBA11-2	EBA11-2	EBA11-3
Sample ID:	CSR			WG-56484-	WG-56484-	WG-56484-	WG-56484-	WG-56484-	WG-56484-	WG-56484-	WG-56484-	WG-56484-	WG-56484-	WG-56484-	WG-56484-	WG-56484-	WG-56484-	WG-56484-	WG-56484-	WG-56484-
Sample Date:	Schedule 3.2 ⁽¹⁾			050917-CR-20	281117-CR-14	281117-CR-15	280217-JS-02	300517-CR-19	050917-CR-21	281117-CR-16	280217-JS-04	300517-CR-21	050917-CR-19	281117-CR-17	280217-JS-05	290517-CR-01	040917-CR-04	281117-CR-11	280217-JS-07	
	FAW	DW		9/5/2017	11/28/2017	11/28/2017	2/28/2017	5/30/2017	9/5/2017	11/28/2017	2/28/2017	5/30/2017	9/5/2017	11/28/2017	2/28/2017	5/29/2017	9/4/2017	11/28/2017	2/28/2017	
Parameters	Units	a	b			Duplicate														
Field Parameters																				
Dissolved Oxygen, Field	mg/L	-	-	6.39	11.72	11.72	13.3	-	8.29	11.67	5.22	-	8.95	7.72	7.59	-	12.67	7.44	10.6	
ORP, Field	millivolts	-	-	230	205	205	243	83	163	212	232	107	254	175	237	234	180	213	234	
pH, Field	s.u.	-	-	7.26	7.31	7.31	7.01	7.33	6.94	7.12	7.57	7.69	7.58	7.69	7.72	6.61	7.12	7.76	7.81	
Specific Conductance, Field	uS/cm	-	-	654	655	655	834	656	917	995	430	327	347	244	261	214	272	252	120	
Temperature, Field	Deg C	-	-	13.26	9.50	9.50	7.15	12.01	11.86	9.38	6.26	10.81	11.19	8.25	7.39	12.37	11.5	8.97	7.62	
Total Dissolved Solids, Field	g/L	-	-	0.419	0.419	0.419	0.534	0.420	0.586	0.637	0.278	0.211	0.227	0.159	0.17	0.139	0.17	0.164	0.078	
Turbidity, Field	NTU	-	-	0.7	0.7	0.7	0.6	6.2	1.5	3.1	8	22.8	4	5.0	23	565	22.9	110.0	22	
General Chemistry																				
Alkalinity as CaCO3 Ph=8.3	mg/L	-	-	ND (1.0)	ND (1.0)	ND (1.0)	ND (0.50)	ND (0.50)	ND (1.0)	ND (1.0)	ND (0.50)	ND (0.50)	1.4	ND (1.0)	ND (0.50)	ND (0.50)	ND (1.0)	ND (1.0)	ND (0.50)	
Alkalinity, Bicarbonate (as CaCO3)	mg/L	-	-	360	376	382	400	402	367	512	204	188	182	121	132	133	156	133	54.9	
Alkalinity, Carbonate (as CaCO3)	mg/L	-	-	ND (1.0)	ND (1.0)	ND (1.0)	ND (0.50)	ND (0.50)	ND (1.0)	ND (1.0)	ND (0.50)	ND (0.50)	1.7	ND (1.0)	ND (0.50)	ND (0.50)	ND (1.0)	ND (1.0)	ND (0.50)	
Alkalinity, Hydroxide (as CaCO3)	mg/L	-	-	ND (1.0)	ND (1.0)	ND (1.0)	ND (0.50)	ND (0.50)	ND (1.0)	ND (1.0)	ND (0.50)	ND (0.50)	ND (1.0)	ND (1.0)	ND (0.50)	ND (0.50)	ND (1.0)	ND (1.0)	ND (0.50)	
Alkalinity, Total (as CaCO3)	mg/L	-	-	295	308	313	327	329	301	420	167	154	152	98.9	108	109	128	109	45.0	
Chloride (Dissolved)	mg/L	1500	250	5.9	4.0	4.0	19	19	67	40	4.6	4.9	4.3	4.7 J	5.0	5.0	7.1	5.5	2.0	
Fluoride	mg/L	[b]	1.5	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.023)	0.015	0.022	ND (0.020)	ND (0.025)	0.018	0.023	0.020	ND (0.030)	0.020	0.028	0.025	ND (0.024)	
Hardness (Dissolved)	mg/L	-	-	321	305	304	346	321	377	438	176	161	153	101	103	102	121	116	46.4	
pH, Lab	s.u.	-	-	8.17 J	8.22 J	8.21 J	8.16 J	8.06 J	8.04 J	8.09 J	8.29 J	8.25 J	8.32 J	8.18 J	8.12 J	8.27 J	8.26 J	8.23 J	7.78 J	
Specific Conductance, Lab	uS/cm	-	-	582	582	574	678	696	791	901	352	345	321	218	221	223	259	225	104	
Sulphate (Dissolved)	mg/L	[b]	500	13.6	1.5	1.5	15.9	13.6	12.0	13.2	13.6	14.7	10.0	6.0 J	3.32	2.38	3.0	2.1	3.48	
Nutrients																				
Ammonia-N	mg/L	[a]	-	0.025	0.048 J	ND (0.020) J	ND (0.031)	0.025	0.048	0.064	ND (0.038)	0.019	0.024	ND (0.020)	ND (0.041)	0.025	0.029	0.026	ND (0.037)	
Nitrate (as N)	mg/L	400	10	2.61 J	2.25	2.29	1.58	3.21	4.07 J	1.98	0.823	1.96	1.01 J	0.654	0.205	0.254	0.278 J	0.203	0.104	
Nitrite (as N)	mg/L	[c]	1	ND (0.0050) J	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050) J	0.0146	ND (0.0050)	0.0055	ND (0.0050) J	0.0053	0.0071	ND (0.0050)	ND (0.0050) J	ND (0.0050)	0.0067	
Nitrite/Nitrate	mg/L	400	10	2.61 J	2.25	2.29	1.58	3.21	4.07 J	1.99	0.823	1.96	1.01 J	0.659	0.212	0.254	0.278 J	0.203	0.110	
Dissolved Metals																				
Aluminum	ug/L	-	9500	ND (3.0)	ND (3.0)	ND (3.0)	ND (3.0)	ND (3.0)	ND (3.0)	ND (3.0)	ND (3.0)	43.7	3.2	ND (3.0)	3.4	ND (7.8)	3.2	5.2	ND (3.0)	
Antimony	ug/L	90	6	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	
Arsenic	ug/L	50	10	ND (0.10)	ND (0.10)	0.11	0.16	0.13	0.12	0.15	0.26	0.23	0.23	0.26	0.14	0.14	0.14	0.16	0.21	
Barium	ug/L	10000	1000	8.6	7.6	7.7	13.4	12.7	15.6	17.3	5.1	4.4	4.6	2.8	5.6	5.3	7.0	5.6	ND (1.0)	
Beryllium	ug/L	1.5	8	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	
Bismuth	ug/L	-	-	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	
Boron	ug/L	12000	5000	108	57	61	288	230	212	275	85	101	82	117	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	
Cadmium	ug/L	[b]	5	0.014	0.010	0.010	0.029	0.025	0.031	0.038	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	
Calcium	ug/L	-	-	99000	92200	91000	102000	91500	110000	129000	52100	47600	45000	29200	27300	27000	33000	31200	14600	
Chromium Total	ug/L	10	50	ND (1.0)	1.2	1.2	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	1.7	1.6	1.5	1.5	2.3	2.3	1.7	2.4	ND (1.0)	
Cobalt	ug/L	40	[j]	ND (0.20)	ND (0.20)	ND (0.20)	0.35	0.26	0.31	0.38	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	
Copper	ug/L	[b]	1500	0.51	ND (0.20)	ND (0.20)	2.18	1.58	1.64	3.39	0.50	0.75	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	
Iron	ug/L	-	6500	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	6.5	ND (5.0)	ND (5.0)	ND (5.0)	11.7	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	
Lead	ug/L	[b]	10	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	
Lithium	ug/L	-	8	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	
Magnesium	ug/L	-	-	17800	18100	18600	22100	22400	24900	28400	11100	10200	9990	6770	8450	8490	9340	9250	2430	
Manganese	ug/L	-	1500	ND (1.0)	ND (1.0)	ND (1.0)	51.6	55.4	68.9	81.4	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	
Mercury	ug/L	0.25	1	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	
Molybdenum	ug/L	-	250	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	
Nickel	ug/L	[b]	80	ND (1.0)	ND (1.0)	ND (1.0)	1.1	1.0	ND (1.0)	1.9	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	
Phosphorus	ug/L	-	-	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	11	25	23	25	22	ND (10)	ND (10)	ND (10)	ND (10)	27	
Potassium	ug/L	-	-	1380	1440	1430	1940	2060	2020	2220	782	718	725	579	407	407	513	499	245	
Selenium	ug/L	20	10	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	0.14	0.14	0.15	0.17	0.15	
Silicon	ug/L	-	-	11700	11400	11300	12000	13400	11700	12800	7890	7730	7640	6750	8040	8630	8320	8300	4530	
Silver	ug/L	[b]	20	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)	
Sodium	ug/L	-	200000	6460	7090	7430	16000	18300	18200	21400	6030	4700	4910	3930	3810	3540	3790	1330		
Strontium	ug/L	-	2500	213	208	210	265	271	303	345	110	106	95.4	66.2	59.2	58.8	67.7	64.8	25.2	
Sulphur	ug/L	-	-	3900	ND (3000)	ND (3000)	5500	5500	4400	5400 / 5400	4600	4800	3800	ND (3000) / ND (300	ND (3000)	ND (3000)	ND (3000)	ND (3000)	ND (3000)	
Thallium	ug/L	3	-	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	
Tin	ug/L	-	2500	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	
Titanium	ug/L	1000	-	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	
Uranium	ug/L	85	20	0.30	0.25	0.24	0.87	0.72	0.72	0.39	0.39	0.34	0.19	0.14	0.15	0.20	0.17	ND (0.10)		
Vanadium	ug/L	-	20	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	6.2	5.2	5.6	6.0	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	
Zinc	ug/L	[b]	3000	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	9.1	ND (5.0)	
Zirconium	ug/L	-	-	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.50)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.50)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.50)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.50)	

Table 5.10

Groundwater Analytical Results

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Comox Strathcona Waste Management

Sample Location:		CSR		EBA11-3	EBA11-3	EBA11-3	EBA11-3	EBA11-3	EBA11-3	EBA11-4	EBA11-4	EBA11-4	EBA11-4	EBA11-4	EBA11-4	HBT94-1	HBT94-1	HBT94-1	HBT94-1	HBT94-2
Sample ID:		Schedule 3.2 ⁽¹⁾		WG-56484-300517-CR-11	WG-56484-300517-CR-12	WG-56484-040917-CR-08	WG-56484-281117-CR-07	WG-56484-281117-CR-08	WG-56484-280217-JS-09	WG-56484-280217-JS-09	WG-56484-300517-CR-13	WG-56484-040917-CR-09	WG-56484-040917-CR-10	WG-56484-281117-CR-09	WG-56484-010317-JS-20	WG-56484-300517-CR-18	WG-56484-040917-CR-15	WG-56484-281117-CR-19	WG-56484-280217-JS-12	
Sample Date:		FAW	DW	5/30/2017	5/30/2017	9/4/2017	11/28/2017	11/28/2017	2/28/2017	2/28/2017	5/30/2017	9/4/2017	9/4/2017	11/28/2017	3/1/2017	5/30/2017	9/4/2017	11/28/2017	2/28/2017	
Parameters	Units	a	b	Duplicate		Duplicate		Duplicate		Duplicate		Duplicate		Duplicate		Duplicate		Duplicate		
Field Parameters																				
Dissolved Oxygen, Field	mg/L	-	-	-	-	8.17	8.78	8.78	7.11	7.11	-	8.23	8.23	12.43	10.34	-	8.59	1.01	1.2	
ORP, Field	millivolts	-	-	193	193	237	230	230	237	237	247	232	232	206	251	-46	-38	-60	-27	
pH, Field	s.u.	-	-	7.81	7.81	6.92	6.54	6.54	7.85	7.85	6.57	7.59	7.59	7.25	6.93	7.21	7.30	7.13	7.18	
Specific Conductance, Field	uS/cm	-	-	95	95	134	502	502	161	161	118	129	129	132	-	601	615	607	753	
Temperature, Field	Deg C	-	-	11.32	11.32	11.75	10.43	10.43	7.39	7.39	11.42	11.31	11.31	10.56	8.14	14.59	12.36	10.96	9.89	
Total Dissolved Solids, Field	g/L	-	-	0.062	0.062	0.087	0.321	0.321	0.105	0.105	0.077	0.084	0.084	0.086	0.361	0.385	0.395	0.388	0.433	
Turbidity, Field	NTU	-	-	5.8	5.8	15.1	0.9	0.9	21	21	22.3	29.3	29.3	11.9	2.2	1.8	4.9	0.7	0	
General Chemistry																				
Alkalinity as CaCO3 Ph=8.3	mg/L	-	-	ND (0.50)	ND (0.50)	ND (1.0)	ND (1.0)	ND (1.0)	ND (0.50)	ND (0.50)	ND (0.50)	ND (1.0)	ND (1.0)	ND (1.0)	ND (0.50)	ND (0.50)	ND (1.0)	ND (1.0)	ND (0.50)	
Alkalinity, Bicarbonate (as CaCO3)	mg/L	-	-	56.0	53.7	60.7	61.7	56.4	61.3	62.0	63.9	65.0	64.6	61.6	292	272	319	302	353	
Alkalinity, Carbonate (as CaCO3)	mg/L	-	-	ND (0.50)	ND (0.50)	ND (1.0)	ND (1.0)	ND (1.0)	ND (0.50)	ND (0.50)	ND (0.50)	ND (1.0)	ND (1.0)	ND (1.0)	ND (0.50)	ND (0.50)	ND (1.0)	ND (1.0)	ND (0.50)	
Alkalinity, Hydroxide (as CaCO3)	mg/L	-	-	ND (0.50)	ND (0.50)	ND (1.0)	ND (1.0)	ND (1.0)	ND (0.50)	ND (0.50)	ND (0.50)	ND (1.0)	ND (1.0)	ND (1.0)	ND (0.50)	ND (0.50)	ND (1.0)	ND (1.0)	ND (0.50)	
Alkalinity, Total (as CaCO3)	mg/L	-	-	45.9	44.1	49.8	50.6	46.2	50.2	50.8	52.3	53.3	52.9	50.5	239	223	262	248	289	
Chloride (Dissolved)	mg/L	1500	250	2.9	2.9	4.8	100	100	9.3	9.5	6.6	4.8	4.8	4.7	25	17	30	35	26	
Fluoride	mg/L	[b]	1.5	0.016	0.016	0.024	ND (0.020)	ND (0.020)	ND (0.029)	ND (0.027)	0.021	0.028	0.025	ND (0.020)	ND (0.022)	0.017	0.023	ND (0.020)	ND (0.021)	
Hardness (Dissolved)	mg/L	-	-	44.4	45.8	54.3	180	181	54.2	54.8	52.5	49.8	49.9	51.6	218	199	219	221	225	
pH, Lab	s.u.	-	-	7.95 J	7.94 J	7.98 J	7.96 J	7.90 J	7.79 J	7.83 J	8.05 J	7.96 J	8.00 J	8.02 J	8.19 J	7.89 J	8.28 J	7.85 J	7.78 J	
Specific Conductance, Lab	uS/cm	-	-	99.7	99.7	124	451	452	136	137	125	118	119	117	536	478	575	566	624	
Sulphate (Dissolved)	mg/L	[b]	500	3.12	3.14	2.7	2.5	2.7	2.58	2.61	2.07	1.6 J	3.0 J	1.3	4.90	1.03	ND (1.0)	ND (1.0)	2.91	
Nutrients																				
Ammonia-N	mg/L	[a]	-	0.016	0.019	0.043	ND (0.020)	ND (0.020)	ND (0.033)	ND (0.045)	0.026	ND (0.020)	ND (0.020)	0.030	3.4	2.8	4.1	2.9	1.8	
Nitrate (as N)	mg/L	400	10	0.065	0.065	0.589 J	0.420	0.405	0.233	0.222	0.174	0.100 J	0.103 J	0.080	0.189	0.057	ND (0.020) J	ND (0.020)	ND (0.020)	
Nitrite (as N)	mg/L	[c]	1	ND (0.0050)	ND (0.0050)	ND (0.0050) J	ND (0.0050)	ND (0.0050)	0.0080	0.0081	0.0068	0.0055 J	0.0064 J	ND (0.0050)	0.0109	ND (0.0050)	ND (0.0050) J	0.0061	ND (0.0050)	
Nitrite/Nitrate	mg/L	400	10	0.065	0.065	0.589 J	0.420	0.405	0.241	0.230	0.181	0.106 J	0.109 J	0.080	0.199	0.057	ND (0.020) J	ND (0.020)	ND (0.020)	
Dissolved Metals																				
Aluminum	ug/L	-	9500	ND (3.0)	ND (3.0)	ND (3.0)	ND (3.0)	ND (3.0)	3.9	5.1	ND (10.4)	3.7	4.3	5.4	3.2	ND (8.2)	5.1	5.2	4.6	
Antimony	ug/L	90	6	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	
Arsenic	ug/L	50	10	0.20	0.21	0.18	0.12	0.11	1.75	1.76	1.98	1.76	1.71	1.61	0.48	0.64	0.83	0.37	3.58	
Barium	ug/L	10000	1000	ND (1.0)	ND (1.0)	ND (1.0)	1.8	1.8	1.6	1.6	1.5	1.4	1.4	1.6	10.2	12.5	10.7	13.4	14.3	
Beryllium	ug/L	1.5	8	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	
Bismuth	ug/L	-	-	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	
Boron	ug/L	12000	5000	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	246	205	172	173	702	
Cadmium	ug/L	[b]	5	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	0.112	ND (0.010)	0.012	ND (0.010)	0.053	
Calcium	ug/L	-	-	14100	14500	17100	57100	57700	16700	16800	16000	15300	15400	15700	74000	67600	73900	74700	76300	
Chromium Total	ug/L	10	50	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	1.8	1.8	1.6	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	
Cobalt	ug/L	40	[j]	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	0.36	0.29	0.26	0.25	0.39	
Copper	ug/L	[b]	1500	ND (0.20)	ND (0.20)	ND (0.20)	0.21	0.21	ND (0.20)	ND (0.20)	0.27	ND (0.20)	ND (0.20)	ND (0.20)	1.22	0.93	0.51	0.23	0.40	
Iron	ug/L	-	6500	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	6.9 J	2210	1580	3660	750 J	
Lead	ug/L	[b]	10	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	
Lithium	ug/L	-	8	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	
Magnesium	ug/L	-	-	2250	2320	2840	9160	8990	3020	3150	3020	2800	2760	2990	8090	7350	8360	8360	8330	
Manganese	ug/L	-	1500	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	1940 ^b	1890 ^b	2000 ^b	2410 ^b	
Mercury	ug/L	0.25	1	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	
Molybdenum	ug/L	-	250	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	
Nickel	ug/L	[b]	80	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	1.3	1.0	1.1	1.3	2.4	
Phosphorus	ug/L	-	-	26	28	24	14	15	44	45	51	44	47	39	ND (10)					

Table 5.10

Groundwater Analytical Results
2017 Operations and Monitoring Report
Campbell River Waste Management Centre
Comox Strathcona Waste Management

Sample Location:		CSR		HBT94-2	HBT94-2	HBT94-2	HBT94-2	HBT94-2	HBT94-3	HBT94-3	HBT94-3	HBT94-3	HBT94-3	MW01-16	MW01-16	MW01-16	MW01-16
Sample ID:		Schedule 3.2 ⁽¹⁾		WG-56484-	WG-56484-	WG-56484-	WG-56484-	WG-56484-	WG-56484-	WG-56484-	WG-56484-	WG-56484-	WG-56484-	WG-56484-	WG-56484-	WG-56484-	WG-56484-
Sample Date:		FAW	DW	280217-JS-13	300517-CR-17	040917-CR-13	040917-CR-14	281117-CR-20	280217-JS-11	300517-CR-15	300517-CR-16	040917-CR-12	281117-CR-18	280217-JS-01	290517-CR-03	040917-CR-01	261117-CR-01
				2/28/2017	5/30/2017	9/4/2017	9/4/2017	11/28/2017	2/28/2017	5/30/2017	5/30/2017	9/4/2017	11/28/2017	2/28/2017	5/29/2017	9/4/2017	11/26/2017
Parameters	Units	a	b	Duplicate			Duplicate				Duplicate						
Field Parameters																	
Dissolved Oxygen, Field	mg/L	-	-	1.2	-	11.32	11.32	1.89	2.75	-	-	12.9	3.82	9.24	-	10.76	11.91
ORP, Field	millivolts	-	-	-27	-33	-42	-42	-52	-6.5	-44	-44	-44	-42	275	215	227	226
pH, Field	s.u.	-	-	7.18	6.88	7.17	7.17	7.41	6.84	6.76	6.76	6.90	6.82	6.84	7.32	7.13	6.60
Specific Conductance, Field	uS/cm	-	-	753	1210	587	587	330	958	839	839	848	936	95	57	78	107
Temperature, Field	Deg C	-	-	9.89	14.06	12.24	12.24	10.84	10.47	14.55	14.55	13.76	10.97	11.69	13.26	13.24	13.40
Total Dissolved Solids, Field	g/L	-	-	0.433	0.777	0.374	0.374	0.208	0.615	0.537	0.537	0.545	0.599	0.0062	0.037	0.051	0.071
Turbidity, Field	NTU	-	-	0	4.3	3.6	3.6	5.1	0	30.8	30.8	4.5	0.8	11	18.7	22	10.2
General Chemistry																	
Alkalinity as CaCO3 Ph=8.3	mg/L	-	-	ND (0.50)	ND (0.50)	ND (1.0)	ND (1.0)	ND (1.0)	ND (0.50)	ND (0.50)	ND (0.50)	ND (1.0)	ND (1.0)	ND (0.50)	ND (0.50)	ND (1.0)	ND (1.0)
Alkalinity, Bicarbonate (as CaCO3)	mg/L	-	-	358	745	305	295	157	395	455	454	405	439	45.6	39.9	42.1	58.4
Alkalinity, Carbonate (as CaCO3)	mg/L	-	-	ND (0.50)	ND (0.50)	ND (1.0)	ND (1.0)	ND (1.0)	ND (0.50)	ND (0.50)	ND (0.50)	ND (1.0)	ND (1.0)	ND (0.50)	ND (0.50)	ND (1.0)	ND (1.0)
Alkalinity, Hydroxide (as CaCO3)	mg/L	-	-	ND (0.50)	ND (0.50)	ND (1.0)	ND (1.0)	ND (1.0)	ND (0.50)	ND (0.50)	ND (0.50)	ND (1.0)	ND (1.0)	ND (0.50)	ND (0.50)	ND (1.0)	ND (1.0)
Alkalinity, Total (as CaCO3)	mg/L	-	-	294	610	250	242	129	324	373	372	332	360	37.4	32.7	34.5	47.8
Chloride (Dissolved)	mg/L	1500	250	26	56	19	19	6.9	46	51	51	48	49	0.94	1.3	ND (1.0)	1.2
Fluoride	mg/L	[b]	1.5	ND (0.022)	0.017	0.025	0.025	ND (0.020)	ND (0.030)	0.022	0.021	0.034	0.022	ND (0.029)	0.017	0.021	ND (0.020)
Hardness (Dissolved)	mg/L	-	-	220	508	136	142	56.3	247	275	272	214	253	32.9	28.7	33.0	44.7
pH, Lab	s.u.	-	-	7.80 J	7.46 J	8.27 J	8.27 J	8.09 J	8.10 J	7.94 J	8.03 J	7.86 J	7.87 J	7.66 J	7.77 J	7.74 J	7.80 J
Specific Conductance, Lab	uS/cm	-	-	626	1250	531	520	281	760	867	866	776	841	78.1	62.2	76.6	93.6
Sulphate (Dissolved)	mg/L	[b]	500	2.98	2.09	1.9	2.1	2.1	ND (0.50)	ND (0.50)	ND (0.50)	2.6	ND (1.0)	2.78	2.81	2.0	2.4
Nutrients																	
Ammonia-N	mg/L	[a]	-	1.6	5.3	15	15	11	17	15	16	15	18	ND (0.039)	0.013	ND (0.020)	ND (0.020)
Nitrate (as N)	mg/L	400	10	ND (0.020)	ND (0.020)	ND (0.020) J	ND (0.020) J	ND (0.020)	ND (0.020)	0.049 J	ND (0.020) J	ND (0.020) J	ND (0.020)	0.055	0.112	0.070 J	0.044
Nitrite (as N)	mg/L	[c]	1	ND (0.0050)	ND (0.0050)	ND (0.0050) J	ND (0.0050) J	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050) J	ND (0.0050)	0.0065	0.0053	ND (0.0050) J	0.0067
Nitrite/Nitrate	mg/L	400	10	ND (0.020)	ND (0.020)	ND (0.020) J	ND (0.020) J	ND (0.020)	ND (0.020)	0.049 J	ND (0.020) J	ND (0.020) J	ND (0.020)	0.061	0.118	0.070 J	0.051
Dissolved Metals																	
Aluminum	ug/L	-	9500	4.0	ND (4.1)	4.6	4.5	5.5	ND (3.0)	ND (3.0)	ND (9.3)	ND (3.0)	ND (3.0)	6.2	ND (6.0)	3.1	ND (3.0)
Antimony	ug/L	90	6	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)
Arsenic	ug/L	50	10	3.60	4.35	3.12	2.97	2.79	2.94	3.27	3.15	2.81	4.29	0.20	0.11	ND (0.10)	ND (0.10)
Barium	ug/L	10000	1000	14.5	40.6	16.4	16.7	7.3	26.3	27.8	28.9	28.3	33.1	4.2	2.1	1.9	ND (3.2)
Beryllium	ug/L	1.5	8	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)
Bismuth	ug/L	-	-	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Boron	ug/L	12000	5000	702	586	602	595	187	429	506	509	321	463	ND (50)	ND (50)	ND (50)	ND (50)
Cadmium	ug/L	[b]	5	0.055	0.065	0.039	0.040	0.014	ND (0.010)	ND (0.010)	ND (0.010)	0.012	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)
Calcium	ug/L	-	-	74200	173000	46700	48900	19500	76000	85500	84800	67100	78900	10600	9290	10400	ND (14700)
Chromium Total	ug/L	10	50	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Cobalt	ug/L	40	[j]	0.39	0.63	0.35	0.33	ND (0.20)	0.78	0.86	0.84	1.70	1.26	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)
Copper	ug/L	[b]	1500	0.43	0.66	0.44	0.39	0.31	0.32	0.32	0.36	ND (0.20)	0.35	ND (0.20)	0.45	ND (0.20)	ND (0.20)
Iron	ug/L	-	6500	744 J	1650	628	643	268	2880 J	2640	2640	3070	2620	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)
Lead	ug/L	[b]	10	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)
Lithium	ug/L	-	8	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)
Magnesium	ug/L	-	-	8300	18200	4720	4810	1860	13900	15000	14600	11300	13700	1560	1340	1720	ND (1940)
Manganese	ug/L	-	1500	2180 ^b	5030 ^b	1540 ^b	1540 ^b	623	2120 ^b	2340 ^b	2230 ^b	2240 ^b	2590 ^b	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Mercury	ug/L	0.25	1	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)
Molybdenum	ug/L	-	250	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Nickel	ug/L	[b]	80	2.4	2.9	2.4	2.5	ND (1.0)	2.9	3.4	3.3	2.8	3.1	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Phosphorus	ug/L	-	-	26	32	24	25	38	36	34	43	23	18	ND (10)	ND (10)	ND (10)	ND (10)
Potassium	ug/L	-	-	3780	6180	5340	5290	3880	9030	8460	8250	7810	9220	248	159	150	ND (227)
Selenium	ug/L	20	10	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	0.11	ND (0.10)	0.10	ND (0.10)
Silicon	ug/L	-	-	11100	12900	10700	10700	10200	15500	15400	15600	13700	4450	4020	3780	ND (4780)	ND (4780)
Silver	ug/L	[b]	20	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)
Sodium	ug/L	-	200000	45300	68100	32000	32400	17900	37300	41300	40700	45400	42200	1300	1030	1130	ND (1420)
Strontium	ug/L	-	2500	245	650	212	213	90.5	280	344	332	261	311	15.8	12.5	15.2	ND (21.6)
Sulphur	ug/L	-	-	ND (3000)	ND (3000)	ND (3000)	ND (3000)	ND (3000)	ND (3000)	ND (3000)	ND (3000)	ND (3000)	ND (3000)	ND (3000)	ND (3000)	ND (3000)	ND (3000)
Thallium	ug/L	3	-	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)
Tin	ug/L	-	2500	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)
Titanium	ug/L	1000	-	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)
Uranium	ug/L	85	20	0.15	0.43	0.11	0.10	ND (0.10)	ND (0.10)	0.16	0.16	0.18	0.38	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)
Vanadium	ug/L	-	20	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)
Zinc	ug/L	[b]	3000	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)
Zirconium	ug/L	-	-	ND (0.50)	0.40	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.50)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.50)	ND (0.10)	ND (0.10)	ND (0.10)

Table 5.11

Groundwater Analytical Results - Volatile Organic Compounds
2017 Operations and Monitoring Report
Campbell River Waste Management Centre
Comox Strathcona Waste Management

Sample Location:	CSR			AG99-06	AG99-06	AM02-01	EBA04-7	EBA04-7	EBA11-1	EBA11-1	EBA11-3	EBA11-3	EBA11-4	EBA11-4	EBA11-4	EBA11-4	HBT94-2	HBT94-2
Sample ID:	Schedule 3.2 ⁽¹⁾			WG-56484-	WG-56484-	WG-56484-	WG-56484-	WG-56484-	WG-56484-	WG-56484-	WG-56484-	WG-56484-	WG-56484-	WG-56484-	WG-56484-	WG-56484-	WG-56484-	WG-56484-
Sample Date:	FAW			280217-JS-10	040917-CR-11	040917-CR-02	280217-JS-02	050917-CR-21	280217-JS-04	050917-CR-19	280217-JS-07	040917-CR-08	280217-JS-08	280217-JS-09	040917-CR-09	040917-CR-10	280217-JS-12	280217-JS-13
	DW			2/28/2017	9/4/2017	9/4/2017	2/28/2017	9/5/2017	2/28/2017	9/5/2017	2/28/2017	9/4/2017	2/28/2017	2/28/2017	9/4/2017	9/4/2017	2/28/2017	2/28/2017
Parameters	Units	a	b											Duplicate		Duplicate		Duplicate
Petroleum Products																		
Total Petroleum Hydrocarbons VPH (C6-C10)LessBTEX	mg/L	1.5	-	ND (0.3)	ND (0.3)	ND (0.3)	ND (0.3)	ND (0.3)	ND (0.3)	ND (0.3)	ND (0.3)	ND (0.3)	ND (0.3)	ND (0.3)	ND (0.3)	ND (0.3)	ND (0.3)	ND (0.3)
Total Petroleum Hydrocarbons VH (C6-C10)	mg/L	-	-	ND (0.3)	ND (0.3)	ND (0.3)	ND (0.3)	ND (0.3)	ND (0.3)	ND (0.3)	ND (0.3)	ND (0.3)	ND (0.3)	ND (0.3)	ND (0.3)	ND (0.3)	ND (0.3)	ND (0.3)
Volatile Organic Compounds																		
1,1,1,2-Tetrachloroethane	ug/L	-	6	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)
1,1,1-Trichloroethane	ug/L	-	8000	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)
1,1,2,2-Tetrachloroethane	ug/L	-	0.8	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)
1,1,2-Trichloroethane	ug/L	-	3	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)
1,1-Dichloroethane	ug/L	-	30	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)
1,1-Dichloroethene	ug/L	-	14	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)
1,2,3-Trichlorobenzene	ug/L	80	3	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)
1,2,4-Trichlorobenzene	ug/L	240	5.5	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)
1,2-Dibromoethane (Ethylene dibromide)	ug/L	-	0.5	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)
1,2-Dichlorobenzene	ug/L	7	200	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)
1,2-Dichloroethane	ug/L	1000	5	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)
1,2-Dichloropropane	ug/L	-	4.5	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)
1,3-Butadiene	ug/L	-	1	ND (5.0)	-	-	ND (5.0)	-	ND (5.0)	-	ND (5.0)	-	ND (5.0)	ND (5.0)	-	-	ND (5.0)	ND (5.0)
1,3-Dichlorobenzene	ug/L	1500	-	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)
1,4-Dichlorobenzene	ug/L	260	5	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)
Benzene	ug/L	400	5	ND (0.40)	ND (0.40)	ND (0.40)	ND (0.40)	ND (0.40)	ND (0.40)	ND (0.40)	ND (0.40)	ND (0.40)	ND (0.40)	ND (0.40)	ND (0.40)	ND (0.40)	ND (0.40)	ND (0.40)
Bromobenzene	ug/L	-	30	ND (2.0)	-	-	ND (2.0)	-	ND (2.0)	-	ND (2.0)	-	ND (2.0)	ND (2.0)	-	-	ND (2.0)	ND (2.0)
Bromodichloromethane	ug/L	-	100	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Bromoform	ug/L	-	100	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Bromomethane (Methyl bromide)	ug/L	-	5.5	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Carbon tetrachloride	ug/L	130	2	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)
Chlorobenzene	ug/L	13	80	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	1.3	1.3
Chloroethane	ug/L	-	-	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Chloroform (Trichloromethane)	ug/L	20	100	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Chloromethane (Methyl chloride)	ug/L	-	-	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
cis-1,2-Dichloroethene	ug/L	-	8	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
cis-1,3-Dichloropropene	ug/L	-	-	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Dibromochloromethane	ug/L	-	100	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Dibromomethane	ug/L	-	-	ND (0.90)	-	-	ND (0.90)	-	ND (0.90)	-	ND (0.90)	-	ND (0.90)	ND (0.90)	-	-	ND (0.90)	ND (0.90)
Dichlorodifluoromethane (CFC-12)	ug/L	-	800	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)
Ethylbenzene	ug/L	2000	140	ND (0.40)	ND (0.40)	ND (0.40)	ND (0.40)	ND (0.40)	ND (0.40)	ND (0.40)	ND (0.40)	ND (0.40)	ND (0.40)	ND (0.40)	ND (0.40)	ND (0.40)	ND (0.40)	ND (0.40)
Hexachlorobutadiene	ug/L	15	2	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)
m&p-Xylene	ug/L	-	-	ND (0.40)	ND (0.40)	ND (0.40)	ND (0.40)	ND (0.40)	ND (0.40)	ND (0.40)	ND (0.40)	ND (0.40)	ND (0.40)	ND (0.40)	ND (0.40)	ND (0.40)	ND (0.40)	ND (0.40)
Methyl Tert Butyl Ether	ug/L	34000	95	ND (4.0)	ND (4.0)	ND (4.0)	ND (4.0)	ND (4.0)	ND (4.0)	ND (4.0)	ND (4.0)	ND (4.0)	ND (4.0)	ND (4.0)	ND (4.0)	ND (4.0)	ND (4.0)	ND (4.0)
Methylene chloride	ug/L	-	50	2.2	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)
o-Xylene	ug/L	-	-	ND (0.40)	ND (0.40)	ND (0.40)	ND (0.40)	ND (0.40)	ND (0.40)	ND (0.40)	ND (0.40)	ND (0.40)	ND (0.40)	ND (0.40)	ND (0.40)	ND (0.40)	ND (0.40)	ND (0.40)
Styrene	ug/L	720	800	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)
Tetrachloroethene	ug/L	1100	30	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)
Toluene	ug/L	5	60	ND (0.40)	ND (0.40)	ND (0.40)	ND (0.40)	ND (0.40)	ND (0.40)	ND (0.40)	ND (0.40)	ND (0.40)	ND (0.40)	ND (0.40)	ND (0.40)	ND (0.40)	ND (0.40)	ND (0.40)
trans-1,2-Dichloroethene	ug/L	-	80	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
trans-1,3-Dichloropropene	ug/L	-	-	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Trichloroethene	ug/L	200	5	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)
Trichlorofluoromethane (CFC-11)	ug/L	-	1000	ND (4.0)	ND (4.0)	ND (4.0)	ND (4.0)	ND (4.0)	ND (4.0)	ND (4.0)	ND (4.0)	ND (4.0)	ND (4.0)	ND (4.0)	ND (4.0)	ND (4.0)	ND (4.0)	ND (4.0)
Trifluorotrichloroethane (Freon 113)	ug/L	-	100000	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)
Vinyl chloride	ug/L	-	2	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)
Xylene (total)	ug/L	300	90	ND (0.40)	ND (0.40)	ND (0.40)	ND (0.40)	ND (0.40)	ND (0.40)	ND (0.40)	ND (0.40)	ND (0.40)	ND (0.40)	ND (0.40)	ND (0.40)	ND (0.40)	ND (0.40)	ND (0.40)

Table 5.11

Groundwater Analytical Results - Volatile Organic Compounds
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Campbell River Waste Management Centre
Comox Strathcona Waste Management

Sample Location:		CSR		HBT94-3	MW01-16	MW01-16
Sample ID:		Schedule 3.2 ⁽¹⁾		WG-56484-	WG-56484-	WG-56484-
Sample Date:		FAW	DW	040917-CR-12	280217-JS-01	040917-CR-01
				9/4/2017	2/28/2017	9/4/2017
Parameters	Units	a	b			
Petroleum Products						
Total Petroleum Hydrocarbons VPH (C6-C10)LessBTEX	mg/L	1.5	-	ND (0.3)	ND (0.3)	ND (0.3)
Total Petroleum Hydrocarbons VH (C6-C10)	mg/L	-	-	ND (0.3)	ND (0.3)	ND (0.3)
Volatile Organic Compounds						
1,1,1,2-Tetrachloroethane	ug/L	-	6	ND (0.50)	ND (0.50)	ND (0.50)
1,1,1-Trichloroethane	ug/L	-	8000	ND (0.50)	ND (0.50)	ND (0.50)
1,1,2,2-Tetrachloroethane	ug/L	-	0.8	ND (0.50)	ND (0.50)	ND (0.50)
1,1,2-Trichloroethane	ug/L	-	3	ND (0.50)	ND (0.50)	ND (0.50)
1,1-Dichloroethane	ug/L	-	30	ND (0.50)	ND (0.50)	ND (0.50)
1,1-Dichloroethene	ug/L	-	14	ND (0.50)	ND (0.50)	ND (0.50)
1,2,3-Trichlorobenzene	ug/L	80	3	ND (2.0)	ND (2.0)	ND (2.0)
1,2,4-Trichlorobenzene	ug/L	240	5.5	ND (2.0)	ND (2.0)	ND (2.0)
1,2-Dibromoethane (Ethylene dibromide)	ug/L	-	0.5	ND (0.20)	ND (0.20)	ND (0.20)
1,2-Dichlorobenzene	ug/L	7	200	ND (0.50)	ND (0.50)	ND (0.50)
1,2-Dichloroethane	ug/L	1000	5	ND (0.50)	ND (0.50)	ND (0.50)
1,2-Dichloropropane	ug/L	-	4.5	ND (0.50)	ND (0.50)	ND (0.50)
1,3-Butadiene	ug/L	-	1	-	ND (5.0)	-
1,3-Dichlorobenzene	ug/L	1500	-	ND (0.50)	ND (0.50)	ND (0.50)
1,4-Dichlorobenzene	ug/L	260	5	ND (0.50)	ND (0.50)	ND (0.50)
Benzene	ug/L	400	5	ND (0.40)	ND (0.40)	ND (0.40)
Bromobenzene	ug/L	-	30	-	ND (2.0)	-
Bromodichloromethane	ug/L	-	100	ND (1.0)	ND (1.0)	ND (1.0)
Bromoform	ug/L	-	100	ND (1.0)	ND (1.0)	ND (1.0)
Bromomethane (Methyl bromide)	ug/L	-	5.5	ND (1.0)	ND (1.0)	ND (1.0)
Carbon tetrachloride	ug/L	130	2	ND (0.50)	ND (0.50)	ND (0.50)
Chlorobenzene	ug/L	13	80	0.52	ND (0.50)	ND (0.50)
Chloroethane	ug/L	-	-	ND (1.0)	ND (1.0)	ND (1.0)
Chloroform (Trichloromethane)	ug/L	20	100	ND (1.0)	ND (1.0)	ND (1.0)
Chloromethane (Methyl chloride)	ug/L	-	-	ND (1.0)	ND (1.0)	ND (1.0)
cis-1,2-Dichloroethene	ug/L	-	8	ND (1.0)	ND (1.0)	ND (1.0)
cis-1,3-Dichloropropene	ug/L	-	-	ND (1.0)	ND (1.0)	ND (1.0)
Dibromochloromethane	ug/L	-	100	ND (1.0)	ND (1.0)	ND (1.0)
Dibromomethane	ug/L	-	-	-	ND (0.90)	-
Dichlorodifluoromethane (CFC-12)	ug/L	-	800	ND (2.0)	ND (2.0)	ND (2.0)
Ethylbenzene	ug/L	2000	140	ND (0.40)	ND (0.40)	ND (0.40)
Hexachlorobutadiene	ug/L	15	2	ND (0.50)	ND (0.50)	ND (0.50)
m&p-Xylene	ug/L	-	-	ND (0.40)	ND (0.40)	ND (0.40)
Methyl Tert Butyl Ether	ug/L	34000	95	ND (4.0)	ND (4.0)	ND (4.0)
Methylene chloride	ug/L	-	50	ND (2.0)	ND (2.0)	ND (2.0)
o-Xylene	ug/L	-	-	ND (0.40)	ND (0.40)	ND (0.40)
Styrene	ug/L	720	800	ND (0.50)	ND (0.50)	ND (0.50)
Tetrachloroethene	ug/L	1100	30	ND (0.50)	ND (0.50)	ND (0.50)
Toluene	ug/L	5	60	ND (0.40)	ND (0.40)	ND (0.40)
trans-1,2-Dichloroethene	ug/L	-	80	ND (1.0)	ND (1.0)	ND (1.0)
trans-1,3-Dichloropropene	ug/L	-	-	ND (1.0)	ND (1.0)	ND (1.0)
Trichloroethene	ug/L	200	5	ND (0.50)	ND (0.50)	ND (0.50)
Trichlorofluoromethane (CFC-11)	ug/L	-	1000	ND (4.0)	ND (4.0)	ND (4.0)
Trifluorotrichloroethane (Freon 113)	ug/L	-	100000	ND (2.0)	ND (2.0)	ND (2.0)
Vinyl chloride	ug/L	-	2	ND (0.50)	ND (0.50)	ND (0.50)
Xylene (total)	ug/L	300	90	ND (0.40)	ND (0.40)	ND (0.40)

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Sample Location:						SW-1	SW-1	SW-1	SW-2	SW-2	SW-2
Sample ID:		CSR		BC WQG ⁽²⁾		WS-56484-	WS-56484-	WS-56484-	WS-56484-	WS-56484-	WS-56484-
Sample Date:		Schedule 3.2 ⁽¹⁾				010317-JS-01	300517-CR-01	281117-CR-01	010317-JS-02	300517-CR-03	281117-CR-03
		FAW	DW	DW	FWAL	3/1/2017	5/30/2017	11/28/2017	3/1/2017	5/30/2017	11/28/2017
Parameters	Units	a	b	c	d						
Field Parameters											
Dissolved Oxygen, Field	mg/L	-	-	-	<5	7.28	11.29	13.56	5.89	10.23	2.67 ^d
ORP, Field	millivolts	-	-	-	-	241	235	176	211	106	176
pH, Field	s.u.	-	-	-	6.5-9.0	7.84	5.50 ^d	7.50	7.53	7.83	6.81
Specific Conductance, Field	uS/cm	-	-	-	-	31	119	37	104	85	83
Temperature, Field	Deg C	-	-	15 (*)	18 (12 spring/fall) (c)	3.11	17.28 ^c	5.00	2.95	16.01 ^c	7.21
Total Dissolved Solids, Field	g/L	-	-	-	-	0.02	0.076	0.024	0.068	0.055	0.054
Turbidity, Field	NTU	-	-	(c)	(c)	0	1.1	0.3	0.4	2.8	1.3
General Chemistry											
Alkalinity as CaCO3 Ph=8.3	mg/L	-	-	-	-	ND (0.50)	ND (0.50)	ND (1.0)	ND (0.50)	ND (0.50)	ND (1.0)
Alkalinity, Bicarbonate (as CaCO3)	mg/L	-	-	-	-	8.74	12.7	9.6	33.6	41.6	19.6
Alkalinity, Carbonate (as CaCO3)	mg/L	-	-	-	-	ND (0.50)	ND (0.50)	ND (1.0)	ND (0.50)	ND (0.50)	ND (1.0)
Alkalinity, Hydroxide (as CaCO3)	mg/L	-	-	-	-	ND (0.50)	ND (0.50)	ND (1.0)	ND (0.50)	ND (0.50)	ND (1.0)
Alkalinity, Total (as CaCO3)	mg/L	-	-	-	[j] w	7.16	10.4	7.9	27.6	34.1	16.0
Chloride (Dissolved)	mg/L	1500	250	250 (*)	150	3.1	3.4	3.6	3.2	3.8	6.3
Fluoride	mg/L	[b]	1.5	1.5	[b]	ND (0.026)	ND (0.017)	ND (0.020)	ND (0.029)	ND (0.028)	ND (0.020)
Hardness	mg/L	-	-	-	-	8.16	12.4	8.78	24.6	33.1	22.8
Hardness (Dissolved)	mg/L	-	-	-	-	8.57	11.7	9.22	25.3	31.8	24.3
pH, Lab	s.u.	-	-	-	6.5-9.0	6.97 J	7.13 J	7.01 J	7.45 J	7.29 J	6.86 J
Specific Conductance, Lab	uS/cm	-	-	-	-	29.3	35.7	30.4	64.5	76.8	69.5
Sulphate (Dissolved)	mg/L	[b]	500	500 (*)	[b]	1.42	ND (0.50)	ND (1.0)	2.05	ND (0.50)	2.9
Nutrients											
Ammonia-N	mg/L	[a]	-	-	[d]	0.051	0.094	ND (0.020)	0.064	0.041	ND (0.020)
Nitrate (as N)	mg/L	400	10	10	3	0.026	0.027	ND (0.020)	0.150	ND (0.020)	0.063
Nitrite (as N)	mg/L	[c]	1	1	[c]	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)
Nitrite/Nitrate	mg/L	400	10	-	-	0.026	0.027	ND (0.020)	0.150	ND (0.020)	0.063
Dissolved Metals											
Aluminum	ug/L	-	9500	-	[a]	53.3 ^d	71.9 ^d	45.3	28.7	62.1 ^d	204 ^d
Antimony	ug/L	90	6	-	-	ND (0.020)	0.022	0.030	ND (0.020)	0.023	0.065
Arsenic	ug/L	50	10	-	-	0.087	0.175	0.113	0.079	0.291	0.213
Barium	ug/L	10000	1000	-	-	1.46	2.08	1.37	0.817	1.84	2.00
Beryllium	ug/L	1.5	8	-	-	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)
Bismuth	ug/L	-	-	-	-	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)
Boron	ug/L	12000	5000	-	-	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)
Cadmium	ug/L	[b]	5	-	[b]	-	0.0080	ND (0.0050)	ND (0.0050)	0.0070	0.0179
Calcium	ug/L	-	-	-	-	2020	2850	2150	5400	6830	5250
Chromium Total	ug/L	10	50	-	-	ND (0.10)	0.16	0.10	0.20	0.41	0.53
Cobalt	ug/L	40	-	-	-	0.0500	0.126	0.0214	0.199	0.421	0.656
Copper	ug/L	[b]	1500	-	-	0.211	0.451	0.269	0.736	1.00	2.73
Iron	ug/L	-	6500	-	350	101	275	67.2	133	1100 ^d	241
Lead	ug/L	[b]	10	-	-	0.0410	0.122	0.0213	0.0160	0.0670	0.0529
Lithium	ug/L	-	8	-	-	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)
Magnesium	ug/L	-	-	-	-	855	1110	936	2860	3570	2710
Manganese	ug/L	-	1500	-	-	13.4	50.8	4.01	44.0	65.2	104
Mercury	ug/L	0.25	1	-	-	ND (0.0020)	0.0021	ND (0.0020)	ND (0.0020)	0.0024	0.0034
Molybdenum	ug/L	-	250	-	-	ND (0.050)	ND (0.050)	ND (0.050)	ND (0.050)	0.058	ND (0.050)
Nickel	ug/L	[b]	80	-	-	0.118	0.186	0.112	0.096	0.284	0.323
Phosphorus	ug/L	-	-	-	-	4.3	15.4	4.2	19.7	39.7	20.6
Potassium	ug/L	-	-	-	-	98	150	133	199	333	645
Selenium	ug/L	20	10	-	-	ND (0.040)	0.042	ND (0.040)	0.063	0.125	0.087
Silicon	ug/L	-	-	-	-	3180	3570	2350	5210	4680	6670
Silver	ug/L	[b]	20	-	-	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	0.0090	0.0160
Sodium	ug/L	-	200000	-	-	2520	2740	2650	3290	3770	4170
Strontium	ug/L	-	2500	-	-	8.51	12.1	9.19	17.7	22.8	17.0
Sulphur	ug/L	-	-	-	-	ND (3000)	ND (3000)	ND (600) / ND (3000)	ND (3000)	ND (3000)	ND (3000) / 1010
Thallium	ug/L	3	-	-	-	ND (0.0020)	0.0030	ND (0.0020)	ND (0.0020)	0.0030	0.0027
Tin	ug/L	-	2500	-	-	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)
Titanium	ug/L	1000	-	-	-	1.34	2.80	0.61 J	1.41	5.20	7.77
Uranium	ug/L	85	20	-	-	ND (0.0020)	0.0020	0.0028	ND (0.0020)	0.0020	0.0054
Vanadium	ug/L	-	20	-	-	0.28	0.56 J	0.21	1.78	1.74	4.24
Zinc	ug/L	[b]	3000	-	-	0.75	1.00	0.77	0.52	1.00	1.85
Zirconium	ug/L	-	-	-	-	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	0.14	0.32
Total Metals											
Aluminum	ug/L	-	9500	9500	-	60.6	120	43.6	67.4	98.3	250
Antimony	ug/L	90	6	-	9 w	0.023	ND (0.020)	0.028	0.023	ND (0.020)	0.070
Arsenic	ug/L	50	10	10	5	0.072	0.184	0.117	0.100	0.332	0.226
Barium	ug/L	10000	1000	-	1000 w	1.35	2.43	1.65	0.881	2.82	2.67
Beryllium	ug/L	1.5	8	-	0.13 w	0.021	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)
Bismuth	ug/L	-	-	-	-	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)
Boron	ug/L	12000	5000	5000	1200	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)
Cadmium	ug/L	[b]	5	5	-	0.0050	0.0122	ND (0.0050)	ND (0.0050)	0.0125	0.0223
Calcium	ug/L	-	-	-	-	1910	2980	2190	5240	7050	4980
Chromium Total	ug/L	10	50	50	-	0.16	0.34	0.34	0.25	0.49	1.00
Cobalt	ug/L	40	-	-	4	0.060	0.208	0.039	0.218	0.803	0.776
Copper	ug/L	[b]	1500	1000 (*)	[b]	0.63	0.49	0.71	1.16	1.51	3.43 ^d
Iron	ug/L	-	6500	300 (*)	1000	124	460	99.6	213	1640 ^{cd}	333
Lead	ug/L	[b]	10	10	[b]	0.076	0.231	0.046	0.043	0.115	0.088
Lithium	ug/L	-	8	-	-	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)
Magnesium	ug/L	-	-	-	-	820	1210	800	2800	3770	2520
Manganese	ug/L	-	1500	50 (*)	[b]	13.3	71.4 ^c	7.97	43.5	106 ^c	115 ^c
Mercury	ug/L	0.25	1	1	0.02	ND (0.0020)	0.0020	ND (0.0020)	ND (0.0020)	0.0033	0.0024
Molybdenum	ug/L	-	250	250	1000	ND (0.050)	0.051	ND (0.050)	ND (0.050)	0.090	0.061
Nickel	ug/L	[b]	80	-	[b] w	0.13	0.28	0.30	0.13	0.33	0.49
Phosphorus	ug/L	-	-	-	-	15.4	19.1	ND (5.0)	33.6	61.9	38.3
Potassium	ug/L	-	-	-	-	ND (250)	ND (250)	ND (250)	ND (250)	360	650
Selenium	ug/L	20	10	10	2	ND (0.040)	0.053	0.050	0.062	0.138	0.109
Silicon	ug/L	-	-	-	-	3060	3670	2160	5120	5560	5970

Table 5.12

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Sample Location:						SW-1	SW-1	SW-1	SW-2	SW-2	SW-2
Sample ID:		CSR Schedule 3.2 ⁽¹⁾		BC WQG ⁽²⁾		WS-56484- 010317-JS-01	WS-56484- 300517-CR-01	WS-56484- 281117-CR-01	WS-56484- 010317-JS-02	WS-56484- 300517-CR-03	WS-56484- 281117-CR-03
Sample Date:		FAW	DW	DW	FWAL	3/1/2017	5/30/2017	11/28/2017	3/1/2017	5/30/2017	11/28/2017
Parameters	Units	a	b	c	d						
Silver	ug/L	[b]	20	-	[b]	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	0.011	0.024
Sodium	ug/L	-	200000	-	-	2420	2650	2370	3140	3800	3680
Strontium	ug/L	-	2500	-	-	8.60	13.1	11.0	16.1	24.7	17.9
Sulphur	ug/L	-	-	-	-	ND (3000)	ND (3000)	ND (3000)	ND (3000)	ND (3000)	ND (3000)
Thallium	ug/L	3	-	-	0.8 w	ND (0.0020)	0.0038	ND (0.0020)	0.0050	0.0030	0.0034
Tin	ug/L	-	2500	-	-	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)
Titanium	ug/L	1000	-	-	-	ND (2.0)	5.0	ND (2.0) J	5.6	6.2	21.4
Uranium	ug/L	85	20	-	8.5 w	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	0.0069
Vanadium	ug/L	-	20	-	-	0.33	ND (0.20) J	0.29	2.09	1.84	5.28
Zinc	ug/L	[b]	3000	5000 (*)	[b]	ND (1.0)	1.6	7.9 ^d	ND (1.0)	3.1	2.4
Zirconium	ug/L	-	-	-	-	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	0.23

Table 5.12

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Sample Location:						SW03-17	SW03-17
Sample ID:		CSR Schedule 3.2 ⁽¹⁾		BC WQG ⁽²⁾		WS-56484- 300517-CR-02	WS-56484- 281117-CR-02
Sample Date:		FAW	DW	DW	FWAL	5/30/2017	11/28/2017
Parameters	Units	a	b	c	d		
Field Parameters							
Dissolved Oxygen, Field	mg/L	-	-	-	<5	5.68	13.04
ORP, Field	millivolts	-	-	-	-	213	192
pH, Field	s.u.	-	-	-	6.5-9.0	5.87 ^d	7.73
Specific Conductance, Field	uS/cm	-	-	-	-	30	36
Temperature, Field	Deg C	-	-	15 (*)	18 (12 spring/fall) (c)	21.30 ^{cd}	5.89
Total Dissolved Solids, Field	g/L	-	-	-	-	0.020	0.023
Turbidity, Field	NTU	-	-	(c)	(c)	8.7	0.1
General Chemistry							
Alkalinity as CaCO3 Ph=8.3	mg/L	-	-	-	-	ND (0.50)	ND (1.0)
Alkalinity, Bicarbonate (as CaCO3)	mg/L	-	-	-	-	9.96	9.4
Alkalinity, Carbonate (as CaCO3)	mg/L	-	-	-	-	ND (0.50)	ND (1.0)
Alkalinity, Hydroxide (as CaCO3)	mg/L	-	-	-	-	ND (0.50)	ND (1.0)
Alkalinity, Total (as CaCO3)	mg/L	-	-	-	[j] w	8.16	7.7
Chloride (Dissolved)	mg/L	1500	250	250 (*)	150	3.1	3.8
Fluoride	mg/L	[b]	1.5	1.5	[b]	ND (0.017)	ND (0.020)
Hardness	mg/L	-	-	-	-	9.05	8.88
Hardness (Dissolved)	mg/L	-	-	-	-	9.09	9.07
pH, Lab	s.u.	-	-	-	6.5-9.0	7.02 J	7.03 J
Specific Conductance, Lab	uS/cm	-	-	-	-	29.5	31.2
Sulphate (Dissolved)	mg/L	[b]	500	500 (*)	[b]	ND (0.50)	ND (1.0)
Nutrients							
Ammonia-N	mg/L	[a]	-	-	[d]	0.046	ND (0.020)
Nitrate (as N)	mg/L	400	10	10	3	ND (0.020)	ND (0.020)
Nitrite (as N)	mg/L	[c]	1	1	[c]	ND (0.0050)	ND (0.0050)
Nitrite/Nitrate	mg/L	400	10	-	-	ND (0.020)	ND (0.020)
Dissolved Metals							
Aluminum	ug/L	-	9500	-	[a]	41.1 ^d	38.3
Antimony	ug/L	90	6	-	-	ND (0.020)	0.026
Arsenic	ug/L	50	10	-	-	0.109	0.111
Barium	ug/L	10000	1000	-	-	1.55	1.38
Beryllium	ug/L	1.5	8	-	-	ND (0.010)	ND (0.010)
Bismuth	ug/L	-	-	-	-	ND (0.0050)	ND (0.0050)
Boron	ug/L	12000	5000	-	-	ND (10)	ND (10)
Cadmium	ug/L	[b]	5	-	[b]	ND (0.0050)	ND (0.0050)
Calcium	ug/L	-	-	-	-	2190	2140
Chromium Total	ug/L	10	50	-	-	ND (0.10)	ND (0.10)
Cobalt	ug/L	40	-	-	-	0.0520	0.0217
Copper	ug/L	[b]	1500	-	-	0.238	0.220
Iron	ug/L	-	6500	-	350	104	62.4
Lead	ug/L	[b]	10	-	-	0.0380	0.0103
Lithium	ug/L	-	8	-	-	ND (0.50)	ND (0.50)
Magnesium	ug/L	-	-	-	-	881	906
Manganese	ug/L	-	1500	-	-	11.4	5.29
Mercury	ug/L	0.25	1	-	-	ND (0.0020)	ND (0.0020)
Molybdenum	ug/L	-	250	-	-	ND (0.050)	ND (0.050)
Nickel	ug/L	[b]	80	-	-	0.107	0.110
Phosphorus	ug/L	-	-	-	-	6.7	3.1
Potassium	ug/L	-	-	-	-	162	132
Selenium	ug/L	20	10	-	-	ND (0.040)	0.043
Silicon	ug/L	-	-	-	-	2880	2350
Silver	ug/L	[b]	20	-	-	ND (0.0050)	ND (0.0050)
Sodium	ug/L	-	200000	-	-	2650	2570
Strontium	ug/L	-	2500	-	-	9.68	9.35
Sulphur	ug/L	-	-	-	-	ND (3000)	ND (3000) / ND (600)
Thallium	ug/L	3	-	-	-	ND (0.0020)	ND (0.0020)
Tin	ug/L	-	2500	-	-	ND (0.20)	ND (0.20)
Titanium	ug/L	1000	-	-	-	0.73	ND (0.50)
Uranium	ug/L	85	20	-	-	ND (0.0020)	ND (0.0020)
Vanadium	ug/L	-	20	-	-	ND (0.20)	ND (0.20)
Zinc	ug/L	[b]	3000	-	-	0.64	0.72
Zirconium	ug/L	-	-	-	-	ND (0.10)	ND (0.10)
Total Metals							
Aluminum	ug/L	-	9500	9500	-	50.1	42.1
Antimony	ug/L	90	6	-	9 w	ND (0.020)	0.023
Arsenic	ug/L	50	10	10	5	0.070	0.227
Barium	ug/L	10000	1000	-	1000 w	1.57	1.88
Beryllium	ug/L	1.5	8	-	0.13 w	ND (0.010)	ND (0.010)
Bismuth	ug/L	-	-	-	-	ND (0.010)	0.0054
Boron	ug/L	12000	5000	5000	1200	ND (10)	ND (10)
Cadmium	ug/L	[b]	5	5	-	ND (0.0050)	0.0724
Calcium	ug/L	-	-	-	-	2100	2100
Chromium Total	ug/L	10	50	50	-	0.14	0.35
Cobalt	ug/L	40	-	-	4	0.059	0.0513
Copper	ug/L	[b]	1500	1000 (*)	[b]	0.29	2.02 ^d
Iron	ug/L	-	6500	300 (*)	1000	118	87.9
Lead	ug/L	[b]	10	10	[b]	0.053	0.108
Lithium	ug/L	-	8	-	-	ND (0.50)	ND (0.50)
Magnesium	ug/L	-	-	-	-	930	885
Manganese	ug/L	-	1500	50 (*)	[b]	12.3	10.2
Mercury	ug/L	0.25	1	1	0.02	ND (0.0020)	ND (0.0020)
Molybdenum	ug/L	-	250	250	1000	ND (0.050)	ND (0.050)
Nickel	ug/L	[b]	80	-	[b] w	0.13	0.323
Phosphorus	ug/L	-	-	-	-	17.4	14.4
Potassium	ug/L	-	-	-	-	ND (250)	146
Selenium	ug/L	20	10	10	2	ND (0.040)	ND (0.040)
Silicon	ug/L	-	-	-	-	3110	2410

Table 5.12

Surface Water Analytical Results
2017 Operations and Monitoring Report
Campbell River Waste Management Centre
Comox Strathcona Waste Management

Sample Location:						SW03-17	SW03-17
Sample ID:		CSR		BC WQG ⁽²⁾		WS-56484-	WS-56484-
Sample Date:		Schedule 3.2 ⁽¹⁾				300517-CR-02	281117-CR-02
		FAW	DW	DW	FWAL	5/30/2017	11/28/2017
Parameters	Units	a	b	c	d		
Silver	ug/L	[b]	20	-	[b]	ND (0.010)	ND (0.0050)
Sodium	ug/L	-	200000	-	-	2500	2540
Strontium	ug/L	-	2500	-	-	10.3	9.60
Sulphur	ug/L	-	-	-	-	ND (3000)	ND (600) / ND (3000)
Thallium	ug/L	3	-	-	0.8 w	ND (0.0020)	0.0158
Tin	ug/L	-	2500	-	-	ND (0.20)	ND (0.20)
Titanium	ug/L	1000	-	-	-	ND (2.0)	0.63
Uranium	ug/L	85	20	-	8.5 w	ND (0.0050)	0.140
Vanadium	ug/L	-	20	-	-	ND (0.20)	ND (0.20)
Zinc	ug/L	[b]	3000	5000 (*)	[b]	2.2	7.85 ^d
Zirconium	ug/L	-	-	-	-	ND (0.10)	ND (0.10)

Table 5.13

Analytical Table Notes
2017 Operations and Monitoring Report
Campbell River Waste Management Centre
Comox Strathcona Waste Management

Notes:

- (1) British Columbia Contaminated Sites Regulation (CSR) Stage 11 Amendment Nov. 1, 2017
- (2) British Columbia Approved Water Quality Guidelines (WQG), Dec. 2017
 - a BC CSR, Schedule 3.2 Generic Numerical Water Quality Standards - Column 3 Aquatic Life, Freshwater (FAW)
 - b BC CSR, Schedule 3.2 Generic Numerical Water Quality Standards - Column 6 Drinking Water (DW)
 - c BC WQG, Drinking Water (DW)
 - d BC WQG, Freshwater Aquatic Life (FWAL)
- ND Not detected at the associated reporting limit.
- J Estimated concentration.
- w Working Water Quality Guidelines (BC MOE, Jun. 2017)
- (*) Aesthetic objective
- [a] Limit varies with pH.
- [b] Limit varies with Hardness.
- [h] Standard varies with pH, temperature and substance isomer.
- [i] Intermin background cobalt estimate of 20 ug/L applied to the site (BC MOE, 2002)
- [j] Limit varies with dissolved calcium
- Exceeds indicated standard or guideline

Appendices

Appendix A

Operational Certificate MR-02401



MINISTRY OF WATER, LAND
AND AIR PROTECTION

Vancouver Island Region
Environmental Protection
2080-A Lableux Road
Nanaimo, British Columbia
V9T 6J9
Telephone: (250) 751-3100
Fax: (250) 751-3103

OPERATIONAL CERTIFICATE
MR-02401

Under the Provisions of the Waste Management Act

Regional District of Comox-Strathcona

600 Comox Road

Courtenay, British Columbia

V9N 3P6

is authorised to manage waste and recyclable material from the Regional District of Comox-Strathcona and environs at the Campbell River landfill located on Argonaut Road, Campbell River, British Columbia, subject to the conditions listed below. Contravention of any of these conditions is a violation of the *Waste Management Act* and may result in prosecution.

1. MANAGEMENT OF WASTE AND RECYCLABLE MATERIAL

1.1. Sanitary Landfill

- 1.1.1. This subsection applies to the discharge of waste to a sanitary landfill.
- 1.1.2. Waste may be discharged to the sanitary landfill shown on attached Site Plan A.
- 1.1.3. The characteristics of the discharge must be municipal solid waste as defined under the *Waste Management Act* and other wastes as approved in writing by the Regional Waste Manager.
- 1.1.4. The authorised works are a sanitary landfill, and related appurtenances approximately located as shown on attached Site Plan A.
- 1.1.5. The authorised works must be complete and in operation on and from the date of this operational certificate.

1.2. Leachate

- 1.2.1. This subsection applies to leachate from the landfill.
- 1.2.2. The characteristics of the leachate must not exceed concentrations set in the *British Columbia Approved Water Quality Guidelines (Criteria)* and *A Compendium of Working Water Quality Guidelines for British Columbia* at the property boundary. Where natural background water quality concentrations

Date Issued: DEC 02 2003
Date Amended:
(most recent)
Page: 1 of 4


B. W. Medlar
Assistant Regional Waste Manager

OPERATIONAL CERTIFICATE: MR-02401

exceed the aforementioned guidelines, characteristics of the leachate must not exceed background concentrations.

1.3. Entrance facilities

- 1.3.1. The authorised facilities are signs, weigh scales, recyclable material and waste drop-off and storage facilities and related appurtenances.
- 1.3.2. The authorised facilities must be complete and in operation on and from the date of this operational certificate.

1.4. Location of Authorised Facilities

The location of the facilities for the management of waste and recyclable material to which this operational certificate is applicable is Block C of District Lot 85, Sayward Land District, approximately located as shown on attached Site Plan A.

2. GENERAL REQUIREMENTS

2.1. Qualified Professionals

All facilities and information, including works, plans, assessments, investigations, surveys, programs and reports, must be certified by qualified professionals.

2.2. Plans

- 2.2.1. Site development, operating, leachate management, closure and post closure plans must be submitted to the Regional Waste Manager by December 31, 2003.
- 2.2.2. The plans referenced in subsection 2.2.1 must address, but not be limited to, each of the subsections in the *Landfill Criteria for Municipal Solid Waste* including performance, siting, design, operational and closure and post-closure criteria.
- 2.2.3. The facilities must be developed, operated and closed in accordance with the plans referenced in subsection 2.2.1.

2.3. Bear-Proof Facilities

- 2.3.1. Bears must not access putrescible waste at the landfill facility. All putrescible waste that arrives at the landfill facility must be immediately contained within a bear-proof bin or an area enclosed by a bear-proof electric fence. Grass, leaves, weeds, branches and woodwaste are exempt from bear-proofing requirements.
- 2.3.2. A bear-proof electric fence must be installed around the landfill facilities.

- 2.3.3. The bear-proof fence must be designed, constructed, operated and maintained to prevent bears from penetrating the fence.
- 2.3.4. The bear-proof electric fence and bear-proof bins must be installed and in operation by March 30, 2004.

2.4. Landfill Gas

- 2.4.1. When 100,000 tonnes of waste have been discharged at the landfill, an assessment of the potential for landfill gas generation must be submitted to the Regional Waste Manager.
- 2.4.2. The landfill gas assessment must address, but is not limited to, subsections 4.2 and 6.4 of the *Landfill Criteria for Municipal Solid Waste* and section 6 of the *Guidelines for Environmental Monitoring at Municipal Solid Waste Landfills*.
- 2.4.3. The potential for landfill gas generation is to be re-assessed at least once every 5 years after the initial assessment.

2.5. Seismic and Fault Activity

A report that assesses the risk from seismic and fault activity must be submitted to the Regional Waste Manager by December 31, 2003.

2.6. Additional Facilities or Works

The Regional Waste Manager may require investigations, surveys, and the construction of additional facilities or works including, but not limited to, additional leachate and landfill gas management facilities. The Regional Waste Manager may also amend the requirements of any of the information required by this operational certificate including plans, programs, assessments and reports.

3. MONITORING AND REPORTING

3.1. Monitoring Program

- 3.1.1. A monitoring program must be developed to identify any impacts to the environment and public health from the landfill.
- 3.1.2. The monitoring program must address, but not be limited to, subsections 4.1, 4.2 and 7.15 of the *Landfill Criteria for Municipal Solid Waste* and the *Guidelines for Environmental Monitoring at Municipal Solid Waste Landfills*.
- 3.1.3. Monitoring must be conducted in accordance with the monitoring program.



B. W. Medlar
Assistant Regional Waste Manager

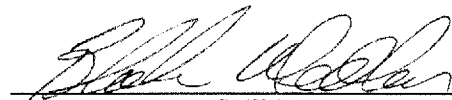
3.2. Annual Operating and Monitoring Report

- 3.2.1. An annual operating and monitoring report for the preceding 12 month period from January 1 to December 31 must be submitted to the Regional Waste Manager by April 30 of each year.
- 3.2.2. The report must include:
- An executive summary;
 - Tonnage of each type of waste discharged to the landfill for the year;
 - Remaining site life and capacity;
 - Review of the preceding year of operation, plans for the next year and any new information or proposed changes relating to the facilities and plans;
 - Comparison of the monitoring data with the performance criteria in section 4 of the *Landfill Criteria for Municipal Solid Waste* and the *Guidelines for Environmental Monitoring at Municipal Solid Waste Landfills*, interpretation of the monitoring data, identification and interpretation of irregularities and trends, recommendations, and any proposed changes to the monitoring program.

4. SITE CLOSURE

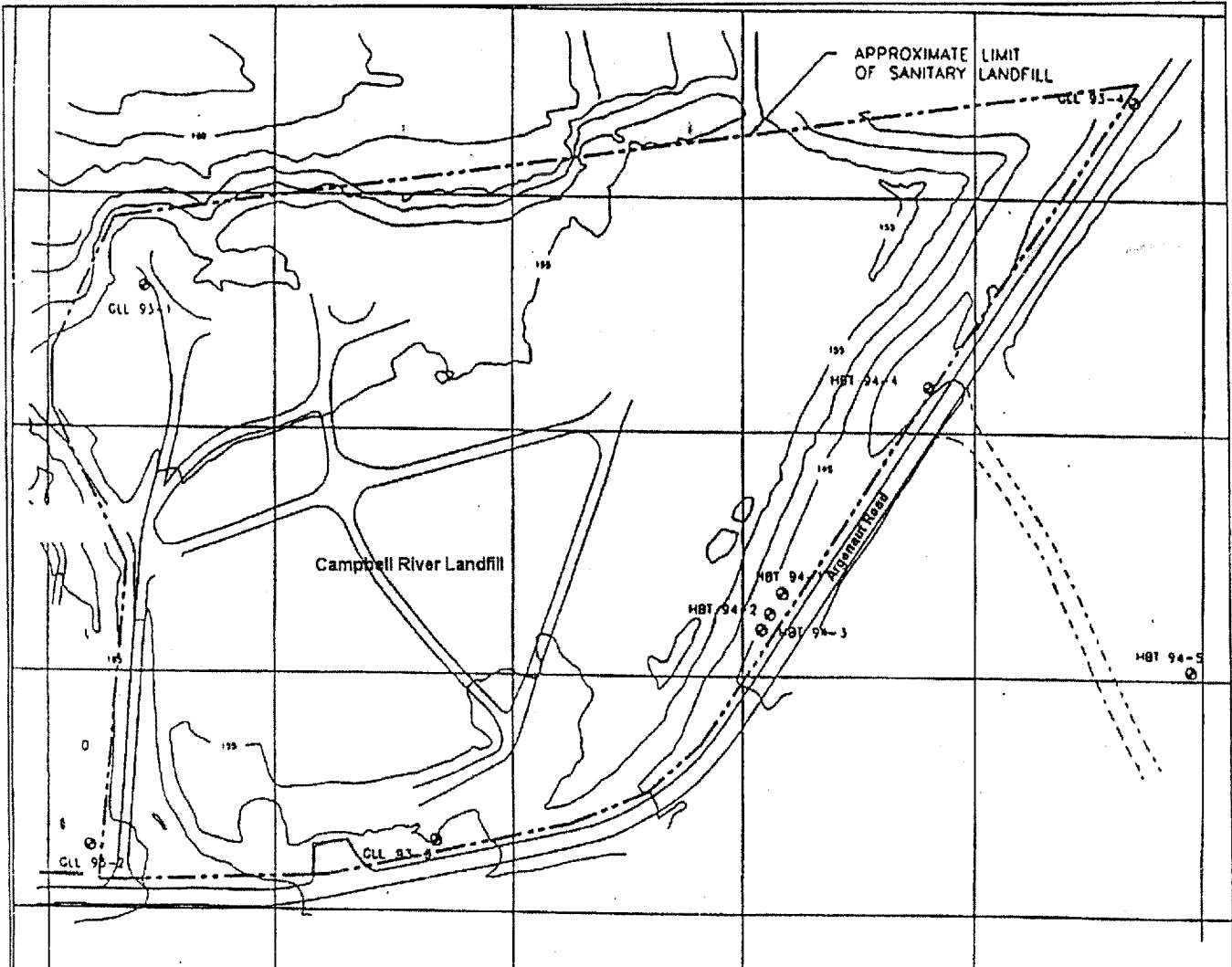
4.1. Closure and Post-Closure Fund

A closure and post-closure financial security trust fund must be built up over time. The closure and post-closure fund must ultimately meet or exceed the estimated closure and post-closure costs plus a reasonable contingency for any remediation that may be required.

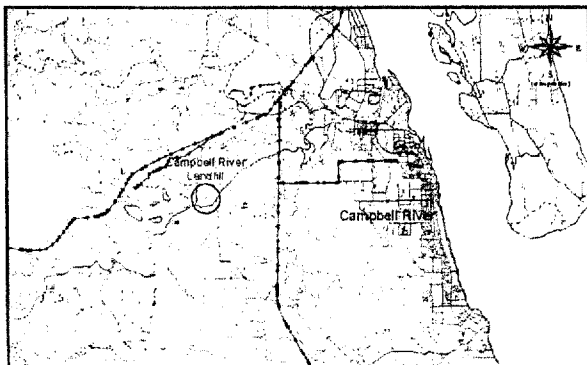


B. W. Medlar
Assistant Regional Waste Manager

SITE PLAN A



Location Map



Scale: Not to Scale

Operational Certificate: MR-02401

Date: DEC 02 2003

B. W. Medlar
Assistant Regional Waste Manager
Vancouver Island Region

Appendix B

Borehole Logs

#

BOREHOLE LOG

PROJECT: 92-746

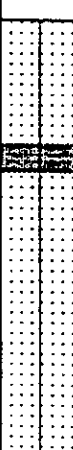
BOREHOLE: 1 1 of 2

CAMPBELL RIVER SANITARY LANDFILL
CAMPBELL RIVER, BRITISH COLUMBIA
FOR: DISTRICT OF CAMPBELL RIVER

DATE: 11 January 1993

GEOLOGIST SRB

ELEVATION 154.0 m ASL

SANDWICH BASIN																		
DEPTH (m)	STRATIGRAPHY	STRATIGRAPHIC DESCRIPTION	MONITOR DETAILS & NUMBER	SAMPLE					N VALUE				WATER CONTENT (%)					
				NUMBER	INTERVAL	TYPE	N VALUE	% WATER	% REC	% RQD								
											15	30	45	60	10	20	30	40
1		SAND Medium brown fine to medium sand, trace silt, moist, loose.			GS													
2																		
3																		
4																		
5																		
6.1		SAND AND GRAVEL Medium brown fine to medium sand, trace silt, trace fine to medium subrounded gravel, moist, loose.			GS													
7																		
8																		
9																		
10																		
11																		
12																		
13.1		SAND Medium brown fine to medium sand, trace silt, trace fine to medium subrounded gravel, moist, compact.			GS													
14																		
14.6		SAND AND GRAVEL Medium brown fine to medium sand, some fine to medium subrounded gravel, moist, compact.			GS													
15																		
16																		
17																		
18																		
19																		

BOREHOLE LOG

PROJECT: 92-746

BOREHOLE: 1 2 of 2

CAMPBELL RIVER SANITARY LANDFILL
CAMPBELL RIVER, BRITISH COLUMBIA
FOR: DISTRICT OF CAMPBELL RIVER

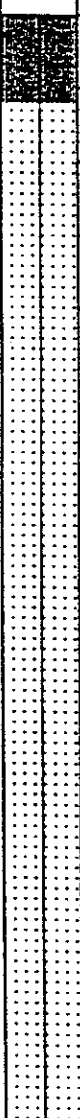
DATE: 11 January 1993

GEOLOGIST SRB

ELEVATION 154.0 m ASL

[illegible]

BOREHOLE LOG	PROJECT: 92-746	BOREHOLE: 2 1 of 2
CAMPBELL RIVER SANITARY LANDFILL CAMPBELL RIVER, BRITISH COLUMBIA FOR: DISTRICT OF CAMPBELL RIVER		DATE: 12 January 1993 GEOLOGIST SRB ELEVATION 165.9 m ASL

DEPTH (m)	STRATIGRAPHY	STRATIGRAPHIC DESCRIPTION	MONITOR DETAILS & NUMBER	SAMPLE					N VALUE				WATER CONTENT (%)						
				NUMBER	INTERVAL	TYPE	N VALUE	% WATER	% REC	% RQD									
											15	30	45	60	10	20	30	40	
1		SAND AND GRAVEL Medium brown fine to medium sand, trace silt and fine subrounded gravel, moist, loose.				GS													
2																			
3																			
4																			
5								GS											
6																			
7																			
8																			
9																			
10																			
11																			
12								GS											
13																			
14																			
15.2																			
16		SAND Medium brown fine to medium sand, trace silt, a few fine pieces of gravel, moist, loose.				GS													
17																			
18																			
19																			
		- Gravel layer at 18.30 m to 18.50 m.																	

BOREHOLE LOG

PROJECT: 92-746

BOREHOLE: 2 2 of 2

CAMPBELL RIVER SANITARY LANDFILL
CAMPBELL RIVER, BRITISH COLUMBIA
FOR: DISTRICT OF CAMPBELL RIVER

DATE: 12 January 1993

GEOLOGIST **SRB**

ELEVATION 165.9 m ASL

[illegible]

BOREHOLE LOG

PROJECT: 92-746

BOREHOLE: 3

1 of 2

CAMPBELL RIVER SANITARY LANDFILL
CAMPBELL RIVER, BRITISH COLUMBIA
FOR: DISTRICT OF CAMPBELL RIVER

DATE: 14 January 1993

GEOLOGIST SRB

ELEVATION 153.6 m ASL

[illegible]

BOREHOLE LOG

PROJECT: 92-746

BOREHOLE: 3 2 of 2

CAMPBELL RIVER SANITARY LANDFILL
CAMPBELL RIVER, BRITISH COLUMBIA
FOR: DISTRICT OF CAMPBELL RIVER

DATE: 14 January 1993

GEOLOGIST SRB

ELEVATION 153.6 m ASL

[illegible]

BOREHOLE LOG

PROJECT: 92-746

BOREHOLE: 4 1 of 1

CAMPBELL RIVER SANITARY LANDFILL
CAMPBELL RIVER, BRITISH COLUMBIA
FOR: DISTRICT OF CAMPBELL RIVER

DATE: 14 January 1993

GEOLOGIST SRB

ELEVATION 146.4 m ASL

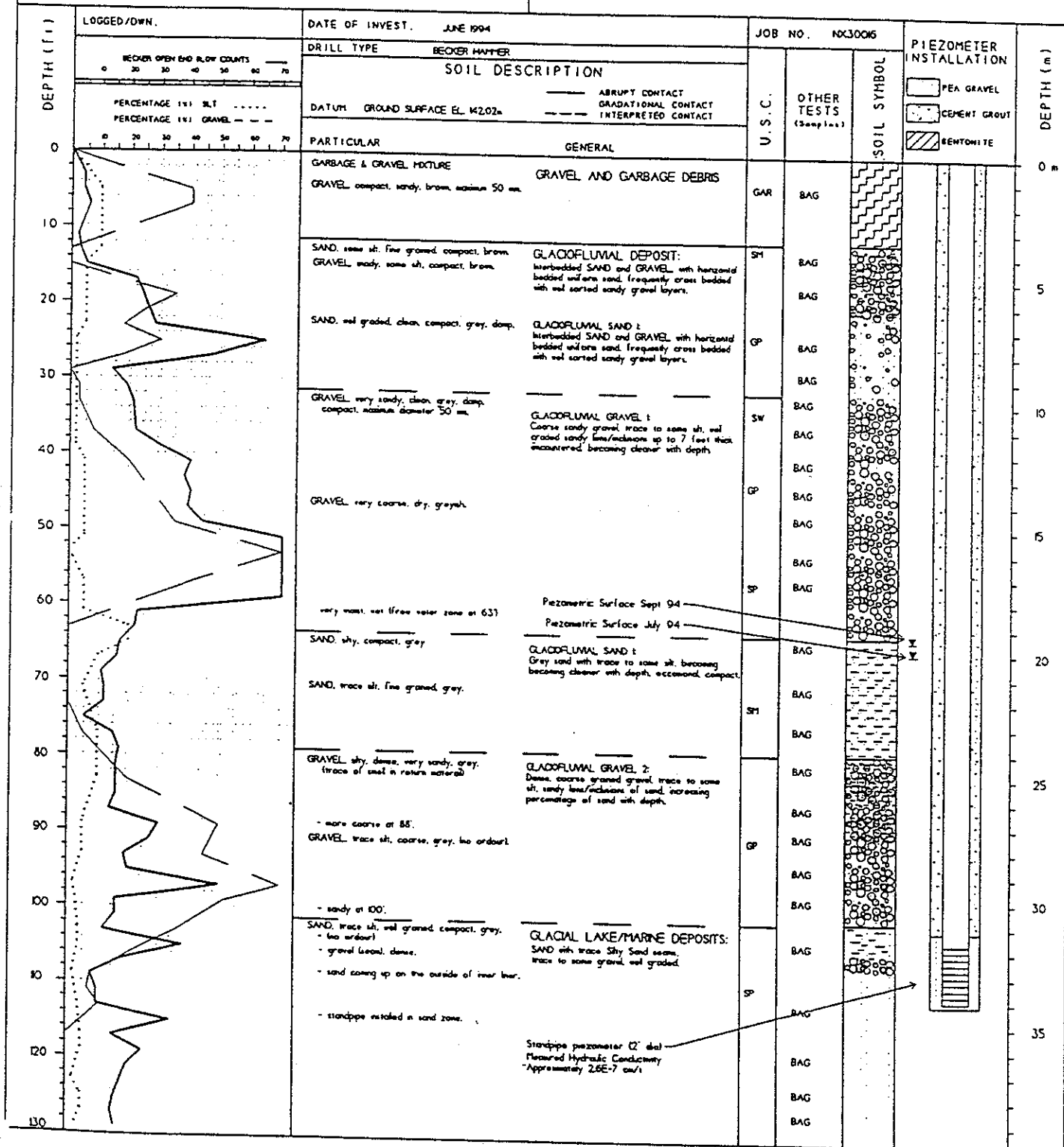
[illegible]



AGRA
Earth & Environmental

LOG OF BOREHOLE NO. HBT 94-1

DISTRICT OF CAMPBELL RIVER LANDFILL, ARGONAUT ROAD
1994 HYDROGEOLOGIC INVESTIGATIONS

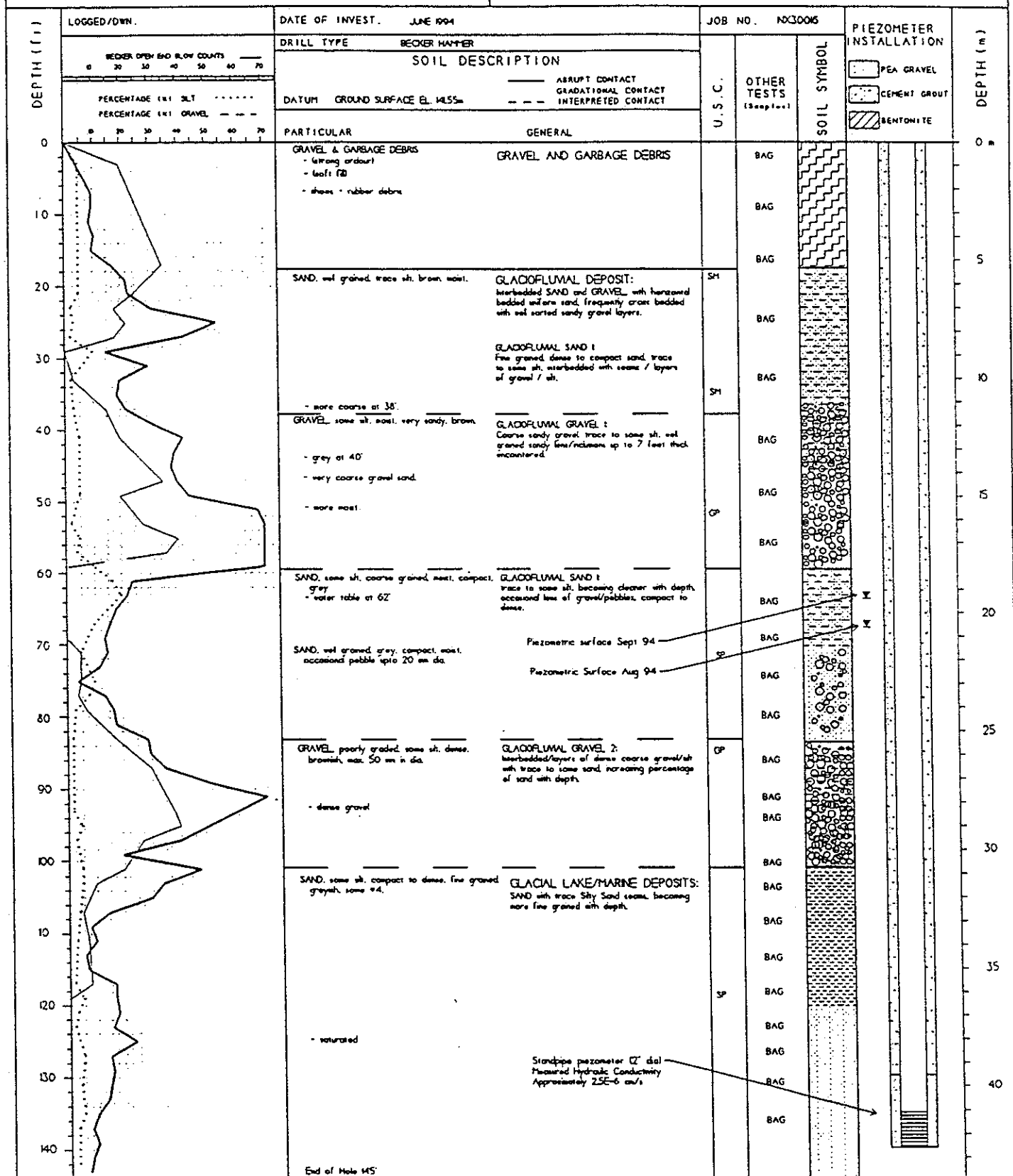




AGRA
Earth & Environmental

LOG OF BOREHOLE NO. HET 94-2

DISTRICT OF CAMPBELL RIVER LANDFILL, ARGONAUT ROAD
1994 HYDROGEOLOGIC INVESTIGATIONS

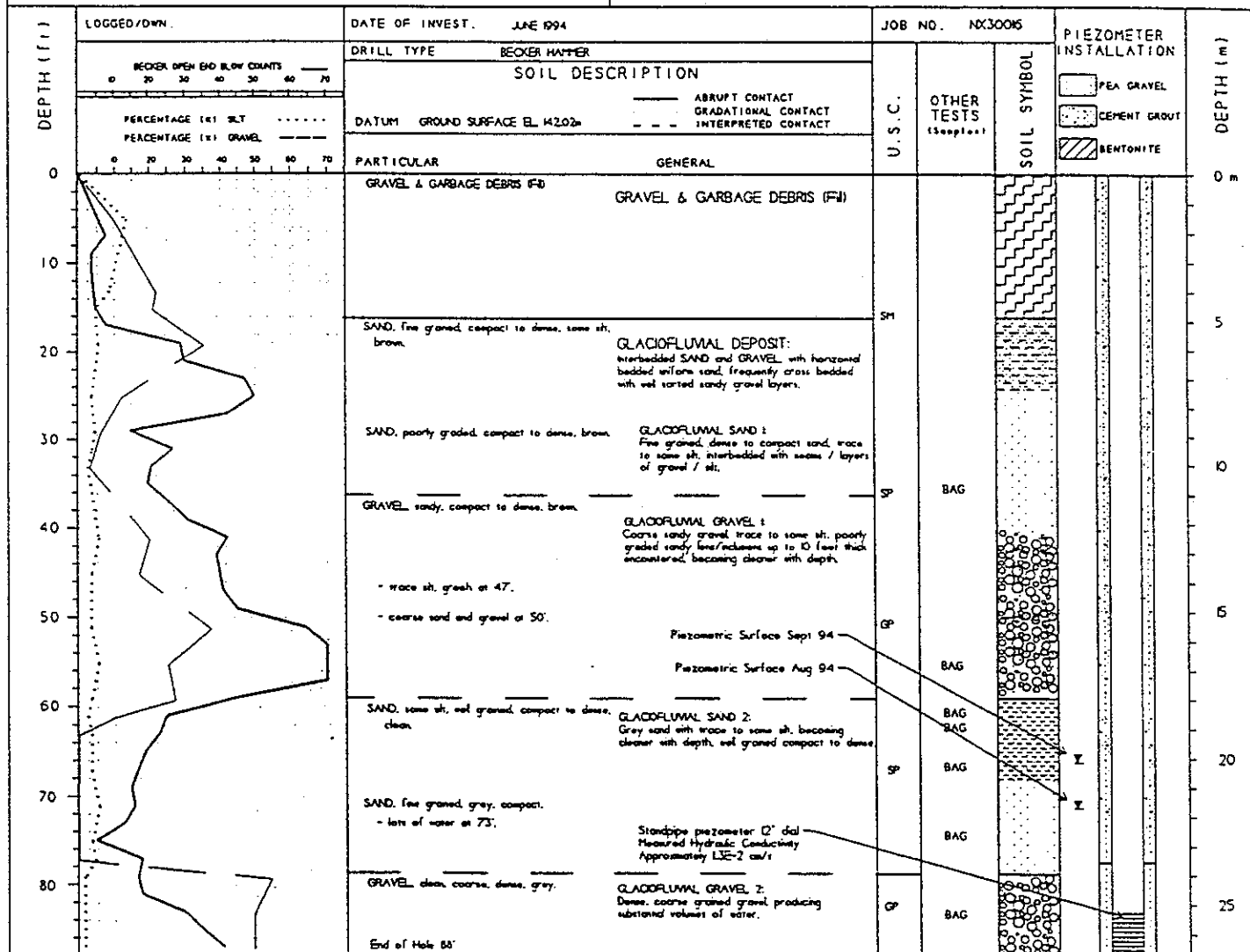




AGRA
Earth & Environmental

LOG OF BOREHOLE NO. HBT 94-3

DISTRICT OF CAMPBELL RIVER LANDFILL, ARGONAUT ROAD
1994 HYDROGEOLOGIC INVESTIGATIONS

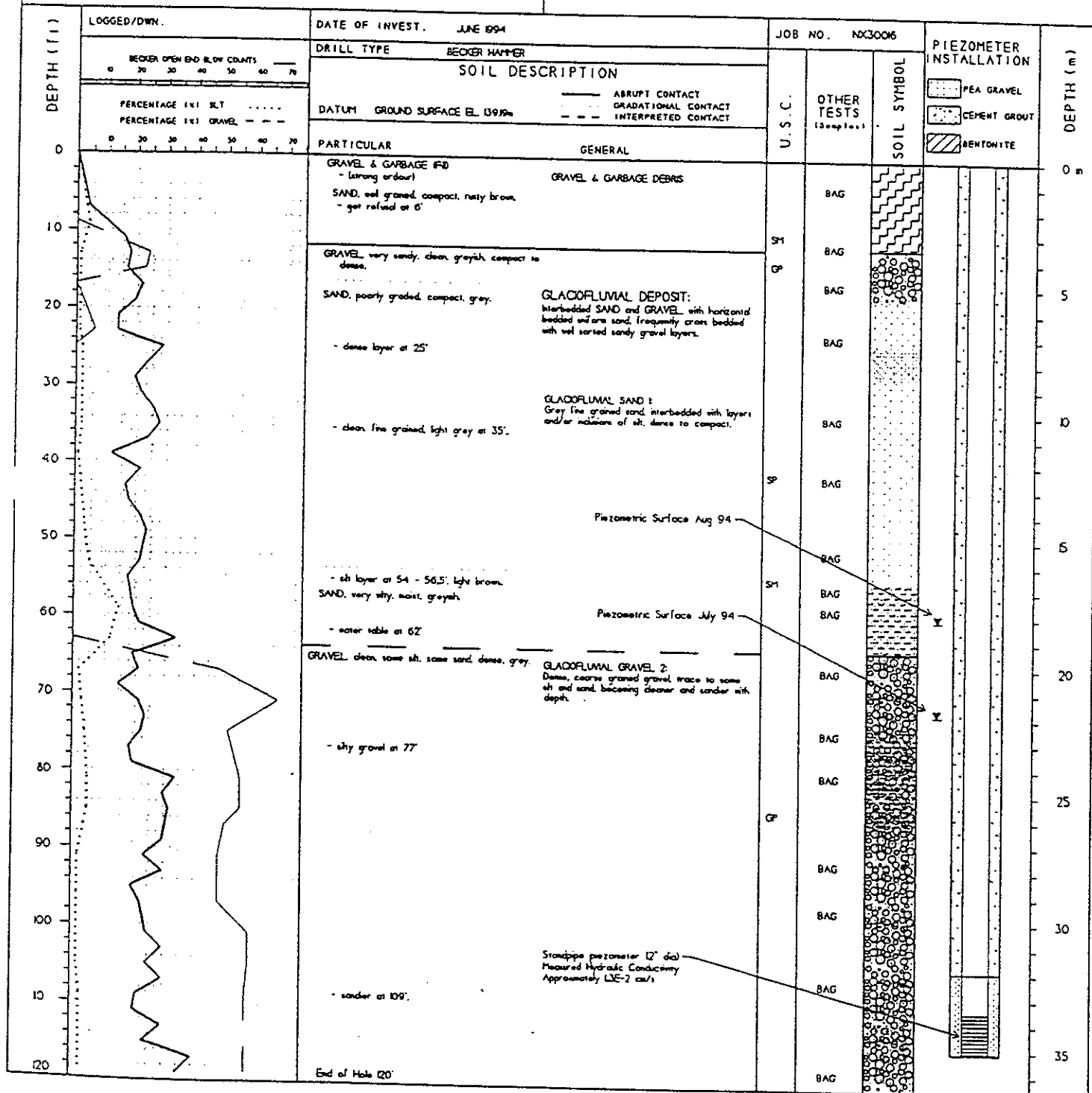




AGRA
Earth & Environmental

LOG OF BOREHOLE NO. HBT 94-4

DISTRICT OF CAMPBELL RIVER LANDFILL ARGONAUT ROAD
1994 HYDROGEOLOGIC INVESTIGATIONS

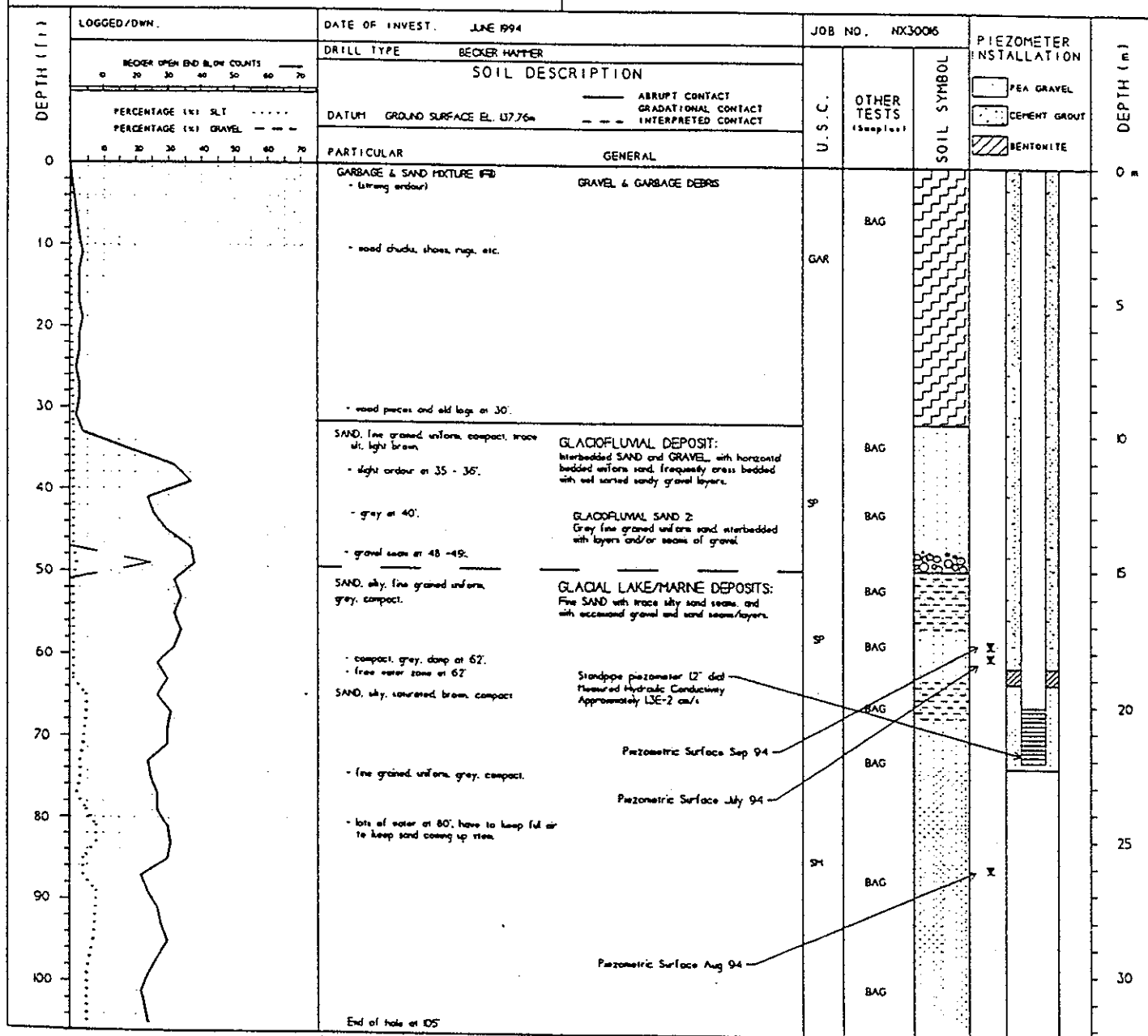


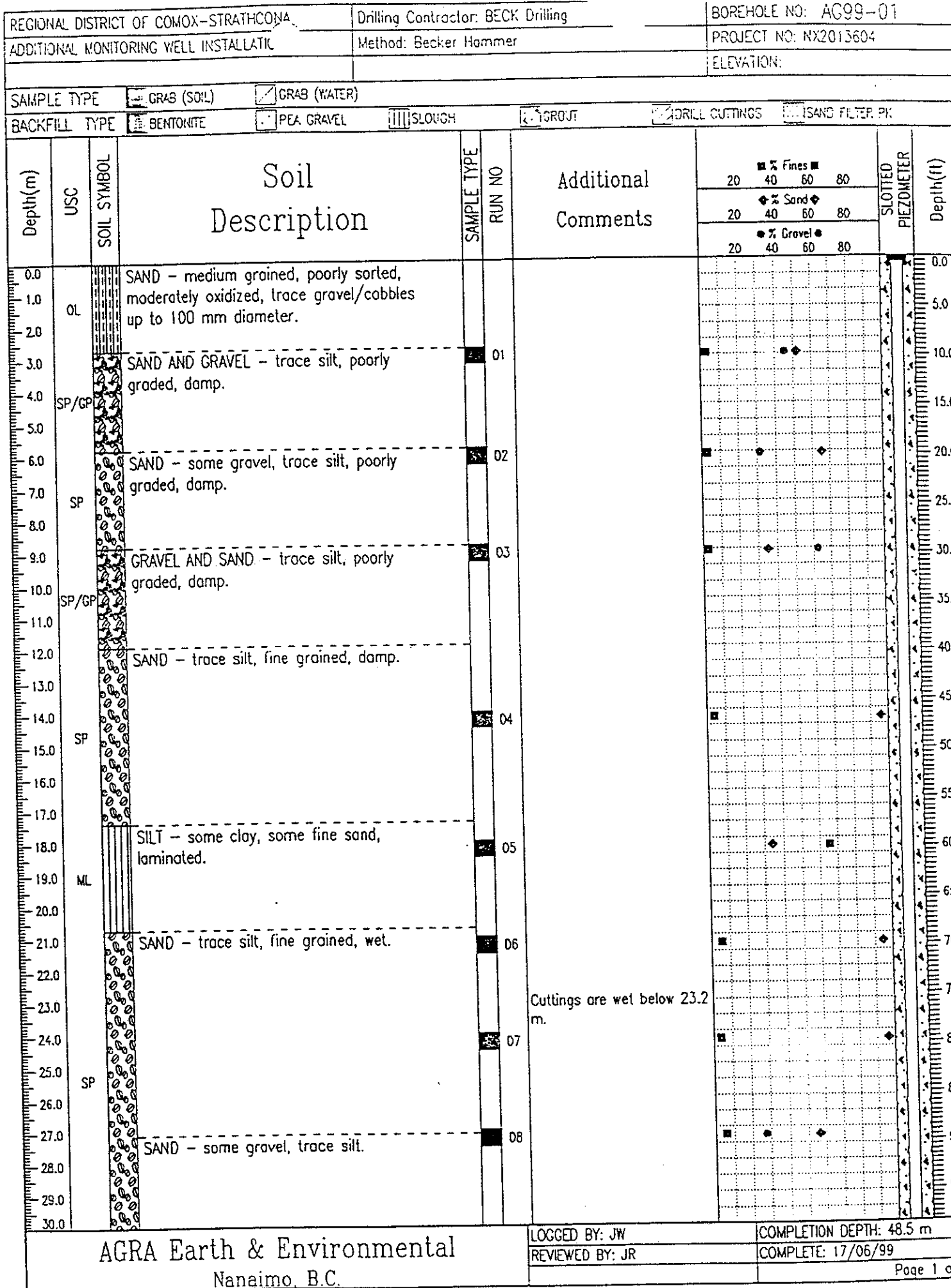


AGRA
Earth & Environmental

LOG OF BOREHOLE NO. HBT 94-5

DISTRICT OF CAMPBELL RIVER LANDFILL, ARGONAUT ROAD
1994 HYDROGEOLOGIC INVESTIGATIONS





REGIONAL DISTRICT OF COMOX-STRAATHCONA		Drilling Contractor: BECK Drilling		BOREHOLE NO: AG99-01	
ADDITIONAL MONITORING WELL INSTALLATION		Method: Becker Hammer		PROJECT NO: NX2013604	
				ELEVATION:	
SAMPLE TYPE ☒ GRAB (SOIL) ☐ GRAB (WATER)					
BACKFILL TYPE ☒ BENTONITE ☐ PEA GRAVEL ☐ SLOUGH ☐ GROUT ☐ DRILL CUTTINGS ☐ SAND FILTER PK					

Depth(m)	USC	SOIL SYMBOL	Soil Description	SAMPLE TYPE	RUN NO	Additional Comments	% Fines				SLOTTED PIEZOMETER	Depth(ft)
							20	40	60	80		
							% Sand					
							20	40	60	80		
30.0	SP											100.0
31.0			SAND AND SILT - low plastic, wet.		09							105.0
32.0	SM/ML											110.0
33.0												115.0
34.0			SAND - some silt, fine grained, wet.		11							120.0
35.0	SM											125.0
36.0												130.0
37.0			SAND - trace silt, fine grained, wet.		12							135.0
38.0												140.0
39.0												145.0
40.0					13							150.0
41.0	SP											155.0
42.0												160.0
43.0												165.0
44.0												170.0
45.0												175.0
46.0			GRAVEL - little sand, clean, wet, occasional cobbles/cobble fragments up to 120 mm diameter.		14							180.0
47.0	GP											185.0
48.0												190.0
49.0			End of Hole at 48.5 m.									195.0
50.0												
51.0												
52.0												
53.0												
54.0												
55.0												
56.0												
57.0												
58.0												
59.0												
60.0												

AGRA Earth & Environmental Nanaimo, B.C.		LOGGED BY: JW	COMPLETION DEPTH: 48.5 m
		REVIEWED BY: JR	COMPLETE: 17/05/99

REGIONAL DISTRICT OF COMOX-STATHCONA		Drilling Contractor: BECK Drilling		BOREHOLE NO: AG99-02	
ADDITIONAL MONITORING WELL INSTALLATION		Method: Becker Hammer		PROJECT NO: NX2013504	
				ELEVATION:	
SAMPLE TYPE		☒ GRAB (SOIL) ☐ GRAB (WATER)			
BACKFILL TYPE		☒ BENTONITE ☐ PEA GRAVEL ☐ SLOUGH ☐ GROUT ☒ DRILL CUTTINGS ☐ SAND FILTER PK			

Depth(m)	USC	SOIL SYMBOL	Soil Description	SAMPLE TYPE	RUN NO	Additional Comments	☒ Fines ☒ Sand ☒ Gravel			SLOTTED PIEZOMETER	Depth(ft)
							20	40	60		
							20	40	60		
							20	40	60		
0.0			SAND - silty, cobbles, oxidized, sand is fine grained.								0.0
1.0											5.0
2.0											10.0
3.0			SAND - trace silt, fine grained, occasional gravel, damp, poorly graded.		01						15.0
4.0											20.0
5.0											25.0
6.0	SP										30.0
7.0											35.0
8.0			SAND - some gravel, trace silt, max 100 mm diameter, damp, poorly graded.		02						40.0
9.0											45.0
10.0											50.0
11.0			SAND - fine grained, trace silt, damp, poorly graded.		03						55.0
12.0											60.0
13.0											65.0
14.0	SP/ML		- silt lenses from 13.7 to 14.9 m.								70.0
15.0											75.0
16.0			SAND - some gravel, trace silt, damp, poorly graded.		04						80.0
17.0											85.0
18.0											90.0
19.0	SP				05						95.0
20.0											
21.0			SAND - fine to medium grained, trace silt, wet.		06						
22.0											
23.0											
24.0	ML		SILT - some fine sand, low plastic, moist, oxidized.		07						
25.0			SAND AND SILT - low plastic, moist.		08						
26.0											
27.0	ML/SP										
28.0						Water encountered at 27.7 m depth.					
29.0											
30.0											

AGRA Earth & Environmental		LOGGED BY: JW	COMPLETION DEPTH: 51.51 m
Nanaimo, B.C.		REVIEWED BY: JR	COMPLETE: 18/06/99

REGIONAL DISTRICT OF COMOX-STRAATHCONA		Drilling Contractor: BECK Drilling		BOREHOLE NO: AC99-02	
ADDITIONAL MONITORING WELL INSTALLATION		Method: Becker Hammer		PROJECT NO: NX2013604	
		ELEVATION:			
SAMPLE TYPE		☒ GRAB (SOIL) ☒ GRAB (WATER)			
BACKFILL TYPE		☒ BENTONITE ☐ PEA GRAVEL ☐ SLOUGH ☐ GROUT ☒ DRILL CUTTINGS ☐ SAND FILTER PK			

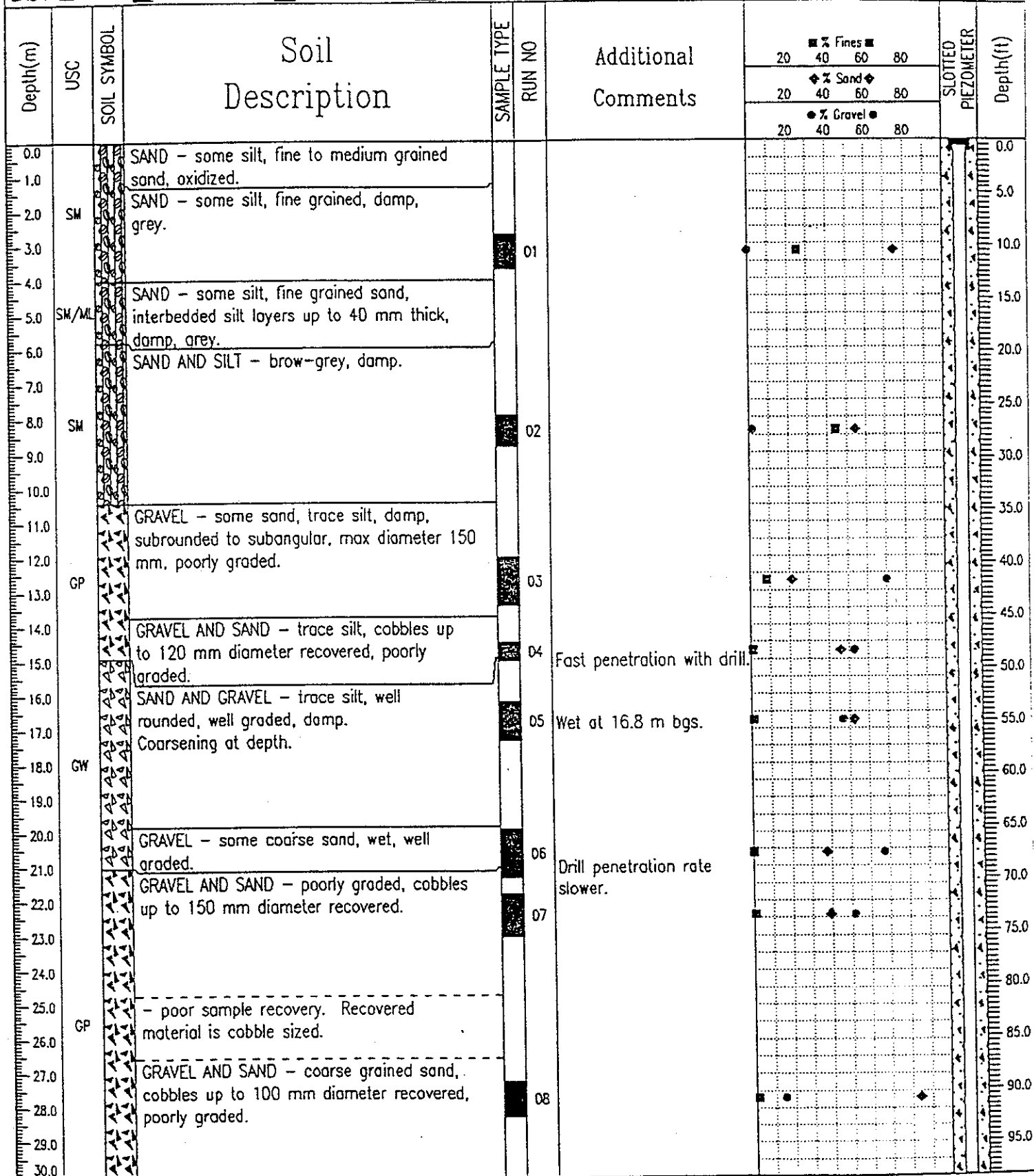
Depth(m)	USC	SOIL SYMBOL	Soil Description	SAMPLE TYPE	RUN NO	Additional Comments	■ % Fines ■ ◆ % Sand ◆ ● % Gravel ●				SLOTTED PIEZOMETER	Depth(ft)		
							20	40	60	80				
							20	40	60	80				
							20	40	60	80				
30.0	SM		SAND - little silt, poorly graded, wet.		09							100.0		
31.0										105.0				
32.0												110.0		
33.0												115.0		
34.0	SP		SAND - trace silt, fine grained, wet.		10							120.0		
35.0												125.0		
36.0													130.0	
37.0													135.0	
38.0													140.0	
39.0													145.0	
40.0													150.0	
41.0													155.0	
42.0													160.0	
43.0													165.0	
44.0	GW		GRAVEL - some sand, some cobbles, clean.		12							170.0		
45.0													175.0	
46.0														180.0
47.0														185.0
48.0														190.0
49.0														195.0
50.0			End of Hole at 51.5 m. Well installed.		13							200.0		
51.0													205.0	
52.0														210.0
53.0														215.0
54.0														220.0
55.0														225.0
56.0														230.0
57.0														235.0
58.0														240.0
59.0														245.0
60.0														250.0

AGRA Earth & Environmental Nanaimo, B.C.		LOGGED BY: JW	COMPLETION DEPTH: 51.51 m
		REVIEWED BY: JR	COMPLETE: 18/06/99

06/03/23 04:01PM (BORGHOUT)
Page 2 of 2

REGIONAL DISTRICT OF COMOX-STRAATHCONA	Drilling Contractor: BECK Drilling	BOREHOLE NO: AG99-03
ADDITIONAL MONITORING WELL INSTALLATION	Method: Becker Hammer	PROJECT NO: NX2013604
		ELEVATION:

SAMPLE TYPE	☒ GRAB (SOIL)	☒ GRAB (WATER)				
BACKFILL TYPE	☒ BENTONITE	☐ PEA GRAVEL	☐ SLOUGH	☐ GROUT	☒ DRILL CUTTINGS	☐ SAND FILTER PK



AGRA Earth & Environmental
Nanaimo, B.C.

LOGGED BY: JR
REVIEWED BY: JW

COMPLETION DEPTH: 53.2 m
COMPLETE: 18/06/99

REGIONAL DISTRICT OF COMOX-STRAATHCONA		Drilling Contractor: BECK Drilling		BOREHOLE NO: AG99-03	
ADDITIONAL MONITORING WELL INSTALLATION		Method: Becker Hammer		PROJECT NO: NX2013504	
				ELEVATION:	
SAMPLE TYPE ☒ GRAB (SOIL) ☐ GRAB (WATER)					
BACKFILL TYPE ☒ BENTONITE ☐ PEA GRAVEL ☐ SLOUGH ☐ GROUT ☐ DRILL CUTTINGS ☐ SAND FILTER PK					

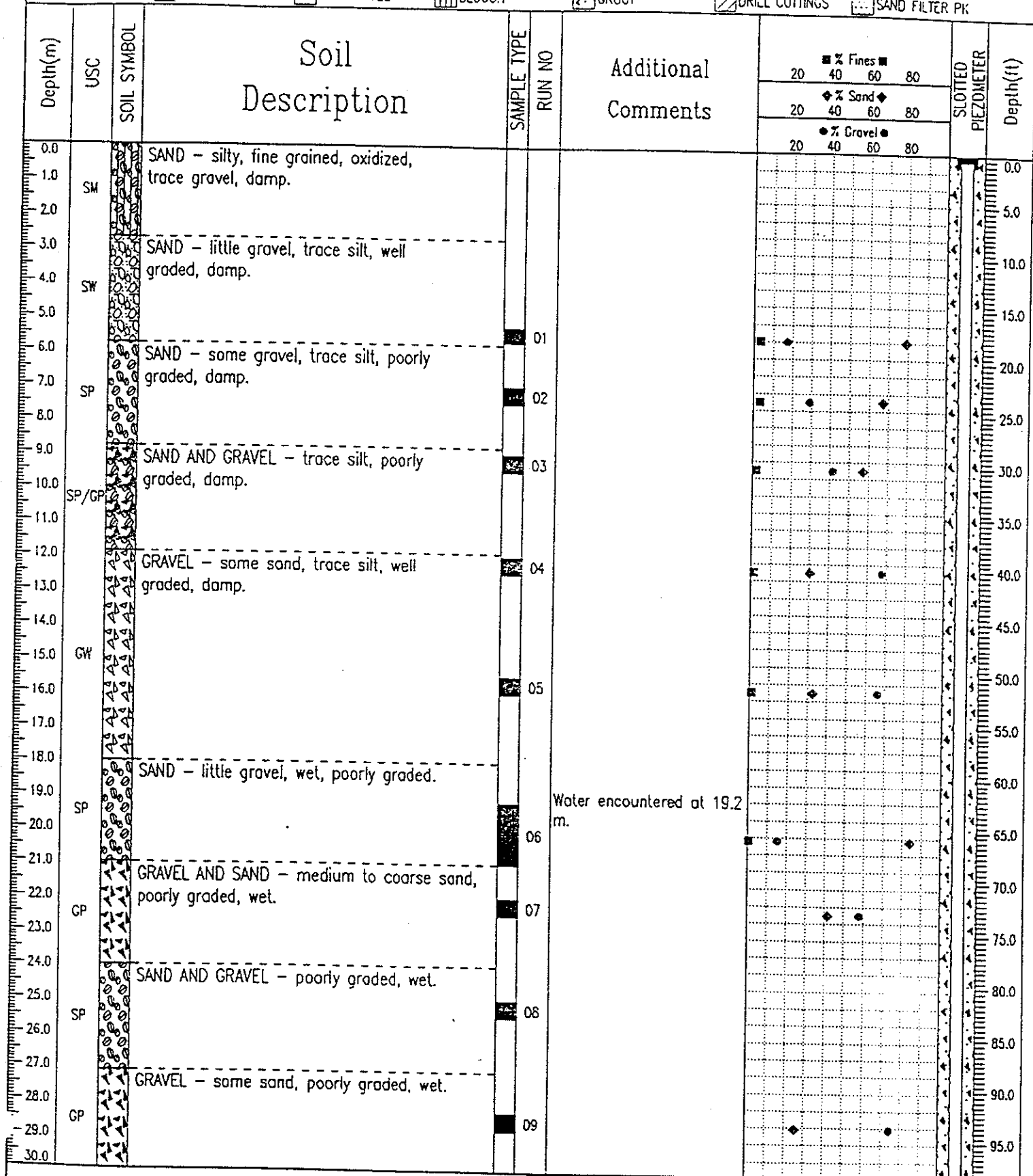
Depth(m)	USC	SOIL SYMBOL	Soil Description	SAMPLE TYPE	RUN NO	Additional Comments	Grain Size Analysis (%)				SLOTTED PIEZOMETER	Depth(ft)
							Fines	Sand	Gravel			
							20	40	60	80		
							20	40	60	80		
30.0	GP	AG	- well graded.		09							100.0
31.0		AG										105.0
32.0		AG										110.0
33.0		AG										115.0
34.0		AG										120.0
35.0	GW	AG										125.0
36.0		AG			10							130.0
37.0		AG										135.0
38.0		AG										140.0
39.0		AG										145.0
40.0		AG	- poorly graded.		12							150.0
41.0		AG										155.0
42.0		AG										160.0
43.0		AG	GRAVEL - some cobbles, little sand, poorly graded.		13							165.0
44.0	GP	AG										170.0
45.0		AG										175.0
46.0		AG	- increasing sand content.		14							180.0
47.0		AG										185.0
48.0		AG										190.0
49.0		AG	GRAVEL - some sand, well graded.		15							195.0
50.0		AG										
51.0	GW	AG										
52.0		AG										
53.0		AG										
54.0			End of Hole at 53.2 m.			Drill penetration rate very slow. Drill bit blocked, withdraw to 50.6 m.						
55.0												
56.0												
57.0												
58.0												
59.0												
60.0												

AGRA Earth & Environmental Nanaimo, B.C.		LOGGED BY: JR	COMPLETION DEPTH: 53.2 m
		REVIEWED BY: JW	COMPLETE: 18/06/99
		Page 2 of 2	

06/03/23 04:30 PM (BOREHOLE)

REGIONAL DISTRICT OF COMOX-STRAATHCONA	Drilling Contractor: BECK Drilling	BOREHOLE NO: AG99-04
ADDITIONAL MONITORING WELL INSTALLATION	Method: Becker Hammer	PROJECT NO: NX2013504
		ELEVATION:

SAMPLE TYPE	☒ GRAB (SOIL)	☐ GRAB (WATER)
BACKFILL TYPE	☒ BENTONITE	☐ PEA GRAVEL
	☐ SLOUGH	☐ GROUT
	☐ DRILL CUTTINGS	☐ SAND FILTER PK



AGRA Earth & Environmental
Nanaimo, B.C.

LOGGED BY: JW

REVIEWED BY: JR

COMPLETION DEPTH: 45.42 m

COMPLETE: 17/06/99

REGIONAL DISTRICT OF COMOX-STRATHCONA		Drilling Contractor: BECK Drilling		BOREHOLE NO: AG99-04								
ADDITIONAL MONITORING WELL INSTALLATION		Method: Becker Hammer		PROJECT NO: NX2013604								
ELEVATION:												
SAMPLE TYPE ☒ GRAB (SOIL) ☐ GRAB (WATER)												
BACKFILL TYPE ☒ BENTONITE ☐ PEA GRAVEL ☐ SLOUGH ☐ GROUT ☒ DRILL CUTTINGS ☐ SAND FILTER PK												
Depth(m)	USC	SOIL SYMBOL	Soil Description	SAMPLE TYPE	RUN NO	Additional Comments	■ % Fines ■ 20 40 60 80 ◆ % Sand ◆ 20 40 60 80 ● % Gravel ● 20 40 60 80				SLOTTED PIEZOMETER	Depth(ft)
30.0											100.0	
31.0					10						105.0	
32.0											110.0	
33.0	GP				11						115.0	
34.0											120.0	
35.0											125.0	
36.0											130.0	
37.0			GRAVEL - little sand, well graded, wet.		12						135.0	
38.0	GW										140.0	
39.0											145.0	
40.0			GRAVEL - some sand, poorly graded, wet.		13						150.0	
41.0											155.0	
42.0											160.0	
43.0	GP		GRAVEL - some cobbles, trace sand, poorly graded.		14						165.0	
44.0											170.0	
45.0											175.0	
46.0			End of Hole at 45.4 m. Slow drilling. Well installed.								180.0	
47.0											185.0	
48.0											190.0	
49.0											195.0	
50.0												
51.0												
52.0												
53.0												
54.0												
55.0												
56.0												
57.0												
58.0												
59.0												
60.0												

AGRA Earth & Environmental

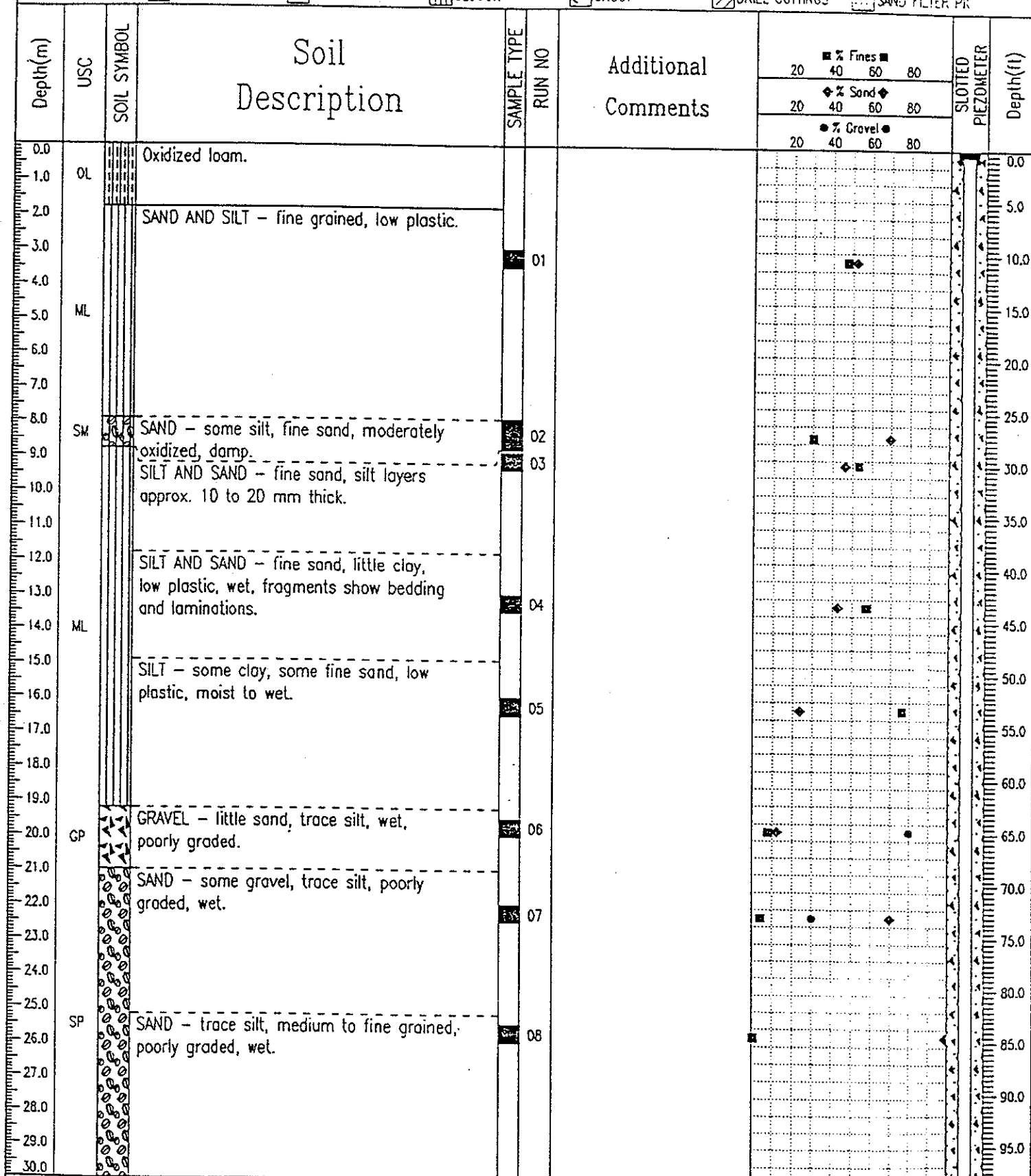
Nanaimo, B.C.

LOGGED BY: JW	COMPLETION DEPTH: 45.42 m
REVIEWED BY: JR	COMPLETE: 17/06/99

03/03/23 04:31PM (BCKHOLE)
Page 2 of 2

REGIONAL DISTRICT OF COMOX-STRAATHCONA	Drilling Contractor: BECK Drilling	BOREHOLE NO: AC99-05
ADDITIONAL MONITORING WELL INSTALLATION	Method: Becker Hammer	PROJECT NO: NX2013504
		ELEVATION:

SAMPLE TYPE	☒ GRAB (SOIL)	☐ GRAB (WATER)
BACKFILL TYPE	☒ BENTONITE	☐ PEA GRAVEL
	☐ SLOUGH	☐ GROUT
	☒ DRILL CUTTINGS	☐ SAND FILTER PK



AGRA Earth & Environmental
Nanaimo, B.C.

LOGGED BY: JW
REVIEWED BY: JR

COMPLETION DEPTH: 50.9 m
COMPLETE: 18/06/99

REGIONAL DISTRICT OF COMOX-STRAATHCONA		Drilling Contractor: BECK Drilling		BOREHOLE NO: AC99-05	
ADDITIONAL MONITORING WELL INSTALLATION		Method: Becker Hammer		PROJECT NO: KX2013604	
				ELEVATION:	
SAMPLE TYPE		☒ GRAB (SOIL) ☐ GRAB (WATER)			
BACKFILL TYPE		☒ BENTONITE ☐ PEA GRAVEL ☐ SLOUGH ☐ GROUT ☐ DRILL CUTTINGS ☐ SAND FILTER PK			

Depth(m)	USC	SOIL SYMBOL	Soil Description	SAMPLE TYPE	RUN NO	Additional Comments	% Fines			% Sand			% Gravel			SLOTTED PIEZOMETER	Depth(ft)			
							20	40	60	80	20	40	60	80	20			40	60	80
30.0															100.0					
31.0	SP														105.0					
32.0															110.0					
33.0			SAND AND GRAVEL - poorly graded, cobbles up to 120 mm diameter.		09	Fast drill penetration.									115.0					
34.0	GP/SP				10	Low recovery, slow penetration rate.									120.0					
35.0															125.0					
36.0															130.0					
37.0			GRAVEL - some sand, poorly graded, occasional cobbles up to 120 mm diameter.												135.0					
38.0	GP														140.0					
39.0															145.0					
40.0															150.0					
41.0			SAND - some gravel, poorly graded, wet.		11										155.0					
42.0															160.0					
43.0															165.0					
44.0															170.0					
45.0															175.0					
46.0	SP		SAND - little gravel, trace silt, medium to fine grained.		12										180.0					
47.0															185.0					
48.0															190.0					
49.0															195.0					
50.0																				
51.0			End of Hole at 50.9 m.																	
52.0																				
53.0																				
54.0																				
55.0																				
56.0																				
57.0																				
58.0																				
59.0																				
60.0																				

AGRA Earth & Environmental Nanaimo, B.C.		LOGGED BY: JW	COMPLETION DEPTH: 50.9 m
		REVIEWED BY: JR	COMPLETE: 18/06/99
		Page 2 of 2	

REGIONAL DISTRICT OF COMOX-STRAATHCONA		Drilling Contractor: BECK Drilling		BOREHOLE NO: AC99-06	
ADDITIONAL MONITORING WELL INSTALLATION		Method: Becker Hammer		PROJECT NO: NX2013604	
				ELEVATION:	
SAMPLE TYPE ☒ GRAB (SOIL) ☐ GRAB (WATER)					
BACKFILL TYPE ☒ BENTONITE ☐ PEA GRAVEL ☐ SLOUGH ☐ GROUT ☐ DRILL CUTTINGS ☐ SAND FILTER PK					

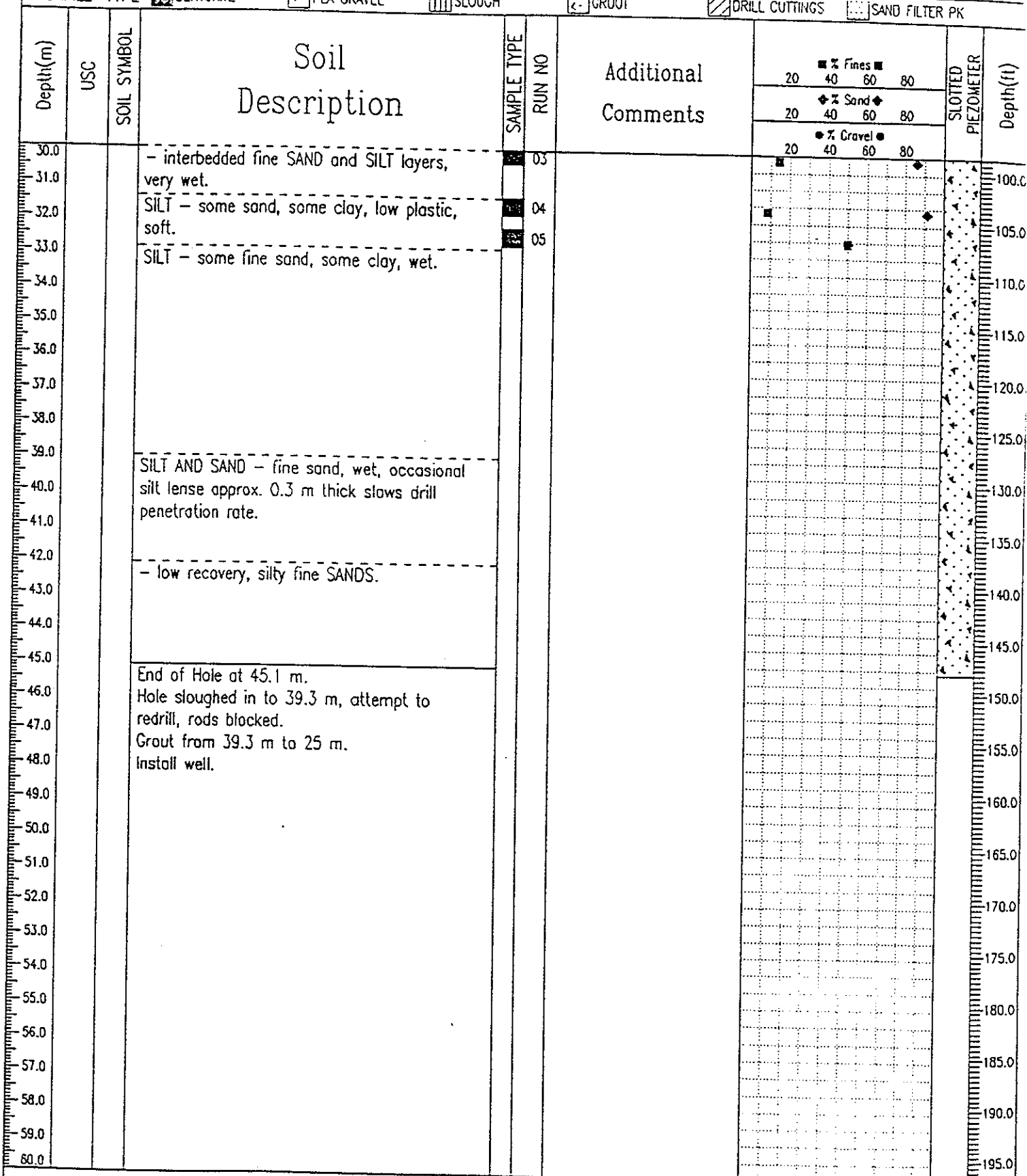
Depth(m)	USC	SOIL SYMBOL	Soil Description	SAMPLE TYPE	RUN NO	Additional Comments	■ % Fines ■ ◆ % Sand ◆ ● % Gravel ●			SLOTTED PIEZOMETER	Depth(ft)
							20	40	60		
							20	40	60		
							20	40	60		
0.0			SAND - medium grained.								0.0
1.0											1.0
2.0											2.0
3.0											3.0
4.0											4.0
5.0											5.0
6.0											6.0
7.0											7.0
8.0											8.0
9.0											9.0
10.0											10.0
11.0											11.0
12.0											12.0
13.0											13.0
14.0			- grades to fine sand.								14.0
15.0											15.0
16.0											16.0
17.0											17.0
18.0			SAND - some gravel, little silt, moist, medium grained sand.								18.0
19.0			SAND - little silt, fine grained sand.		01		■		◆		19.0
20.0											20.0
21.0											21.0
22.0											22.0
23.0											23.0
24.0											24.0
25.0											25.0
26.0			SILT - sandy, fine grained, wet.		02		■		◆		26.0
27.0											27.0
28.0											28.0
29.0											29.0
30.0					03						30.0

AGRA Earth & Environmental Nanaimo, B.C.		LOGGED BY: JW	COMPLETION DEPTH: 45.11 m
		REVIEWED BY: JR	COMPLETE: 18/06/99

03/03/23 04:00 PM (BOREHOLE)
Page 1 of 2

REGIONAL DISTRICT OF COMOX-STRAATHCONA	Drilling Contractor: BECK Drilling	BOREHOLE NO: AG99-06
ADDITIONAL MONITORING WELL INSTALLATION	Method: Becker Hammer	PROJECT NO: NX2013604
		ELEVATION:

SAMPLE TYPE	☒ GRAB (SOIL)	☐ GRAB (WATER)
BACKFILL TYPE	☒ BENTONITE	☐ PEA GRAVEL
	☐ SLOUGH	☐ GROUT
	☐ DRILL CUTTINGS	☐ SAND FILTER PK

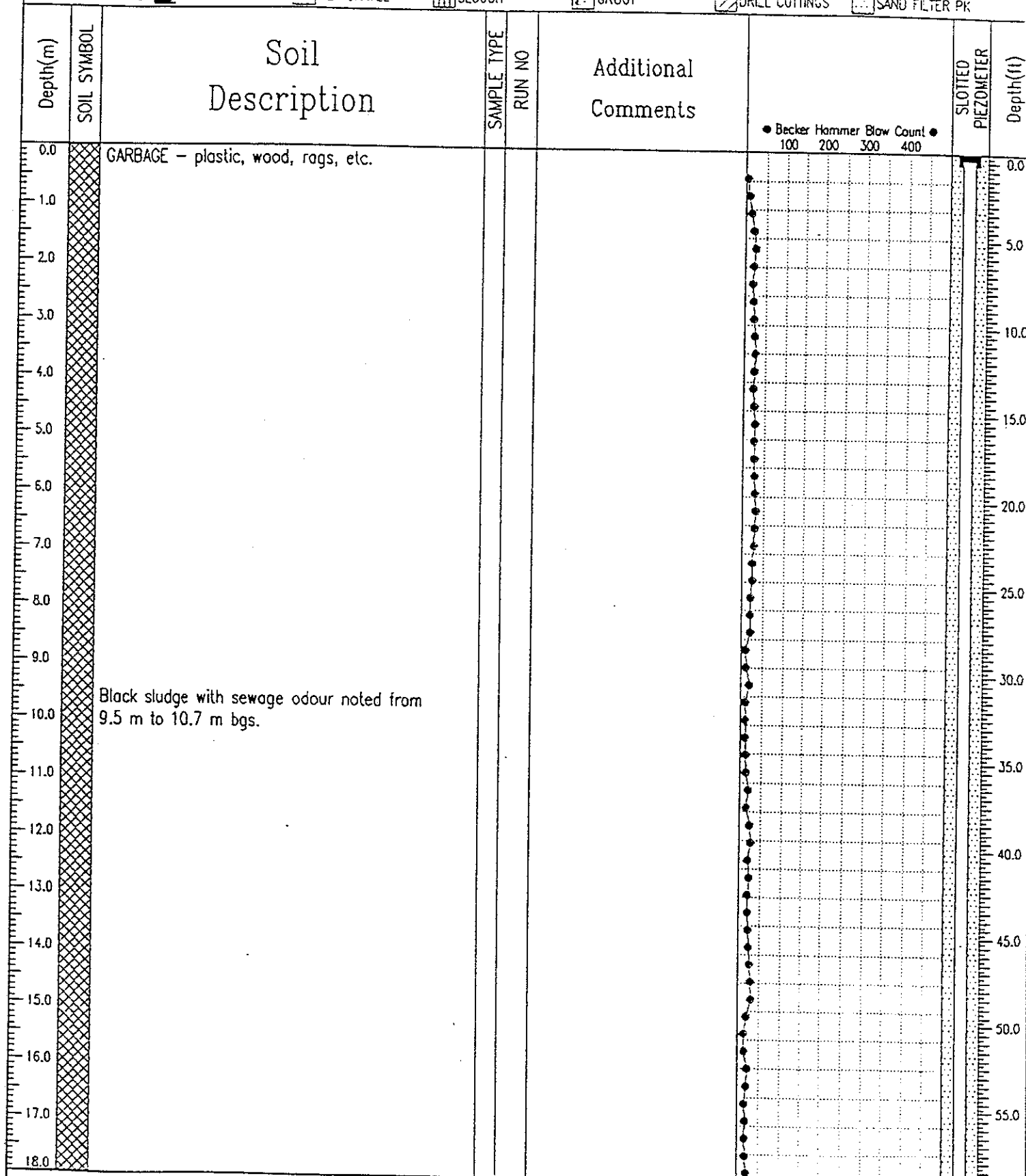


AGRA Earth & Environmental
Nanaimo, B.C.

LOGGED BY: JW
REVIEWED BY: JR

COMPLETION DEPTH: 45.11 m
COMPLETE: 18/06/99

REGIONAL DISTRICT OF COMOX-STRAATHCONA		Contractor: BECK Drilling	BOREHOLE NO: AM00-01
ADDITIONAL MONITORING WELL INSTALLATION		Method: Becker Hammer, Hollow Stem	PROJECT NO: HX2025502-500
		ELEVATION:	
SAMPLE TYPE	☒ GRAB (SOIL) ☒ GRAB (WATER) ☒ SPT		
BACKFILL TYPE	☒ BENTONITE ☐ PEA GRAVEL ☐ SLOUGH ☐ GROUT ☒ DRILL CUTTINGS ☐ SAND FILTER PK		



AMEC Earth & Environmental Limited
Nanaimo, B.C.

LOGGED BY: BH

REVIEWED BY: CM

COMPLETION DEPTH: 48.463 m

COMPLETE: 21/09/00

REGIONAL DISTRICT OF COMOX-STRAATHCOMA		Contractor: BECK Drilling		BOREHOLE NO: AM00-01	
ADDITIONAL MONITORING WELL INSTALLATION		Method: Becker Hammer, Hollow Stem		PROJECT NO: NX2025502-600	
				ELEVATION:	
SAMPLE TYPE ☒ GRAB (SOIL) ☒ GRAB (WATER) ☒ SPT					
BACKFILL TYPE ☒ BENTONITE ☐ PEA GRAVEL ☐ SLOUGH ☐ GROUT ☒ DRILL CUTTINGS ☐ SAND FILTER PK					
Depth(m)	SOIL SYMBOL	Soil Description	SAMPLE TYPE	RUN NO	Additional Comments
18.0					
19.0					
20.0					
21.0					
22.0					
23.0					
24.0					
25.0					
26.0		Wood debris.			
27.0		GRAVEL - some sand, very dense, greyish.			Dust appearing in cyclone.
28.0					
29.0		-becoming damp at 29.3 m.		G1	
30.0					
31.0					
32.0				G2	
33.0					
34.0		SAND - clean, very dense, moist, grey.		G3	
35.0		GRAVEL - sandy, clean, very dense, moist.			
36.0					

LOGGED BY: BH REVIEWED BY: CM COMPLETION DEPTH: 48.463 m COMPLETE: 21/09/00	
Page 2 of 3	

REGIONAL DISTRICT OF COMOX-STRAATHCOM

ADDITIONAL MONITORING WELL INSTALLATION

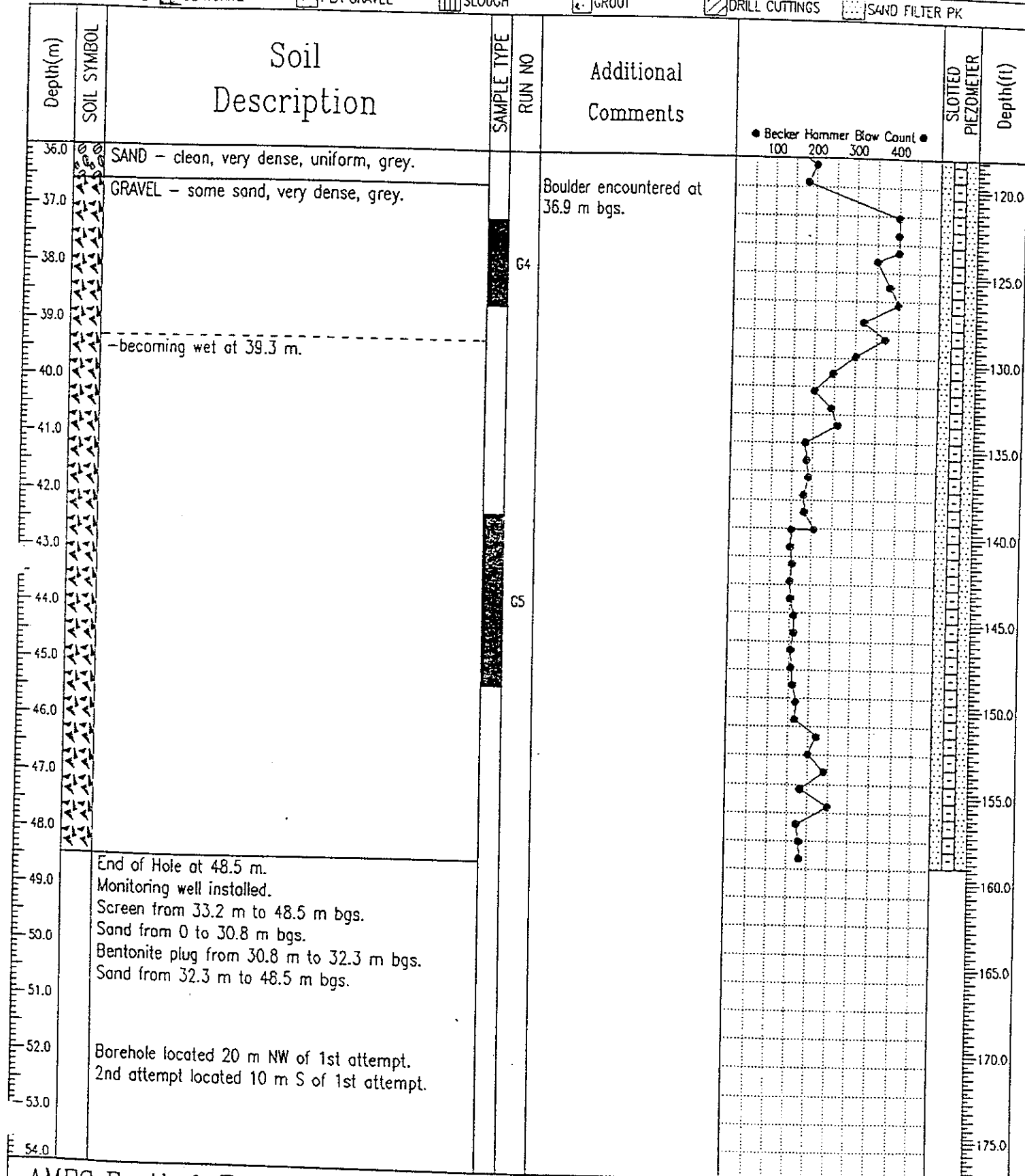
Contractor: BECK Drilling

Method: Becker Hammer, Hollow Stem

BOREHOLE NO: AM00-01

PROJECT NO: WX2025502-600

ELEVATION:

SAMPLE TYPE ☐ GRAB (SOIL) ☐ GRAB (WATER) ☒ ISPTBACKFILL TYPE ☒ BENTONITE ☐ PEA GRAVEL ☐ SLOUGH ☐ GROUT ☒ DRILL CUTTINGS ☐ SAND FILTER PKAMEC Earth & Environmental Limited
Nanaimo, B.C.

LOGGED BY: BH

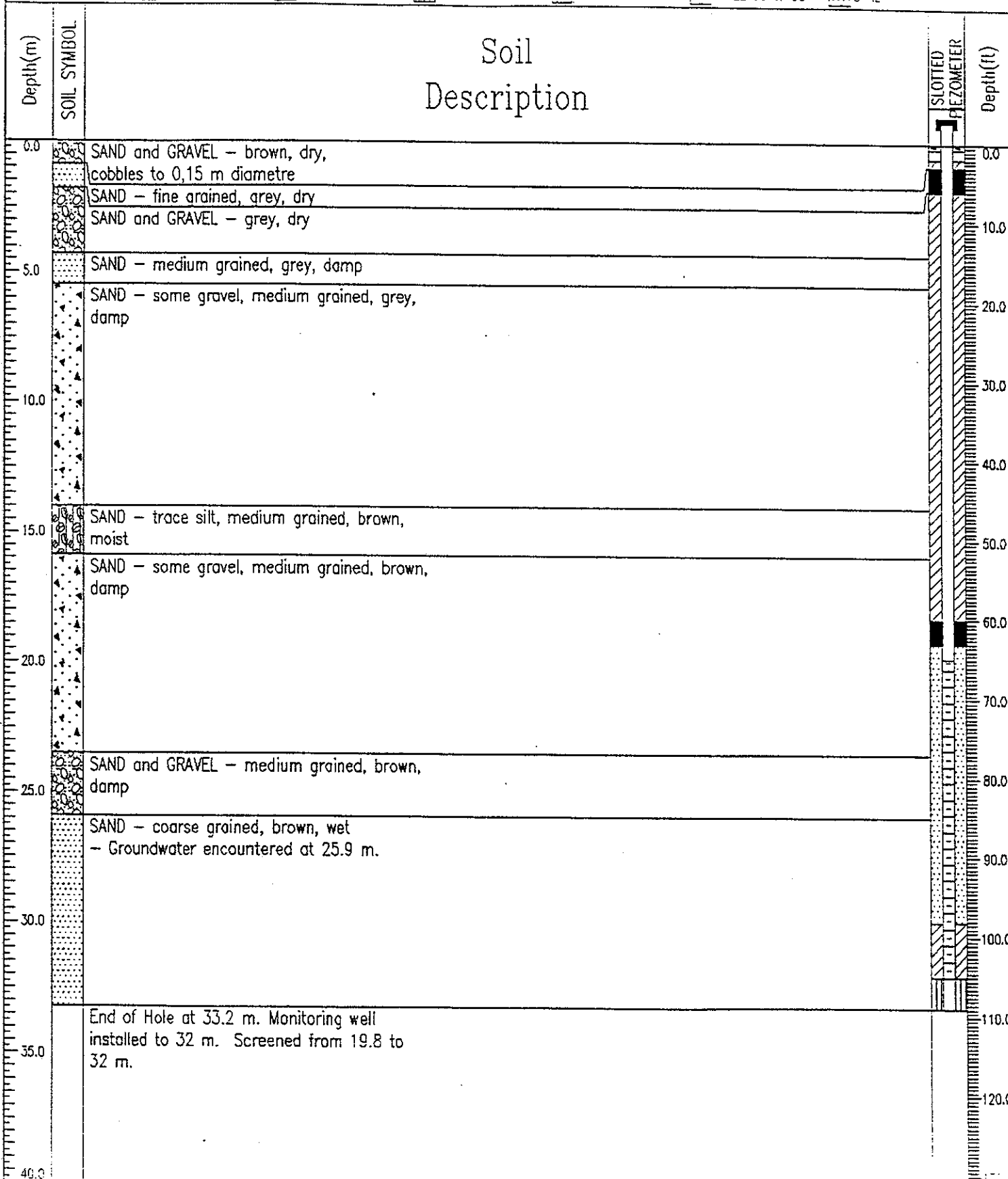
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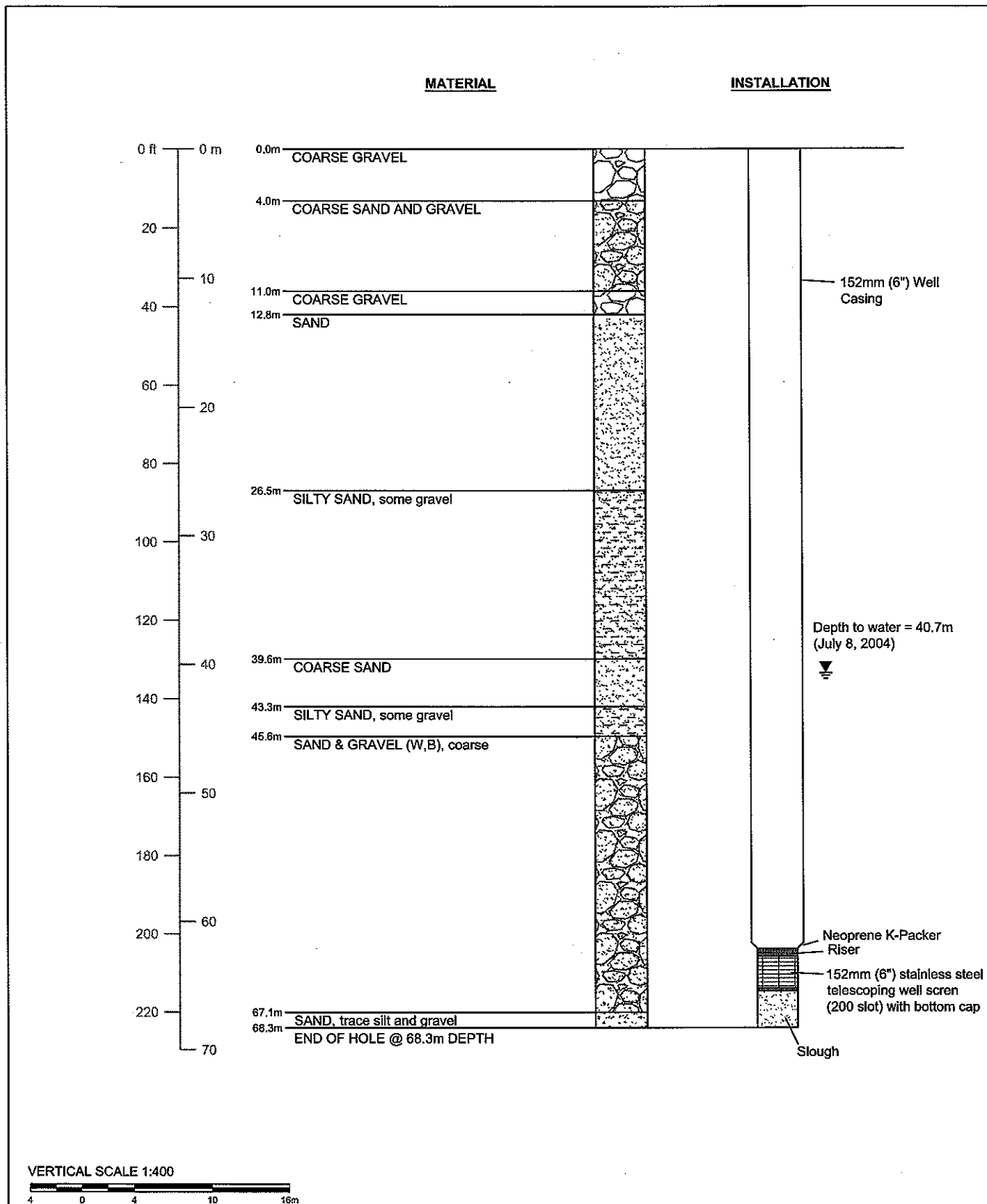
COMPLETION DEPTH: 48.463 m

COMPLETE: 21/09/00

Page 3 of 3

Annual Groundwater Monitoring	BECK Drilling and Environmental Services	BOREHOLE NO: AMOC-1
Regional District of Comox-Straithcreek	Acker Tractor Air Rotary Drill	PROJECT NO: NX2025506
		ELEVATION:
BACKFILL TYPE	☒ BENTONITE ☒ PEA GRAVEL ☒ SLOUGH ☒ GROUT ☒ DRILL CUTTINGS ☒ SAND	





EBA Engineering Consultants Ltd.



PROJECT INSTALLATION OF PROD. WELL AND ADDITIONAL MONITORING WELLS, CAMPBELL RIVER LANDFILL

CLIENT

REGIONAL DISTRICT OF COMOX-STRATHCONA

TITLE

EBA04-1 WELL SCHEMATIC

DATE 2004/08/17

DWN.

YL

CHKD.

SB

FILE NO.

0807-2840017.010

Monitoring Wells Campbell River Landfill		Drillwell Enterprises Ltd.	BOREHOLE NO: EBA04-2
Regional District of Comox-Strathcona		Drilling Method: Air Rotary	PROJECT NO: 2840017.010
		ELEVATION:	
BACKFILL TYPE ☒ BENTONITE ☐ PEA GRAVEL ☐ SLOUGH ☐ GROUT ☐ DRILL CUTTINGS ☐ SAND			
Depth (m)	SOIL SYMBOL	Soil Description	Field Notes
0.0		GRAVEL CAP	CASING LEFT IN GROUND TO DEPTH OF 33.5m.
1.0		WOOD FIBRE	
2.0		GARBAGE	
3.0		WOOD FIBRE	
4.0		GARBAGE	
5.0		SAND & GRAVEL	
6.0			
7.0			
8.0			
9.0		COARSE GRAVEL	
10.0			
11.0			
12.0			
13.0			
14.0			
15.0			
16.0			
17.0			
18.0			
19.0			
20.0			
21.0			
22.0			
23.0			
24.0			
25.0			
26.0			
27.0			
28.0			
29.0			
30.0			
31.0			
32.0			
33.0			
34.0			
35.0			

EBA Engineering Consultants Ltd.	LOGGED BY: MK	COMPLETION DEPTH: 65.5 m
	REVIEWED BY: SB	COMPLETE: 07/07/04
Page 1 of 2		

Monitoring Wells Campbell River Landfill		Drillwell Enterprises Ltd.	BOREHOLE NO: EBA04-2		
Regional District of Comox-Strathcona		Drilling Method: Air Rotary	PROJECT NO: 2840017.010		
			ELEVATION:		
BACKFILL TYPE ☒ BENTONITE ☐ PEA GRAVEL ☐ SLOUGH ☐ GROUT ☐ DRILL CUTTINGS ☐ SAND					
Depth(m)	SOIL SYMBOL	Soil Description	Field Notes	SLOTTED PIEZOMETER	Depth(ft)
35.0					115.0
36.0					120.0
37.0					125.0
38.0					130.0
39.0					135.0
40.0					140.0
41.0					145.0
42.0					150.0
43.0					155.0
44.0					160.0
45.0					165.0
46.0					170.0
47.0					175.0
48.0					180.0
49.0					185.0
50.0					190.0
51.0					SAND & GRAVEL
52.0	200.0				
53.0	205.0				
54.0	210.0				
55.0	215.0				
56.0	220.0				
57.0	225.0				
58.0					
59.0					
60.0					
61.0	END OF HOLE @ 65.5m BELOW SURFACE NOTE: SOILS LOGGED BY DRILLWELL STAFF.				215.0
62.0					220.0
63.0					225.0
64.0					
65.0					
66.0					
67.0					
68.0					
69.0					
70.0					
EBA Engineering Consultants Ltd.			LOGGED BY: MK	COMPLETION DEPTH: 65.5 m	
			REVIEWED BY: SB	COMPLETE: 07/07/04	
				Page 2 of 2	

Monitoring Wells Campbell River Landfill		Drillwell Enterprises Ltd.	BOREHOLE NO: EBA04-3
Regional District of Comox-Strathcona		Drilling Method: Air Rotary	PROJECT NO: 2840017.010
		ELEVATION:	

BACKFILL TYPE	☒ BENTONITE	☐ PEA GRAVEL	☐ SLOUGH	☐ GROUT	☐ DRILL CUTTINGS	☐ SAND

Depth(m)	SOIL SYMBOL	Soil Description	Field Notes	SLOTTED PIEZOMETER	Depth (ft)
0.0		SAND	CASING LEFT IN GROUND TO DEPTH OF 11.2m.		0.0
1.0					
2.0					
3.0					
4.0		SAND, some gravel			5.0
5.0					
6.0					
7.0					
8.0		SAND AND GRAVEL			10.0
9.0					
10.0					
11.0					
12.0		SILTY SAND	15.0		
13.0					
14.0					
15.0					
16.0		FINE SAND	20.0		
17.0					
18.0					
19.0					
20.0		COARSE SAND	25.0		
21.0					
22.0					
23.0					
24.0		FINE SAND, some silt	30.0		
25.0					
26.0					
27.0					
28.0					
29.0					
30.0					
31.0					
32.0					
33.0					
34.0					
35.0		SAND AND GRAVEL	35.0		

EBA Engineering Consultants Ltd.	LOGGED BY: MC	COMPLETION DEPTH: 41.2 m
	REVIEWED BY: SB	COMPLETE: 07/07/04

Monitoring Wells Campbell River Landfill		Drillwell Enterprises Ltd.		BOREHOLE NO: EBA04-3	
Regional District of Comox-Strathcona		Drilling Method: Air Rotary		PROJECT NO: 2840017.010	
				ELEVATION:	
BACKFILL TYPE ☒ BENTONITE ☐ PEA GRAVEL ☐ SLOUGH ☐ GROUT ☐ DRILL CUTTINGS ☐ SAND					
Depth(m)	SOIL SYMBOL	Soil Description	Field Notes	SLOTTED PIEZOMETER	Depth(ft)
35.0		END OF HOLE @ 41.2 m BELOW SURFACE NOTE: SOILS LOGGED BY DRILLWELL STAFF.			115.0
36.0					120.0
37.0					125.0
38.0					130.0
39.0					135.0
40.0					140.0
41.0					145.0
42.0					150.0
43.0					155.0
44.0					160.0
45.0					165.0
46.0					170.0
47.0					175.0
48.0					180.0
49.0					185.0
50.0					190.0
51.0					195.0
52.0	200.0				
53.0	205.0				
54.0	210.0				
55.0	215.0				
56.0	220.0				
57.0	225.0				
58.0					
59.0					
60.0					
61.0					
62.0					
63.0					
64.0					
65.0					
66.0					
67.0					
68.0					
69.0					
70.0					
EBA Engineering Consultants Ltd.			LOGGED BY: MC REVIEWED BY: SB	COMPLETION DEPTH: 41.2 m COMPLETE: 07/07/04	

Monitoring Wells Campbell River Landfill		Sonic Drilling Ltd.		BOREHOLE NO: EBA04-4	
Regional District of Comox-Strathcona		Drilling Method: Sonic		PROJECT NO: 2840017.010	
				ELEVATION:	
BACKFILL TYPE ☒ BENTONITE ☐ PEA GRAVEL ☐ SLOUGH ☐ GROUT ☐ DRILL CUTTINGS ☐ SAND					
Depth(m)	SOIL SYMBOL	Soil Description	Field Notes	SLOTTED PIEZOMETER	Depth(ft)
0.0		GARBAGE			0.0
1.0					5.0
2.0					10.0
3.0					15.0
4.0					20.0
5.0					25.0
6.0					30.0
7.0					35.0
8.0					40.0
9.0					45.0
10.0					50.0
11.0					55.0
12.0					60.0
13.0					65.0
14.0					70.0
15.0					75.0
16.0					80.0
17.0					85.0
18.0					90.0
19.0					95.0
20.0					100.0
21.0	105.0				
22.0	110.0				
22.0		SAND, fine to medium grained, well sorted, loose, damp			70.0
23.0					75.0
24.0					80.0
25.0					85.0
26.0		SILT, occasional gravel, trace silt, compact, moist			90.0
27.0		SAND, fine to medium grained, well sorted			95.0
28.0		SILT & CLAY with trace sand			100.0
29.0		SAND and SAND & GRAVEL interlayers			105.0
30.0					110.0
31.0					
32.0					
33.0					
34.0					
35.0					
EBA Engineering Consultants Ltd.			LOGGED BY: MC	COMPLETION DEPTH: 53.4 m	
			REVIEWED BY: SB	COMPLETE: 15/07/04	
			Page 1 of 2		

Monitoring Wells Campbell River Landfill		Sonic Drilling Ltd.		BOREHOLE NO: EBA04-4	
Regional District of Comox-Strathcona		Drilling Method: Sonic		PROJECT NO: 2840017.010	
				ELEVATION:	
BACKFILL TYPE ☒ BENTONITE ☐ PEA GRAVEL ☐ SLOUGH ☐ GROUT ☐ DRILL CUTTINGS ☐ SAND					
Depth(m)	SOIL SYMBOL	Soil Description	Field Notes	SLOTTED PIEZOMETER	Depth(ft)
35.0					115.0
36.0					120.0
37.0					125.0
38.0					130.0
39.0					135.0
40.0					140.0
41.0					145.0
42.0					150.0
43.0					155.0
44.0					160.0
45.0					165.0
46.0					170.0
47.0					175.0
48.0					180.0
49.0					185.0
50.0					190.0
51.0					END OF HOLE @ 53.3 m BELOW SURFACE NOTE: SOILS LOGGED BY EBA STAFF.
52.0	200.0				
53.0	205.0				
54.0	210.0				
55.0	215.0				
56.0	220.0				
57.0	225.0				
58.0					
59.0					
60.0					
61.0					
62.0					
63.0					
64.0					
65.0					
66.0					
67.0					
68.0					
69.0					
70.0					
EBA Engineering Consultants Ltd.			LOGGED BY: MC	COMPLETION DEPTH: 53.4 m	
			REVIEWED BY: SB	COMPLETE: 15/07/04	
				Page 2 of 2	

Monitoring Wells Campbell River Landfill		Sonic Drilling Ltd.		BOREHOLE NO: EBA04-5					
Regional District of Comox-Strathcona		Drilling Method: Sonic		PROJECT NO: 2840017.010					
				ELEVATION:					
BACKFILL TYPE ☒ BENTONITE ☐ PEA GRAVEL ☐ SLOUGH ☐ GROUT ☐ DRILL CUTTINGS ☐ SAND									
Depth(m)	SOIL SYMBOL	Soil Description	Field Notes	SLOTTED PIEZOMETER	Depth(ft)				
0.0		GARBAGE	WELLSCREEN FULL OF BENTONITE, WELL TO BE REDRILLED.		0.0				
1.0					5.0				
2.0					10.0				
3.0					15.0				
4.0					20.0				
5.0					25.0				
6.0					30.0				
7.0					35.0				
8.0					40.0				
9.0					45.0				
10.0					50.0				
11.0					55.0				
12.0					60.0				
13.0					65.0				
14.0					70.0				
15.0					75.0				
16.0						SAND & GRAVEL, medium to coarse grained, sub-angular, compact moist			80.0
17.0									85.0
18.0	90.0								
19.0	95.0								
20.0	100.0								
21.0	105.0								
22.0	110.0								
23.0									
24.0									
25.0									
26.0		SILT & GRAVEL, moist							
27.0									
28.0									
29.0									
30.0									
31.0									
32.0									
33.0									
34.0									
35.0									
EBA Engineering Consultants Ltd.			LOGGED BY: MC REVIEWED BY: SB		COMPLETION DEPTH: 67.1 m COMPLETE: 07/07/04				

Monitoring Wells Campbell River Landfill		Sonic Drilling Ltd.		BOREHOLE NO: EBA04-5	
Regional District of Comox-Strathcona		Drilling Method: Sonic		PROJECT NO: 2840017.010	
				ELEVATION:	
BACKFILL TYPE ☒ BENTONITE ☐ PEA GRAVEL ☐ SLOUGH ☐ GROUT ☐ DRILL CUTTINGS ☐ SAND					
Depth(m)	SOIL SYMBOL	Soil Description	Field Notes	SLOTTED PIEZOMETER	Depth (ft)
35.0					115.0
36.0					120.0
37.0					125.0
38.0					130.0
39.0					135.0
40.0					140.0
41.0					145.0
42.0					150.0
43.0					155.0
44.0					160.0
45.0					165.0
46.0					170.0
47.0					175.0
48.0					180.0
49.0					185.0
50.0					190.0
51.0					195.0
52.0					200.0
53.0					205.0
54.0					210.0
55.0	215.0				
56.0	220.0				
57.0	225.0				
58.0					
59.0					
60.0					
61.0					
62.0					
63.0					
64.0					
65.0					
66.0					
67.0					
68.0					
69.0					
70.0					
		END OF HOLE @ 67.1 m BELOW SURFACE NOTE: SOILS LOGGED BY EBA STAFF.			
EBA Engineering Consultants Ltd.			LOGGED BY: MC	COMPLETION DEPTH: 67.1 m	
			REVIEWED BY: SB	COMPLETE: 07/07/04	
			Page 2 of 2		

Monitoring Wells Campbell River Landfill		Drillwell Enterprises Ltd.	BOREHOLE NO: EBA04-6
Regional District of Comox-Strathcona		Drilling Method: Air Rotary	PROJECT NO: 2840017.010
		ELEVATION:	

BACKFILL TYPE	☒ BENTONITE	☐ PEA GRAVEL	☐ SLOUGH	☐ GROUT	☒ DRILL CUTTINGS	☒ SAND

Depth(m)	SOIL SYMBOL	Soil Description	Field Notes	SLOTTED PIEZOMETER	Depth(ft)
0.0		SAND	CASING LEFT IN GROUND TO DEPTH OF 26.2m.		0.0
1.0					
2.0					
3.0					
4.0		SAND, some gravel			5.0
5.0					
6.0					
7.0		COARSE GRAVEL			10.0
8.0					
9.0					
10.0		SAND & FINER GRAVEL			15.0
11.0					
12.0					
13.0					
14.0					
15.0					
16.0		SILTY SAND	20.0		
17.0		SAND	25.0		
18.0					
19.0					
20.0					
21.0					
22.0		SAND & GRAVEL, slightly silty	30.0		
23.0					
24.0					
25.0		SILTY SAND, brown	35.0		
26.0					
27.0					
28.0		SAND & GRAVEL	40.0		
29.0					
30.0					
31.0					
32.0					
33.0					
34.0					
35.0					

EBA Engineering Consultants Ltd.	LOGGED BY: MC	COMPLETION DEPTH: 39.6 m
	REVIEWED BY: SB	COMPLETE: 13/07/04
		Page 1 of 2

Monitoring Wells Campbell River Landfill		Drillwell Enterprises Ltd.	BOREHOLE NO: EBA04-6
Regional District of Comox-Strathcona		Drilling Method: Air Rotary	PROJECT NO: 2840017.010
		ELEVATION:	

BACKFILL TYPE	☒ BENTONITE	☐ PEA GRAVEL	☐ SLOUGH	☐ GROUT	☐ DRILL CUTTINGS	☐ SAND

Depth(m)	SOIL SYMBOL	Soil Description	Field Notes	SLOTTED PIEZOMETER	Depth(ft)
35.0		END OF HOLE @ 39.6 m BELOW SURFACE NOTE: SOILS LOGGED BY DRILLWELL STAFF.			115.0
36.0					120.0
37.0					125.0
38.0					130.0
39.0					135.0
40.0					140.0
41.0					145.0
42.0					150.0
43.0					155.0
44.0					160.0
45.0	165.0				
46.0	170.0				
47.0	175.0				
48.0	180.0				
49.0	185.0				
50.0	190.0				
51.0	195.0				
52.0	200.0				
53.0	205.0				
54.0	210.0				
55.0	215.0				
56.0	220.0				
57.0	225.0				
58.0					
59.0					
60.0					
61.0					
62.0					
63.0					
64.0					
65.0					
66.0					
67.0					
68.0					
69.0					
70.0					

EBA Engineering Consultants Ltd.	LOGGED BY: MC REVIEWED BY: SB	COMPLETION DEPTH: 39.6 m COMPLETE: 13/07/04

Monitoring Wells Campbell River Landfill		Drillwell Enterprises Ltd.	BOREHOLE NO: EBA04-7
Regional District of Comox-Strathcona		Drilling Method: Air Rotary	PROJECT NO: 2840017.010
			ELEVATION:
BACKFILL TYPE BENTONITE PEA GRAVEL SLOUGH GROUT DRILL CUTTINGS SAND			
Depth(m)	SOIL SYMBOL	Soil Description	Field Notes
0.0		SAND	CASING LEFT IN GROUND TO DEPTH OF 11.2m
1.0			
2.0			
3.0			
4.0			
5.0			
6.0			
7.0			
8.0			
9.0			
10.0		SAND, some gravel	
11.0			
12.0			
13.0			
14.0			
15.0			
16.0			
17.0			
18.0			
19.0			
20.0		COARSE GRAVEL	
21.0			
22.0			
23.0			
24.0			
25.0			
26.0			
27.0			
28.0			
29.0			
30.0		SAND & GRAVEL	
31.0			
32.0			
33.0			
34.0			
35.0			
36.0			
37.0			
38.0			
39.0			
40.0		SILTY SAND	
41.0			
42.0			
43.0			
44.0			
45.0			
46.0			
47.0			
48.0			
49.0			
50.0		SAND	
51.0			
52.0			
53.0			
54.0			
55.0			
56.0			
57.0			
58.0			
59.0			
60.0		SAND & GRAVEL, some silt	
61.0			
62.0			
63.0			
64.0			
65.0			
66.0			
67.0			
68.0			
69.0			
70.0		SILTY SAND, brown	
71.0			
72.0			
73.0			
74.0			
75.0			
76.0			
77.0			
78.0			
79.0			
80.0		SAND & GRAVEL	
81.0			
82.0			
83.0			
84.0			
85.0			
86.0			
87.0			
88.0			
89.0			
90.0		END OF HOLE @ 32.0 m BELOW SURFACE NOTE: SOILS LOGGED BY DRILLWELL STAFF.	
91.0			
92.0			
93.0			
94.0			
95.0			
96.0			
97.0			
98.0			
99.0			

EBA Engineering Consultants Ltd.

LOGGED BY: MC

REVIEWED BY: SB

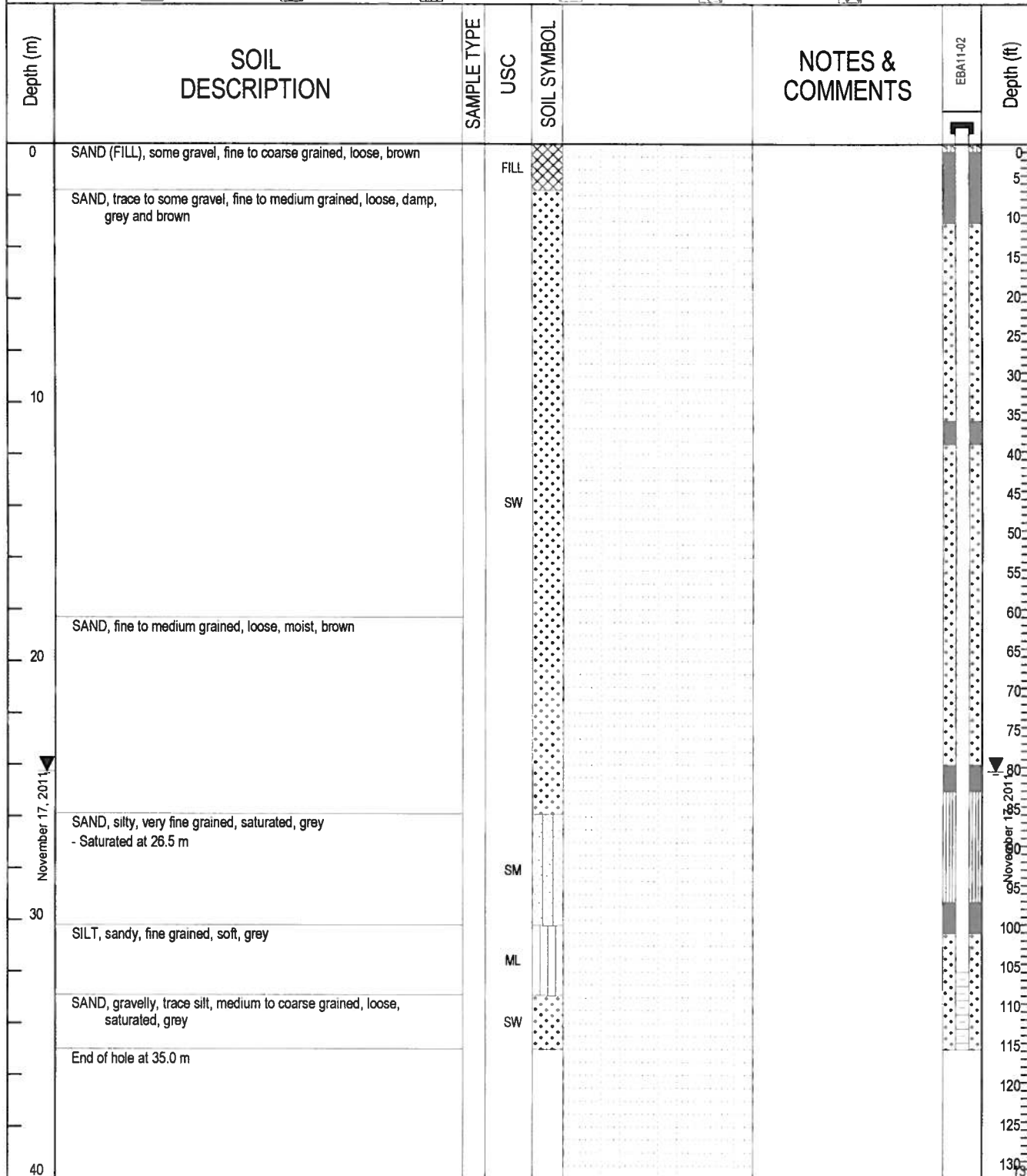
COMPLETION DEPTH: 32 m

COMPLETE: 17/07/04

Project: Stage 2 PSI		Client: Comox Valley Regional District		PROJECT NO. - BOREHOLE NO.	
Location: Block J, CRWMC		Drilling Contractor: Drillwell Enterprises		N23101802 - EBA11-01	
Client: Campbell River, BC		Drilling Method: Air Rotary			
SAMPLE TYPE DISTURBED NO RECOVERY SPT A-CASING SHELBY TUBE CORE					
BACKFILL TYPE BENTONITE PEA GRAVEL SLOUGH GROUT DRILL CUTTINGS SAND					

Depth (m)	SOIL DESCRIPTION	SAMPLE TYPE	USC	SOIL SYMBOL	NOTES & COMMENTS	EBA11-01	Depth (ft)
0	SAND, fine grained, loose, homogeneous, damp, orange and white						0
	SAND, fine to medium grained, loose, moist, grey						5
							10
							15
	- Trace silt at 6.1 m						20
							25
	- Compact at 8.5 m						30
10	SAND, fine grained, trace gravel, small, grey						35
							40
	- Trace silt at 11.3 m						45
	- No silt at 11.7 m						50
							55
	- Coarse sand at 14.3 m		SW				60
	SAND, fine grained, homogenous moist, brown						65
	- Trace small gravel at 15.2 m						70
							75
20	SAND, trace to some silt, very fine grained, moist, grey						80
	- Silty at 19.8 m						85
	- Moist to wet at 20.7 m						90
							95
	- Saturated at 23.2 m						100
							105
							110
							115
							120
							125
							130
							135
							140
							145
							150
							155
							160
							165
							170
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							1000
							1005
							1010
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							1055
							1060
							1065
							1070
							1075
							1080
							1085
							1090
							1095
							1100
							1105
							1110
							1115
							1120
							1125
							1130
							1135
							1140

Project: Subsurface Investigation		Client: Comox Valley Regional District		PROJECT NO. - BOREHOLE NO.	
Location: Block J, CRWMC		Drilling Contractor: Drillwell Enterprises		N23101803 - EBA11-02	
City: Campbell River, BC		Drilling Method: Air Rotary			
SAMPLE TYPE	☒ DISTURBED	☐ NO RECOVERY	☒ SPT	☐ A-CASING	☐ SHELBY TUBE
BACKFILL TYPE	☒ BENTONITE	☐ PEA GRAVEL	☐ SLOUGH	☐ GROUT	☐ DRILL CUTTINGS
					☐ SAND



 A TETRA TECH COMPANY	LOGGED BY: MG	COMPLETION DEPTH: 35 m
	REVIEWED BY:	COMPLETE: 11/16/2011
	DRAWING NO: 6	Page 1 of 1

Project: Stage 2 PSI		Client: Comox Valley Regional District		PROJECT NO. - BOREHOLE NO.	
Location: Block J, CRWMC		Drilling Contractor: Drillwell Enterprises		N23101802 - EBA11-03	
Client: Campbell River, BC		Drilling Method: Air Rotary			
SAMPLE TYPE		☒ DISTURBED	☐ NO RECOVERY	☒ SPT	☐ A-CASING
BACKFILL TYPE		☒ BENTONITE	☐ PEA GRAVEL	☐ SLOUGH	☐ GROUT
		☐ SHELBY TUBE	☐ CORE		
		☐ DRILL CUTTINGS	☐ SAND		

Depth (m)	SOIL DESCRIPTION	SAMPLE TYPE	USC	SOIL SYMBOL	NOTES & COMMENTS	Depth (ft)
0	ORGANICS (FOREST FLOOR), silt, trace sand, soft, moist, dark brown	TOPSOIL	SM			0
	SILT, trace sand, trace organics, fine to coarse grained, soft, moist, reddish brown					5
	SILT, trace clay, stiff, moist, light brown		SC			10
	SAND, fine to medium grained, loose, damp, tan coloured					15
	- Brown at 6.1 m					20
	- Compact at 7.9 m					25
	- Loose at 8.8 m					30
10						35
						40
						45
						50
			SW			55
						60
	SAND, fine to coarse grained, moist, grey					65
20						70
	- Saturated at 22.6 m, trace gravel					75
						80
						85
						90
	SILT, sandy, trace gravel, very fine grained, soft, saturated, grey		SM			95
30						100
	End of hole at 30.1 m					105
						110
						115
35						120

 A TETRA TECH COMPANY	LOGGED BY: MG	COMPLETION DEPTH: 30.175 m
	REVIEWED BY:	COMPLETE: 11/17/2011
	DRAWING NO: 2	Page 1 of 1

Project: Stage 2 PSI		Client: Comox Valley Regional District		PROJECT NO. - BOREHOLE NO.	
Location: Block J, CRWMC		Drilling Contractor: Drillwell Enterprises		N23101802 - EBA11-04	
Client: Campbell River, BC		Drilling Method: Air Rotary			
SAMPLE TYPE DISTURBED NO RECOVERY SPT A-CASING SHELBY TUBE CORE					
BACKFILL TYPE BENTONITE PEA GRAVEL SLOUGH GROUT DRILL CUTTINGS SAND					

Depth (m)	SOIL DESCRIPTION	SAMPLE TYPE	USC	SOIL SYMBOL	NOTES & COMMENTS	EBA11-04	Depth (ft)
0	SILT, sandy, trace organics, soft, moist, reddish brown SAND, fine grained, loose, homogenous, moist, tan coloured		ML				0
	- Grey at 3.1 m						5
			SW				10
							15
							20
							25
							30
							35
							40
							45
							50
							55
							60
							65
20	SAND, trace gravel, fine to medium grained, compact						70
							75
	SILT, sandy, fine grained, trace gravel, moist to wet, grey		ML				80
							85
	SAND, trace gravel, trace silt, saturated, tan coloured		SW				90
	SILT, sandy, soft, saturated, grey		ML				95
							100
	SAND, very fine grained, some silt, saturated, grey		SM				105
							110
							115
30	End of hole at 29.6 m						120
							125
							130
							135
							140
							145
35							150

 A TETRA TECH COMPANY	LOGGED BY: MG	COMPLETION DEPTH: 29.57 m
	REVIEWED BY:	COMPLETE: 11/17/2011
	DRAWING NO: 3	Page 1 of 1



STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

Page 1 of 3

PROJECT NAME: Campbell River Waste Management Centre
PROJECT NUMBER: 056484
CLIENT: Comox Valley Regional District
LOCATION: Campbell River, BC
DRILLING CONTRACTOR: Mud Bay Drilling

HOLE DESIGNATION: MW01-16
DATE COMPLETED: 21 June 2016
DRILLING METHOD: Rotasonic (153 mm)
FIELD PERSONNEL: S. Foster

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	BOREHOLE	SAMPLE				
				NUMBER	INTERVAL	REC (%)	N' VALUE	
	NORTHING: 5542091 EASTING: 331111	TOP OF RISER GROUND SURFACE 186.68 185.94	STICKUP 0.80 M					
1	OL-SILT, with gravel (organic topsoil), loose, silt to fine gravel, dark brown, dry	185.64		RS-1		100		
2	GW-GRAVEL with cobbles, with silt/fine sand, loose, brown, dry			RS-2		100		
	- silt and sand with cobbles layer (0.3 m) at 1.83m BGS							
3	SP-gravelly SAND, medium sand, minor coarse sand, fine to coarse gravel, light grey, dry	183.50 182.90	BENTONITE CHIP AND SOIL CUTTINGS 51 mm Ø PVC RISER PIPE	RS-3		100		
4	SW/GW-SAND and GRAVEL, with cobbles, fine sand, fine to coarse gravel, cobbles, tight, grey, moist							
5								
6	SW-gravelly SAND, trace cobble, fine sand (less medium, less coarse), fine gravel (less coarse), light grey dry	180.46	152 mm Ø BOREHOLE	RS-4		100		
7								
8								
9								
10	SP-SAND, fine sand, light brown, slightly moist	175.88		RS-5		100		
11	GM-SILTY SAND and GRAVEL, silt with fine to coarse sand, with fine to coarse gravel, light grey, dry	174.97 174.06						
12	SW/GW-SAND and GRAVEL, trace silt, well graded, fine to coarse sand, fine to coarse gravel, grey, moist			RS-6		100		
13								
14								
15	SP-SAND, trace silt, trace gravel, medium to coarse grain sand, fine gravel, brown, moist	171.01		RS-7		100		
16	- trace cobble at 16.46m BGS							
17								
18	SW/GW-SAND and GRAVEL, fine to coarse sand, fine to coarse gravel, trace silt, brown, moist	167.96	BENTONITE/SOIL CUTTINGS	RS-8		100		
19								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
STATIC WATER LEVEL ▼ June 29, 2016

OVERBURDEN LOG 056484-MW01-16.GPJ CRA_CORP.GDT 22/7/16



STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

Page 2 of 3

PROJECT NAME: Campbell River Waste Management Centre
PROJECT NUMBER: 056484
CLIENT: Comox Valley Regional District
LOCATION: Campbell River, BC
DRILLING CONTRACTOR: Mud Bay Drilling

HOLE DESIGNATION: MW01-16
DATE COMPLETED: 21 June 2016
DRILLING METHOD: Rotasonic (153 mm)
FIELD PERSONNEL: S. Foster

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	BOREHOLE	SAMPLE				
				NUMBER	INTERVAL	REC (%)	'N' VALUE	
21	GM-GRAVEL (TILL), with silt/fine sand, fine to coarse gravel, fine sand (less medium/coarse), very dense, clumpy, gravel rounded to subrounded, grey to brown, moist - core through boulder at 21.03m BGS	165.52		RS-9		100		
22								
23								
24								
25								
26	SP-SAND with gravel, fine to coarse sand, fine gravel, subrounded, brown, grey, moist	157.90		RS-10		100		
27								
28								
29				RS-11		100		
30								
31	SW/GW-SAND and GRAVEL trace silt, trace cobbles, fine to coarse sand, fine to coarse gravel, subrounded, brown, moist - trace cobbles at 29.26m BGS - becoming wet at 29.87m BGS - trace cobbles at 31.39m BGS	156.99		RS-12		100		
32								
33								
34								
35								
36	- increase in silt, return on water, cloudy at 33.22m BGS - orange brown, sandy silt layer, 5 cm thickness at 34.75m BGS - slow drilling, hard at 35.05m BGS			RS-13		100		
37								
38								
39								
40								
41	- sandy till with gravel at 39.01m BGS			RS-14		100		
42								
43								
44								
45								
46				RS-15		100		
47								
48								
49								
50								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
STATIC WATER LEVEL ▼ June 29, 2016

OVERBURDEN LOG 056484-MW01-16.GPJ CRA_CORP.GDT 22/7/16

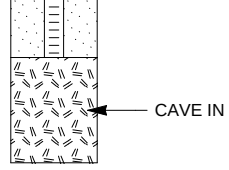


STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

Page 3 of 3

PROJECT NAME: Campbell River Waste Management Centre
PROJECT NUMBER: 056484
CLIENT: Comox Valley Regional District
LOCATION: Campbell River, BC
DRILLING CONTRACTOR: Mud Bay Drilling

HOLE DESIGNATION: MW01-16
DATE COMPLETED: 21 June 2016
DRILLING METHOD: Rotasonic (153 mm)
FIELD PERSONNEL: S. Foster

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	BOREHOLE	SAMPLE				
				NUMBER	INTERVAL	REC (%)	N' VALUE	
41	END OF BOREHOLE @ 42.37m BGS Monitoring well completed in saturated conditions. Initial static water level elevated above normal due to addition of water during drilling. Borehole backfilled with bentonite gravel, and a mixture of soil cuttings and bentonite chip.	143.58		RS-16		100		
42								
43								
44								
45								
46								
47								
48								
49								
50								
51								
52								
53								
54								
55								
56								
57								
58								
59								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
STATIC WATER LEVEL ▼ June 29, 2016

OVERBURDEN LOG 056484-MW01-16.GPJ CRA_CORP.GDT 22/7/16

Appendix C

Well Licenses and Surface Water Points of Diversion

THE PROVINCE OF BRITISH COLUMBIA—WATER ACT

CONDITIONAL WATER LICENCE

Canfarge Limited of 1051 Main Street, Vancouver, British Columbia V9N 5N3

is hereby authorized to divert and use water as follows:

- (a) The source of the water-supply is Antonelli Lake.
- (b) The point of diversion is located as shown on the attached plan.
- (c) The date from which this licence shall have precedence is 30th June, 1967.
- (d) The purpose for which the water is to be used is industrial (gravel washing).
- (e) The maximum quantity of water which may be diverted is 1 cubic foot per second and such additional quantity as the Engineer may from time to time determine should be allowed for losses.
- (f) The period of the year during which the water may be used is the whole year.
- (g) The land upon which the water is to be used and to which this licence is appurtenant is Block A of Lot 85, Sayward District.
- (h) The works authorized to be constructed are pump, pipe, settling pond and ditch, which shall be located approximately as shown on the attached plan.
- (i) The construction of the said works has been completed and the water shall be beneficially used on or before the 31st day of December, 1986.
- (j) This licence is issued in substitution of Conditional Water Licence 32774, under Section 16 of the Water Act.

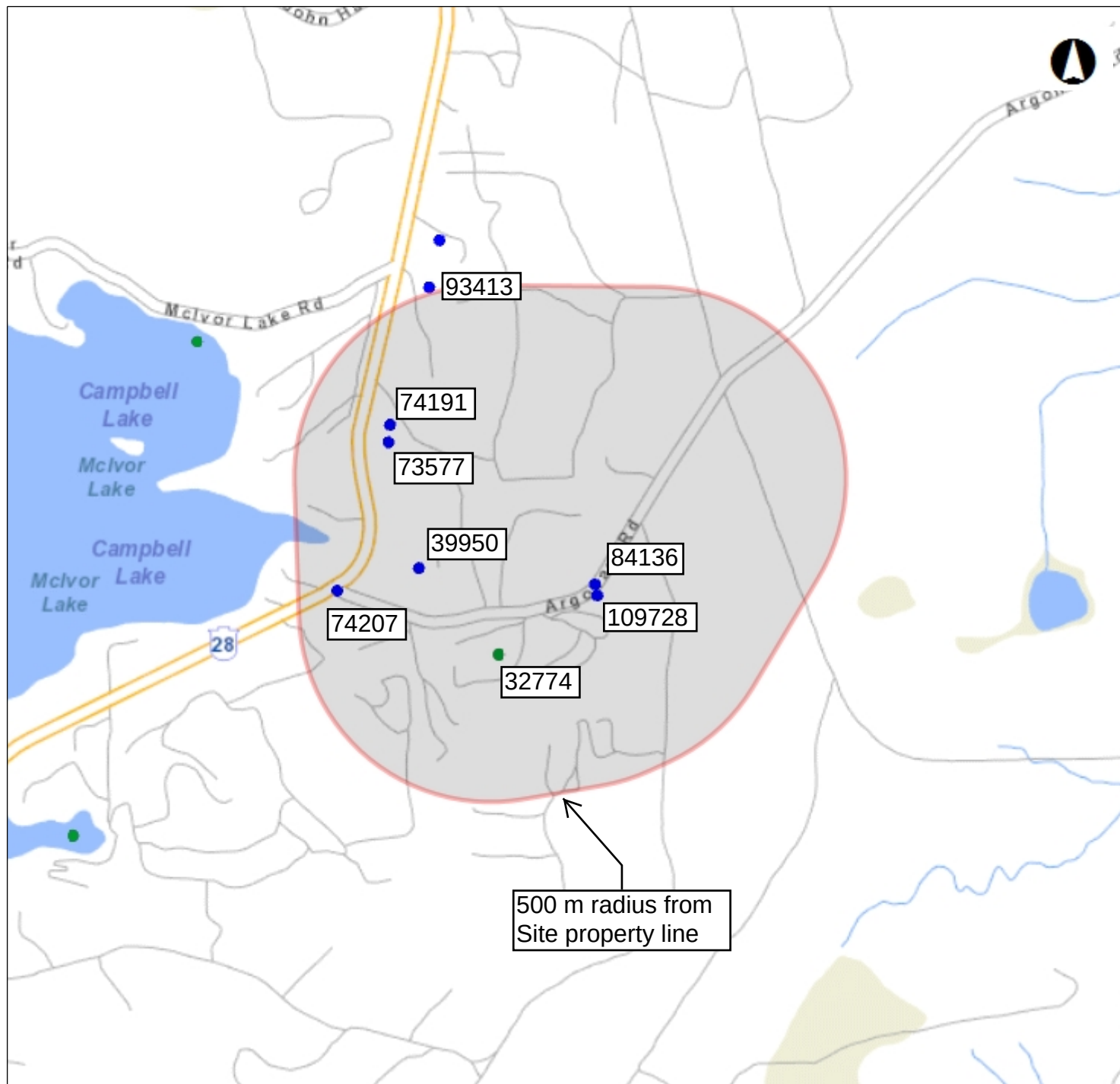

B. Hollingshead
Regional Water Manager

File No. 0273655

Date issued:

MAY 31 1985

Conditional Licence 61372



Legend

- Water Wells
- Points of Diversion
- STATUS
- Active Application
- Active Application and Licence
- Inactive
- Active Licence
- TileCache

0 0.30 0.61 km

1: 15,000

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CAUTION: Maps obtained using this site are not designed to assist in navigation. These maps may be generalized and may not reflect current conditions. Uncharted hazards may exist. DO NOT USE THESE MAPS FOR NAVIGATIONAL PURPOSES.

Datum: NAD83

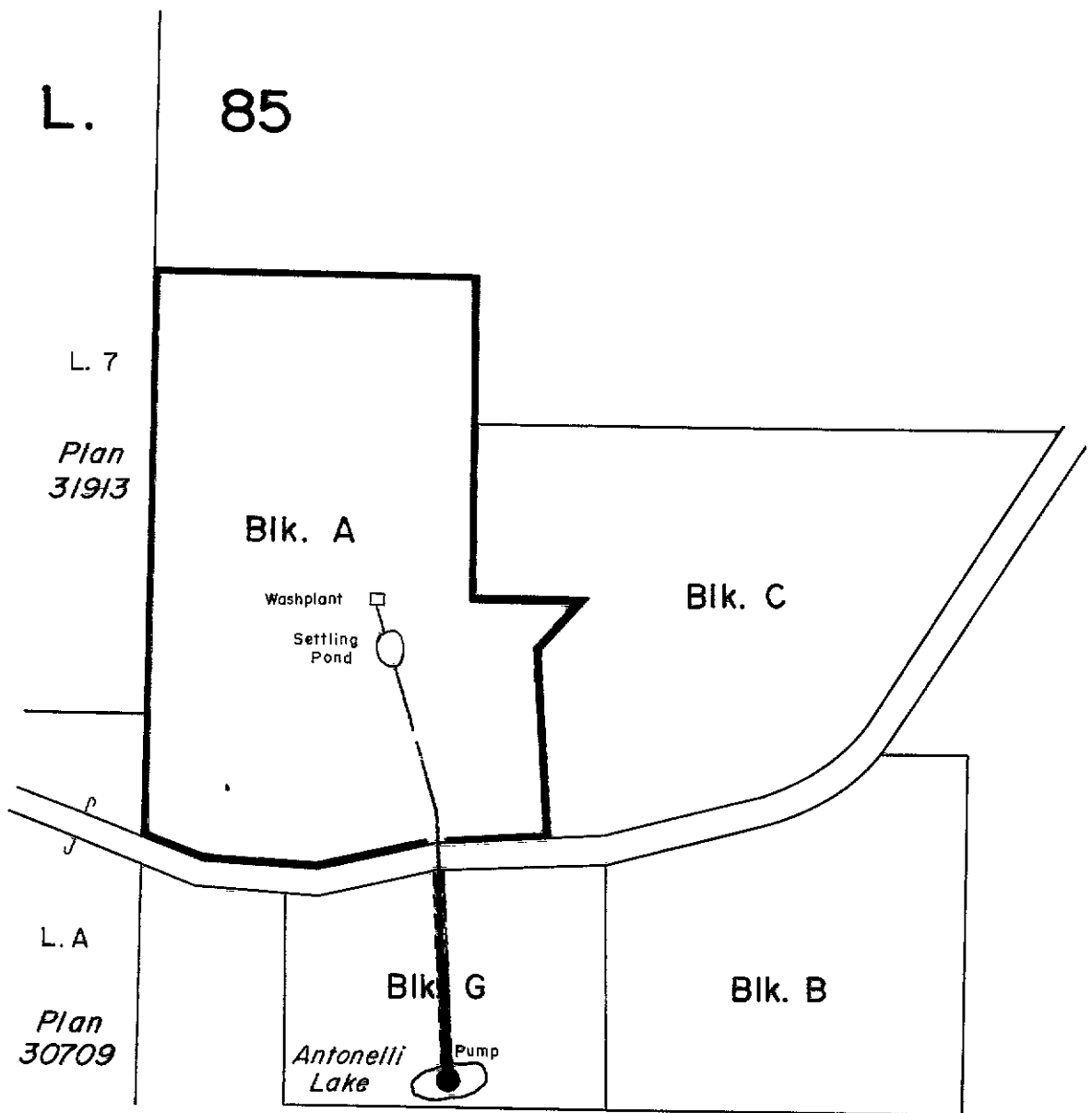
Projection: NAD_1983_BC_Environment_Albers

Key Map of British Columbia





Province of British Columbia



WATER DISTRICT : NANAIMO
PRECINCT : SAYWARD
LAND DISTRICT : SAYWARD

LEGEND

Scale : 400 Feet to 1 inch
Point of Diversion : ●
Map Number : WR 92 K/3c
Pipe : ————
Permit over Crown Land : ~~—————~~

Signature *[Signature]*
Date May 31, 1985

C.L. 61372 for C.L.32774
File 0273655
P.C.L. 14736

The boundaries of the land to which this licence
is appurtenant are shown thus: —————

General

- 1. Requirements for well construction and well closure reports are found in Part 5 of the Water Act and the Ground Water Protection Regulation. Part 5 of the act and regulation are available at: http://www.env.gov.bc.ca/wsd/plan_protect_sustain/groundwater/index.html.
- 2. The current Ministry standard datum for mapping and geodetic use is the North American Datum of 1983 (NAD 83). To determine GPS coordinates using a Global Positioning System (GPS), set the datum to NAD 83.
- 3. For latitude and longitude coordinates, provide coordinates either in degree, minutes and seconds (e.g., 50° 2¿ 21.037¿) or decimal degrees (e.g., 50.039175°).
- 4. For the method of determining ground elevation, enter: GPS, differential GPS, level, altimeter, 1:50,000 map, 1:20,000 map, 1:10,000 map or 1:5,000 map.
- 5. The classes and sub-classes of wells are shown below:

Class	Sub-class (if applicable)
Water supply	Domestic; Non-domestic
Monitoring	Temporary; Permanent
Recharge or injection	
Dewatering or drainage	Temporary; Permanent
Remediation	Temporary; Permanent
Geotechnical	Borehole; Test pit; Special type of hole; Closed loop geothermal

- 6. Well reports submitted to the Deputy Comptroller, or retained by the person responsible, as required under the Water Act and the Ground Water Protection Regulation, shall be considered part of the Provincial Government records and is subject to the Freedom of Information and Protection of Privacy Act.

How to Fill Out the Lithologic Description Table

- 7. Each row in the lithologic description table represents either a depth interval or depth in the well.
- 8. A row could represent a depth interval (e.g., from 0 feet to 12 feet), such as for a geologic stratum or a specific depth (e.g., 120 feet), such as for a depth location of a water-bearing fracture.
- 9. For a depth interval, enter the relative hardness of the material in the column ¿Relative Hardness," if applicable: Very Hard (VH), Hard (H), Dense (D), Stiff (ST), Medium (M), Loose (L), Soft (S), Very Soft (VS).
- 10. For a depth interval, enter the letter for the overall colour of the geologic material in the column "Colour," if applicable: White (W), Grey (Gy), Blue (Bl), Green (G), Yellow (Y), Brown (Br), Red (R), Tan (T), Black (Bk).
- 11. For each depth interval, enter the description of the geologic materials encountered during drilling in the column "Material Description.¿ Material descriptions should be chosen from the following recommended list of materials:

Surficial materials (approximate range of particle size)	Bedrock materials
boulders (greater than 10 inches)	conglomerate
cobbles (21/2 inches to 10 inches)	sandstone
gravel (80 slot to 21/2 inches)	shale
coarse sand (25 slot to 80 slot)	siltstone
medium sand (10 slot to 25 slot)	limestone
fine sand (2 slot to 10 slot)	crystalline
silt (less than 2 slot)	granite
clay (much less than 2 slot)	basalt
till (variable particle size)	volcanic
organics (e.g., top soil, wood, peat)	bedrock

- 12. In describing the material, list the material in order from greatest to least and indicate what materials occur in trace (less than 5%) amounts. The word "and" means both materials occur in approximately equal amounts (e.g., "gravel and coarse sand, trace silt").
- 13. Under the column "Water-bearing Estimated Flow (USgpm)," use "D" for "dry," "W" for "wet," or enter the estimated flow in USgpm.
- 14. If a water-bearing fracture is encountered, the depth of the fracture should be recorded in a row and the estimated flow of water in the fracture can be entered in the column "Water-bearing Estimated Flow (USgpm)."

How to Fill Out the Closure Description Table and the Well Closure Information Section

- 15. Each row in the closure description table represents either a depth interval (e.g., from 0 feet to 12 feet) or depth (e.g., 120 feet) in the well.
- 16. For a depth interval, enter the type of backfill or sealant material(s) in the column "Material Description."
- 17. Indicate in "Details of closure" whether casing(s) or screen(s) were pulled or left in place. If casing(s) were left in place, indicate whether it was perforated or ripped.

Screen Details

- 18. "Type" includes riser pipe, K-packer, screen, screen blank, or tail pipe.

Well Driller

- 19. Fill in the name of the driller who constructed the well.

Registration Number of Driller Responsible

- 20. Fill in the registration number on the Qualified Well Driller identification card. If the work was completed by a driller who is not registered as a Qualified Well Driller, the Qualified Well Driller who is directly supervising the work should fill in their registration number on their Qualified Well Driller identification card. The Qualified Well Driller signs the form.

Definitions of Abbreviations

asl	above sea level	ft	feet	PID	Parcel Identifier	USgpm ...	US gallons per minute
bgl	below ground level	hrs	hours	Rg.	Range	UTM	Universal Transverse
btoc	below top of casing	in	inches	Sec.	Section		Mercator Grid
Dia	Diameter	NAD 83 ...	North American Datum (1983)	SWL	static water level		
D.L.	District Lot			Twp.	Township		



☒ Well Construction Report

☐ Well Closure Report

☐ Well Alteration Report

Stamp company name/address/
phone/fax/email here, if desired.

Ministry Well ID Plate Number:

Ministry Well Tag Number:

39950

Existing Well Tag Number:

☐ Confirmation/alternative specs. attached

☐ Original well construction report attached

Red lettering indicates minimum mandatory information

See reverse for notes & definitions of abbreviations.

Owner Name: ISLAND READY MIX

Mailing address: "" Town Prov Postal Code

Well location: Street GOLD RIVER HIGHWAY NEAR DUMP Town CAMPBELL RIVER

or

Legal description: Lot Plan D.L. Block Sec. 85 Twp. Rg. Land District SAYWARD

or

PID: and Description of well location (attach sketch, if nec.):

NAD 83:Zone: 10 (see note 2)

UTM Northing: 5542131 m

UTM Easting: 331298 m

Latitude (see note 3): 50° 00' 27.32"

Longitude: 125° 21' 16.03"

Method of drilling:

☐ air rotary ☐ cable tool ☐ mud rotary ☐ auger ☐ driving ☐ jetting ☐ excavating ☐ other (specify):

Orientation of well: ☐ vertical ☐ horizontal Ground elevation: 0 ft (asl) Method (see note 4):

Class of well (see note 5): Sub-class of well:

Water supply wells, indicate intended water use: ☐ private domestic ☐ water supply system ☐ irrigation ☒ commercial or industrial ☐ other (specify):

Lithologic description (see notes 7-14) or closure description (see notes 15 and 16)

From ft (bgl)	To ft (bgl)	Relative Hardness	Colour	Description	Material Description (use recommended terms on reverse. List in order of decreasing amount, if applicable)	Water-bearing Estimated Flow (USgpm)	Observations (e.g. fractured, weathered, well sorted, silty wash), closure details
0	10				silty gravel		
10	55				sand & gravel		
55	55				sand		

Casing details

From ft (bgl)	To ft (bgl)	Dia in	Casing Material/Open Hole	Wall Thickness in	Drive Shoe

Screen details

From ft (bgl)	To ft (bgl)	Dia in	Type (see note 18)	Slot Size

Production Casing Diameter: 10.0 in

Surface seal: Type: Depth: ft

Method of installation: ☐ Poured ☐ Pumped Thickness: in

Backfill: Type: Depth: ft

Liner: ☐ PVC ☐ Other (specify):

Diameter: in Thickness: in

From: ft bgl To: ft bgl Perforated: From: ft bgl To: ft bgl

Developed by:

☐ Air lifting ☐ Surging ☐ Jetting ☐ Pumping ☐ Bailing

☐ Other (specify): Total duration: hrs

Notes:

Well yield estimated by:

☐ Pumping ☐ Air lifting ☐ Bailing ☐ Other (specify):

Rate: USgpm Duration: hrs

SWL before test: ft (btoc) Pumping water level: ft (btoc)

Obvious water quality characteristics:

☐ Fresh ☐ Salty ☐ Clear ☐ Cloudy ☐ Sediment ☐ Gas

Colour/odour: Water sample collected: ☐

Well driller (print clearly):

Name (first, last) (see note 19):

Registration no. (see note 20):

Consultant (if applicable name and company):

DECLARATION: Well construction, well alteration or well closure, as the case may be, has been done in accordance with the requirements in the Water Act and the Ground Water Protection Regulation.

Signature of Driller Responsible

Intake: ☐ Screen ☐ Open bottom ☐ Uncased hole

Screen type: ☐ Telescope ☐ Pipe size

Screen material: ☐ Stainless steel ☐ Plastic ☐ Other (specify):

Screen opening: ☐ Continuous slot ☐ Slotted ☐ Perforated Pipe

Screen bottom: ☐ Bail ☐ Plug ☐ Plate ☐ Other (specify):

Filter pack From: ft To: ft Thickness: in

Type and size of material:

Final well completion data:

Total depth drilled: ft Finished well depth: 55 ft bgl

Final stick up: in Depth to bedrock: ft bgl

SWL: 7 ft (btoc) Estimated well yield: 0.00 USgpm

Artesian flow: USgpm, or artesian pressure: ft

Type of well cap: Well disinfected: ☐ yes ☒ no

Where well ID plate is attached:

Well closure information:

Reason for closure:

Method of closure:

Sealant material: Backfill material:

Details of closure:

Date of work (YYYY/MM/DD):

Started: 1978/06/26 Completed:

Comment:

Please Note: The information recorded in this well report describes the works and hydrogeologic conditions at the time of construction, alteration or closure, as the case may be. Well yield, well performance and water quality are not guaranteed as they are influenced by a number of factors, including natural variability, human activities and condition of the work, which may change over time.

Well Owner Copy

Sheet 1 of 2

General

- 1. Requirements for well construction and well closure reports are found in Part 5 of the Water Act and the Ground Water Protection Regulation. Part 5 of the act and regulation are available at: http://www.env.gov.bc.ca/wsd/plan_protect_sustain/groundwater/index.html.
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Remediation	Temporary; Permanent
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fine sand (2 slot to 10 slot)	crystalline
silt (less than 2 slot)	granite
clay (much less than 2 slot)	basalt
till (variable particle size)	volcanic
organics (e.g., top soil, wood, peat)	bedrock

- 12. In describing the material, list the material in order from greatest to least and indicate what materials occur in trace (less than 5%) amounts. The word "and" means both materials occur in approximately equal amounts (e.g., "gravel and coarse sand, trace silt").
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asl	ft	PID	USgpm ...
bgl	hrs	Rg.	UTM
btoc	in	Sec.	Mercator Grid
Dia	NAD 83 ...	SWL	
D.L.	Datum (1983)	Twp.	

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coarse sand (25 slot to 80 slot)	siltstone
medium sand (10 slot to 25 slot)	limestone
fine sand (2 slot to 10 slot)	crystalline
silt (less than 2 slot)	granite
clay (much less than 2 slot)	basalt
till (variable particle size)	volcanic
organics (e.g., top soil, wood, peat)	bedrock

- 12. In describing the material, list the material in order from greatest to least and indicate what materials occur in trace (less than 5%) amounts. The word "and" means both materials occur in approximately equal amounts (e.g., "gravel and coarse sand, trace silt").
- 13. Under the column "Water-bearing Estimated Flow (USgpm)," use "D" for "dry," "W" for "wet," or enter the estimated flow in USgpm.
- 14. If a water-bearing fracture is encountered, the depth of the fracture should be recorded in a row and the estimated flow of water in the fracture can be entered in the column "Water-bearing Estimated Flow (USgpm)."

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Screen Details

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Registration Number of Driller Responsible

- 20. Fill in the registration number on the Qualified Well Driller identification card. If the work was completed by a driller who is not registered as a Qualified Well Driller, the Qualified Well Driller who is directly supervising the work should fill in their registration number on their Qualified Well Driller identification card. The Qualified Well Driller signs the form.

Definitions of Abbreviations

asl	ft	PID	USgpm ...
bgl	hrs	Rg.	UTM
btoc	in	Sec.	Mercator Grid
Dia	NAD 83 ...	SWL	
D.L.	Datum (1983)	Twp.	



☒ Well Construction Report

☐ Well Closure Report

☐ Well Alteration Report

Stamp company name/address/
phone/fax/email here, if desired.

Ministry Well ID Plate Number:

Ministry Well Tag Number: 74191

Existing Well Tag Number:

☐ Confirmation/alternative specs. attached

☒ Original well construction report attached

Red lettering indicates minimum mandatory information

See reverse for notes & definitions of abbreviations.

Owner Name: AL & SONS BACKHOE &

Mailing address: "" Town Prov Postal Code

Well location: Street GOLD RIVER HIGHWAY Town

Legal description: Lot 2 Plan 47695 D.L. 85 Block Sec. Twp. Rg. Land District SAYWARD

PID: 12474266 and Description of well location (attach sketch, if nec.):

NAD 83:Zone: 10 UTM Northing: 5542508 m Latitude (see note 3): 50° 00' 39.46"

(see note 2) UTM Easting: 331238 m Longitude: 125° 21' 19.64"

Method of drilling:☐ air rotary ☐ cable tool ☐ mud rotary☐ auger ☐ driving ☐ jetting ☐ excavating ☐ other (specify):

Orientation of well: ☐ vertical ☐ horizontal Ground elevation: 0 ft (asl) Method (see note 4):

Class of well (see note 5): Sub-class of well:

Water supply wells, indicate intended water use: ☐ private domestic ☐ water supply system ☐ irrigation ☐ commercial or industrial ☒ other (specify):

Lithologic description (see notes 7-14) or closure description (see notes 15 and 16)

From ft (bgl)	To ft (bgl)	Relative Hardness	Colour	Description	Material Description (use recommended terms on reverse. List in order of decreasing amount, if applicable)	Water-bearing Estimated Flow (USgpm)	Observations (e.g. fractured, weathered, well sorted, silty wash), closure details
0	20				GREY SAND & GRAVEL		
20	50				GREY SAND & GRAVEL		
50	75				BROWN SAND & GRAVEL		
122	124				WATER BEARING SAND & GRAVEL		
85	100				WATER BEARING SAND & GRAVEL		
100	125				WATERBEARING SAND & GRAVEL		
115	122				ROCKS & SAND		
75	85				BROWN SAND & GRAVEL		

Casing details

From ft (bgl)	To ft (bgl)	Dia in	Casing Material/Open Hole	Wall Thickness in	Drive Shoe

Screen details

From ft (bgl)	To ft (bgl)	Dia in	Type (see note 18)	Slot Size

Production Casing Diameter: 6.0 in

Surface seal: Type: Depth: ft

Method of installation: ☐ Poured ☐ Pumped Thickness: in

Backfill: Type: Depth: ft

Liner: ☐ PVC ☐ Other (specify):

Diameter: in Thickness: in

From: ft bgl To: ft bgl Perforated: From: ft bgl To: ft bgl

Developed by:

☐ Air lifting ☐ Surging ☐ Jetting ☐ Pumping ☐ Bailing

☐ Other (specify): Total duration: hrs

Notes:

Well yield estimated by:

☐ Pumping ☐ Air lifting ☐ Bailing ☐ Other (specify):

Rate: USgpm Duration: hrs

SWL before test: ft (btoc) Pumping water level: ft (btoc)

Obvious water quality characteristics:

☐ Fresh ☐ Salty ☐ Clear ☐ Cloudy ☐ Sediment ☐ Gas

Colour/odour: Water sample collected: ☐

Well driller (print clearly):

Name (first, last) (see note 19):

Registration no. (see note 20):

Consultant (if applicable name and company):

DECLARATION: Well construction, well alteration or well closure, as the case may be, has been done in accordance with the requirements in the Water Act and the Ground Water Protection Regulation.

Signature of Driller Responsible

Intake: ☐ Screen ☐ Open bottom ☐ Uncased hole

Screen type: ☐ Telescope ☐ Pipe size

Screen material: ☐ Stainless steel ☐ Plastic ☐ Other (specify):

Screen opening: ☐ Continuous slot ☐ Slotted ☐ Perforated Pipe

Screen bottom: ☐ Bail ☐ Plug ☐ Plate ☐ Other (specify):

Filter pack From: ft To: ft Thickness: in

Type and size of material:

Final well completion data:

Total depth drilled: ft Finished well depth: 123 ft bgl

Final stick up: in Depth to bedrock: ft bgl

SWL: 80 ft (btoc) Estimated well yield: 100.00 USgpm

Artesian flow: USgpm, or artesian pressure: ft

Type of well cap: Well disinfected: ☐ yes ☒ no

Where well ID plate is attached:

Well closure information:

Reason for closure:

Method of closure:

Sealant material: Backfill material:

Details of closure:

Date of work (YYYY/MM/DD):

Started: 1991/10/23 Completed: 1991/10/23

Comment: STEEL CASING,0.0 TO 123.2, 250 THICK,A53

LBS, CONTINUOUS,STAINLESS STEEL,PUMP TEST RATE 100 USGM,80 F

Please Note: The information recorded in this well report describes the works and hydrogeologic conditions at the time of construction, alteration or closure, as the case may be. Well yield, well performance and water quality are not guaranteed as they are influenced by a number of factors, including natural variability, human activities and condition of the work, which may change over time.

Well Owner Copy

Sheet 1 of 2

General

1. Requirements for well construction and well closure reports are found in Part 5 of the Water Act and the Ground Water Protection Regulation. Part 5 of the act and regulation are available at: http://www.env.gov.bc.ca/wsd/plan_protect_sustain/groundwater/index.html.
2. The current Ministry standard datum for mapping and geodetic use is the North American Datum of 1983 (NAD 83). To determine GPS coordinates using a Global Positioning System (GPS), set the datum to NAD 83.
3. For latitude and longitude coordinates, provide coordinates either in degree, minutes and seconds (e.g., 50° 2¿ 21.037¿) or decimal degrees (e.g., 50.039175°).
4. For the method of determining ground elevation, enter: GPS, differential GPS, level, altimeter, 1:50,000 map, 1:20,000 map, 1:10,000 map or 1:5,000 map.
5. The classes and sub-classes of wells are shown below:

Class	Sub-class (if applicable)
Water supply	Domestic; Non-domestic
Monitoring	Temporary; Permanent
Recharge or injection	
Dewatering or drainage	Temporary; Permanent
Remediation	Temporary; Permanent
Geotechnical	Borehole; Test pit; Special type of hole; Closed loop geothermal
6. Well reports submitted to the Deputy Comptroller, or retained by the person responsible, as required under the Water Act and the Ground Water Protection Regulation, shall be considered part of the Provincial Government records and is subject to the Freedom of Information and Protection of Privacy Act.

How to Fill Out the Lithologic Description Table

7. Each row in the lithologic description table represents either a depth interval or depth in the well.
8. A row could represent a depth interval (e.g., from 0 feet to 12 feet), such as for a geologic stratum or a specific depth (e.g., 120 feet), such as for a depth location of a water-bearing fracture.
9. For a depth interval, enter the relative hardness of the material in the column ¿Relative Hardness," if applicable: Very Hard (VH), Hard (H), Dense (D), Stiff (ST), Medium (M), Loose (L), Soft (S), Very Soft (VS).
10. For a depth interval, enter the letter for the overall colour of the geologic material in the column "Colour," if applicable: White (W), Grey (Gy), Blue (Bl), Green (G), Yellow (Y), Brown (Br), Red (R), Tan (T), Black (Bk).
11. For each depth interval, enter the description of the geologic materials encountered during drilling in the column "Material Description.¿ Material descriptions should be chosen from the following recommended list of materials:

Surficial materials (approximate range of particle size)	Bedrock materials
boulders (greater than 10 inches)	conglomerate
cobbles (21/2 inches to 10 inches)	sandstone
gravel (80 slot to 21/2 inches)	shale
coarse sand (25 slot to 80 slot)	siltstone
medium sand (10 slot to 25 slot)	limestone
fine sand (2 slot to 10 slot)	crystalline
silt (less than 2 slot)	granite
clay (much less than 2 slot)	basalt
till (variable particle size)	volcanic
organics (e.g., top soil, wood, peat)	bedrock

12. In describing the material, list the material in order from greatest to least and indicate what materials occur in trace (less than 5%) amounts. The word "and" means both materials occur in approximately equal amounts (e.g., "gravel and coarse sand, trace silt").
13. Under the column "Water-bearing Estimated Flow (USgpm)," use "D" for "dry," "W" for "wet," or enter the estimated flow in USgpm.
14. If a water-bearing fracture is encountered, the depth of the fracture should be recorded in a row and the estimated flow of water in the fracture can be entered in the column "Water-bearing Estimated Flow (USgpm)."

How to Fill Out the Closure Description Table and the Well Closure Information Section

15. Each row in the closure description table represents either a depth interval (e.g., from 0 feet to 12 feet) or depth (e.g., 120 feet) in the well.
16. For a depth interval, enter the type of backfill or sealant material(s) in the column "Material Description."
17. Indicate in "Details of closure" whether casing(s) or screen(s) were pulled or left in place. If casing(s) were left in place, indicate whether it was perforated or ripped.

Screen Details

18. "Type" includes riser pipe, K-packer, screen, screen blank, or tail pipe.

Well Driller

19. Fill in the name of the driller who constructed the well.

Registration Number of Driller Responsible

20. Fill in the registration number on the Qualified Well Driller identification card. If the work was completed by a driller who is not registered as a Qualified Well Driller, the Qualified Well Driller who is directly supervising the work should fill in their registration number on their Qualified Well Driller identification card. The Qualified Well Driller signs the form.

Definitions of Abbreviations

asl	ft	PID	USgpm ...
bgl	hrs	Rg.	UTM
btoc	in	Sec.	Mercator Grid
Dia	NAD 83 ...	SWL	
D.L.	Datum (1983)	Twp.	



☒ Well Construction Report

☐ Well Closure Report

☐ Well Alteration Report

Stamp company name/address/
phone/fax/email here, if desired.

Ministry Well ID Plate Number: _____
Ministry Well Tag Number: 74207
Existing Well Tag Number: _____
☐ Confirmation/alternative specs. attached
☒ Original well construction report attached

Red lettering indicates minimum mandatory information

See reverse for notes & definitions of abbreviations.

Owner Name: M & S FOREST PRODUCT

Mailing address: "" Town _____ Prov _____ Postal Code _____

Well location: Street GOLD RIVER HIGHWAY Town _____

or

Legal description: Lot _____ Plan _____ D.L. 85 Block _____ Sec. _____ Twp. _____ Rg. _____ Land District SAYWARD

or

PID: _____ and Description of well location (attach sketch, if nec.): NEAR UPLAND EXCAVATING

NAD 83:Zone: 10
(see note 2)

UTM Northing: 5542081 m
UTM Easting: 331083 m

Latitude (see note 3): 50° 00' 25.49"
Longitude: 125° 21' 26.74"

Method of drilling:☐ air rotary ☐ cable tool ☐ mud rotary☐ auger ☐ driving ☐ jetting ☐ excavating ☐ other (specify): _____

Orientation of well: ☐ vertical ☐ horizontal Ground elevation: _____ 0 ft (asl) Method (see note 4): _____

Class of well (see note 5): _____ Sub-class of well: _____

Water supply wells, indicate intended water use: ☐ private domestic ☐ water supply system ☐ irrigation ☒ commercial or industrial ☐ other (specify): _____

Lithologic description (see notes 7-14) or closure description (see notes 15 and 16)

From ft (bgl)	To ft (bgl)	Relative Hardness	Colour	Description	Material Description (use recommended terms on reverse. List in order of decreasing amount, if applicable)	Water-bearing Estimated Flow (USgpm)	Observations (e.g. fractured, weathered, well sorted, silty wash), closure details
<u>0</u>	<u>93</u>				<u>BROWN SAND & GRAVEL</u>		
<u>100</u>	<u>138</u>				<u>WB SAND</u>		
<u>93</u>	<u>100</u>				<u>BROWN WB SAND & GRAVEL</u>		

Casing details

Screen details

From ft (bgl)	To ft (bgl)	Dia in	Casing Material/Open Hole	Wall Thickness in	Drive Shoe

From ft (bgl)	To ft (bgl)	Dia in	Type (see note 18)	Slot Size

Production Casing Diameter: 7.0 in

Surface seal: Type: _____ Depth: _____ ft

Method of installation: ☐ Poured ☐ Pumped Thickness: _____ in

Backfill: Type: _____ Depth: _____ ft

Liner: ☐ PVC ☐ Other (specify): _____

Diameter: _____ in Thickness: _____ in

From: _____ ft bgl To: _____ ft bgl Perforated: From: _____ ft bgl To: _____ ft bgl

Developed by:

☐ Air lifting ☐ Surging ☐ Jetting ☐ Pumping ☐ Bailing

☐ Other (specify): _____ Total duration: _____ hrs

Notes: _____

Well yield estimated by:

☐ Pumping ☐ Air lifting ☐ Bailing ☐ Other (specify): _____

Rate: _____ USgpm Duration: _____ hrs

SWL before test: _____ ft (btoc) Pumping water level: _____ ft (btoc)

Obvious water quality characteristics:

☐ Fresh ☐ Salty ☐ Clear ☐ Cloudy ☐ Sediment ☐ Gas

Colour/odour: _____ Water sample collected: ☐

Well driller (print clearly):

Name (first, last) (see note 19): _____

Registration no. (see note 20): _____

Consultant (if applicable name and company): _____

DECLARATION: Well construction, well alteration or well closure, as the case may be, has been done in accordance with the requirements in the Water Act and the Ground Water Protection Regulation.

Signature of Driller Responsible

Intake: ☐ Screen ☐ Open bottom ☐ Uncased hole

Screen type: ☐ Telescope ☐ Pipe size

Screen material: ☐ Stainless steel ☐ Plastic ☐ Other (specify): _____

Screen opening: ☐ Continuous slot ☐ Slotted ☐ Perforated Pipe

Screen bottom: ☐ Bail ☐ Plug ☐ Plate ☐ Other (specify): _____

Filter pack From: _____ ft To: _____ ft Thickness: _____ in

Type and size of material: _____

Final well completion data:

Total depth drilled: _____ ft Finished well depth: 138 ft bgl

Final stick up: _____ in Depth to bedrock: _____ ft bgl

SWL: 85 ft (btoc) Estimated well yield: 20.00 USgpm

Artesian flow: _____ USgpm, or artesian pressure: _____ ft

Type of well cap: _____ Well disinfected: ☐ yes ☒ no

Where well ID plate is attached: _____

Well closure information:

Reason for closure: _____

Method of closure: _____

Sealant material: _____ Backfill material: _____

Details of closure: _____

Date of work (YYYY/MM/DD):

Started: 1987/05/01 Completed: 1987/05/01

Comment: STEEL CASING,0.0 TO 129.0,.250 THICK,53 LBS,
CONTINUOUS,STAINLESS STEEL,PUMP TEST RATE 20 USGM,5 FT AFTEI

Please Note: The information recorded in this well report describes the works and hydrogeologic conditions at the time of construction, alteration or closure, as the case may be. Well yield, well performance and water quality are not guaranteed as they are influenced by a number of factors, including natural variability, human activities and condition of the work, which may change over time.

Well Owner Copy

Sheet 1 of 2

General

- 1. Requirements for well construction and well closure reports are found in Part 5 of the Water Act and the Ground Water Protection Regulation. Part 5 of the act and regulation are available at: http://www.env.gov.bc.ca/wsd/plan_protect_sustain/groundwater/index.html.
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- 4. For the method of determining ground elevation, enter: GPS, differential GPS, level, altimeter, 1:50,000 map, 1:20,000 map, 1:10,000 map or 1:5,000 map.
- 5. The classes and sub-classes of wells are shown below:

Class	Sub-class (if applicable)
Water supply	Domestic; Non-domestic
Monitoring	Temporary; Permanent
Recharge or injection	
Dewatering or drainage	Temporary; Permanent
Remediation	Temporary; Permanent
Geotechnical	Borehole; Test pit; Special type of hole; Closed loop geothermal

- 6. Well reports submitted to the Deputy Comptroller, or retained by the person responsible, as required under the Water Act and the Ground Water Protection Regulation, shall be considered part of the Provincial Government records and is subject to the Freedom of Information and Protection of Privacy Act.

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- 7. Each row in the lithologic description table represents either a depth interval or depth in the well.
- 8. A row could represent a depth interval (e.g., from 0 feet to 12 feet), such as for a geologic stratum or a specific depth (e.g., 120 feet), such as for a depth location of a water-bearing fracture.
- 9. For a depth interval, enter the relative hardness of the material in the column ¿Relative Hardness," if applicable: Very Hard (VH), Hard (H), Dense (D), Stiff (ST), Medium (M), Loose (L), Soft (S), Very Soft (VS).
- 10. For a depth interval, enter the letter for the overall colour of the geologic material in the column "Colour," if applicable: White (W), Grey (Gy), Blue (Bl), Green (G), Yellow (Y), Brown (Br), Red (R), Tan (T), Black (Bk).
- 11. For each depth interval, enter the description of the geologic materials encountered during drilling in the column "Material Description.¿ Material descriptions should be chosen from the following recommended list of materials:

Surficial materials (approximate range of particle size)	Bedrock materials
boulders (greater than 10 inches)	conglomerate
cobbles (21/2 inches to 10 inches)	sandstone
gravel (80 slot to 21/2 inches)	shale
coarse sand (25 slot to 80 slot)	siltstone
medium sand (10 slot to 25 slot)	limestone
fine sand (2 slot to 10 slot)	crystalline
silt (less than 2 slot)	granite
clay (much less than 2 slot)	basalt
till (variable particle size)	volcanic
organics (e.g., top soil, wood, peat)	bedrock

- 12. In describing the material, list the material in order from greatest to least and indicate what materials occur in trace (less than 5%) amounts. The word "and" means both materials occur in approximately equal amounts (e.g., "gravel and coarse sand, trace silt").
- 13. Under the column "Water-bearing Estimated Flow (USgpm)," use "D" for "dry," "W" for "wet," or enter the estimated flow in USgpm.
- 14. If a water-bearing fracture is encountered, the depth of the fracture should be recorded in a row and the estimated flow of water in the fracture can be entered in the column "Water-bearing Estimated Flow (USgpm)."

How to Fill Out the Closure Description Table and the Well Closure Information Section

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- 16. For a depth interval, enter the type of backfill or sealant material(s) in the column "Material Description."
- 17. Indicate in "Details of closure" whether casing(s) or screen(s) were pulled or left in place. If casing(s) were left in place, indicate whether it was perforated or ripped.

Screen Details

- 18. "Type" includes riser pipe, K-packer, screen, screen blank, or tail pipe.

Well Driller

- 19. Fill in the name of the driller who constructed the well.

Registration Number of Driller Responsible

- 20. Fill in the registration number on the Qualified Well Driller identification card. If the work was completed by a driller who is not registered as a Qualified Well Driller, the Qualified Well Driller who is directly supervising the work should fill in their registration number on their Qualified Well Driller identification card. The Qualified Well Driller signs the form.

Definitions of Abbreviations

asl	above sea level	ft	feet	PID	Parcel Identifier	USgpm ...	US gallons per minute
bgl	below ground level	hrs	hours	Rg.	Range	UTM	Universal Transverse
btoc	below top of casing	in	inches	Sec.	Section		Mercator Grid
Dia	Diameter	NAD 83 ...	North American Datum (1983)	SWL	static water level		
D.L.	District Lot			Twp.	Township		



☒ Well Construction Report

☐ Well Closure Report

☐ Well Alteration Report

Stamp company name/address/
phone/fax/email here, if desired.

Ministry Well ID Plate Number:

Ministry Well Tag Number:

84136

Existing Well Tag Number:

☐ Confirmation/alternative specs. attached

☐ Original well construction report attached

Red lettering indicates minimum mandatory information

See reverse for notes & definitions of abbreviations.

Owner Name:

CAMPBELL RIVER LANDFILL

Mailing address:

""

Town

Prov

Postal Code

Well location:

Street

6700 ARGONAUT RD

Town

or

Legal description:

Lot Plan D.L. Block Sec. Twp. Rg. Land District

or

PID:

and

 Description of well location (attach sketch, if nec.):

NAD 83:Zone:

10

and

 UTM Northing:

5542070

 m

or

 Latitude (see note 3):

50° 00' 25.81"

 (see note 2) UTM Easting:

331755

 m Longitude:

125° 20' 52.99"

Method of drilling:☒ air rotary ☐ cable tool ☐ mud rotary☐ auger ☐ driving ☐ jetting ☐ excavating ☐ other (specify):

Orientation of well: ☐ vertical ☐ horizontal Ground elevation: ft (asl) Method (see note 4):

Class of well (see note 5): Sub-class of well:

Water supply wells, indicate intended water use: ☐ private domestic ☐ water supply system ☐ irrigation ☒ commercial or industrial ☐ other (specify):

Lithologic description (see notes 7-14) or closure description (see notes 15 and 16)

From ft (bgl)	To ft (bgl)	Relative Hardness	Colour	Description	Material Description (use recommended terms on reverse. List in order of decreasing amount, if applicable)	Water-bearing Estimated Flow (USgpm)	Observations (e.g. fractured, weathered, well sorted, silty wash), closure details
0	13				COARSE GRAVEL		
13	36				COARSE SAND & GRAVEL		
36	42				COARSE GRAVEL		
42	87				BROWN SAND		
87	130				BROWN SILTY SAND & SOME GRAVEL		
130	142				CLEAN BROWN COARSE SAND		
142	150				SLIGHTLY SILTY SAND & GRAVEL		
150	220				COARSE SAND & GRAVEL (WB)		
220	224				MORE SAND & SILTYER BROWN WATER		

Casing details

Screen details

From ft (bgl)	To ft (bgl)	Dia in	Casing Material/Open Hole	Wall Thickness in	Drive Shoe

From ft (bgl)	To ft (bgl)	Dia in	Type (see note 18)	Slot Size
206.3	215	5.5		200

Production Casing Diameter:

6.00

 in

Surface seal: Type: Depth: ft

Method of installation: ☐ Poured ☐ Pumped Thickness: in

Backfill: Type: Depth: ft

Liner: ☐ PVC ☐ Other (specify):

Diameter: in Thickness: in

From: ft bgl To: ft bgl Perforated: From: ft bgl To: ft bgl

Developed by:

☐ Air lifting ☐ Surging ☐ Jetting ☐ Pumping ☐ Bailing

☐ Other (specify): Total duration: hrs

Notes:

Well yield estimated by:

☐ Pumping ☐ Air lifting ☐ Bailing ☐ Other (specify):

Rate: USgpm Duration: hrs

SWL before test: ft (btoc) Pumping water level: ft (btoc)

Obvious water quality characteristics:

☐ Fresh ☐ Salty ☐ Clear ☐ Cloudy ☐ Sediment ☐ Gas

Colour/odour: Water sample collected: ☐

Well driller (print clearly):

Name (first, last) (see note 19):

DOUG WATT

Registration no. (see note 20):

Consultant (if applicable name and company):

DECLARATION: Well construction, well alteration or well closure, as the case may be, has been done in accordance with the requirements in the Water Act and the Ground Water Protection Regulation.

Signature of Driller Responsible

Intake: ☐ Screen ☐ Open bottom ☐ Uncased hole

Screen type: ☒ Telescope ☐ Pipe size

Screen material: ☒ Stainless steel ☐ Plastic ☐ Other (specify):

Screen opening: ☐ Continuous slot ☐ Slotted ☐ Perforated Pipe

Screen bottom: ☐ Bail ☐ Plug ☐ Plate ☐ Other (specify):

Filter pack From: ft To: ft Thickness: in

Type and size of material:

Final well completion data:

Total depth drilled: ft Finished well depth:

215

 ft bgl

Final stick up: in Depth to bedrock: ft bgl

SWL: ft (btoc) Estimated well yield:

75.00

 USgpm

Artesian flow: USgpm, or artesian pressure: ft

Type of well cap: Well disinfected: ☐ yes ☒ no

Where well ID plate is attached:

Well closure information:

Reason for closure:

Method of closure:

Sealant material: Backfill material:

Details of closure:

Date of work (YYYY/MM/DD):

Started:

2004/07/05

 Completed:

2004/07/05

Comment:

CHLORINE & WELDED LID

Please Note: The information recorded in this well report describes the works and hydrogeologic conditions at the time of construction, alteration or closure, as the case may be. Well yield, well performance and water quality are not guaranteed as they are influenced by a number of factors, including natural variability, human activities and condition of the work, which may change over time.

Well Owner Copy

Sheet 1 of 2

General

- 1. Requirements for well construction and well closure reports are found in Part 5 of the Water Act and the Ground Water Protection Regulation. Part 5 of the act and regulation are available at: http://www.env.gov.bc.ca/wsd/plan_protect_sustain/groundwater/index.html.
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- 4. For the method of determining ground elevation, enter: GPS, differential GPS, level, altimeter, 1:50,000 map, 1:20,000 map, 1:10,000 map or 1:5,000 map.
- 5. The classes and sub-classes of wells are shown below:

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Remediation	Temporary; Permanent
Geotechnical	Borehole; Test pit; Special type of hole; Closed loop geothermal
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- 9. For a depth interval, enter the relative hardness of the material in the column ¿Relative Hardness," if applicable: Very Hard (VH), Hard (H), Dense (D), Stiff (ST), Medium (M), Loose (L), Soft (S), Very Soft (VS).
- 10. For a depth interval, enter the letter for the overall colour of the geologic material in the column "Colour," if applicable: White (W), Grey (Gy), Blue (Bl), Green (G), Yellow (Y), Brown (Br), Red (R), Tan (T), Black (Bk).
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Surficial materials (approximate range of particle size)	Bedrock materials
boulders (greater than 10 inches)	conglomerate
cobbles (21/2 inches to 10 inches)	sandstone
gravel (80 slot to 21/2 inches)	shale
coarse sand (25 slot to 80 slot)	siltstone
medium sand (10 slot to 25 slot)	limestone
fine sand (2 slot to 10 slot)	crystalline
silt (less than 2 slot)	granite
clay (much less than 2 slot)	basalt
till (variable particle size)	volcanic
organics (e.g., top soil, wood, peat)	bedrock

- 12. In describing the material, list the material in order from greatest to least and indicate what materials occur in trace (less than 5%) amounts. The word "and" means both materials occur in approximately equal amounts (e.g., "gravel and coarse sand, trace silt").
- 13. Under the column "Water-bearing Estimated Flow (USgpm)," use "D" for "dry," "W" for "wet," or enter the estimated flow in USgpm.
- 14. If a water-bearing fracture is encountered, the depth of the fracture should be recorded in a row and the estimated flow of water in the fracture can be entered in the column "Water-bearing Estimated Flow (USgpm)."

How to Fill Out the Closure Description Table and the Well Closure Information Section

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Screen Details

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Well Driller

- 19. Fill in the name of the driller who constructed the well.

Registration Number of Driller Responsible

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Definitions of Abbreviations

asl	ft	PID	USgpm ...
bgl	hrs	Rg.	UTM
btoc	in	Sec.	Mercator Grid
Dia	NAD 83 ...	SWL	
D.L.	Datum (1983)	Twp.	



☐

Well Construction Report

☐

Well Closure Report

☒

Well Alteration Report

Stamp company name/address/
phone/fax/email here, if desired.

Ministry Well ID Plate Number: 12472
Ministry Well Tag Number: 93413
Existing Well Tag Number:
☐ Confirmation/alternative specs. attached
☒ Original well construction report attached

Red lettering indicates minimum mandatory information

See reverse for notes & definitions of abbreviations.

Owner Name: EMCON (MINISTRY OF HIGHWAYS)

Mailing address: UNKNOWNTown CAMPBELL RIVERProv BCPostal Code

Well location: Street 7025 GOLD RIVER HIGHWAYTown

or

Legal description: Lot PlanD.L. 85BlockSec.Twp.Rg.Land District RENFREW

or

PID:andDescription of well location (attach sketch, if nec.): BETWEEN BRINE TANK @ SHOP, SE PORTION OF PROPEI

NAD 83:Zone: 10UTM Northing: 5542862mLatitude (see note 3): 50° 00' 51.03"

(see note 2)andUTM Easting: 331355mLongitude: 125° 21' 14.32"

Method of drilling:☐ air rotary☒ cable tool☐ mud rotary☐ auger☐ driving☐ jetting☐ excavating☐ other (specify):
Orientation of well: ☒ vertical☐ horizontalGround elevation: ft (asl)Method (see note 4):
Class of well (see note 5): Water supplySub-class of well: Non-domestic
Water supply wells, indicate intended water use: ☐ private domestic☐ water supply system☐ irrigation☒ commercial or industrial☐ other (specify):

Lithologic description (see notes 7-14) or closure description (see notes 15 and 16)

From ft (bgl)	To ft (bgl)	Relative Hardness	Colour	Description	Material Description (use recommended terms on reverse. List in order of decreasing amount, if applicable)	Water-bearing Estimated Flow (USgpm)	Observations (e.g. fractured, weathered, well sorted, silty wash), closure details
160	178			medium	sand GRAVEL		
178	184						FINER & SANDIER AS GOING DEEPER
184	187		brown	silty	fine sand		
187	188		brown	silty	sand		VERY SILTY

Recom'd Pump Setting (depth) ft (bgl): 180

Casing details

From ft (bgl)	To ft (bgl)	Dia in	Casing Material/Open Hole	Wall Thickness in	Drive Shoe

Screen details

From ft (bgl)	To ft (bgl)	Dia in	Type (see note 18)	Slot Size
180	182	5	Riser Pipe	
182	186	5	K-packer	12

Production Casing Diameter: in

Surface seal: Type: Depth: ft

Method of installation: ☐ Poured☐ PumpedThickness: in

Backfill: Type: Depth: ft

Liner: ☐ PVC☐ Other (specify):

Diameter: inThickness: in

From: ft bglTo: ft bglPerforated: From: ft bglTo: ft bgl

Developed by:

☐ Air lifting☐ Surging☐ Jetting☐ Pumping☒ Bailing☐ Other (specify): Total duration: hrs

Notes:

Well yield estimated by:

☐ Pumping☐ Air lifting☐ Bailing☐ Other (specify):

Rate: USgpmDuration: hrs

SWL before test: ft (btoc)Pumping water level: ft (btoc)

Obvious water quality characteristics:

☐ Fresh☐ Salty☐ Clear☐ Cloudy☐ Sediment☐ GasColour/odour: Water sample collected: ☐

Well driller (print clearly):

Name (first, last) (see note 19): CALVIN SLADE

Registration no. (see note 20): WD

Consultant (if applicable name and company):

DECLARATION: Well construction, well alteration or well closure, as the case may be, has been done in accordance with the requirements in the Water Act and the Ground Water Protection Regulation.

Signature of Driller Responsible

Intake: ☐ Screen☐ Open bottom☐ Uncased hole

Screen type: ☒ Telescope☐ Pipe size

Screen material: ☒ Stainless steel☐ Plastic☐ Other (specify):

Screen opening: ☒ Continuous slot☐ Slotted☐ Perforated Pipe

Screen bottom: ☐ Bail☐ Plug☐ Plate☒ Other (specify):

Filter pack From: ftTo: ftThickness: in

Type and size of material:

Final well completion data:

Total depth drilled: 26 ftFinished well depth: 180 ft bgl

Final stick up: 24 inDepth to bedrock: ft bgl

SWL: 159 ft (btoc)Estimated well yield: 10.00 USgpm

Artesian flow: USgpm, or artesian pressure: ft

Type of well cap: PITLESS UNIT &Well disinfected: ☐ yes☒ no

Where well ID plate is attached:

Well closure information:

Reason for closure:

Method of closure:

Sealant material: Backfill material:

Details of closure:

Date of work (YYYY/MM/DD):

Started: 2005/12/15Completed: 2005/12/15

Comment: MEASUREMENTS FROM GROUND LEVEL. RECOMMENDED PUMPING RATE: 10 USGPM.

Please Note: The information recorded in this well report describes the works and hydrogeologic conditions at the time of construction, alteration or closure, as the case may be. Well yield, well performance and water quality are not guaranteed as they are influenced by a number of factors, including natural variability, human activities and condition of the work, which may change over time.

Well Owner CopySheet 1 of 2

General

- 1. Requirements for well construction and well closure reports are found in Part 5 of the Water Act and the Ground Water Protection Regulation. Part 5 of the act and regulation are available at: http://www.env.gov.bc.ca/wsd/plan_protect_sustain/groundwater/index.html.
- 2. The current Ministry standard datum for mapping and geodetic use is the North American Datum of 1983 (NAD 83). To determine GPS coordinates using a Global Positioning System (GPS), set the datum to NAD 83.
- 3. For latitude and longitude coordinates, provide coordinates either in degree, minutes and seconds (e.g., 50° 2¿ 21.037¿) or decimal degrees (e.g., 50.039175°).
- 4. For the method of determining ground elevation, enter: GPS, differential GPS, level, altimeter, 1:50,000 map, 1:20,000 map, 1:10,000 map or 1:5,000 map.
- 5. The classes and sub-classes of wells are shown below:

Class	Sub-class (if applicable)
Water supply	Domestic; Non-domestic
Monitoring	Temporary; Permanent
Recharge or injection	
Dewatering or drainage	Temporary; Permanent
Remediation	Temporary; Permanent
Geotechnical	Borehole; Test pit; Special type of hole; Closed loop geothermal
- 6. Well reports submitted to the Deputy Comptroller, or retained by the person responsible, as required under the Water Act and the Ground Water Protection Regulation, shall be considered part of the Provincial Government records and is subject to the Freedom of Information and Protection of Privacy Act.

How to Fill Out the Lithologic Description Table

- 7. Each row in the lithologic description table represents either a depth interval or depth in the well.
- 8. A row could represent a depth interval (e.g., from 0 feet to 12 feet), such as for a geologic stratum or a specific depth (e.g., 120 feet), such as for a depth location of a water-bearing fracture.
- 9. For a depth interval, enter the relative hardness of the material in the column ¿Relative Hardness," if applicable: Very Hard (VH), Hard (H), Dense (D), Stiff (ST), Medium (M), Loose (L), Soft (S), Very Soft (VS).
- 10. For a depth interval, enter the letter for the overall colour of the geologic material in the column "Colour," if applicable: White (W), Grey (Gy), Blue (Bl), Green (G), Yellow (Y), Brown (Br), Red (R), Tan (T), Black (Bk).
- 11. For each depth interval, enter the description of the geologic materials encountered during drilling in the column "Material Description.¿ Material descriptions should be chosen from the following recommended list of materials:

Surficial materials (approximate range of particle size)	Bedrock materials
boulders (greater than 10 inches)	conglomerate
cobbles (21/2 inches to 10 inches)	sandstone
gravel (80 slot to 21/2 inches)	shale
coarse sand (25 slot to 80 slot)	siltstone
medium sand (10 slot to 25 slot)	limestone
fine sand (2 slot to 10 slot)	crystalline
silt (less than 2 slot)	granite
clay (much less than 2 slot)	basalt
till (variable particle size)	volcanic
organics (e.g., top soil, wood, peat)	bedrock

- 12. In describing the material, list the material in order from greatest to least and indicate what materials occur in trace (less than 5%) amounts. The word "and" means both materials occur in approximately equal amounts (e.g., "gravel and coarse sand, trace silt").
- 13. Under the column "Water-bearing Estimated Flow (USgpm)," use "D" for "dry," "W" for "wet," or enter the estimated flow in USgpm.
- 14. If a water-bearing fracture is encountered, the depth of the fracture should be recorded in a row and the estimated flow of water in the fracture can be entered in the column "Water-bearing Estimated Flow (USgpm)."

How to Fill Out the Closure Description Table and the Well Closure Information Section

- 15. Each row in the closure description table represents either a depth interval (e.g., from 0 feet to 12 feet) or depth (e.g., 120 feet) in the well.
- 16. For a depth interval, enter the type of backfill or sealant material(s) in the column "Material Description."
- 17. Indicate in "Details of closure" whether casing(s) or screen(s) were pulled or left in place. If casing(s) were left in place, indicate whether it was perforated or ripped.

Screen Details

- 18. "Type" includes riser pipe, K-packer, screen, screen blank, or tail pipe.

Well Driller

- 19. Fill in the name of the driller who constructed the well.

Registration Number of Driller Responsible

- 20. Fill in the registration number on the Qualified Well Driller identification card. If the work was completed by a driller who is not registered as a Qualified Well Driller, the Qualified Well Driller who is directly supervising the work should fill in their registration number on their Qualified Well Driller identification card. The Qualified Well Driller signs the form.

Definitions of Abbreviations

asl	ft	PID	USgpm ...
bgl	hrs	Rg.	UTM
btoc	in	Sec.	Mercator Grid
Dia	NAD 83 ...	SWL	
D.L.	Datum (1983)	Twp.	

Appendix D

Closure Fund Memorandum



Memorandum

February 21, 2018

To: Beth Dunlop, Comox Valley Regional District Ref. No.: 056484-03-302

From:  Thomas Elliott/cs/85-Rev.1 Tel: 604-248-3655

cc: Deacon Liddy

**Subject: 2017 Closure and Post-Closure Fund Estimates
Comox-Strathcona Waste Management
Campbell River, Comox Valley, Gold River, Tahsis and Zeballos, British Columbia**

1. Introduction

This memorandum has been prepared by GHD Limited (GHD) for the Comox Valley Regional District (CVRD) to present the 2017 closure and post-closure (CPC) fund estimates for the following Comox-Strathcona (CSWM) Waste Management Centres (WMCs):

- Campbell River
- Comox Valley
- Gold River
- Tahsis
- Zeballos

In addition an estimate has also been developed for the former Cortes Island Landfill.

Table 1 presents a summary of the CPC cost estimates for the five WMCs and the Cortes Island landfill.

The former Sayward landfill, which was included in the CVRD's 2016 liability fund estimates, has not been included based on cancellation of the waste discharge permit by the British Columbia Ministry of Environment (MOE) effective June 8, 2017 (letter dated December 12, 2017).

2. Calculation Methodology

Landfill CPC fund estimates have been calculated based on the methodology for calculating landfill liability described in PS 3270 – Solid Waste Landfill Closure & Post-closure Liability. The following equation presents a summary of the methodology:

$$E = [A \times (B/C)] - D$$



Where:

A = Present value of estimated CPC expenditures for landfill site

B = Total used capacity of the landfill

C = Total capacity of the landfill (both used and unused)

D = Total CPC liabilities/expenditures recognized to date.

E = Landfill CPC fund estimate

The estimated total CPC expenditures for landfill sites were considered to consist of capital and operations expenditures and post-closure operation and maintenance (O&M) costs. Estimated closure costs and scheduling were based on the Comox Strathcona Waste Management (CSWM) 2018-2022 Proposed Financial Plan. Post-closure O&M costs were developed by GHD based on experience with similar sized landfills in southwestern BC. Post closure monitoring costs were forecast based on current monitoring costs as contained in the agreement between GHD and the CVRD dated May 14, 2014 for all sites except the Comox Valley WMC Cell 1 which was estimated based on GHD experience at CVRD WMCs.

2.1 Inflation and Discount Rates

All calculations of the present value of CPC costs were completed using the same rates for O&M inflation, construction cost inflation, and discount. The following list presents values and sources for inflation and discount rates applied:

- Construction cost inflation rate of 0.96% based on the 10 year average annual increase in the Vancouver non-residential building construction index from more recent available data (Q4 2017), as calculated by GHD.
- Discount rate of 3.1% based on the Municipal Finance Authority of BC's (MFA) 30 year indicative lending rate, at January 2, 2018, provided by the CSWM.
- Inflation rate of 1.31% based on the average annual percent change of the Consumer price index for BC (averaged over 2008-2017 period) as calculated by GHD.

Further details on values used for forecasts are presented below for each WMC in turn.

3. Campbell River

Details of the present value calculations for the Campbell River WMC are presented in Table 2. The following list summarizes the key inputs to the CPC Fund Update:

- Closure of the existing landfill footprint will take place in phases between 2018 and 2024 at a total cost of \$11,512,500.
- Annual cost of post closure operations and monitoring of \$90,000.
- Annual cost of post-closure landfill gas collection system operations and maintenance of \$100,000.



- Total used capacity to end of 2017 of 2,468,126 cubic metres (m³) as compared to a total capacity of 2,700,000 m³ (approximately 91% of total capacity used). Remaining airspace was determined based on GHD memo entitled Fill Plan Technical Brief, Campbell River Waste Management Centre, dated December 1, 2017.
- 30 year post closure period beginning in 2025.

The estimated present value of the CPC costs of the existing landfill is \$14,782,035. Based on the current airspace capacity used of 91.4 percent, the current landfill CPC liability is \$13,572,564.

4. Comox Valley

Details of the present value calculations for the Comox Valley WMC are presented in Tables 3 and 4. Separate calculations were developed for the historical Comox Valley WMC and Cell 1 of the Comox Valley WMC. Separate calculations were developed as both received waste in 2017 however they are scheduled to close at different times. The following list summarizes the key inputs to the CPC Fund Update for each of the portions of the Comox Valley WMC:

Historical Comox Valley WMC (Table 3)

- Closure of the historical landfill footprint was planned for two phases. The first phase was partially completed in 2015. The costs for phase 2 are \$200,000 in 2018 and \$2,500,000 in 2019.
- Annual cost of post closure monitoring of \$90,000.
- Cost of post closure landfill maintenance of \$20,000 every five years.
- Annual cost of post-closure landfill gas collection system operations and maintenance of \$75,000.
- Total used capacity to end of 2017 of 3,342,325 m³ as compared to a total capacity of 3,390,559 m³ (approximately 98.6% of total capacity used). Remaining airspace was determined based on McElhanney Survey conducted November 2017 as compared to revised final contours prepared by EBA in 2017.
- 30 year post closure period beginning in 2020.

The estimated present value of the CPC cost of the historical Comox Valley WMC landfill is \$6,795,271. Based on the current airspace capacity used of 98.6 percent, the current landfill CPC liability is \$6,698,602.

Comox Valley WMC Cell 1 (Table 4)

- Closure of Comox Valley WMC Cell was planned for planned for three phases:
 - Phase 1 LFG/surface water management design and construction, scheduled for 2018 and 2019 forecast at \$50,000 and \$150, 000 respectively
 - Phase 2 LFG/surface water management design and construction, scheduled for 2021 and 2022 forecast at \$50,000 and \$350, 000 respectively
 - Partial closure of Cell 1 scheduled for 2023 forecast at \$500,000



- Annual cost of post closure monitoring of \$50,000.
- Cost of post closure landfill maintenance of \$10,000 every five years.
- Annual cost of post-closure landfill gas collection system operations and maintenance of \$25,000.
- Total used capacity to end of 2017 of 5,940 m³ as compared to a total capacity of 470,945 m³ (approximately 1% of total capacity used). Remaining airspace was determined based on communication with CVRD staff.
- 30 year post closure period beginning in 2024.

The estimated present value of the CPC cost of Cell 1 is \$2,597,204. Based on the current airspace capacity used of 1.26 percent, the current landfill CPC liability is \$32,758.

5. Gold River

Details of the present value calculations for the Gold River WMC are presented in Table 5. The following list summarizes the key inputs to the CPC Fund Update:

- Closure of the existing landfill footprint in 2026 at \$414,600 and 2027 at \$1,210,700.
- Annual cost of post closure operations and monitoring of \$26,500.
- Cost of post closure landfill maintenance of \$20,000 every five years.
- Total used capacity to end of 2017 of 54,075 m³ as compared to a total capacity of 58,000 m³ (approximately 93% of total capacity used).
- 30 year post closure period beginning in 2028.

The estimated present value of the CPC cost of the existing landfill is \$1,975,866. Based on the current airspace capacity used of 93.2 percent, the current landfill CPC liability is \$1,842,155.

6. Tahsis

Details of the present value calculations for the Tahsis WMC are presented in Table 6. The following list summarizes the key inputs to the CPC Fund Update:

- Closure of the existing landfill footprint in 2024 at \$100,000 and 2025 at \$725,000.
- Annual cost of post closure operations and monitoring of \$24,000.
- Cost of post closure landfill maintenance of \$20,000 every five years.
- Total used capacity to the end of 2017 of 95,777 m³ as compared to a total capacity of 114,450 m³ (approximately 84% of total capacity used). Remaining airspace was determined based on GHD draft memo Tahsis Landfill - Fill Plan Update dated January 17, 2017.
- 30 year post closure period beginning in 2026.



The estimated present value of the CPC of the existing landfill is \$1,302,117. Based on the current airspace capacity used of 83.7 percent, the current landfill CPC liability is \$1,089,671.

7. Zeballos

Details of the present value calculations for the Zeballos WMC are presented in Table 7. The following list summarizes the key inputs to the CPC Fund Update:

- Closure of the existing landfill footprint in 2024 and 2025 with a total cost of \$576,000.
- Annual cost of post closure operations and monitoring of \$28,000.
- Cost of post closure landfill maintenance of \$20,000 every five years.
- Total used capacity to the end of 2017 of 9,875 m³ as compared to a total capacity of 16,500 m³ (approximately 59.9% of total capacity used) calculated based on topographical surveys conducted in October 2015 and November 2017.
- 30 year post closure period beginning in 2026.

The estimated present value of the CPC cost of the existing landfill is \$1,169,169. Based on the current airspace capacity used of 59.9 percent the current landfill CPC liability is \$699,730.

8. Cortes

Details of the present value calculations for the former Cortes Island landfill are presented in Table 8. The following list summarizes the key inputs to the CPC Fund Update:

- Closure of the former landfill footprint in 2018 with a total estimated cost of \$90,000 based on GHD's work plan to complete final cove improvements at the Site.
- No annual post closure operations and monitoring costs. Upon implementation of additional closure works, CSWM will request MOE approval for abandonment of the site permit and expects that no post closure maintenance or monitoring costs will be incurred.
- Site abandoned 1995 with 100% of capacity used.
- Actual total airspace and waste in place unknown.

The estimated present value of the CPC cost of the existing landfill is \$90,678. As the former landfill is at 100 percent of capacity, the current landfill CPC liability is also \$90,678.

Table 1

**PSAB Solid Waste Landfill Closure Post-Closure Care Liability
2017 Closure and Post-Closure Fund Estimates
Comox Valley Regional District**

Waste Management Centre	Estimated Closure Year	Years to Closure	Total Closure/Post Closure Costs December 31, 2017 stated in 2014\$ (unless otherwise noted)	Inflated Closure/Post Closure Costs to year of Expenditure (0.96% for construction, 1.31% for O&M)	PV of Inflated Closure/ Post Closure Costs (MFA 30 year rate 3.10%)	% of Capacity used to December 31, 2017	Dec 31, 2017 Closure/ Post Closure Care Liability
Campbell River	2024	7	\$ 17,212,500	\$ 20,387,215	\$ 14,782,035	91.41%	\$ 13,512,564
Comox Valley Historical Landfill	2019	2	\$ 7,970,000	\$ 9,708,773	\$ 6,795,271	98.58%	\$ 6,698,602
Comox Valley Cell 1	2023	6	\$ 3,410,000	\$ 4,230,422	\$ 2,597,204	1.26%	\$ 32,758
Gold River	2027	10	\$ 2,540,300	\$ 3,174,368	\$ 1,975,866	93.23%	\$ 1,842,155
Tahsis	2025	8	\$ 1,665,000	\$ 2,113,496	\$ 1,302,117	83.68%	\$ 1,089,671
Zeballos	2025	8	\$ 1,536,000	\$ 2,007,675	\$ 1,169,169	59.85%	\$ 699,730
Cortes	2018	1	\$ 90,000	\$ 93,489	\$ 90,678	100.00%	\$ 90,678
			\$ 34,423,800	\$ 41,715,438	\$ 28,712,341		
Current year	2017						
Total Closure/Post closure liability December 31, 2017							\$ 23,966,159

Table 2: Landfill Liability - Campbell River Waste Management Centre

Data:	31-Dec-17
Landfill Cover Option	LLDPE
Landfill Closure Date (approximate)	2024
Post Closure Period (years)	30
Current (Dec 2017) Cumulative Waste Volume (m3)	2,468,126
Remaining airspace volume (m3)	231,874
Landfill Capacity at Closure (m3)	2,700,000
Closure Construction Costs (2014\$)(2018-2022 PB)	\$ 11,512,500
Annual post closure O&M (2014\$)	\$ 90,000
Annual post closure LFG O&M (2014\$)	\$ 100,000
Construction cost escalation rate	0.96%
Discount rate	3.10%
Inflation rate	1.31%

Note 1
Note 2
Note 2
Note 3
Note 4
Note 5
Note 6
Note 7
Note 8

Year	Years for FV calcs	Years for NPV	Construction Cash Flow 2014 \$	Maintenance Cash Flow 2014 \$	Cash Flow plus Inflation	Net Present Value	Description of Cost
2017							
2018	4	1	\$ 750,000	\$ -	\$ 779,072	\$ 755,647	Ph 2 surface water mgt construction
2019	5	2	\$ 200,000	\$ -	\$ 209,737	\$ 197,314	Ph 2 design and construction
2020	6	3	\$ 525,000	\$ -	\$ 555,819	\$ 507,175	Ph 2 LFG and final cover design
2021	7	4	\$ 6,150,000	\$ -	\$ 6,573,223	\$ 5,817,598	Ph 2 LFG and final cover construction
2022	8	5	\$ 125,000	\$ -	\$ 134,878	\$ 115,784	Ph 3 closure design
2023	9	6	\$ 125,000	\$ -	\$ 136,167	\$ 113,376	Ph 3 LFG and final cover design
2024	10	7	\$ 3,637,500	\$ -	\$ 4,000,308	\$ 3,230,597	Ph 3 LFG and final cover construction
2025	11	8		\$ 190,000	\$ 219,291	\$ 171,772	Annual O&M plus annual LFG O&M
2026	12	9		\$ 190,000	\$ 222,168	\$ 168,793	Annual O&M plus annual LFG O&M
2027	13	10		\$ 190,000	\$ 225,083	\$ 165,865	Annual O&M plus annual LFG O&M
2028	14	11		\$ 190,000	\$ 228,036	\$ 162,989	Annual O&M plus annual LFG O&M
2029	15	12		\$ 190,000	\$ 231,027	\$ 160,162	Annual O&M plus annual LFG O&M
2030	16	13		\$ 190,000	\$ 234,058	\$ 157,384	Annual O&M plus annual LFG O&M
2031	17	14		\$ 190,000	\$ 237,129	\$ 154,655	Annual O&M plus annual LFG O&M
2032	18	15		\$ 190,000	\$ 240,240	\$ 151,973	Annual O&M plus annual LFG O&M
2033	19	16		\$ 190,000	\$ 243,392	\$ 149,337	Annual O&M plus annual LFG O&M
2034	20	17		\$ 190,000	\$ 246,585	\$ 146,747	Annual O&M plus annual LFG O&M
2035	21	18		\$ 190,000	\$ 249,820	\$ 144,202	Annual O&M plus annual LFG O&M
2036	22	19		\$ 190,000	\$ 253,098	\$ 141,701	Annual O&M plus annual LFG O&M
2037	23	20		\$ 190,000	\$ 256,418	\$ 139,244	Annual O&M plus annual LFG O&M
2038	24	21		\$ 190,000	\$ 259,782	\$ 136,829	Annual O&M plus annual LFG O&M
2039	25	22		\$ 190,000	\$ 263,190	\$ 134,456	Annual O&M plus annual LFG O&M
2040	26	23		\$ 190,000	\$ 266,643	\$ 132,124	Annual O&M plus annual LFG O&M
2041	27	24		\$ 190,000	\$ 270,142	\$ 129,833	Annual O&M plus annual LFG O&M
2042	28	25		\$ 190,000	\$ 273,686	\$ 127,581	Annual O&M plus annual LFG O&M
2043	29	26		\$ 190,000	\$ 277,276	\$ 125,368	Annual O&M plus annual LFG O&M
2044	30	27		\$ 190,000	\$ 280,914	\$ 123,194	Annual O&M plus annual LFG O&M
2045	31	28		\$ 190,000	\$ 284,600	\$ 121,057	Annual O&M plus annual LFG O&M
2046	32	29		\$ 190,000	\$ 288,333	\$ 118,958	Annual O&M plus annual LFG O&M
2047	33	30		\$ 190,000	\$ 292,116	\$ 116,895	Annual O&M plus annual LFG O&M
2048	34	31		\$ 190,000	\$ 295,949	\$ 114,868	Annual O&M plus annual LFG O&M
2049	35	32		\$ 190,000	\$ 299,831	\$ 112,875	Annual O&M plus annual LFG O&M
2050	36	33		\$ 190,000	\$ 303,765	\$ 110,918	Annual O&M plus annual LFG O&M
2051	37	34		\$ 190,000	\$ 307,750	\$ 108,994	Annual O&M plus annual LFG O&M
2052	38	35		\$ 190,000	\$ 311,788	\$ 107,104	Annual O&M plus annual LFG O&M
2053	39	36		\$ 190,000	\$ 315,878	\$ 105,246	Annual O&M plus annual LFG O&M
2054	40	37		\$ 190,000	\$ 320,022	\$ 103,421	Annual O&M plus annual LFG O&M
TOTAL COST			\$ 11,512,500	\$ 5,700,000	\$ 20,387,215	\$ 14,782,035	
NPV of Estimated Closure and Post Closure Costs =						\$ 14,782,035	
Landfill Liability in Dec 2017 (\$) =						\$ 13,512,564	NPV x (Cumulative Capacity Used)/(Total Estimated Capacity)

Notes:

- (1) Airspace consumed calculated based on operational data for waste received at the site during 2017.
- (2) Total airspace remaining and waste in place calculated as of December 31, 2017 based on GHD memorandum Fill Plan Technical Brief, Campbell River Waste Management Centre dated December 1, 2016.
- (3) Construction costs in 2014\$ from 2018-2022 proposed financial plan capital schedules.
- (4) Annual post closure operating and maintenance costs include environmental monitoring costs.
- (5) Annual Post Closure Landfill Gas System costs calculated assuming landfill gas collection system will be finalized in 2021.
- (6) Construction cost inflation rate applied to forecast construction costs, calculated based on 10 year average annual increase in Vancouver non-residential building construction index (CANSIM Table 327-0043) (latest index Q4 2017).
- (7) Discount rate calculated based on MFA 30 year borrowing rate as of December 31, 2017.
- (8) Operations and maintenance inflation rate applied to operations and maintenance costs. Calculated based on the average of the annual percent change of the Consumer price index for BC (averaged over 2008-2017 period) (CANSIM Table 326-0020) (<http://www5.statcan.gc.ca/cansim/a26>, accessed on 12 Feb 2018).

Table 3: Landfill Liability - Comox Valley Waste Management Centre - Historical Landfill

Data:		31-Dec-17					
Landfill Cover Option		LLDPE					
Landfill Closure Date (approximate)		2019					
Post Closure Period (years)		30					
Current (Dec 2017) waste in place (m3)		3,342,325					
Remaining airspace (Dec 2017) (m3)		48,234					
Landfill Capacity at Closure (m3)		3,390,559					
Closure construction costs (2014\$) (2018-2022 PB)		\$ 2,700,000					
Annual post closure O&M (2014\$)		\$ 90,000					
5th year post closure O&M costs (2014\$)		\$ 110,000					
Annual post closure LFG O&M (2014\$)		\$ 75,000					
Construction cost escalation rate		0.96%					
Discount rate		3.10%					
Inflation rate		1.31%					

Year	Years for FV calcs	Years for NPV	Construction Costs Cash Flow (2014 \$)	Monitoring / Maintenance Cash Flow (2014 \$)	Cash Flow plus Inflation	Net Present Value	Description of Cost
2017							
2018	4	1	\$ 200,000	\$ 100,000	\$ 313,104	\$ 303,690	Partial post closure LFG, O&M; Ph2 closure design
2019	5	2	\$ 2,500,000	\$ 100,000	\$ 2,728,447	\$ 2,566,837	Partial post closure LFG, O&M; Ph 2 construction
2020	6	3		\$ 165,000	\$ 178,422	\$ 162,807	Annual O&M plus annual LFG O&M
2021	7	4		\$ 165,000	\$ 180,763	\$ 159,983	Annual O&M plus annual LFG O&M
2022	8	5		\$ 165,000	\$ 183,134	\$ 157,208	Annual O&M plus annual LFG O&M
2023	9	6		\$ 185,000	\$ 208,026	\$ 173,207	Annual O&M plus annual LFG O&M plus 5 year maintenance
2024	10	7		\$ 165,000	\$ 187,971	\$ 151,803	Annual O&M plus annual LFG O&M
2025	11	8		\$ 165,000	\$ 190,437	\$ 149,170	Annual O&M plus annual LFG O&M
2026	12	9		\$ 165,000	\$ 192,935	\$ 146,583	Annual O&M plus annual LFG O&M
2027	13	10		\$ 165,000	\$ 195,467	\$ 144,041	Annual O&M plus annual LFG O&M
2028	14	11		\$ 185,000	\$ 222,035	\$ 158,700	Annual O&M plus annual LFG O&M plus 5 year maintenance
2029	15	12		\$ 165,000	\$ 200,629	\$ 139,088	Annual O&M plus annual LFG O&M
2030	16	13		\$ 165,000	\$ 203,261	\$ 136,676	Annual O&M plus annual LFG O&M
2031	17	14		\$ 165,000	\$ 205,928	\$ 134,306	Annual O&M plus annual LFG O&M
2032	18	15		\$ 165,000	\$ 208,630	\$ 131,976	Annual O&M plus annual LFG O&M
2033	19	16		\$ 185,000	\$ 236,987	\$ 145,407	Annual O&M plus annual LFG O&M plus 5 year maintenance
2034	20	17		\$ 165,000	\$ 214,140	\$ 127,438	Annual O&M plus annual LFG O&M
2035	21	18		\$ 165,000	\$ 216,949	\$ 125,228	Annual O&M plus annual LFG O&M
2036	22	19		\$ 165,000	\$ 219,795	\$ 123,056	Annual O&M plus annual LFG O&M
2037	23	20		\$ 165,000	\$ 222,679	\$ 120,922	Annual O&M plus annual LFG O&M
2038	24	21		\$ 185,000	\$ 252,946	\$ 133,228	Annual O&M plus annual LFG O&M plus 5 year maintenance
2039	25	22		\$ 165,000	\$ 228,560	\$ 116,764	Annual O&M plus annual LFG O&M
2040	26	23		\$ 165,000	\$ 231,559	\$ 114,739	Annual O&M plus annual LFG O&M
2041	27	24		\$ 165,000	\$ 234,597	\$ 112,749	Annual O&M plus annual LFG O&M
2042	28	25		\$ 165,000	\$ 237,674	\$ 110,794	Annual O&M plus annual LFG O&M
2043	29	26		\$ 185,000	\$ 269,980	\$ 122,069	Annual O&M plus annual LFG O&M plus 5 year maintenance
2044	30	27		\$ 165,000	\$ 243,952	\$ 106,984	Annual O&M plus annual LFG O&M
2045	31	28		\$ 165,000	\$ 247,152	\$ 105,129	Annual O&M plus annual LFG O&M
2046	32	29		\$ 165,000	\$ 250,395	\$ 103,306	Annual O&M plus annual LFG O&M
2047	33	30		\$ 165,000	\$ 253,680	\$ 101,514	Annual O&M plus annual LFG O&M
2048	34	31		\$ 185,000	\$ 288,160	\$ 111,845	Annual O&M plus annual LFG O&M plus 5 year maintenance
2049	35	32		\$ 165,000	\$ 260,380	\$ 98,023	Annual O&M plus annual LFG O&M
TOTAL COST			\$ 2,700,000	\$ 5,270,000	\$ 9,708,773	\$ 6,795,271	
NPV of Estimated Closure and Post Closure Costs =						\$ 6,795,271	
Landfill Liability in Dec 2017 (\$) =						\$ 6,698,602	NPV x (Cumulative Capacity Used)/(Total Estimated Capacity)

Notes:

- (1) Total site capacity based on Annual Operations and Monitoring Report (GHD, 2017) and revised final contours (EBA, 2017).
- (2) Remaining capacity as of December 31, 2017 calculated based on surveys conducted November 23, 2017 and September 2016 prorated to end of 2017 and revised final contours (EBA, 2017).
- (3) Construction costs in 2014\$ from 2018-2022 proposed financial plan capital schedules.
- (4) Annual post closure operating and maintenance costs include environmental monitoring costs, estimated based on GHD experience at CVRD waste management centres.
- (5) Annual Post Closure Landfill Gas System costs calculated assuming landfill gas collection system will be finalized in 2021. Estimated based on GHD experience at similar sites in British Columbia.
- (6) Construction cost inflation rate applied to forecast construction costs, calculated based on 10 year average annual increase in Vancouver non-residential building construction index (CANSIM Table 327-0043) (latest index Q4 2017).
- (7) Discount rate calculated based on MFA 30 year borrowing rate as of December 31, 2017.
- (8) Operations and maintenance inflation rate applied to operations and maintenance costs. Calculated based on the average of the annual percent change of the Consumer price index for BC (averaged over 2008-2017 period) (CANSIM Table 326-0020) (<http://www5.statcan.gc.ca/cansim/a26>, accessed on 12 Feb 2018).

Table 4: Landfill Liability - Comox Valley Waste Management Centre - Cell 1

Data:	31-Dec-17	
Landfill Cover Option	LLDPE	
Landfill Closure Date (approximate)	2023	
Post Closure Period (years)	30	
Current (Dec 2017) waste in place (m3)	5,940	Note 1
Remaining airspace (Dec 2017) (m3)	465,005	Note 2
Landfill Capacity at Closure (m3)	470,945	Note 2
Closure construction costs (2017\$) (2018-2022 PB)	\$1,100,000	Note 3
Annual post closure O&M (2017\$)	\$50,000	Note 4
5th year post closure O&M costs (2017\$)	\$60,000	Note 4
Annual post closure LFG O&M (2017\$)	\$25,000	Note 5
Construction cost escalation rate	0.96%	Note 6
Discount rate	3.10%	Note 7
Inflation rate	1.31%	Note 8

Year	Years for FV calcs	Years for NPV	Construction Costs Cash Flow (2017 \$)	Monitoring / Maintenance Cash Flow (2017 \$)	Cash Flow plus Inflation	Net Present Value	Decription of Cost
2017							
2018	1	1	\$ 50,000		\$ 50,478	\$ 48,960	Cell 1 LFG/surface water mgt design
2019	2	2	\$ 150,000		\$ 152,880	\$ 143,824	Cell 1 LFG/surface water mgt constuction
2020	3	3					
2021	4	4	\$ 50,000		\$ 51,938	\$ 45,968	Cell 1 LFG/surface water mgt design
2022	5	5	\$ 350,000		\$ 367,040	\$ 315,079	Cell 1 LFG construction (\$150K); Cell 1 surf water mgt (\$200K)
2023	6	6	\$ 500,000		\$ 529,352	\$ 440,750	Partial closure Cell 1
2024	7	7		\$ 75,000	\$ 82,165	\$ 66,355	
2025	8	8		\$ 75,000	\$ 83,243	\$ 65,204	
2026	9	9		\$ 75,000	\$ 84,335	\$ 64,074	
2027	10	10		\$ 75,000	\$ 85,441	\$ 62,962	
2028	11	11		\$ 85,000	\$ 98,104	\$ 70,120	
2029	12	12		\$ 75,000	\$ 87,698	\$ 60,797	
2030	13	13		\$ 75,000	\$ 88,848	\$ 59,743	
2031	14	14		\$ 75,000	\$ 90,014	\$ 58,707	
2032	15	15		\$ 75,000	\$ 91,195	\$ 57,689	
2033	16	16		\$ 85,000	\$ 104,710	\$ 64,247	
2034	17	17		\$ 75,000	\$ 93,604	\$ 55,705	
2035	18	18		\$ 75,000	\$ 94,832	\$ 54,739	
2036	19	19		\$ 75,000	\$ 96,076	\$ 53,790	
2037	20	20		\$ 75,000	\$ 97,336	\$ 52,857	
2038	21	21		\$ 85,000	\$ 111,762	\$ 58,866	
2039	22	22		\$ 75,000	\$ 99,907	\$ 51,039	
2040	23	23		\$ 75,000	\$ 101,218	\$ 50,154	
2041	24	24		\$ 75,000	\$ 102,546	\$ 49,284	
2042	25	25		\$ 75,000	\$ 103,891	\$ 48,430	
2043	26	26		\$ 85,000	\$ 119,288	\$ 53,935	
2044	27	27		\$ 75,000	\$ 106,635	\$ 46,764	
2045	28	28		\$ 75,000	\$ 108,034	\$ 45,953	
2046	29	29		\$ 75,000	\$ 109,451	\$ 45,156	
2047	30	30		\$ 75,000	\$ 110,887	\$ 44,373	
2048	31	31		\$ 85,000	\$ 127,321	\$ 49,418	
2049	32	32		\$ 75,000	\$ 113,816	\$ 42,847	
2050	33	33		\$ 75,000	\$ 115,309	\$ 42,104	
2051	34	34		\$ 75,000	\$ 116,822	\$ 41,374	
2052	35	35		\$ 75,000	\$ 118,354	\$ 40,657	
2053	36	36		\$ 85,000	\$ 135,895	\$ 45,278	
TOTAL COST			\$ 1,100,000	\$ 2,310,000	\$ 4,230,422	\$ 2,597,204	
NPV of Estimated Closure and Post Closure Costs =						\$ 2,597,204	
Landfill Liability in Dec 2017 (\$) =						\$32,758	NPV x (Cumulative Capacity Used)/(Total Estimated Capacity)

Notes:

- (1) Waste in place calculated based data received from CVRD operational staff (February 2018).
- (2) Remaining airspace capacity calculated based on Comox Valley Regional Waste Management Centre Fill Plan (AECOM, 2017).
- (3) Construction costs in 2014\$ from 2018-2022 proposed financial plan capital schedules.
- (4) Annual post closure operating and maintenance costs include environmental monitoring costs, estimated based on GHD experience at CVRD waste management centres.
- (5) Annual Post Closure Landfill Gas System costs calculated assuming landfill gas collection system will be finalized in 2024. Estimated based on GHD experience at similar sites in British Columbia.
- (6) Construction cost inflation rate applied to forecast construction costs, calculated based on 10 year average annual increase in Vancouver non-residential building construction index (CANSIM Table 327-0043) (latest index Q4 2017).
- (7) Discount rate calculated based on MFA 30 year borrowing rate as of December 31, 2017.
- (8) Operations and maintenance inflation rate applied to operations and maintenance costs. Calculated based on the average of the annual percent change of the Consumer price index for BC (averaged over 2008-2017 period) (CANSIM Table 326-0020) (<http://www5.statcan.gc.ca/cansim/a26>, accessed on 12 Feb 2018).

Table 5: Landfill Liability Assessment - Gold River Waste Management Centre

Data:	31-Dec-17	
Landfill Cover Option	GCL	
Landfill Closure Date (approximate)	2027	
Post Closure Period (years)	30	
Current (Dec 2017) waste in place (m3)	54,075	Note 1
Landfill Capacity at Closure (m3)	58,000	Note 2
Closure Costs (2014\$) (2018-2022 PB)	\$1,625,300	Note 3
Annual post closure O&M (2014\$)	\$26,500	Note 4
5th year post closure O&M costs (2014\$)	\$46,500	Note 4
Construction cost escalation rate	0.96%	Note 5
Discount rate	3.10%	Note 6
Inflation rate	1.31%	Note 7

Year	Years for FV	Years for PV	Cash Flow (2014\$)		Cash Flow plus Inflation	Net Present Value	Description of Cost
			Construction/ Other	Monitoring /Maintenance			
2017			-		-	-	
2018	4	1	-		-	-	
2019	5	2	-		-	-	
2020	6	3	-		-	-	
2021	7	4	-		-	-	
2022	8	5	-		-	-	
2023	9	6	-		-	-	
2024	10	7			-	-	
2025	11	8			-	-	
2026	12	9	\$ 414,600		\$ 464,705	\$ 353,061	Closure engineering based on option 2 DOC plan
2027	13	10	\$ 1,210,700		\$ 1,369,979	\$ 1,009,549	Closure construction
2028	14	11		\$ 26,500	\$ 31,805	\$ 22,733	Annual O&M
2029	15	12		\$ 26,500	\$ 32,222	\$ 22,338	Annual O&M
2030	16	13		\$ 26,500	\$ 32,645	\$ 21,951	Annual O&M
2031	17	14		\$ 26,500	\$ 33,073	\$ 21,570	Annual O&M
2032	18	15		\$ 46,500	\$ 58,796	\$ 37,193	Annual O&M plus allowance for 5 year maintenance
2033	19	16		\$ 26,500	\$ 33,947	\$ 20,829	Annual O&M
2034	20	17		\$ 26,500	\$ 34,392	\$ 20,467	Annual O&M
2035	21	18		\$ 26,500	\$ 34,843	\$ 20,112	Annual O&M
2036	22	19		\$ 26,500	\$ 35,300	\$ 19,764	Annual O&M
2037	23	20		\$ 46,500	\$ 62,755	\$ 34,078	Annual O&M plus allowance for 5 year maintenance
2038	24	21		\$ 26,500	\$ 36,233	\$ 19,084	Annual O&M
2039	25	22		\$ 26,500	\$ 36,708	\$ 18,753	Annual O&M
2040	26	23		\$ 26,500	\$ 37,190	\$ 18,428	Annual O&M
2041	27	24		\$ 26,500	\$ 37,678	\$ 18,108	Annual O&M
2042	28	25		\$ 46,500	\$ 66,981	\$ 31,224	Annual O&M plus allowance for 5 year maintenance
2043	29	26		\$ 26,500	\$ 38,673	\$ 17,486	Annual O&M
2044	30	27		\$ 26,500	\$ 39,180	\$ 17,182	Annual O&M
2045	31	28		\$ 26,500	\$ 39,694	\$ 16,884	Annual O&M
2046	32	29		\$ 26,500	\$ 40,215	\$ 16,592	Annual O&M
2047	33	30		\$ 46,500	\$ 71,492	\$ 28,608	Annual O&M plus allowance for 5 year maintenance
2048	34	31		\$ 26,500	\$ 41,277	\$ 16,021	Annual O&M
2049	35	32		\$ 26,500	\$ 41,819	\$ 15,743	Annual O&M
2050	36	33		\$ 26,500	\$ 42,367	\$ 15,470	Annual O&M
2051	37	34		\$ 26,500	\$ 42,923	\$ 15,202	Annual O&M
2052	38	35		\$ 46,500	\$ 76,306	\$ 26,212	Annual O&M plus allowance for 5 year maintenance
2053	39	36		\$ 26,500	\$ 44,057	\$ 14,679	Annual O&M
2054	40	37		\$ 26,500	\$ 44,635	\$ 14,425	Annual O&M
2055	41	38		\$ 26,500	\$ 45,220	\$ 14,174	Annual O&M
2056	42	39		\$ 26,500	\$ 45,814	\$ 13,929	Annual O&M
2057	43	40		\$ 46,500	\$ 81,444	\$ 24,017	Annual O&M plus allowance for 5 year maintenance
TOTAL COST			\$1,625,300	\$915,000	\$3,174,368	\$1,975,866	
NPV of Estimated Closure and Post Closure Costs =						\$1,975,866	
Landfill Liability in Dec 2017 (\$) =						\$1,842,155	NPV x (Cumulative Capacity Used)/(Total Estimated Capacity)

Notes:

- (1) Remaining capacity as of December 31, 2017 calculated based on surveys conducted December 21, 2017 and November 1, 2016 prorated to end of 2017.
- (2) Total site capacity based on Annual Operations and Monitoring Report (GHD, 2017).
- (3) Construction costs in 2014\$ from 2018-2022 proposed financial plan capital schedules. Transfer Station costs are not included in closure costs.
- (4) Annual post closure operating and maintenance costs include environmental monitoring costs, estimated based on GHD experience at CVRD waste management centres.
- (5) Construction cost inflation rate applied to forecast construction costs, calculated based on 10 year average annual increase in Vancouver non-residential building construction index (CANSIM Table 327-0043) (latest index Q4 2017).
- (6) Discount rate calculated based on MFA 30 year borrowing rate as of December 31, 2017.
- (7) Operations and maintenance inflation rate applied to operations and maintenance costs. Calculated based on the average of the annual percent change of the Consumer price index for BC (averaged over 2008-2017 period) (CANSIM Table 326-0020) (<http://www5.statcan.gc.ca/cansim/a26>, accessed on 12 Feb 2018).

Table 6: Landfill Liability Assessment - Tahsis Waste Management Centre

Data:		31-Dec-2017				
Landfill Cover Option		GCL				
Landfill Closure Date (approximate)		2025				
Post Closure Period (years)		30				
Current (Dec 2017) waste in place (m3)		95,777		Note 1		
Landfill Capacity at Closure (m3)		114,450		Note 2		
Closure Costs (2014\$) (2018-2022 PB)		\$ 825,000		Note 3		
Annual post closure O&M (2014\$)		\$ 24,000		Note 4		
5th year post closure O&M costs (2014\$)		\$ 44,000		Note 4		
Construction cost escalation rate		0.96%		Note 5		
Discount rate		3.10%		Note 6		
Inflation rate		1.31%		Note 7		

Year	Years for FV	Years for PV	Cash Flow (2014\$)		Cash Flow plus Inflation	Net Present Value	Description of Cost
			Construction/ Other	Monitoring /Maintenance			
2017			\$ -		\$ -	\$ -	
2018	4	1	\$ -		\$ -	\$ -	
2019	5	2	\$ -		\$ -	\$ -	
2020	6	3	\$ -		\$ -	\$ -	
2021	7	4	\$ -		\$ -	\$ -	
2022	7	5	\$ -		\$ -	\$ -	
2023	9	6	\$ -		\$ -	\$ -	
2024	10	7	\$ 100,000		\$ 109,974	\$ 88,814	Final closure engineering (2014\$) based on option 2 DOC
2025	11	8	\$ 725,000		\$ 804,929	\$ 630,504	Final closure construction/final capping (2014\$)
2026	12	9		\$ 24,000	\$ 28,063	\$ 21,321	Annual O&M
2027	13	10		\$ 24,000	\$ 28,432	\$ 20,951	Annual O&M
2028	14	11		\$ 24,000	\$ 28,805	\$ 20,588	Annual O&M
2029	15	12		\$ 24,000	\$ 29,182	\$ 20,231	Annual O&M
2030	16	13		\$ 44,000	\$ 54,203	\$ 36,447	Annual O&M plus allowance for 5 year maintenance
2031	17	14		\$ 24,000	\$ 29,953	\$ 19,535	Annual O&M
2032	18	15		\$ 24,000	\$ 30,346	\$ 19,197	Annual O&M
2033	19	16		\$ 24,000	\$ 30,744	\$ 18,864	Annual O&M
2034	20	17		\$ 24,000	\$ 31,148	\$ 18,536	Annual O&M
2035	21	18		\$ 44,000	\$ 57,853	\$ 33,394	Annual O&M plus allowance for 5 year maintenance
2036	22	19		\$ 24,000	\$ 31,970	\$ 17,899	Annual O&M
2037	23	20		\$ 24,000	\$ 32,390	\$ 17,589	Annual O&M
2038	24	21		\$ 24,000	\$ 32,815	\$ 17,284	Annual O&M
2039	25	22		\$ 24,000	\$ 33,245	\$ 16,984	Annual O&M
2040	26	23		\$ 44,000	\$ 61,749	\$ 30,597	Annual O&M plus allowance for 5 year maintenance
2041	27	24		\$ 24,000	\$ 34,123	\$ 16,400	Annual O&M
2042	28	25		\$ 24,000	\$ 34,571	\$ 16,115	Annual O&M
2043	29	26		\$ 24,000	\$ 35,024	\$ 15,836	Annual O&M
2044	30	27		\$ 24,000	\$ 35,484	\$ 15,561	Annual O&M
2045	31	28		\$ 44,000	\$ 65,907	\$ 28,034	Annual O&M plus allowance for 5 year maintenance
2046	32	29		\$ 24,000	\$ 36,421	\$ 15,026	Annual O&M
2047	33	30		\$ 24,000	\$ 36,899	\$ 14,766	Annual O&M
2048	34	31		\$ 24,000	\$ 37,383	\$ 14,510	Annual O&M
2049	35	32		\$ 24,000	\$ 37,873	\$ 14,258	Annual O&M
2050	36	33		\$ 44,000	\$ 70,346	\$ 25,686	Annual O&M plus allowance for 5 year maintenance
2051	37	34		\$ 24,000	\$ 38,874	\$ 13,768	Annual O&M
2052	38	35		\$ 24,000	\$ 39,384	\$ 13,529	Annual O&M
2053	39	36		\$ 24,000	\$ 39,900	\$ 13,294	Annual O&M
2054	40	37		\$ 24,000	\$ 40,424	\$ 13,064	Annual O&M
2055	41	38		\$ 44,000	\$ 75,083	\$ 23,535	Annual O&M plus allowance for 5 year maintenance
TOTAL COST			\$ 825,000	\$ 840,000	\$ 2,113,496	\$ 1,302,117	
NPV of Estimated Closure and Post Closure Costs =						\$ 1,302,117	
Landfill Liability in Dec 2017 (\$) =						\$ 1,089,671	NPV x (Cumulative Capacity Used)/(Total Estimated Capacity)

Notes:

- (1) Remaining capacity as of December 31, 2017 calculated based on surveys conducted January 23, 2018 and November 14, 2016 prorated to end of 2017.
- (2) Total site capacity based on Annual Operations and Monitoring Report (GHD, 2017).
- (3) Construction costs in 2014\$ from 2018-2022 proposed financial plan capital schedules. Transfer Station costs are not included in closure costs.
- (4) Annual post closure operating and maintenance costs include environmental monitoring costs, estimated based on GHD experience at CVRD waste management centres.
- (5) Construction cost inflation rate applied to forecast construction costs, calculated based on 10 year average annual increase in Vancouver non-residential building construction index (CANSIM Table 327-0043) (latest index Q4 2017).
- (6) Discount rate calculated based on MFA 30 year borrowing rate as of December 31, 2017.
- (7) Operations and maintenance inflation rate applied to operations and maintenance costs. Calculated based on the average of the annual percent change of the Consumer price index for BC (averaged over 2008-2017 period) (CANSIM Table 326-0020) (<http://www5.statcan.gc.ca/cansim/a26>, accessed on 12 Feb 2018).

Table 7: Landfill Liability Assessment - Zeballos Waste Management Centre

Data:	31-Dec-2017	
Landfill Cover Option	GCL	
Landfill Closure Date (approximate)	\$ 2,025	
Post Closure Period (years)	\$ 30	
Current (Dec 2017) waste in place (m3)	\$ 9,875	Note 1
Landfill Capacity at Closure (m3)	\$ 16,500	Note 2
Closure Costs (2014\$) (2018-2022 PB)	\$ 576,000	Note 3
Annual post closure O&M (2014\$)	\$ 28,000	Note 4
5th year post closure O&M costs (2014\$)	\$ 48,000	Note 4
Construction cost escalation rate	0.96%	Note 5
Discount rate	3.10%	Note 6
Inflation rate	1.31%	Note 7

Year	Years for FV	Years for PV	Cash Flow (2014\$)		Cash Flow plus Inflation	Net Present Value	Description of Cost
			Construction/ Other	Monitoring /Maintenance			
2017							
2018	4	1					
2019	5	2					
2020	6	3					
2021	7	4					
2022	8	5					
2023	9	6					
2024	10	7	\$ 96,000		\$ 105,575	\$ 85,261	Final closure engineering, option 2 DOC plan
2025	11	8	\$ 480,000		\$ 532,918	\$ 417,437	Final closure construction/final capping
2026	12	9		\$ 28,000	\$ 32,741	\$ 24,875	Annual O&M
2027	13	10		\$ 28,000	\$ 33,170	\$ 24,443	Annual O&M
2028	14	11		\$ 28,000	\$ 33,605	\$ 24,019	Annual O&M
2029	15	12		\$ 28,000	\$ 34,046	\$ 23,603	Annual O&M
2030	16	13		\$ 48,000	\$ 59,131	\$ 39,760	Annual O&M plus allowance for 5 year maintenance
2031	17	14		\$ 28,000	\$ 34,945	\$ 22,791	Annual O&M
2032	18	15		\$ 28,000	\$ 35,404	\$ 22,396	Annual O&M
2033	19	16		\$ 28,000	\$ 35,868	\$ 22,008	Annual O&M
2034	20	17		\$ 28,000	\$ 36,339	\$ 21,626	Annual O&M
2035	21	18		\$ 48,000	\$ 63,112	\$ 36,430	Annual O&M plus allowance for 5 year maintenance
2036	22	19		\$ 28,000	\$ 37,299	\$ 20,882	Annual O&M
2037	23	20		\$ 28,000	\$ 37,788	\$ 20,520	Annual O&M
2038	24	21		\$ 28,000	\$ 38,284	\$ 20,164	Annual O&M
2039	25	22		\$ 28,000	\$ 38,786	\$ 19,815	Annual O&M
2040	26	23		\$ 48,000	\$ 67,363	\$ 33,379	Annual O&M plus allowance for 5 year maintenance
2041	27	24		\$ 28,000	\$ 39,810	\$ 19,133	Annual O&M
2042	28	25		\$ 28,000	\$ 40,333	\$ 18,801	Annual O&M
2043	29	26		\$ 28,000	\$ 40,862	\$ 18,475	Annual O&M
2044	30	27		\$ 28,000	\$ 41,398	\$ 18,155	Annual O&M
2045	31	28		\$ 48,000	\$ 71,899	\$ 30,583	Annual O&M plus allowance for 5 year maintenance
2046	32	29		\$ 28,000	\$ 42,491	\$ 17,531	Annual O&M
2047	33	30		\$ 28,000	\$ 43,049	\$ 17,227	Annual O&M
2048	34	31		\$ 28,000	\$ 43,613	\$ 16,928	Annual O&M
2049	35	32		\$ 28,000	\$ 44,186	\$ 16,634	Annual O&M
2050	36	33		\$ 48,000	\$ 76,741	\$ 28,021	Annual O&M plus allowance for 5 year maintenance
2051	37	34		\$ 28,000	\$ 45,353	\$ 16,062	Annual O&M
2052	38	35		\$ 28,000	\$ 45,948	\$ 15,784	Annual O&M
2053	39	36		\$ 28,000	\$ 46,550	\$ 15,510	Annual O&M
2054	40	37		\$ 28,000	\$ 47,161	\$ 15,241	Annual O&M
2055	41	38		\$ 48,000	\$ 81,908	\$ 25,674	Annual O&M plus allowance for 5 year maintenance
TOTAL COST			\$ 576,000	\$ 960,000	\$ 2,007,675	\$ 1,169,169	
NPV of Estimated Closure and Post Closure Costs =						\$ 1,169,169	
Landfill Liability in Dec 2017 (\$) =						\$ 699,730	NPV x (Cumulative Capacity Used)/(Total Estimated Capacity)

Notes:

- (1) Remaining capacity as of December 31, 2017 calculated based on surveys conducted December 21, 2017 and November 8, 2016 prorated to end of 2017.
- (2) Total site capacity based on Annual Operations and Monitoring Report (GHD, 2017).
- (3) Construction costs in 2014\$ from 2018-2022 proposed financial plan capital schedules. Transfer Station costs are not included in closure costs.
- (4) Annual post closure operating and maintenance costs include environmental monitoring costs, estimated based on GHD experience at CVRD waste management centres.
- (5) Construction cost inflation rate applied to forecast construction costs, calculated based on 10 year average annual increase in Vancouver non-residential building construction index (CANSIM Table 327-0043) (latest index Q4 2017).
- (6) Discount rate calculated based on MFA 30 year borrowing rate as of December 31, 2017.
- (7) Operations and maintenance inflation rate applied to operations and maintenance costs. Calculated based on the average of the annual percent change of the Consumer price index for BC (averaged over 2008-2017 period) (CANSIM Table 326-0020) (<http://www5.statcan.gc.ca/cansim/a26>, accessed on 12 Feb 2018).

Table 8: Landfill Liability Assessment - Cortes Island Landfill

Data:	31-Dec-2017	
Landfill Cover Option		
Landfill Closure Date (approximate)	2018	
Post Closure Period (years)		
Current (Dec 2017) waste in place (m3)	n/a	Note 1
Landfill Capacity at Closure (m3)	n/a	Note 1
Closure Costs (2014\$) (2018-2022 proposed budget)	\$ 90,000	Note 2
Annual post closure O&M (2014\$)	n/a	Note 3
Construction cost escalation rate	0.96%	Note 4
Discount rate	3.10%	Note 5
Inflation rate	1.31%	Note 6

Year	Years for FV	Years for PV	Cash Flow (2014\$)		Cash Flow plus Inflation	Net Present Value	Description of Cost
			Construction/Other	Monitoring/Maintenance			
2017			\$ -		\$ -	\$ -	
2018	4	1	\$ 90,000		\$ 93,489	\$ 90,678	Final closure
2019	5	2			\$ -	\$ -	Annual O&M
2020	6	3			\$ -	\$ -	Annual O&M
2021	7	4			\$ -	\$ -	Annual O&M
2022	8	5			\$ -	\$ -	Annual O&M
2023	9	6			\$ -	\$ -	Annual O&M
2024	10	7			\$ -	\$ -	Annual O&M
2025	11	8			\$ -	\$ -	Annual O&M
2026	12	9			\$ -	\$ -	Annual O&M
2027	13	10			\$ -	\$ -	Annual O&M
2028	14	11			\$ -	\$ -	Annual O&M
2029	15	12			\$ -	\$ -	Annual O&M
2030	16	13			\$ -	\$ -	Annual O&M
2031	17	14			\$ -	\$ -	Annual O&M
2032	18	15			\$ -	\$ -	Annual O&M
2033	19	16			\$ -	\$ -	Annual O&M
2034	20	17			\$ -	\$ -	Annual O&M
2035	21	18			\$ -	\$ -	Annual O&M
2036	22	19			\$ -	\$ -	Annual O&M
2037	23	20			\$ -	\$ -	Annual O&M
2038	24	21			\$ -	\$ -	Annual O&M
2039	25	22			\$ -	\$ -	Annual O&M
2040	26	23			\$ -	\$ -	Annual O&M
2041	27	24			\$ -	\$ -	Annual O&M
2042	28	25			\$ -	\$ -	Annual O&M
2043	29	26			\$ -	\$ -	Annual O&M
2044	30	27			\$ -	\$ -	Annual O&M
2045	31	28			\$ -	\$ -	Annual O&M
2046	32	29			\$ -	\$ -	Annual O&M
2047	33	30			\$ -	\$ -	Annual O&M
2048	34	31			\$ -	\$ -	Annual O&M
2049	35	32			\$ -	\$ -	Annual O&M
TOTAL COST			\$ 90,000	\$ -	\$ 93,489	\$ 90,678	
NPV of Estimated Closure and Post Closure Costs =						\$ 90,678	
Landfill Liability in Dec 2017 (\$) =						\$ 90,678	NPV x (Cumulative Capacity Used)/(Total Estimated Capacity)

Notes:

- (1) The landfill has been abandoned and currently houses a solid waste transfer station only. Actual total airspace and waste in place unknown at the Site.
- (2)
- (3) Construction costs based on GHD work plan for implementation of closure works to attain abandonment of permit (GHD, 2017).
- (4) Upon completion of closure works, CSWM expects that the BC MOE will approve abandonment of the Site and will not incur additional post closure monitoring and maintenance costs.
- (5) Construction cost inflation rate applied to forecast construction costs, calculated based on 10 year average annual increase in Vancouver non-residential building construction index (CANSIM Table 327-0043) (latest index Q4 2017).
- (6) Discount rate calculated based on MFA 30 year borrowing rate as of December 31, 2017.
- (7) Operations and maintenance inflation rate applied to operations and maintenance costs. Calculated based on the average of the annual percent change of the Consumer price index for BC (averaged over 2008-2017 period) (CANSIM Table 326-0020) (<http://www5.statcan.gc.ca/cansim/a26>, accessed on 12 Feb 2018).

Appendix E

Monitoring Specifications

GHD LIMITED
ENVIRONMENTAL MONITORING PROGRAM SERVICES – 2017 TERM
MONITORING SPECIFICATIONS

PROJECT: Comox Strathcona Waste Management
 Campbell River Waste Management Centre

PROJECT NO.: 056484-02

PROJECT MANAGER: Greg Ferraro

PROJECT COORDINATOR: Michaela Dyck

MONITORING STAFF:	RESPONSIBILITY
Thomas Elliott	Field Technicians
James Stewart	
Cassie Ragan	
Airesse MacPhee	QA/QC Chemist
Laurie Linington	Database Manager

LABORATORIES USED: Maxxam Analytics, Burnaby, British Columbia

AUTHORIZATION:	MONITORING EVENT	SIGNATURE	DATE
	Feb, May, Aug, Nov	<u><i>MD</i></u>	May 26, 2017

REVISIONS:	DATE	REVISION	GHD
	Apr 2014	Spec creation	MND
1	Jun 2014	39950, EBA06-1, and HBT94-4 removed from sampling program. Phosphorus analysis changed to metals analysis instead of colorimetric method.	MND
2	Jan 2016	SW-2 added to surface water monitoring program, updated field and database staffing, added WG matrix to field blank	TE
3	Mar 2016	Added dissolved metals analysis to WS schedule to differentiate from total metals when comparing to criteria	CR
4	July 2016	Background well MW01-16 added to groundwater monitoring program. Destroyed wells GLL93-1, GLL93-2, EBA04-2 removed from sampling program. Updated project staffing.	TE
5	Jan 2017	Reduced sampling for VOCs to a semi-annual schedule (February and August)	MND
6	May 2017	Added SW03-17 and well tag 109728 (domestic well) to the monitoring program. Switched surface water metals analyses to a low level analysis.	MND

WATER QUALITY MONITORING

Monitoring Locations: Figure 1 and Table 1

Monitoring Frequency: Table 1

Monitoring Parameters: Table 2

TIPS

Contact Moe or Michelle Vale of Barry and Vale Contracting to notify them that we will be monitoring 250-286-3505.

Scalehouse: 250-287-8530 (Attendant – Heather)

Table 1

**Water Quality Monitoring Program Summary
Environmental Monitoring Program Services - 2017 Term
Campbell River Waste Management Centre
Comox Strathcona Waste Management**

<i>Sampling Location</i>	<i>Sampling Location Purpose</i>	<i>Sample Matrix</i>	<i>Hydraulic Monitoring</i>	<i>February</i>	<i>May</i>	<i>August</i>	<i>November</i>
Groundwater Monitoring Program (22 locations)							
Well tag 109728	Domestic well on Al & Sons property on south side of Argonuat Road	WG	√	Schedule A	Schedule A	Schedule A	Schedule A
AG99-01	Monitor downgradient groundwater quality to the east of the Site. Off-site	WG	√	Schedule A	Schedule A	Schedule A	Schedule A
AG99-02	Monitor downgradient groundwater quality to the east of the Site. Off-site	WG	√	Schedule A	Schedule A	Schedule A	Schedule A
AG99-04	Monitor downgradient groundwater quality to the east of the Site. Off-site	WG	√	Schedule A	Schedule A	Schedule A	Schedule A
AG99-05	Monitor downgradient groundwater quality to the east of the Site. Off-site	WG	√	Schedule A	Schedule A	Schedule A	Schedule A
AG99-06	Downgradient of the Site to the northeast. Off-site	WG	√	Schedule A Schedule B	Schedule A	Schedule A Schedule B	Schedule A
MW01-16	Background location	WG	√	Schedule A Schedule B	Schedule A	Schedule A Schedule B	Schedule A
AM02-01	Background location	WG	√	Schedule A Schedule B	Schedule A	Schedule A Schedule B	Schedule A
EBA04-1	Tap from building	WG		Schedule A	Schedule A	Schedule A	Schedule A
EBA04-3	Downgradient of the Site to the northeast. Off-site	WG	√	Schedule A	Schedule A	Schedule A	Schedule A
EBA04-4	Northeast area of the landfill	WG	√	Schedule A	Schedule A	Schedule A	Schedule A
EBA04-6	Northeast toe of landfill. Off-site	WG	√	Schedule A	Schedule A	Schedule A	Schedule A
EBA04-7	Northeast toe of landfill. Off-site	WG	√	Schedule A Schedule B	Schedule A	Schedule A Schedule B	Schedule A
EBA11-1	Downgradient of the Site to the northeast. Off-site	WG	√	Schedule A Schedule B	Schedule A	Schedule A Schedule B	Schedule A
EBA11-2	Downgradient of the Site to the northeast. Off-site	WG	√	Schedule A	Schedule A	Schedule A	Schedule A

**Water Quality Monitoring Program Summary
Environmental Monitoring Program Services - 2017 Term
Campbell River Waste Management Centre
Comox Strathcona Waste Management**

<i>Sampling Location</i>	<i>Sampling Location Purpose</i>	<i>Sample Matrix</i>	<i>Hydraulic Monitoring</i>	<i>February</i>	<i>May</i>	<i>August</i>	<i>November</i>
EBA11-3	Downgradient of the Site to the northeast. Off-site	WG	√	Schedule A Schedule B	Schedule A	Schedule A Schedule B	Schedule A
EBA11-4	Downgradient of the Site to the northeast. Off-site	WG	√	Schedule A Schedule B	Schedule A	Schedule A Schedule B	Schedule A
GLL93-4	Northeast toe of landfill. Off-site	WG	√	Schedule A	Schedule A	Schedule A	Schedule A
HBT94-1	Southeast property line	WG	√	Schedule A	Schedule A	Schedule A	Schedule A
HBT94-2	Southeast property line	WG	√	Schedule A Schedule B	Schedule A	Schedule A Schedule B	Schedule A
HBT94-3	Southeast property line	WG	√	Schedule A	Schedule A	Schedule A	Schedule A
HBT94-5	Monitor downgradient groundwater quality to the east of the Site. Off-site	WG	√	Schedule A	Schedule A	Schedule A	Schedule A

Surface Water Monitoring Program (3 locations)

SW-1	Cold Creek Tributary	WS	√	Schedule A	Schedule A	Schedule A	Schedule A
SW-2	Cold Creek Slough	WS	√	Schedule A	Schedule A	Schedule A	Schedule A
SW03-17	Unnamed Pond upstream of SW-1	WS	√	Schedule A	Schedule A	Schedule A	Schedule A

Field Quality Assurance/Quality Control

Field Blank	WG		Schedule A	Schedule A	Schedule A	Schedule A
Groundwater Duplicate	WG		2x Schedule A Schedule B	2x Schedule A	2x Schedule A Schedule B	2x Schedule A
Surface Water Duplicate	WS		Schedule A	-	-	-
Trip Blank	WG		Schedule B	-	Schedule B	-

Extra Bottles

	WG		Schedule A Schedule B	Schedule A	Schedule A Schedule B	Schedule A
	WS		Schedule A	Schedule A	Schedule A	Schedule A

Notes:

- WG - Groundwater
- WS - Surface Water
- √ - Every monitoring event
- EBA04-1, cannot measure water level

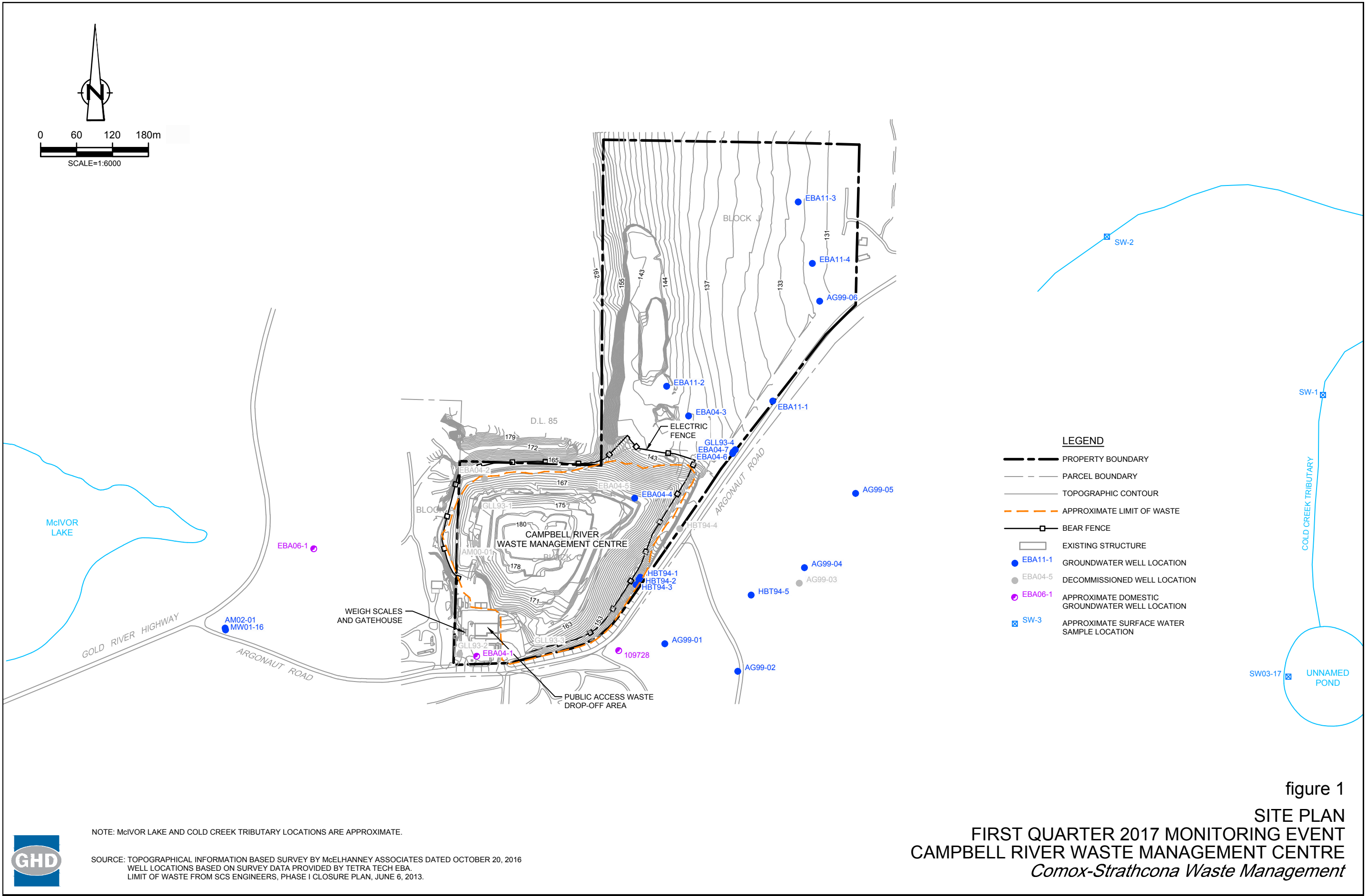
Monitoring Parameter Schedules
Environmental Monitoring Program Services - 2017 Term
Campbell River Waste Management Centre
Comox Strathcona Waste Management

	<i>Groundwater</i>	<i>Surface Water</i>
Schedule A		
<u>Hydraulic Monitoring</u>		
Water Level and Depth to Bottom	√	
Flow		√
<u>Field Parameters</u>		
Specific Conductance, Field	√	√
Dissolved Oxygen, Field	√	√
pH, Field	√	√
Temperature, Field	√	√
ORP	√	√
<u>General Chemistry</u>		
Alkalinity (speciated)	√	√
Chloride	√	√
Fluoride	√	√
pH	√	√
Specific Conductance	√	√
Sulphate (Dissolved)	√	√
Nitrate (as N)	√	√
Nitrite (as N)	√	√
<u>Metals (including Mercury, Sulphur, and Hardness)**</u>		
<u>Dissolved</u>	√	√
<u>Total</u>		√
Aluminum	√	√
Antimony	√	√
Arsenic	√	√
Barium	√	√
Beryllium	√	√
Bismuth	√	√
Boron	√	√
Cadmium	√	√
Calcium	√	√
Chromium	√	√
Cobalt	√	√
Copper	√	√
Iron	√	√
Lead	√	√
Lithium	√	√
Magnesium	√	√
Manganese	√	√
Mercury	√	√
Molybdenum	√	√
Nickel	√	√
Phosphorus	√	√
Potassium	√	√
Selenium	√	√
Silicon	√	√
Silver	√	√
Sodium	√	√
Strontium	√	√
Sulphur	√	√
Thallium	√	√
Tin	√	√
Titanium	√	√
Uranium	√	√
Vanadium	√	√
Zinc	√	√
Zirconium	√	√

**Low level metals (total and dissolved) for surface water

Monitoring Parameter Schedules
Environmental Monitoring Program Services - 2017 Term
Campbell River Waste Management Centre
Comox Strathcona Waste Management

	<i>Groundwater</i>	<i>Surface Water</i>
Schedule B		
<u>Volatile Organic Compounds (VOCs)</u>		
1,1,1,2-tetrachloroethane	√	
1,1,1-trichloroethane	√	
1,1,2,2-tetrachloroethane	√	
1,1,2-trichloroethane	√	
1,1-dichloroethane	√	
1,1-dichloroethene	√	
1,2-dichlorobenzene	√	
1,2-dichloroethane	√	
1,2-dichloropropane	√	
1,3-dichlorobenzene	√	
1,4-dichlorobenzene	√	
Benzene mg/L	√	
Bromodichloromethane	√	
Bromoform	√	
Bromomethane	√	
Carbon tetrachloride	√	
Chlorobenzene	√	
Chlorodibromomethane	√	
Chloroethane	√	
Chloroform	√	
Chloromethane	√	
cis-1,2-dichloroethene	√	
cis-1,3-dichloropropene	√	
Dibromomethane	√	
Dichloromethane	√	
Ethylbenzene	√	
m & p-Xylene		
Methyl-tert-butylether (MTBE)	√	
o-Xylene	√	
Styrene	√	
Tetrachloroethene	√	
Toluene	√	
trans-1,2-dichloroethene	√	
trans-1,3-dichloropropene	√	
Trichlorofluoromethane	√	
Vinyl chloride	√	
Xylenes (Total)	√	
<u>Petroleum Hydrocarbons</u>		
Total Petroleum Hydrocarbons VH (C6-C10)	√	
Total Petroleum Hydrocarbons VPH (C6-C10)LessBTEX	√	



Appendix F

Field Parameters, Field Sample Keys, and Laboratory Reports



GHD Field Sample Key (FSK)

SiteCampbell River 056484-02

Sample ReasonQ1

Sampler NameMichaela Dyck/Jamie Stewart

Sampling CompanyGHD

Laboratory(s)Maxxam Analytics

SSOW Reference Code :

pH	Temperature	Conductivity	Turbidity	DO	Eh / ORP

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)	Conductivity Units												
										Volume of Water Purged	Field pH	Sample Temp.	Temp Units	Conductivity	Conductivity Units	Turbidity	Turbidity Units	DO	DO Units	Eh/ORP	Eh/ORP Units	TDS (g/L)
GROUNDWATER																						
WG-56484-280217-JS-01	MW01-16	2/28/2017	7:20	N	WG	grab				80	6.84	11.69	C	95	uS	11	ntu	9.24	mg/L	275	mV	0.006
WG-56484-280217-JS-02	EBA04-7	2/28/2017	8:10	N	WG	grab				84	7.01	7.15	C	834	uS	0.6	ntu	13.3	mg/L	243	mV	0.534
WG-56484-280217-JS-03	EBA04-6	2/28/2017	8:20	N	WG	grab				148	7.28	8.71	C	628	uS	0	ntu	14.9	mg/L	221	mV	0.402
WG-56484-280217-JS-04	EBA11-1	2/28/2017	9:00	N	WG	grab				80	7.57	6.26	C	430	uS	8	ntu	5.22	mg/L	232	mV	0.278
WG-56484-280217-JS-05	EBA11-2	2/28/2017	10:40	N	WG	grab				96	7.72	7.39	C	261	uS	23	ntu	7.59	mg/L	237	mV	0.170
WG-56484-280217-JS-06	EBA04-3	2/28/2017	11:30	N	WG	grab				96	7.44	8.59	C	545	uS	0.1	ntu	4.27	mg/L	240	mV	0.348
WG-56484-280217-JS-07	EBA11-3	2/28/2017	12:20	N	WG	grab				72	7.81	7.62	C	120	uS	22	ntu	10.6	mg/L	234	mV	0.078
WG-56484-280217-JS-08	EBA11-4	2/28/2017	12:45	N	WG	grab				54	7.85	7.39	C	161	uS	21	ntu	7.11	mg/L	237	mV	0.105
WG-56484-280217-JS-09	EBA11-4	2/28/2017	12:50	FD	WG	grab	WG-56484-280217-JS-08			54	7.85	7.39	C	161	uS	21	ntu	7.11	mg/L	237	mV	0.105
WG-56484-280217-JS-10	AG99-06	2/28/2017	13:20	N	WG	grab				33	7.58	7.21	C	253	uS	16.3	ntu	11.54	mg/L	254	mV	0.183
WG-56484-280217-JS-11	HBT94-3	2/28/2017	14:00	N	WG	grab				12	6.84	10.47	C	958	uS	0	ntu	2.75	mg/L	-6.5	mV	0.615
WG-56484-280217-JS-12	HBT94-2	2/28/2017	14:25	N	WG	grab				108	7.18	9.89	C	753	uS	0	ntu	1.2	mg/L	-27	mV	0.433
WG-56484-280217-JS-13	HBT94-2	2/28/2017	14:30	FD	WG	grab	WG-56484-280217-JS-12			108	7.18	9.89	C	753	uS	0	ntu	1.2	mg/L	-27	mV	0.433
WG-56484-280217-JS-14	AG99-2	2/28/2017	16:30	N	WG	grab				162	8.23	8.31	C	375	uS	0	ntu	8.43	mg/L	105	mV	0.244
WG-56484-280217-JS-15	FLDBLK	2/28/2017	16:40	FB	WG	grab				-	-	-	C	-	uS	-	ntu	-	mg/L	-	mV	-
WG-56484-280217-JS-16	EBA04-1	2/28/2017	16:50	N	WG	grab				-	8.56	7.67	C	120	uS	0	ntu	6.75	mg/L	105	mV	0.078
WG-56484-010317-JS-17	AG99-4	3/1/2017	9:00	N	WG	grab				150	7.64	9.42	C	115	uS	0	ntu	6.57	mg/L	242	mV	0.075
WG-56484-010317-JS-18	AGG99-1	3/1/2017	10:30	N	WG	grab				138	7.51	8.59	C	224	uS	2.8	ntu	8.08	mg/L	264	mV	0.145
WG-56484-010317-JS-19	AGG99-5	3/1/2017	12:00	N	WG	grab				178	7.51	8.24	C	239	uS	4.5	ntu	6.58	mg/L	238	mV	0.155
WG-56484-010317-JS-20	HBT94-1	3/1/2017	13:00	N	WG	grab				-	6.93	8.14	C	-	uS	2.2	ntu	10.34	mg/L	251	mV	0.361
SURFACE WATER																						
WS-56484-010317-JS-01	SW-1	3/1/2017	12:45	N	WS	grab				-	7.84	3.11	C	31	uS	0	ntu	7.28	mg/L	241	mV	0.020
WS-56484-010317-JS-02	SW-2	3/1/2017	13:30	N	WS	grab				-	7.53	2.95	C	104	uS	0.4	ntu	5.89	mg/L	211	mV	0.068

Footnotes

1.
2.
3.
4.
5.
6.

Key

Required Field

Populate When Appropriate

Field Data

Your P.O. #: 73506861
Your Project #: 56484-02
Your C.O.C. #: 516800-01-01, 516800-05-01

Attention: Aïresse MacPhee

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

Report Date: 2017/03/09

Report #: R2354581

Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B715393

Received: 2017/03/01, 14:35

Sample Matrix: Water
Samples Received: 21

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity - Water (1)	8	2017/03/03	2017/03/03	BBY6SOP-00026	SM 22 2320 B m
Alkalinity - Water (1)	12	2017/03/03	2017/03/04	BBY6SOP-00026	SM 22 2320 B m
Chloride by Automated Colourimetry (1)	20	N/A	2017/03/03	BBY6SOP-00011	SM 22 4500-Cl- E m
Conductance - water (1)	8	N/A	2017/03/03	BBY6SOP-00026	SM 22 2510 B m
Conductance - water (1)	12	N/A	2017/03/04	BBY6SOP-00026	SM 22 2510 B m
Fluoride (1)	11	N/A	2017/03/04	BBY6SOP-00048	SM 22 4500-F C m
Fluoride (1)	9	N/A	2017/03/07	BBY6SOP-00048	SM 22 4500-F C m
Hardness (calculated as CaCO ₃) (1)	20	N/A	2017/03/06	BBY WI-00033	Auto Calc
Mercury (Dissolved) by CVAf (1)	20	N/A	2017/03/03	BBY7SOP-00015	BCMOE BCLM Oct2013 m
Na, K, Ca, Mg, S by CRC ICPMS (diss.) (1)	20	N/A	2017/03/06	BBY7SOP-00002	EPA 6020A R1 m
Elements by CRC ICPMS (dissolved) (1)	20	N/A	2017/03/04	BBY7SOP-00002	EPA 6020B R2 m
Ammonia-N (Preserved) (1)	20	N/A	2017/03/03	BBY6SOP-00009	SM 22 4500-NH ₃ - G m
Nitrate + Nitrite (N) (1)	20	N/A	2017/03/03	BBY6SOP-00010	SM 22 4500-NO ₃ - I m
Nitrite (N) by CFA (1)	20	N/A	2017/03/03	BBY6SOP-00010	SM 22 4500-NO ₃ - I m
Nitrogen - Nitrate (as N) (1)	20	N/A	2017/03/04	BBY6SOP-00010	SM 22 4500-NO ₃ I m
Filter and HNO ₃ Preserve for Metals (1)	14	N/A	2017/03/04	BBY7 WI-00004	BCMOE Reqs 08/14
Filter and HNO ₃ Preserve for Metals (1)	6	N/A	2017/03/06	BBY7 WI-00004	BCMOE Reqs 08/14
pH Water (1, 2)	8	N/A	2017/03/03	BBY6SOP-00026	SM 22 4500-H+ B m
pH Water (1, 2)	12	N/A	2017/03/04	BBY6SOP-00026	SM 22 4500-H+ B m
Orthophosphate by Konelab (1)	20	N/A	2017/03/03	BBY6SOP-00013	SM 22 4500-P E m
Sulphate by Automated Colourimetry (1)	20	N/A	2017/03/03	BBY6SOP-00017	SM 22 4500-SO ₄ 2- E m
VOCs, VH, F1, LH in Water by HS GC/MS (1)	5	2017/03/03	2017/03/03	BBY8SOP-00009	BC Lab Manual 2007
VOCs, VH, F1, LH in Water by HS GC/MS (1)	4	2017/03/03	2017/03/04	BBY8SOP-00009	BC Lab Manual 2007
VOCs, VH, F1, LH in Water by HS GC/MS (1)	1	2017/03/03	2017/03/07	BBY8SOP-00009	BC Lab Manual 2007
Volatile HC-BTEX (1)	9	N/A	2017/03/06	BBY WI-00033	Auto Calc
Volatile HC-BTEX (1)	1	N/A	2017/03/08	BBY WI-00033	Auto Calc

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 Vancouver

(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.

Your P.O. #: 73506861
Your Project #: 56484-02
Your C.O.C. #: 516800-01-01, 516800-05-01

Attention:Airesse MacPhee

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

Report Date: 2017/03/09

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Version: 1 - Final

CERTIFICATE OF ANALYSIS

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Received: 2017/03/01, 14:35

Encryption Key

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

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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 #: B715393
Report Date: 2017/03/09

GHD Limited
Client Project #: 56484-02
Your P.O. #: 73506861
Sampler Initials: JS

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		QQ4088		QQ4089	QQ4090		
Sampling Date		2017/02/28 07:20		2017/02/28 08:10	2017/02/28 08:20		
COC Number		516800-01-01		516800-01-01	516800-01-01		
	UNITS	WG-56484-280217-JS-01	QC Batch	WG-56484-280217-JS-02	WG-56484-280217-JS-03	RDL	QC Batch
ANIONS							
Nitrite (N)	mg/L	0.0065	8568787	<0.0050	<0.0050	0.0050	8568787
Calculated Parameters							
Filter and HNO3 Preservation	N/A	FIELD	ONSITE	FIELD	FIELD	N/A	ONSITE
Nitrate (N)	mg/L	0.055	8566580	1.58	1.52	0.020	8566580
Misc. Inorganics							
Fluoride (F)	mg/L	0.029	8571200	0.023	0.021	0.010	8571200
Dissolved Hardness (CaCO3)	mg/L	32.9	8566638	346	255	0.50	8566638
Alkalinity (Total as CaCO3)	mg/L	37.4	8567689	327	261	0.50	8567689
Alkalinity (PP as CaCO3)	mg/L	<0.50	8567689	<0.50	<0.50	0.50	8567689
Bicarbonate (HCO3)	mg/L	45.6	8567689	400	318	0.50	8567689
Carbonate (CO3)	mg/L	<0.50	8567689	<0.50	<0.50	0.50	8567689
Hydroxide (OH)	mg/L	<0.50	8567689	<0.50	<0.50	0.50	8567689
Anions							
Dissolved Sulphate (SO4)	mg/L	2.78	8569327	15.9	3.98	0.50	8569329
Dissolved Chloride (Cl)	mg/L	0.94	8569325	19	5.2	0.50	8569328
Nutrients							
Orthophosphate (P)	mg/L	0.0234	8568021	0.0056	<0.0050	0.0050	8568021
Total Ammonia (N)	mg/L	0.039	8568151	0.031	0.043	0.0050	8568151
Nitrate plus Nitrite (N)	mg/L	0.061	8568785	1.58	1.52	0.020	8568785
Physical Properties							
Conductivity	uS/cm	78.1	8567698	678	499	1.0	8567698
pH	pH	7.66	8567699	8.16	8.20	N/A	8567699
Volatiles							
VPH (VHW6 to 10 - BTEX)	ug/L	<300	8566717	<300	N/A	300	8566717
RDL = Reportable Detection Limit N/A = Not Applicable							

Maxxam Job #: B715393
Report Date: 2017/03/09

GHD Limited
Client Project #: 56484-02
Your P.O. #: 73506861
Sampler Initials: JS

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		QQ4091	QQ4092	QQ4093		
Sampling Date		2017/02/28 09:00	2017/02/28 10:40	2017/02/28 11:30		
COC Number		516800-01-01	516800-01-01	516800-01-01		
	UNITS	WG-56484-280217-JS-04	WG-56484-280217-JS-05	WG-56484-280217-JS-06	RDL	QC Batch
ANIONS						
Nitrite (N)	mg/L	<0.0050	0.0071	<0.0050	0.0050	8568787
Calculated Parameters						
Filter and HNO ₃ Preservation	N/A	FIELD	FIELD	FIELD	N/A	ONSITE
Nitrate (N)	mg/L	0.823	0.205	0.422	0.020	8566580
Misc. Inorganics						
Fluoride (F)	mg/L	0.025	0.030	0.019	0.010	8571200
Dissolved Hardness (CaCO ₃)	mg/L	176	103	216	0.50	8566638
Alkalinity (Total as CaCO ₃)	mg/L	167	108	191	0.50	8567689
Alkalinity (PP as CaCO ₃)	mg/L	<0.50	<0.50	<0.50	0.50	8567689
Bicarbonate (HCO ₃)	mg/L	204	132	233	0.50	8567689
Carbonate (CO ₃)	mg/L	<0.50	<0.50	<0.50	0.50	8567689
Hydroxide (OH)	mg/L	<0.50	<0.50	<0.50	0.50	8567689
Anions						
Dissolved Sulphate (SO ₄)	mg/L	13.6	3.32	4.50	0.50	8569329
Dissolved Chloride (Cl)	mg/L	4.6	5.0	22	0.50	8569328
Nutrients						
Orthophosphate (P)	mg/L	0.0280	0.0254	<0.0050	0.0050	8568021
Total Ammonia (N)	mg/L	0.038	0.041	0.025	0.0050	8568150
Nitrate plus Nitrite (N)	mg/L	0.823	0.212	0.422	0.020	8568785
Physical Properties						
Conductivity	uS/cm	352	221	431	1.0	8567698
pH	pH	8.29	8.12	8.15	N/A	8567699
Volatiles						
VPH (VHW6 to 10 - BTEX)	ug/L	<300	N/A	N/A	300	8566717
RDL = Reportable Detection Limit N/A = Not Applicable						

Maxxam Job #: B715393
Report Date: 2017/03/09

GHD Limited
Client Project #: 56484-02
Your P.O. #: 73506861
Sampler Initials: JS

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		QQ4093	QQ4094	QQ4095		
Sampling Date		2017/02/28 11:30	2017/02/28 12:20	2017/02/28 12:45		
COC Number		516800-01-01	516800-01-01	516800-01-01		
	UNITS	WG-56484-280217-JS-06 Lab-Dup	WG-56484-280217-JS-07	WG-56484-280217-JS-08	RDL	QC Batch
ANIONS						
Nitrite (N)	mg/L	N/A	0.0067	0.0080	0.0050	8568787
Calculated Parameters						
Filter and HNO3 Preservation	N/A	N/A	FIELD	FIELD	N/A	ONSITE
Nitrate (N)	mg/L	N/A	0.104	0.233	0.020	8566580
Misc. Inorganics						
Fluoride (F)	mg/L	N/A	0.024	0.029	0.010	8571200
Dissolved Hardness (CaCO3)	mg/L	N/A	46.4	54.2	0.50	8566638
Alkalinity (Total as CaCO3)	mg/L	N/A	45.0	50.2	0.50	8567689
Alkalinity (PP as CaCO3)	mg/L	N/A	<0.50	<0.50	0.50	8567689
Bicarbonate (HCO3)	mg/L	N/A	54.9	61.3	0.50	8567689
Carbonate (CO3)	mg/L	N/A	<0.50	<0.50	0.50	8567689
Hydroxide (OH)	mg/L	N/A	<0.50	<0.50	0.50	8567689
Anions						
Dissolved Sulphate (SO4)	mg/L	N/A	3.48	2.58	0.50	8569329
Dissolved Chloride (Cl)	mg/L	N/A	2.0	9.3	0.50	8569328
Nutrients						
Orthophosphate (P)	mg/L	<0.0050	0.0383	0.0680	0.0050	8568021
Total Ammonia (N)	mg/L	N/A	0.037	0.033	0.0050	8568150
Nitrate plus Nitrite (N)	mg/L	N/A	0.110	0.241	0.020	8568785
Physical Properties						
Conductivity	uS/cm	N/A	104	136	1.0	8567698
pH	pH	N/A	7.78	7.79	N/A	8567699
Volatiles						
VPH (VHW6 to 10 - BTEX)	ug/L	N/A	<300	<300	300	8566717
RDL = Reportable Detection Limit Lab-Dup = Laboratory Initiated Duplicate N/A = Not Applicable						

Maxxam Job #: B715393
Report Date: 2017/03/09

GHD Limited
Client Project #: 56484-02
Your P.O. #: 73506861
Sampler Initials: JS

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		QQ4096	QQ4096		QQ4097		
Sampling Date		2017/02/28 12:50	2017/02/28 12:50		2017/02/28 13:20		
COC Number		516800-01-01	516800-01-01		516800-01-01		
	UNITS	WG-56484-280217-JS-09	WG-56484-280217-JS-09 Lab-Dup	QC Batch	WG-56484-280217-JS-10	RDL	QC Batch
ANIONS							
Nitrite (N)	mg/L	0.0081	N/A	8568787	<0.0050	0.0050	8568787
Calculated Parameters							
Filter and HNO3 Preservation	N/A	FIELD	N/A	ONSITE	FIELD	N/A	ONSITE
Nitrate (N)	mg/L	0.222	N/A	8566580	0.068	0.020	8566580
Misc. Inorganics							
Fluoride (F)	mg/L	0.027	N/A	8570835	0.030	0.010	8570835
Dissolved Hardness (CaCO3)	mg/L	54.8	N/A	8566638	128	0.50	8566638
Alkalinity (Total as CaCO3)	mg/L	50.8	50.8	8567689	111	0.50	8567676
Alkalinity (PP as CaCO3)	mg/L	<0.50	<0.50	8567689	<0.50	0.50	8567676
Bicarbonate (HCO3)	mg/L	62.0	62.0	8567689	135	0.50	8567676
Carbonate (CO3)	mg/L	<0.50	<0.50	8567689	<0.50	0.50	8567676
Hydroxide (OH)	mg/L	<0.50	<0.50	8567689	<0.50	0.50	8567676
Anions							
Dissolved Sulphate (SO4)	mg/L	2.61	N/A	8569327	3.01	0.50	8569327
Dissolved Chloride (Cl)	mg/L	9.5	N/A	8569325	6.9	0.50	8569325
Nutrients							
Orthophosphate (P)	mg/L	0.0626	N/A	8568021	0.0275	0.0050	8568021
Total Ammonia (N)	mg/L	0.045	N/A	8568150	0.035	0.0050	8568150
Nitrate plus Nitrite (N)	mg/L	0.230	N/A	8568785	0.068	0.020	8568785
Physical Properties							
Conductivity	uS/cm	137	136	8567698	234	1.0	8567683
pH	pH	7.83	7.79	8567699	7.91	N/A	8567685
Volatiles							
VPH (VHW6 to 10 - BTEX)	ug/L	<300	N/A	8566717	<300	300	8566717
RDL = Reportable Detection Limit Lab-Dup = Laboratory Initiated Duplicate N/A = Not Applicable							

Maxxam Job #: B715393
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GHD Limited
Client Project #: 56484-02
Your P.O. #: 73506861
Sampler Initials: JS

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		QQ4117			QQ4118		
Sampling Date		2017/02/28 14:00			2017/02/28 14:25		
COC Number		516800-05-01			516800-05-01		
	UNITS	WG-56484-280217-JS-11	RDL	QC Batch	WG-56484-280217-JS-12	RDL	QC Batch
ANIONS							
Nitrite (N)	mg/L	<0.0050	0.0050	8568787	<0.0050	0.0050	8568787
Calculated Parameters							
Filter and HNO3 Preservation	N/A	FIELD	N/A	ONSITE	FIELD	N/A	ONSITE
Nitrate (N)	mg/L	<0.020	0.020	8566580	<0.020	0.020	8566580
Misc. Inorganics							
Fluoride (F)	mg/L	0.030	0.010	8570835	0.021	0.010	8570835
Dissolved Hardness (CaCO3)	mg/L	247	0.50	8566638	225	0.50	8566638
Alkalinity (Total as CaCO3)	mg/L	324	0.50	8567689	289	0.50	8567676
Alkalinity (PP as CaCO3)	mg/L	<0.50	0.50	8567689	<0.50	0.50	8567676
Bicarbonate (HCO3)	mg/L	395	0.50	8567689	353	0.50	8567676
Carbonate (CO3)	mg/L	<0.50	0.50	8567689	<0.50	0.50	8567676
Hydroxide (OH)	mg/L	<0.50	0.50	8567689	<0.50	0.50	8567676
Anions							
Dissolved Sulphate (SO4)	mg/L	<0.50	0.50	8569327	2.91	0.50	8569327
Dissolved Chloride (Cl)	mg/L	46	0.50	8569325	26	0.50	8569325
Nutrients							
Orthophosphate (P)	mg/L	0.0191	0.0050	8568021	0.0142	0.0050	8568021
Total Ammonia (N)	mg/L	17 (1)	0.50	8568150	1.8 (1)	0.050	8568150
Nitrate plus Nitrite (N)	mg/L	<0.020	0.020	8568785	<0.020	0.020	8568785
Physical Properties							
Conductivity	uS/cm	760	1.0	8567698	624	1.0	8567683
pH	pH	8.10	N/A	8567699	7.78	N/A	8567685
Volatiles							
VPH (VHW6 to 10 - BTEX)	ug/L	N/A	N/A	N/A	<300	300	8566717
RDL = Reportable Detection Limit N/A = Not Applicable (1) Detection limits raised due to dilution to bring analyte within the calibrated range.							

Maxxam Job #: B715393
Report Date: 2017/03/09

GHD Limited
Client Project #: 56484-02
Your P.O. #: 73506861
Sampler Initials: JS

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		QQ4119		QQ4120		
Sampling Date		2017/02/28 14:30		2017/02/28 16:30		
COC Number		516800-05-01		516800-05-01		
	UNITS	WG-56484-280217-JS-13	RDL	WG-56484-280217-JS-14	RDL	QC Batch
ANIONS						
Nitrite (N)	mg/L	<0.0050	0.0050	<0.0050	0.0050	8568787
Calculated Parameters						
Filter and HNO3 Preservation	N/A	FIELD	N/A	FIELD	N/A	ONSITE
Nitrate (N)	mg/L	<0.020	0.020	0.230	0.020	8566580
Misc. Inorganics						
Fluoride (F)	mg/L	0.022	0.010	0.020	0.010	8570835
Dissolved Hardness (CaCO3)	mg/L	220	0.50	160	0.50	8566638
Alkalinity (Total as CaCO3)	mg/L	294	0.50	158	0.50	8567676
Alkalinity (PP as CaCO3)	mg/L	<0.50	0.50	<0.50	0.50	8567676
Bicarbonate (HCO3)	mg/L	358	0.50	193	0.50	8567676
Carbonate (CO3)	mg/L	<0.50	0.50	<0.50	0.50	8567676
Hydroxide (OH)	mg/L	<0.50	0.50	<0.50	0.50	8567676
Anions						
Dissolved Sulphate (SO4)	mg/L	2.98	0.50	4.21	0.50	8569327
Dissolved Chloride (Cl)	mg/L	26	0.50	1.4	0.50	8569325
Nutrients						
Orthophosphate (P)	mg/L	0.0141	0.0050	0.0289	0.0050	8568021
Total Ammonia (N)	mg/L	1.6 (1)	0.050	0.024	0.0050	8568150
Nitrate plus Nitrite (N)	mg/L	<0.020	0.020	0.230	0.020	8568785
Physical Properties						
Conductivity	uS/cm	626	1.0	305	1.0	8567683
pH	pH	7.80	N/A	8.14	N/A	8567685
Volatiles						
VPH (VHW6 to 10 - BTEX)	ug/L	<300	300	N/A	N/A	8566717
RDL = Reportable Detection Limit N/A = Not Applicable (1) Detection limits raised due to dilution to bring analyte within the calibrated range.						

Maxxam Job #: B715393
Report Date: 2017/03/09

GHD Limited
Client Project #: 56484-02
Your P.O. #: 73506861
Sampler Initials: JS

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		QQ4121	QQ4121	QQ4122		
Sampling Date		2017/02/28 16:40	2017/02/28 16:40	2017/02/28 16:50		
COC Number		516800-05-01	516800-05-01	516800-05-01		
	UNITS	WG-56484-280217-JS-15	WG-56484-280217-JS-15 Lab-Dup	WG-56484-280217-JS-16	RDL	QC Batch
ANIONS						
Nitrite (N)	mg/L	<0.0050	<0.0050	<0.0050	0.0050	8568787
Calculated Parameters						
Filter and HNO3 Preservation	N/A	FIELD	N/A	FIELD	N/A	ONSITE
Nitrate (N)	mg/L	<0.020	N/A	0.053	0.020	8566580
Misc. Inorganics						
Fluoride (F)	mg/L	0.014	N/A	0.026	0.010	8570835
Dissolved Hardness (CaCO3)	mg/L	<0.50	N/A	40.7	0.50	8566638
Alkalinity (Total as CaCO3)	mg/L	0.82	N/A	39.8	0.50	8567676
Alkalinity (PP as CaCO3)	mg/L	<0.50	N/A	<0.50	0.50	8567676
Bicarbonate (HCO3)	mg/L	1.00	N/A	48.5	0.50	8567676
Carbonate (CO3)	mg/L	<0.50	N/A	<0.50	0.50	8567676
Hydroxide (OH)	mg/L	<0.50	N/A	<0.50	0.50	8567676
Anions						
Dissolved Sulphate (SO4)	mg/L	<0.50	N/A	3.12	0.50	8569327
Dissolved Chloride (Cl)	mg/L	<0.50	N/A	0.99	0.50	8569325
Nutrients						
Orthophosphate (P)	mg/L	<0.0050	N/A	0.0142	0.0050	8568021
Total Ammonia (N)	mg/L	0.063	N/A	0.053	0.0050	8568147
Nitrate plus Nitrite (N)	mg/L	<0.020	<0.020	0.053	0.020	8568785
Physical Properties						
Conductivity	uS/cm	<1.0	N/A	85.6	1.0	8567683
pH	pH	5.93	N/A	7.67	N/A	8567685
RDL = Reportable Detection Limit Lab-Dup = Laboratory Initiated Duplicate N/A = Not Applicable						

Maxxam Job #: B715393
Report Date: 2017/03/09

GHD Limited
Client Project #: 56484-02
Your P.O. #: 73506861
Sampler Initials: JS

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		QQ4122	QQ4123		QQ4124		
Sampling Date		2017/02/28 16:50	2017/03/01 09:00		2017/03/01 10:30		
COC Number		516800-05-01	516800-05-01		516800-05-01		
	UNITS	WG-56484-280217-JS-16 Lab-Dup	WG-56484-010317-JS-17	QC Batch	WG-56484-010317-JS-18	RDL	QC Batch

ANIONS							
Nitrite (N)	mg/L	N/A	<0.0050	8568787	<0.0050	0.0050	8568783
Calculated Parameters							
Filter and HNO3 Preservation	N/A	N/A	FIELD	ONSITE	FIELD	N/A	ONSITE
Nitrate (N)	mg/L	N/A	0.118	8566580	0.217	0.020	8566580
Misc. Inorganics							
Fluoride (F)	mg/L	N/A	0.023	8570835	0.025	0.010	8570835
Dissolved Hardness (CaCO3)	mg/L	N/A	51.8	8566638	104	0.50	8566638
Alkalinity (Total as CaCO3)	mg/L	40.3	49.3	8567676	98.4	0.50	8567676
Alkalinity (PP as CaCO3)	mg/L	<0.50	<0.50	8567676	<0.50	0.50	8567676
Bicarbonate (HCO3)	mg/L	49.1	60.1	8567676	120	0.50	8567676
Carbonate (CO3)	mg/L	<0.50	<0.50	8567676	<0.50	0.50	8567676
Hydroxide (OH)	mg/L	<0.50	<0.50	8567676	<0.50	0.50	8567676
Anions							
Dissolved Sulphate (SO4)	mg/L	3.00	3.41	8569327	4.79	0.50	8569327
Dissolved Chloride (Cl)	mg/L	0.98	1.1	8569325	2.0	0.50	8569325
Nutrients							
Orthophosphate (P)	mg/L	N/A	0.0071	8568021	0.0165	0.0050	8568021
Total Ammonia (N)	mg/L	N/A	0.024	8568147	0.022	0.0050	8568150
Nitrate plus Nitrite (N)	mg/L	N/A	0.118	8568785	0.217	0.020	8568782
Physical Properties							
Conductivity	uS/cm	84.5	104	8567683	200	1.0	8567683
pH	pH	7.66	7.68	8567685	7.86	N/A	8567685

RDL = Reportable Detection Limit

Lab-Dup = Laboratory Initiated Duplicate

N/A = Not Applicable

Maxxam Job #: B715393
Report Date: 2017/03/09

GHD Limited
Client Project #: 56484-02
Your P.O. #: 73506861
Sampler Initials: JS

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		QQ4125	QQ4125		
Sampling Date		2017/03/01 12:00	2017/03/01 12:00		
COC Number		516800-05-01	516800-05-01		
	UNITS	WG-56484-010317-JS-19	WG-56484-010317-JS-19 Lab-Dup	RDL	QC Batch
ANIONS					
Nitrite (N)	mg/L	<0.0050	N/A	0.0050	8568787
Calculated Parameters					
Filter and HNO3 Preservation	N/A	FIELD	N/A	N/A	ONSITE
Nitrate (N)	mg/L	0.055	N/A	0.020	8566580
Misc. Inorganics					
Fluoride (F)	mg/L	0.032	N/A	0.010	8571200
Dissolved Hardness (CaCO3)	mg/L	107	N/A	0.50	8566638
Alkalinity (Total as CaCO3)	mg/L	109	N/A	0.50	8567689
Alkalinity (PP as CaCO3)	mg/L	<0.50	N/A	0.50	8567689
Bicarbonate (HCO3)	mg/L	133	N/A	0.50	8567689
Carbonate (CO3)	mg/L	<0.50	N/A	0.50	8567689
Hydroxide (OH)	mg/L	<0.50	N/A	0.50	8567689
Anions					
Dissolved Sulphate (SO4)	mg/L	3.30	N/A	0.50	8569327
Dissolved Chloride (Cl)	mg/L	5.7	N/A	0.50	8569325
Nutrients					
Orthophosphate (P)	mg/L	0.0075	N/A	0.0050	8568021
Total Ammonia (N)	mg/L	0.042	0.043	0.0050	8568150
Nitrate plus Nitrite (N)	mg/L	0.055	N/A	0.020	8568785
Physical Properties					
Conductivity	uS/cm	229	N/A	1.0	8567698
pH	pH	8.17	N/A	N/A	8567699
RDL = Reportable Detection Limit Lab-Dup = Laboratory Initiated Duplicate N/A = Not Applicable					

Maxxam Job #: B715393
Report Date: 2017/03/09

GHD Limited
Client Project #: 56484-02
Your P.O. #: 73506861
Sampler Initials: JS

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		QQ4126	QQ4127		
Sampling Date		2017/03/01 13:00	2017/03/01		
COC Number		516800-05-01	516800-05-01		
	UNITS	WG-56484-010317-JS-20	TRIP BLANK	RDL	QC Batch
ANIONS					
Nitrite (N)	mg/L	0.0109	N/A	0.0050	8568787
Calculated Parameters					
Filter and HNO3 Preservation	N/A	FIELD	N/A	N/A	ONSITE
Nitrate (N)	mg/L	0.189	N/A	0.020	8566580
Misc. Inorganics					
Fluoride (F)	mg/L	0.022	N/A	0.010	8570835
Dissolved Hardness (CaCO3)	mg/L	218	N/A	0.50	8566638
Alkalinity (Total as CaCO3)	mg/L	239	N/A	0.50	8567689
Alkalinity (PP as CaCO3)	mg/L	<0.50	N/A	0.50	8567689
Bicarbonate (HCO3)	mg/L	292	N/A	0.50	8567689
Carbonate (CO3)	mg/L	<0.50	N/A	0.50	8567689
Hydroxide (OH)	mg/L	<0.50	N/A	0.50	8567689
Anions					
Dissolved Sulphate (SO4)	mg/L	4.90	N/A	0.50	8569327
Dissolved Chloride (Cl)	mg/L	25	N/A	0.50	8569325
Nutrients					
Orthophosphate (P)	mg/L	<0.0050	N/A	0.0050	8568021
Total Ammonia (N)	mg/L	3.4 (1)	N/A	0.050	8568147
Nitrate plus Nitrite (N)	mg/L	0.199	N/A	0.020	8568785
Physical Properties					
Conductivity	uS/cm	536	N/A	1.0	8567698
pH	pH	8.19	N/A	N/A	8567699
Volatiles					
VPH (VHW6 to 10 - BTEX)	ug/L	N/A	<300	300	8566717
RDL = Reportable Detection Limit N/A = Not Applicable (1) Detection limits raised due to dilution to bring analyte within the calibrated range.					

Maxxam Job #: B715393
Report Date: 2017/03/09

GHD Limited
Client Project #: 56484-02
Your P.O. #: 73506861
Sampler Initials: JS

MERCURY BY COLD VAPOR (WATER)

Maxxam ID		QQ4088	QQ4089	QQ4090		
Sampling Date		2017/02/28 07:20	2017/02/28 08:10	2017/02/28 08:20		
COC Number		516800-01-01	516800-01-01	516800-01-01		
	UNITS	WG-56484-280217-JS-01	WG-56484-280217-JS-02	WG-56484-280217-JS-03	RDL	QC Batch

Elements						
Dissolved Mercury (Hg)	ug/L	<0.010	<0.010	<0.010	0.010	8567724
RDL = Reportable Detection Limit						

Maxxam ID		QQ4091	QQ4092	QQ4093		
Sampling Date		2017/02/28 09:00	2017/02/28 10:40	2017/02/28 11:30		
COC Number		516800-01-01	516800-01-01	516800-01-01		
	UNITS	WG-56484-280217-JS-04	WG-56484-280217-JS-05	WG-56484-280217-JS-06	RDL	QC Batch

Elements						
Dissolved Mercury (Hg)	ug/L	<0.010	<0.010	<0.010	0.010	8567724
RDL = Reportable Detection Limit						

Maxxam ID		QQ4094	QQ4095	QQ4096		
Sampling Date		2017/02/28 12:20	2017/02/28 12:45	2017/02/28 12:50		
COC Number		516800-01-01	516800-01-01	516800-01-01		
	UNITS	WG-56484-280217-JS-07	WG-56484-280217-JS-08	WG-56484-280217-JS-09	RDL	QC Batch

Elements						
Dissolved Mercury (Hg)	ug/L	<0.010	<0.010	<0.010	0.010	8567724
RDL = Reportable Detection Limit						

Maxxam ID		QQ4097	QQ4117	QQ4118		
Sampling Date		2017/02/28 13:20	2017/02/28 14:00	2017/02/28 14:25		
COC Number		516800-01-01	516800-05-01	516800-05-01		
	UNITS	WG-56484-280217-JS-10	WG-56484-280217-JS-11	WG-56484-280217-JS-12	RDL	QC Batch

Elements						
Dissolved Mercury (Hg)	ug/L	<0.010	<0.010	<0.010	0.010	8567724
RDL = Reportable Detection Limit						

Maxxam ID		QQ4119		QQ4120	QQ4121		
Sampling Date		2017/02/28 14:30		2017/02/28 16:30	2017/02/28 16:40		
COC Number		516800-05-01		516800-05-01	516800-05-01		
	UNITS	WG-56484-280217-JS-13	QC Batch	WG-56484-280217-JS-14	WG-56484-280217-JS-15	RDL	QC Batch

Elements							
Dissolved Mercury (Hg)	ug/L	<0.010	8567724	<0.010	<0.010	0.010	8567839
RDL = Reportable Detection Limit							

Maxxam Job #: B715393
Report Date: 2017/03/09

GHD Limited
Client Project #: 56484-02
Your P.O. #: 73506861
Sampler Initials: JS

MERCURY BY COLD VAPOR (WATER)

Maxxam ID		QQ4122	QQ4123	QQ4124		
Sampling Date		2017/02/28 16:50	2017/03/01 09:00	2017/03/01 10:30		
COC Number		516800-05-01	516800-05-01	516800-05-01		
	UNITS	WG-56484-280217-JS-16	WG-56484-010317-JS-17	WG-56484-010317-JS-18	RDL	QC Batch

Elements						
Dissolved Mercury (Hg)	ug/L	<0.010	<0.010	<0.010	0.010	8567839
RDL = Reportable Detection Limit						

Maxxam ID		QQ4125	QQ4126		
Sampling Date		2017/03/01 12:00	2017/03/01 13:00		
COC Number		516800-05-01	516800-05-01		
	UNITS	WG-56484-010317-JS-19	WG-56484-010317-JS-20	RDL	QC Batch

Elements					
Dissolved Mercury (Hg)	ug/L	<0.010	<0.010	0.010	8567839
RDL = Reportable Detection Limit					

Maxxam Job #: B715393
Report Date: 2017/03/09

GHD Limited
Client Project #: 56484-02
Your P.O. #: 73506861
Sampler Initials: JS

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		QQ4088	QQ4088	QQ4089		
Sampling Date		2017/02/28 07:20	2017/02/28 07:20	2017/02/28 08:10		
COC Number		516800-01-01	516800-01-01	516800-01-01		
	UNITS	WG-56484-280217-JS-01	WG-56484-280217-JS-01 Lab-Dup	WG-56484-280217-JS-02	RDL	QC Batch
Dissolved Metals by ICPMS						
Dissolved Aluminum (Al)	ug/L	6.2	5.9	<3.0	3.0	8567659
Dissolved Antimony (Sb)	ug/L	<0.50	<0.50	<0.50	0.50	8567659
Dissolved Arsenic (As)	ug/L	0.20	0.19	0.16	0.10	8567659
Dissolved Barium (Ba)	ug/L	4.2	4.1	13.4	1.0	8567659
Dissolved Beryllium (Be)	ug/L	<0.10	<0.10	<0.10	0.10	8567659
Dissolved Bismuth (Bi)	ug/L	<1.0	<1.0	<1.0	1.0	8567659
Dissolved Boron (B)	ug/L	<50	<50	288	50	8567659
Dissolved Cadmium (Cd)	ug/L	<0.010	<0.010	0.029	0.010	8567659
Dissolved Chromium (Cr)	ug/L	<1.0	<1.0	<1.0	1.0	8567659
Dissolved Cobalt (Co)	ug/L	<0.20	<0.20	0.35	0.20	8567659
Dissolved Copper (Cu)	ug/L	<0.20	<0.20	2.18	0.20	8567659
Dissolved Iron (Fe)	ug/L	<5.0 (1)	<5.0	<5.0	5.0	8567659
Dissolved Lead (Pb)	ug/L	<0.20	<0.20	<0.20	0.20	8567659
Dissolved Lithium (Li)	ug/L	<2.0	<2.0	<2.0	2.0	8567659
Dissolved Manganese (Mn)	ug/L	<1.0	<1.0	51.6	1.0	8567659
Dissolved Molybdenum (Mo)	ug/L	<1.0	<1.0	<1.0	1.0	8567659
Dissolved Nickel (Ni)	ug/L	<1.0	<1.0	1.1	1.0	8567659
Dissolved Selenium (Se)	ug/L	0.11	0.12	<0.10	0.10	8567659
Dissolved Silicon (Si)	ug/L	4450	4340	12000	100	8567659
Dissolved Silver (Ag)	ug/L	<0.020	<0.020	<0.020	0.020	8567659
Dissolved Strontium (Sr)	ug/L	15.8	15.5	265	1.0	8567659
Dissolved Thallium (Tl)	ug/L	<0.010	<0.010	<0.010	0.010	8567659
Dissolved Tin (Sn)	ug/L	<5.0	<5.0	<5.0	5.0	8567659
Dissolved Titanium (Ti)	ug/L	<5.0	<5.0	<5.0	5.0	8567659
Dissolved Uranium (U)	ug/L	<0.10	<0.10	0.87	0.10	8567659
Dissolved Vanadium (V)	ug/L	<5.0	<5.0	<5.0	5.0	8567659
Dissolved Zinc (Zn)	ug/L	<5.0	<5.0	<5.0	5.0	8567659
Dissolved Zirconium (Zr)	ug/L	<0.50	<0.50	<0.50	0.50	8567659
Dissolved Calcium (Ca)	mg/L	10.6	N/A	102	0.050	8566639
RDL = Reportable Detection Limit						
Lab-Dup = Laboratory Initiated Duplicate						
N/A = Not Applicable						
(1) Matrix Spike outside acceptance criteria (10% of analytes failure allowed).						

Maxxam Job #: B715393
Report Date: 2017/03/09

GHD Limited
Client Project #: 56484-02
Your P.O. #: 73506861
Sampler Initials: JS

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		QQ4088	QQ4088	QQ4089		
Sampling Date		2017/02/28 07:20	2017/02/28 07:20	2017/02/28 08:10		
COC Number		516800-01-01	516800-01-01	516800-01-01		
	UNITS	WG-56484-280217-JS-01	WG-56484-280217-JS-01 Lab-Dup	WG-56484-280217-JS-02	RDL	QC Batch
Dissolved Magnesium (Mg)	mg/L	1.56	N/A	22.1	0.050	8566639
Dissolved Potassium (K)	mg/L	0.248	N/A	1.94	0.050	8566639
Dissolved Sodium (Na)	mg/L	1.30	N/A	16.0	0.050	8566639
Dissolved Sulphur (S)	mg/L	<3.0	N/A	5.5	3.0	8566639
RDL = Reportable Detection Limit Lab-Dup = Laboratory Initiated Duplicate N/A = Not Applicable						

Maxxam Job #: B715393
Report Date: 2017/03/09

GHD Limited
Client Project #: 56484-02
Your P.O. #: 73506861
Sampler Initials: JS

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		QQ4090	QQ4091	QQ4092		
Sampling Date		2017/02/28 08:20	2017/02/28 09:00	2017/02/28 10:40		
COC Number		516800-01-01	516800-01-01	516800-01-01		
	UNITS	WG-56484-280217-JS-03	WG-56484-280217-JS-04	WG-56484-280217-JS-05	RDL	QC Batch
Dissolved Metals by ICPMS						
Dissolved Aluminum (Al)	ug/L	<3.0	<3.0	3.4	3.0	8567659
Dissolved Antimony (Sb)	ug/L	<0.50	<0.50	<0.50	0.50	8567659
Dissolved Arsenic (As)	ug/L	<0.10	0.26	0.14	0.10	8567659
Dissolved Barium (Ba)	ug/L	6.5	5.1	5.6	1.0	8567659
Dissolved Beryllium (Be)	ug/L	<0.10	<0.10	<0.10	0.10	8567659
Dissolved Bismuth (Bi)	ug/L	<1.0	<1.0	<1.0	1.0	8567659
Dissolved Boron (B)	ug/L	<50	85	<50	50	8567659
Dissolved Cadmium (Cd)	ug/L	<0.010	<0.010	<0.010	0.010	8567659
Dissolved Chromium (Cr)	ug/L	1.1	1.7	2.3	1.0	8567659
Dissolved Cobalt (Co)	ug/L	<0.20	<0.20	<0.20	0.20	8567659
Dissolved Copper (Cu)	ug/L	<0.20	0.50	<0.20	0.20	8567659
Dissolved Iron (Fe)	ug/L	<5.0	<5.0	<5.0	5.0	8567659
Dissolved Lead (Pb)	ug/L	<0.20	<0.20	<0.20	0.20	8567659
Dissolved Lithium (Li)	ug/L	<2.0	<2.0	<2.0	2.0	8567659
Dissolved Manganese (Mn)	ug/L	<1.0	<1.0	<1.0	1.0	8567659
Dissolved Molybdenum (Mo)	ug/L	<1.0	<1.0	<1.0	1.0	8567659
Dissolved Nickel (Ni)	ug/L	<1.0	<1.0	<1.0	1.0	8567659
Dissolved Selenium (Se)	ug/L	<0.10	<0.10	0.14	0.10	8567659
Dissolved Silicon (Si)	ug/L	10300	7890	8040	100	8567659
Dissolved Silver (Ag)	ug/L	<0.020	<0.020	<0.020	0.020	8567659
Dissolved Strontium (Sr)	ug/L	182	110	59.2	1.0	8567659
Dissolved Thallium (Tl)	ug/L	<0.010	<0.010	<0.010	0.010	8567659
Dissolved Tin (Sn)	ug/L	<5.0	<5.0	<5.0	5.0	8567659
Dissolved Titanium (Ti)	ug/L	<5.0	<5.0	<5.0	5.0	8567659
Dissolved Uranium (U)	ug/L	0.21	0.39	0.14	0.10	8567659
Dissolved Vanadium (V)	ug/L	<5.0	6.2	<5.0	5.0	8567659
Dissolved Zinc (Zn)	ug/L	<5.0	<5.0	<5.0	5.0	8567659
Dissolved Zirconium (Zr)	ug/L	<0.50	<0.50	<0.50	0.50	8567659
Dissolved Calcium (Ca)	mg/L	77.8	52.1	27.3	0.050	8566639
Dissolved Magnesium (Mg)	mg/L	14.8	11.1	8.45	0.050	8566639
Dissolved Potassium (K)	mg/L	1.26	0.782	0.407	0.050	8566639
Dissolved Sodium (Na)	mg/L	5.90	6.03	3.93	0.050	8566639
RDL = Reportable Detection Limit						

Maxxam Job #: B715393
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GHD Limited
Client Project #: 56484-02
Your P.O. #: 73506861
Sampler Initials: JS

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		QQ4090	QQ4091	QQ4092		
Sampling Date		2017/02/28 08:20	2017/02/28 09:00	2017/02/28 10:40		
COC Number		516800-01-01	516800-01-01	516800-01-01		
	UNITS	WG-56484-280217-JS-03	WG-56484-280217-JS-04	WG-56484-280217-JS-05	RDL	QC Batch
Dissolved Sulphur (S)	mg/L	<3.0	4.6	<3.0	3.0	8566639
RDL = Reportable Detection Limit						

Maxxam Job #: B715393
Report Date: 2017/03/09

GHD Limited
Client Project #: 56484-02
Your P.O. #: 73506861
Sampler Initials: JS

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		QQ4093	QQ4094	QQ4095		
Sampling Date		2017/02/28 11:30	2017/02/28 12:20	2017/02/28 12:45		
COC Number		516800-01-01	516800-01-01	516800-01-01		
	UNITS	WG-56484-280217-JS-06	WG-56484-280217-JS-07	WG-56484-280217-JS-08	RDL	QC Batch
Dissolved Metals by ICPMS						
Dissolved Aluminum (Al)	ug/L	<3.0	<3.0	3.9	3.0	8567659
Dissolved Antimony (Sb)	ug/L	<0.50	<0.50	<0.50	0.50	8567659
Dissolved Arsenic (As)	ug/L	<0.10	0.21	1.75	0.10	8567659
Dissolved Barium (Ba)	ug/L	7.6	<1.0	1.6	1.0	8567659
Dissolved Beryllium (Be)	ug/L	<0.10	<0.10	<0.10	0.10	8567659
Dissolved Bismuth (Bi)	ug/L	<1.0	<1.0	<1.0	1.0	8567659
Dissolved Boron (B)	ug/L	<50	<50	<50	50	8567659
Dissolved Cadmium (Cd)	ug/L	<0.010	<0.010	<0.010	0.010	8567659
Dissolved Chromium (Cr)	ug/L	<1.0	<1.0	1.8	1.0	8567659
Dissolved Cobalt (Co)	ug/L	<0.20	<0.20	<0.20	0.20	8567659
Dissolved Copper (Cu)	ug/L	<0.20	<0.20	<0.20	0.20	8567659
Dissolved Iron (Fe)	ug/L	<5.0	<5.0	<5.0	5.0	8567659
Dissolved Lead (Pb)	ug/L	<0.20	<0.20	<0.20	0.20	8567659
Dissolved Lithium (Li)	ug/L	<2.0	<2.0	<2.0	2.0	8567659
Dissolved Manganese (Mn)	ug/L	<1.0	<1.0	<1.0	1.0	8567659
Dissolved Molybdenum (Mo)	ug/L	<1.0	<1.0	<1.0	1.0	8567659
Dissolved Nickel (Ni)	ug/L	<1.0	<1.0	<1.0	1.0	8567659
Dissolved Selenium (Se)	ug/L	0.19	0.15	0.24	0.10	8567659
Dissolved Silicon (Si)	ug/L	6720	4530	5640	100	8567659
Dissolved Silver (Ag)	ug/L	<0.020	<0.020	<0.020	0.020	8567659
Dissolved Strontium (Sr)	ug/L	149	25.2	29.8	1.0	8567659
Dissolved Thallium (Tl)	ug/L	<0.010	<0.010	<0.010	0.010	8567659
Dissolved Tin (Sn)	ug/L	<5.0	<5.0	<5.0	5.0	8567659
Dissolved Titanium (Ti)	ug/L	<5.0	<5.0	<5.0	5.0	8567659
Dissolved Uranium (U)	ug/L	0.14	<0.10	0.25	0.10	8567659
Dissolved Vanadium (V)	ug/L	<5.0	<5.0	15.4	5.0	8567659
Dissolved Zinc (Zn)	ug/L	<5.0	<5.0	<5.0	5.0	8567659
Dissolved Zirconium (Zr)	ug/L	<0.50	<0.50	<0.50	0.50	8567659
Dissolved Calcium (Ca)	mg/L	72.3	14.6	16.7	0.050	8566639
Dissolved Magnesium (Mg)	mg/L	8.54	2.43	3.02	0.050	8566639
Dissolved Potassium (K)	mg/L	0.785	0.245	0.991	0.050	8566639
Dissolved Sodium (Na)	mg/L	2.88	1.33	2.74	0.050	8566639
RDL = Reportable Detection Limit						

Maxxam Job #: B715393
Report Date: 2017/03/09

GHD Limited
Client Project #: 56484-02
Your P.O. #: 73506861
Sampler Initials: JS

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		QQ4093	QQ4094	QQ4095		
Sampling Date		2017/02/28 11:30	2017/02/28 12:20	2017/02/28 12:45		
COC Number		516800-01-01	516800-01-01	516800-01-01		
	UNITS	WG-56484-280217-JS-06	WG-56484-280217-JS-07	WG-56484-280217-JS-08	RDL	QC Batch
Dissolved Sulphur (S)	mg/L	<3.0	<3.0	<3.0	3.0	8566639
RDL = Reportable Detection Limit						

Maxxam Job #: B715393
Report Date: 2017/03/09

GHD Limited
Client Project #: 56484-02
Your P.O. #: 73506861
Sampler Initials: JS

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		QQ4096	QQ4097	QQ4117		
Sampling Date		2017/02/28 12:50	2017/02/28 13:20	2017/02/28 14:00		
COC Number		516800-01-01	516800-01-01	516800-05-01		
	UNITS	WG-56484-280217-JS-09	WG-56484-280217-JS-10	WG-56484-280217-JS-11	RDL	QC Batch
Dissolved Metals by ICPMS						
Dissolved Aluminum (Al)	ug/L	5.1	<3.0	<3.0	3.0	8567659
Dissolved Antimony (Sb)	ug/L	<0.50	<0.50	<0.50	0.50	8567659
Dissolved Arsenic (As)	ug/L	1.76	<0.10	2.94	0.10	8567659
Dissolved Barium (Ba)	ug/L	1.6	<1.0	26.3	1.0	8567659
Dissolved Beryllium (Be)	ug/L	<0.10	<0.10	<0.10	0.10	8567659
Dissolved Bismuth (Bi)	ug/L	<1.0	<1.0	<1.0	1.0	8567659
Dissolved Boron (B)	ug/L	<50	<50	429	50	8567659
Dissolved Cadmium (Cd)	ug/L	<0.010	0.022	<0.010	0.010	8567659
Dissolved Chromium (Cr)	ug/L	1.8	1.2	<1.0	1.0	8567659
Dissolved Cobalt (Co)	ug/L	<0.20	<0.20	0.78	0.20	8567659
Dissolved Copper (Cu)	ug/L	<0.20	<0.20	0.32	0.20	8567659
Dissolved Iron (Fe)	ug/L	<5.0	<5.0	2880	5.0	8567659
Dissolved Lead (Pb)	ug/L	<0.20	<0.20	<0.20	0.20	8567659
Dissolved Lithium (Li)	ug/L	<2.0	<2.0	<2.0	2.0	8567659
Dissolved Manganese (Mn)	ug/L	<1.0	<1.0	2120	1.0	8567659
Dissolved Molybdenum (Mo)	ug/L	<1.0	<1.0	<1.0	1.0	8567659
Dissolved Nickel (Ni)	ug/L	<1.0	<1.0	2.9	1.0	8567659
Dissolved Selenium (Se)	ug/L	0.26	0.21	<0.10	0.10	8567659
Dissolved Silicon (Si)	ug/L	5600	5400	15500	100	8567659
Dissolved Silver (Ag)	ug/L	<0.020	<0.020	<0.020	0.020	8567659
Dissolved Strontium (Sr)	ug/L	30.1	87.5	280	1.0	8567659
Dissolved Thallium (Tl)	ug/L	<0.010	<0.010	<0.010	0.010	8567659
Dissolved Tin (Sn)	ug/L	<5.0	<5.0	<5.0	5.0	8567659
Dissolved Titanium (Ti)	ug/L	<5.0	<5.0	<5.0	5.0	8567659
Dissolved Uranium (U)	ug/L	0.25	0.14	<0.10	0.10	8567659
Dissolved Vanadium (V)	ug/L	15.7	<5.0	<5.0	5.0	8567659
Dissolved Zinc (Zn)	ug/L	<5.0	<5.0	<5.0	5.0	8567659
Dissolved Zirconium (Zr)	ug/L	<0.50	<0.50	<0.50	0.50	8567659
Dissolved Calcium (Ca)	mg/L	16.8	40.6	76.0	0.050	8566639
Dissolved Magnesium (Mg)	mg/L	3.15	6.52	13.9	0.050	8566639
Dissolved Potassium (K)	mg/L	1.01	0.386	9.03	0.050	8566639
Dissolved Sodium (Na)	mg/L	2.96	3.51	37.3	0.050	8566639
RDL = Reportable Detection Limit						

Maxxam Job #: B715393
Report Date: 2017/03/09

GHD Limited
Client Project #: 56484-02
Your P.O. #: 73506861
Sampler Initials: JS

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		QQ4096	QQ4097	QQ4117		
Sampling Date		2017/02/28 12:50	2017/02/28 13:20	2017/02/28 14:00		
COC Number		516800-01-01	516800-01-01	516800-05-01		
	UNITS	WG-56484-280217-JS-09	WG-56484-280217-JS-10	WG-56484-280217-JS-11	RDL	QC Batch
Dissolved Sulphur (S)	mg/L	<3.0	<3.0	<3.0	3.0	8566639
RDL = Reportable Detection Limit						

Maxxam Job #: B715393
Report Date: 2017/03/09

GHD Limited
Client Project #: 56484-02
Your P.O. #: 73506861
Sampler Initials: JS

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		QQ4118	QQ4119	QQ4120		
Sampling Date		2017/02/28 14:25	2017/02/28 14:30	2017/02/28 16:30		
COC Number		516800-05-01	516800-05-01	516800-05-01		
	UNITS	WG-56484-280217-JS-12	WG-56484-280217-JS-13	WG-56484-280217-JS-14	RDL	QC Batch
Dissolved Metals by ICPMS						
Dissolved Aluminum (Al)	ug/L	4.6	4.0	4.7	3.0	8567659
Dissolved Antimony (Sb)	ug/L	<0.50	<0.50	<0.50	0.50	8567659
Dissolved Arsenic (As)	ug/L	3.58	3.60	2.03	0.10	8567659
Dissolved Barium (Ba)	ug/L	14.3	14.5	8.1	1.0	8567659
Dissolved Beryllium (Be)	ug/L	<0.10	<0.10	<0.10	0.10	8567659
Dissolved Bismuth (Bi)	ug/L	<1.0	<1.0	<1.0	1.0	8567659
Dissolved Boron (B)	ug/L	702	702	<50	50	8567659
Dissolved Cadmium (Cd)	ug/L	0.053	0.055	<0.010	0.010	8567659
Dissolved Chromium (Cr)	ug/L	<1.0	<1.0	<1.0	1.0	8567659
Dissolved Cobalt (Co)	ug/L	0.39	0.39	<0.20	0.20	8567659
Dissolved Copper (Cu)	ug/L	0.40	0.43	0.26	0.20	8567659
Dissolved Iron (Fe)	ug/L	750	744	<5.0	5.0	8567659
Dissolved Lead (Pb)	ug/L	<0.20	<0.20	<0.20	0.20	8567659
Dissolved Lithium (Li)	ug/L	<2.0	<2.0	<2.0	2.0	8567659
Dissolved Manganese (Mn)	ug/L	2170	2180	<1.0	1.0	8567659
Dissolved Molybdenum (Mo)	ug/L	<1.0	<1.0	<1.0	1.0	8567659
Dissolved Nickel (Ni)	ug/L	2.4	2.4	<1.0	1.0	8567659
Dissolved Selenium (Se)	ug/L	<0.10	<0.10	0.16	0.10	8567659
Dissolved Silicon (Si)	ug/L	11600	11100	5700	100	8567659
Dissolved Silver (Ag)	ug/L	<0.020	<0.020	<0.020	0.020	8567659
Dissolved Strontium (Sr)	ug/L	236	245	68.4	1.0	8567659
Dissolved Thallium (Tl)	ug/L	<0.010	<0.010	<0.010	0.010	8567659
Dissolved Tin (Sn)	ug/L	<5.0	<5.0	<5.0	5.0	8567659
Dissolved Titanium (Ti)	ug/L	<5.0	<5.0	<5.0	5.0	8567659
Dissolved Uranium (U)	ug/L	0.14	0.15	0.53	0.10	8567659
Dissolved Vanadium (V)	ug/L	<5.0	<5.0	18.2	5.0	8567659
Dissolved Zinc (Zn)	ug/L	<5.0	<5.0	<5.0	5.0	8567659
Dissolved Zirconium (Zr)	ug/L	<0.50	<0.50	<0.50	0.50	8567659
Dissolved Calcium (Ca)	mg/L	76.3	74.2	51.4	0.050	8566639
Dissolved Magnesium (Mg)	mg/L	8.33	8.30	7.79	0.050	8566639
Dissolved Potassium (K)	mg/L	3.80	3.78	1.54	0.050	8566639
Dissolved Sodium (Na)	mg/L	43.9	45.3	1.95	0.050	8566639
RDL = Reportable Detection Limit						

Maxxam Job #: B715393
Report Date: 2017/03/09

GHD Limited
Client Project #: 56484-02
Your P.O. #: 73506861
Sampler Initials: JS

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		QQ4118	QQ4119	QQ4120		
Sampling Date		2017/02/28 14:25	2017/02/28 14:30	2017/02/28 16:30		
COC Number		516800-05-01	516800-05-01	516800-05-01		
	UNITS	WG-56484-280217-JS-12	WG-56484-280217-JS-13	WG-56484-280217-JS-14	RDL	QC Batch
Dissolved Sulphur (S)	mg/L	<3.0	<3.0	<3.0	3.0	8566639
RDL = Reportable Detection Limit						

Maxxam Job #: B715393
Report Date: 2017/03/09

GHD Limited
Client Project #: 56484-02
Your P.O. #: 73506861
Sampler Initials: JS

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		QQ4121	QQ4122	QQ4123		
Sampling Date		2017/02/28 16:40	2017/02/28 16:50	2017/03/01 09:00		
COC Number		516800-05-01	516800-05-01	516800-05-01		
	UNITS	WG-56484-280217-JS-15	WG-56484-280217-JS-16	WG-56484-010317-JS-17	RDL	QC Batch
Dissolved Metals by ICPMS						
Dissolved Aluminum (Al)	ug/L	<3.0	6.9	6.7	3.0	8567659
Dissolved Antimony (Sb)	ug/L	<0.50	<0.50	<0.50	0.50	8567659
Dissolved Arsenic (As)	ug/L	<0.10	0.85	0.42	0.10	8567659
Dissolved Barium (Ba)	ug/L	<1.0	<1.0	<1.0	1.0	8567659
Dissolved Beryllium (Be)	ug/L	<0.10	<0.10	<0.10	0.10	8567659
Dissolved Bismuth (Bi)	ug/L	<1.0	<1.0	<1.0	1.0	8567659
Dissolved Boron (B)	ug/L	<50	<50	<50	50	8567659
Dissolved Cadmium (Cd)	ug/L	<0.010	<0.010	<0.010	0.010	8567659
Dissolved Chromium (Cr)	ug/L	<1.0	<1.0	<1.0	1.0	8567659
Dissolved Cobalt (Co)	ug/L	<0.20	<0.20	<0.20	0.20	8567659
Dissolved Copper (Cu)	ug/L	<0.20	1.97	<0.20	0.20	8567659
Dissolved Iron (Fe)	ug/L	<5.0	5.7	<5.0	5.0	8567659
Dissolved Lead (Pb)	ug/L	<0.20	<0.20	<0.20	0.20	8567659
Dissolved Lithium (Li)	ug/L	<2.0	<2.0	<2.0	2.0	8567659
Dissolved Manganese (Mn)	ug/L	<1.0	<1.0	<1.0	1.0	8567659
Dissolved Molybdenum (Mo)	ug/L	<1.0	<1.0	<1.0	1.0	8567659
Dissolved Nickel (Ni)	ug/L	<1.0	<1.0	<1.0	1.0	8567659
Dissolved Selenium (Se)	ug/L	<0.10	0.12	0.12	0.10	8567659
Dissolved Silicon (Si)	ug/L	<100	6010	4730	100	8567659
Dissolved Silver (Ag)	ug/L	<0.020	<0.020	<0.020	0.020	8567659
Dissolved Strontium (Sr)	ug/L	<1.0	19.1	26.8	1.0	8567659
Dissolved Thallium (Tl)	ug/L	<0.010	<0.010	<0.010	0.010	8567659
Dissolved Tin (Sn)	ug/L	<5.0	<5.0	<5.0	5.0	8567659
Dissolved Titanium (Ti)	ug/L	<5.0	<5.0	<5.0	5.0	8567659
Dissolved Uranium (U)	ug/L	<0.10	<0.10	<0.10	0.10	8567659
Dissolved Vanadium (V)	ug/L	<5.0	6.0	<5.0	5.0	8567659
Dissolved Zinc (Zn)	ug/L	<5.0	<5.0	<5.0	5.0	8567659
Dissolved Zirconium (Zr)	ug/L	<0.50	<0.50	<0.50	0.50	8567659
Dissolved Calcium (Ca)	mg/L	<0.050	13.3	17.9	0.050	8566639
Dissolved Magnesium (Mg)	mg/L	<0.050	1.85	1.75	0.050	8566639
Dissolved Potassium (K)	mg/L	<0.050	0.275	0.328	0.050	8566639
Dissolved Sodium (Na)	mg/L	<0.050	1.36	1.53	0.050	8566639
RDL = Reportable Detection Limit						

Maxxam Job #: B715393
Report Date: 2017/03/09

GHD Limited
Client Project #: 56484-02
Your P.O. #: 73506861
Sampler Initials: JS

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		QQ4121	QQ4122	QQ4123		
Sampling Date		2017/02/28 16:40	2017/02/28 16:50	2017/03/01 09:00		
COC Number		516800-05-01	516800-05-01	516800-05-01		
	UNITS	WG-56484-280217-JS-15	WG-56484-280217-JS-16	WG-56484-010317-JS-17	RDL	QC Batch
Dissolved Sulphur (S)	mg/L	<3.0	<3.0	<3.0	3.0	8566639
RDL = Reportable Detection Limit						

Maxxam Job #: B715393
Report Date: 2017/03/09

GHD Limited
Client Project #: 56484-02
Your P.O. #: 73506861
Sampler Initials: JS

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		QQ4124	QQ4125	QQ4126		
Sampling Date		2017/03/01 10:30	2017/03/01 12:00	2017/03/01 13:00		
COC Number		516800-05-01	516800-05-01	516800-05-01		
	UNITS	WG-56484-010317-JS-18	WG-56484-010317-JS-19	WG-56484-010317-JS-20	RDL	QC Batch
Dissolved Metals by ICPMS						
Dissolved Aluminum (Al)	ug/L	3.3	5.0	3.2	3.0	8567659
Dissolved Antimony (Sb)	ug/L	<0.50	<0.50	<0.50	0.50	8567659
Dissolved Arsenic (As)	ug/L	0.89	0.45	0.48	0.10	8567659
Dissolved Barium (Ba)	ug/L	1.9	1.6	10.2	1.0	8567659
Dissolved Beryllium (Be)	ug/L	<0.10	<0.10	<0.10	0.10	8567659
Dissolved Bismuth (Bi)	ug/L	<1.0	<1.0	<1.0	1.0	8567659
Dissolved Boron (B)	ug/L	<50	<50	246	50	8567659
Dissolved Cadmium (Cd)	ug/L	<0.010	<0.010	0.112	0.010	8567659
Dissolved Chromium (Cr)	ug/L	<1.0	<1.0	<1.0	1.0	8567659
Dissolved Cobalt (Co)	ug/L	<0.20	<0.20	0.36	0.20	8567659
Dissolved Copper (Cu)	ug/L	<0.20	1.21	1.22	0.20	8567659
Dissolved Iron (Fe)	ug/L	<5.0	<5.0	6.9	5.0	8567659
Dissolved Lead (Pb)	ug/L	<0.20	<0.20	<0.20	0.20	8567659
Dissolved Lithium (Li)	ug/L	<2.0	<2.0	<2.0	2.0	8567659
Dissolved Manganese (Mn)	ug/L	<1.0	<1.0	1940	1.0	8567659
Dissolved Molybdenum (Mo)	ug/L	<1.0	<1.0	<1.0	1.0	8567659
Dissolved Nickel (Ni)	ug/L	<1.0	<1.0	1.3	1.0	8567659
Dissolved Selenium (Se)	ug/L	0.12	<0.10	<0.10	0.10	8567659
Dissolved Silicon (Si)	ug/L	6480	4470	7200	100	8567659
Dissolved Silver (Ag)	ug/L	<0.020	<0.020	<0.020	0.020	8567659
Dissolved Strontium (Sr)	ug/L	52.3	59.8	214	1.0	8567659
Dissolved Thallium (Tl)	ug/L	<0.010	<0.010	<0.010	0.010	8567659
Dissolved Tin (Sn)	ug/L	<5.0	<5.0	<5.0	5.0	8567659
Dissolved Titanium (Ti)	ug/L	<5.0	<5.0	<5.0	5.0	8567659
Dissolved Uranium (U)	ug/L	<0.10	0.11	0.14	0.10	8567659
Dissolved Vanadium (V)	ug/L	6.0	<5.0	<5.0	5.0	8567659
Dissolved Zinc (Zn)	ug/L	<5.0	<5.0	<5.0	5.0	8567659
Dissolved Zirconium (Zr)	ug/L	<0.50	<0.50	<0.50	0.50	8567659
Dissolved Calcium (Ca)	mg/L	33.5	36.2	74.0	0.050	8566639
Dissolved Magnesium (Mg)	mg/L	4.85	4.04	8.09	0.050	8566639
Dissolved Potassium (K)	mg/L	0.727	0.549	3.46	0.050	8566639
Dissolved Sodium (Na)	mg/L	1.84	2.36	20.6	0.050	8566639
RDL = Reportable Detection Limit						

Maxxam Job #: B715393
Report Date: 2017/03/09

GHD Limited
Client Project #: 56484-02
Your P.O. #: 73506861
Sampler Initials: JS

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		QQ4124	QQ4125	QQ4126		
Sampling Date		2017/03/01 10:30	2017/03/01 12:00	2017/03/01 13:00		
COC Number		516800-05-01	516800-05-01	516800-05-01		
	UNITS	WG-56484-010317-JS-18	WG-56484-010317-JS-19	WG-56484-010317-JS-20	RDL	QC Batch
Dissolved Sulphur (S)	mg/L	<3.0	<3.0	<3.0	3.0	8566639
RDL = Reportable Detection Limit						

Maxxam Job #: B715393
Report Date: 2017/03/09

GHD Limited
Client Project #: 56484-02
Your P.O. #: 73506861
Sampler Initials: JS

VOLATILE ORGANICS BY GC-MS (WATER)

Maxxam ID		QQ4088	QQ4089	QQ4091		
Sampling Date		2017/02/28 07:20	2017/02/28 08:10	2017/02/28 09:00		
COC Number		516800-01-01	516800-01-01	516800-01-01		
	UNITS	WG-56484-280217-JS-01	WG-56484-280217-JS-02	WG-56484-280217-JS-04	RDL	QC Batch
Volatiles						
Chloromethane	ug/L	<1.0	<1.0	<1.0	1.0	8568125
Vinyl chloride	ug/L	<0.50	<0.50	<0.50	0.50	8568125
Chloroethane	ug/L	<1.0	<1.0	<1.0	1.0	8568125
Trichlorofluoromethane	ug/L	<4.0	<4.0	<4.0	4.0	8568125
1,1,2Trichloro-1,2,2Trifluoroethane	ug/L	<2.0	<2.0	<2.0	2.0	8568125
Dichlorodifluoromethane	ug/L	<2.0	<2.0	<2.0	2.0	8568125
1,1-dichloroethene	ug/L	<0.50	<0.50	<0.50	0.50	8568125
Dichloromethane	ug/L	<2.0	<2.0	<2.0	2.0	8568125
trans-1,2-dichloroethene	ug/L	<1.0	<1.0	<1.0	1.0	8568125
1,1-dichloroethane	ug/L	<0.50	<0.50	<0.50	0.50	8568125
cis-1,2-dichloroethene	ug/L	<1.0	<1.0	<1.0	1.0	8568125
Chloroform	ug/L	<1.0	<1.0	<1.0	1.0	8568125
1,1,1-trichloroethane	ug/L	<0.50	<0.50	<0.50	0.50	8568125
1,2-dichloroethane	ug/L	<0.50	<0.50	<0.50	0.50	8568125
Carbon tetrachloride	ug/L	<0.50	<0.50	<0.50	0.50	8568125
Benzene	ug/L	<0.40	<0.40	<0.40	0.40	8568125
Methyl-tert-butylether (MTBE)	ug/L	<4.0	<4.0	<4.0	4.0	8568125
1,2-dichloropropane	ug/L	<0.50	<0.50	<0.50	0.50	8568125
cis-1,3-dichloropropene	ug/L	<1.0	<1.0	<1.0	1.0	8568125
trans-1,3-dichloropropene	ug/L	<1.0	<1.0	<1.0	1.0	8568125
Bromomethane	ug/L	<1.0	<1.0	<1.0	1.0	8568125
1,1,2-trichloroethane	ug/L	<0.50	<0.50	<0.50	0.50	8568125
Trichloroethene	ug/L	<0.50	<0.50	<0.50	0.50	8568125
Chlorodibromomethane	ug/L	<1.0	<1.0	<1.0	1.0	8568125
1,2-dibromoethane	ug/L	<0.20	<0.20	<0.20	0.20	8568125
1,3-Butadiene	ug/L	<5.0	<5.0	<5.0	5.0	8568125
Tetrachloroethene	ug/L	<0.50	<0.50	<0.50	0.50	8568125
Bromodichloromethane	ug/L	<1.0	<1.0	<1.0	1.0	8568125
Toluene	ug/L	<0.40	<0.40	<0.40	0.40	8568125
Ethylbenzene	ug/L	<0.40	<0.40	<0.40	0.40	8568125
m & p-Xylene	ug/L	<0.40	<0.40	<0.40	0.40	8568125
Bromoform	ug/L	<1.0	<1.0	<1.0	1.0	8568125
RDL = Reportable Detection Limit						

Maxxam Job #: B715393
Report Date: 2017/03/09

GHD Limited
Client Project #: 56484-02
Your P.O. #: 73506861
Sampler Initials: JS

VOLATILE ORGANICS BY GC-MS (WATER)

Maxxam ID		QQ4088	QQ4089	QQ4091		
Sampling Date		2017/02/28 07:20	2017/02/28 08:10	2017/02/28 09:00		
COC Number		516800-01-01	516800-01-01	516800-01-01		
	UNITS	WG-56484-280217-JS-01	WG-56484-280217-JS-02	WG-56484-280217-JS-04	RDL	QC Batch
Styrene	ug/L	<0.50	<0.50	<0.50	0.50	8568125
o-Xylene	ug/L	<0.40	<0.40	<0.40	0.40	8568125
Xylenes (Total)	ug/L	<0.40	<0.40	<0.40	0.40	8568125
1,1,1,2-tetrachloroethane	ug/L	<0.50	<0.50	<0.50	0.50	8568125
1,1,2,2-tetrachloroethane	ug/L	<0.50	<0.50	<0.50	0.50	8568125
1,2-dichlorobenzene	ug/L	<0.50	<0.50	<0.50	0.50	8568125
1,3-dichlorobenzene	ug/L	<0.50	<0.50	<0.50	0.50	8568125
1,4-dichlorobenzene	ug/L	<0.50	<0.50	<0.50	0.50	8568125
Chlorobenzene	ug/L	<0.50	<0.50	<0.50	0.50	8568125
Dibromomethane	ug/L	<0.90	<0.90	<0.90	0.90	8568125
Bromobenzene	ug/L	<2.0	<2.0	<2.0	2.0	8568125
1,2,3-trichlorobenzene	ug/L	<2.0	<2.0	<2.0	2.0	8568125
1,2,4-trichlorobenzene	ug/L	<2.0	<2.0	<2.0	2.0	8568125
Hexachlorobutadiene	ug/L	<0.50	<0.50	<0.50	0.50	8568125
VH C6-C10	ug/L	<300	<300	<300	300	8568125
Surrogate Recovery (%)						
1,4-Difluorobenzene (sur.)	%	105	90	89	N/A	8568125
4-Bromofluorobenzene (sur.)	%	98	84	84	N/A	8568125
D4-1,2-Dichloroethane (sur.)	%	104	90	91	N/A	8568125
RDL = Reportable Detection Limit						
N/A = Not Applicable						

Maxxam Job #: B715393
Report Date: 2017/03/09

GHD Limited
Client Project #: 56484-02
Your P.O. #: 73506861
Sampler Initials: JS

VOLATILE ORGANICS BY GC-MS (WATER)

Maxxam ID		QQ4094		QQ4095	QQ4096		
Sampling Date		2017/02/28 12:20		2017/02/28 12:45	2017/02/28 12:50		
COC Number		516800-01-01		516800-01-01	516800-01-01		
	UNITS	WG-56484-280217-JS-07	QC Batch	WG-56484-280217-JS-08	WG-56484-280217-JS-09	RDL	QC Batch
Volatiles							
Chloromethane	ug/L	<1.0	8568145	<1.0	<1.0	1.0	8568125
Vinyl chloride	ug/L	<0.50	8568145	<0.50	<0.50	0.50	8568125
Chloroethane	ug/L	<1.0	8568145	<1.0	<1.0	1.0	8568125
Trichlorofluoromethane	ug/L	<4.0	8568145	<4.0	<4.0	4.0	8568125
1,1,2Trichloro-1,2,2Trifluoroethane	ug/L	<2.0	8568145	<2.0	<2.0	2.0	8568125
Dichlorodifluoromethane	ug/L	<2.0	8568145	<2.0	<2.0	2.0	8568125
1,1-dichloroethene	ug/L	<0.50	8568145	<0.50	<0.50	0.50	8568125
Dichloromethane	ug/L	<2.0	8568145	<2.0	<2.0	2.0	8568125
trans-1,2-dichloroethene	ug/L	<1.0	8568145	<1.0	<1.0	1.0	8568125
1,1-dichloroethane	ug/L	<0.50	8568145	<0.50	<0.50	0.50	8568125
cis-1,2-dichloroethene	ug/L	<1.0	8568145	<1.0	<1.0	1.0	8568125
Chloroform	ug/L	<1.0	8568145	<1.0	<1.0	1.0	8568125
1,1,1-trichloroethane	ug/L	<0.50	8568145	<0.50	<0.50	0.50	8568125
1,2-dichloroethane	ug/L	<0.50	8568145	<0.50	<0.50	0.50	8568125
Carbon tetrachloride	ug/L	<0.50	8568145	<0.50	<0.50	0.50	8568125
Benzene	ug/L	<0.40	8568145	<0.40	<0.40	0.40	8568125
Methyl-tert-butylether (MTBE)	ug/L	<4.0	8568145	<4.0	<4.0	4.0	8568125
1,2-dichloropropane	ug/L	<0.50	8568145	<0.50	<0.50	0.50	8568125
cis-1,3-dichloropropene	ug/L	<1.0	8568145	<1.0	<1.0	1.0	8568125
trans-1,3-dichloropropene	ug/L	<1.0	8568145	<1.0	<1.0	1.0	8568125
Bromomethane	ug/L	<1.0	8568145	<1.0	<1.0	1.0	8568125
1,1,2-trichloroethane	ug/L	<0.50	8568145	<0.50	<0.50	0.50	8568125
Trichloroethene	ug/L	<0.50	8568145	<0.50	<0.50	0.50	8568125
Chlorodibromomethane	ug/L	<1.0	8568145	<1.0	<1.0	1.0	8568125
1,2-dibromoethane	ug/L	<0.20	8568145	<0.20	<0.20	0.20	8568125
1,3-Butadiene	ug/L	<5.0	8568145	<5.0	<5.0	5.0	8568125
Tetrachloroethene	ug/L	<0.50	8568145	<0.50	<0.50	0.50	8568125
Bromodichloromethane	ug/L	<1.0	8568145	<1.0	<1.0	1.0	8568125
Toluene	ug/L	<0.40	8568145	<0.40	<0.40	0.40	8568125
Ethylbenzene	ug/L	<0.40	8568145	<0.40	<0.40	0.40	8568125
m & p-Xylene	ug/L	<0.40	8568145	<0.40	<0.40	0.40	8568125
Bromoform	ug/L	<1.0	8568145	<1.0	<1.0	1.0	8568125
RDL = Reportable Detection Limit							

Maxxam Job #: B715393
Report Date: 2017/03/09

GHD Limited
Client Project #: 56484-02
Your P.O. #: 73506861
Sampler Initials: JS

VOLATILE ORGANICS BY GC-MS (WATER)

Maxxam ID		QQ4094		QQ4095	QQ4096		
Sampling Date		2017/02/28 12:20		2017/02/28 12:45	2017/02/28 12:50		
COC Number		516800-01-01		516800-01-01	516800-01-01		
	UNITS	WG-56484-280217-JS-07	QC Batch	WG-56484-280217-JS-08	WG-56484-280217-JS-09	RDL	QC Batch
Styrene	ug/L	<0.50	8568145	<0.50	<0.50	0.50	8568125
o-Xylene	ug/L	<0.40	8568145	<0.40	<0.40	0.40	8568125
Xylenes (Total)	ug/L	<0.40	8568145	<0.40	<0.40	0.40	8568125
1,1,1,2-tetrachloroethane	ug/L	<0.50	8568145	<0.50	<0.50	0.50	8568125
1,1,2,2-tetrachloroethane	ug/L	<0.50	8568145	<0.50	<0.50	0.50	8568125
1,2-dichlorobenzene	ug/L	<0.50	8568145	<0.50	<0.50	0.50	8568125
1,3-dichlorobenzene	ug/L	<0.50	8568145	<0.50	<0.50	0.50	8568125
1,4-dichlorobenzene	ug/L	<0.50	8568145	<0.50	<0.50	0.50	8568125
Chlorobenzene	ug/L	<0.50	8568145	<0.50	<0.50	0.50	8568125
Dibromomethane	ug/L	<0.90	8568145	<0.90	<0.90	0.90	8568125
Bromobenzene	ug/L	<2.0	8568145	<2.0	<2.0	2.0	8568125
1,2,3-trichlorobenzene	ug/L	<2.0	8568145	<2.0	<2.0	2.0	8568125
1,2,4-trichlorobenzene	ug/L	<2.0	8568145	<2.0	<2.0	2.0	8568125
Hexachlorobutadiene	ug/L	<0.50	8568145	<0.50	<0.50	0.50	8568125
VH C6-C10	ug/L	<300	8568145	<300	<300	300	8568125
Surrogate Recovery (%)							
1,4-Difluorobenzene (sur.)	%	104	8568145	105	104	N/A	8568125
4-Bromofluorobenzene (sur.)	%	99	8568145	95	96	N/A	8568125
D4-1,2-Dichloroethane (sur.)	%	107	8568145	104	105	N/A	8568125
RDL = Reportable Detection Limit N/A = Not Applicable							

Maxxam Job #: B715393
Report Date: 2017/03/09

GHD Limited
Client Project #: 56484-02
Your P.O. #: 73506861
Sampler Initials: JS

VOLATILE ORGANICS BY GC-MS (WATER)

Maxxam ID		QQ4097	QQ4118	QQ4119		
Sampling Date		2017/02/28 13:20	2017/02/28 14:25	2017/02/28 14:30		
COC Number		516800-01-01	516800-05-01	516800-05-01		
	UNITS	WG-56484-280217-JS-10	WG-56484-280217-JS-12	WG-56484-280217-JS-13	RDL	QC Batch
Volatiles						
Chloromethane	ug/L	<1.0	<1.0	<1.0	1.0	8568125
Vinyl chloride	ug/L	<0.50	<0.50	<0.50	0.50	8568125
Chloroethane	ug/L	<1.0	<1.0	<1.0	1.0	8568125
Trichlorofluoromethane	ug/L	<4.0	<4.0	<4.0	4.0	8568125
1,1,2Trichloro-1,2,2Trifluoroethane	ug/L	<2.0	<2.0	<2.0	2.0	8568125
Dichlorodifluoromethane	ug/L	<2.0	<2.0	<2.0	2.0	8568125
1,1-dichloroethene	ug/L	<0.50	<0.50	<0.50	0.50	8568125
Dichloromethane	ug/L	2.2	<2.0	<2.0	2.0	8568125
trans-1,2-dichloroethene	ug/L	<1.0	<1.0	<1.0	1.0	8568125
1,1-dichloroethane	ug/L	<0.50	<0.50	<0.50	0.50	8568125
cis-1,2-dichloroethene	ug/L	<1.0	<1.0	<1.0	1.0	8568125
Chloroform	ug/L	<1.0	<1.0	<1.0	1.0	8568125
1,1,1-trichloroethane	ug/L	<0.50	<0.50	<0.50	0.50	8568125
1,2-dichloroethane	ug/L	<0.50	<0.50	<0.50	0.50	8568125
Carbon tetrachloride	ug/L	<0.50	<0.50	<0.50	0.50	8568125
Benzene	ug/L	<0.40	<0.40	<0.40	0.40	8568125
Methyl-tert-butylether (MTBE)	ug/L	<4.0	<4.0	<4.0	4.0	8568125
1,2-dichloropropane	ug/L	<0.50	<0.50	<0.50	0.50	8568125
cis-1,3-dichloropropene	ug/L	<1.0	<1.0	<1.0	1.0	8568125
trans-1,3-dichloropropene	ug/L	<1.0	<1.0	<1.0	1.0	8568125
Bromomethane	ug/L	<1.0	<1.0	<1.0	1.0	8568125
1,1,2-trichloroethane	ug/L	<0.50	<0.50	<0.50	0.50	8568125
Trichloroethene	ug/L	<0.50	<0.50	<0.50	0.50	8568125
Chlorodibromomethane	ug/L	<1.0	<1.0	<1.0	1.0	8568125
1,2-dibromoethane	ug/L	<0.20	<0.20	<0.20	0.20	8568125
1,3-Butadiene	ug/L	<5.0	<5.0	<5.0	5.0	8568125
Tetrachloroethene	ug/L	<0.50	<0.50	<0.50	0.50	8568125
Bromodichloromethane	ug/L	<1.0	<1.0	<1.0	1.0	8568125
Toluene	ug/L	<0.40	<0.40	<0.40	0.40	8568125
Ethylbenzene	ug/L	<0.40	<0.40	<0.40	0.40	8568125
m & p-Xylene	ug/L	<0.40	<0.40	<0.40	0.40	8568125
Bromoform	ug/L	<1.0	<1.0	<1.0	1.0	8568125
RDL = Reportable Detection Limit						

Maxxam Job #: B715393
Report Date: 2017/03/09

GHD Limited
Client Project #: 56484-02
Your P.O. #: 73506861
Sampler Initials: JS

VOLATILE ORGANICS BY GC-MS (WATER)

Maxxam ID		QQ4097	QQ4118	QQ4119		
Sampling Date		2017/02/28 13:20	2017/02/28 14:25	2017/02/28 14:30		
COC Number		516800-01-01	516800-05-01	516800-05-01		
	UNITS	WG-56484-280217-JS-10	WG-56484-280217-JS-12	WG-56484-280217-JS-13	RDL	QC Batch
Styrene	ug/L	<0.50	<0.50	<0.50	0.50	8568125
o-Xylene	ug/L	<0.40	<0.40	<0.40	0.40	8568125
Xylenes (Total)	ug/L	<0.40	<0.40	<0.40	0.40	8568125
1,1,1,2-tetrachloroethane	ug/L	<0.50	<0.50	<0.50	0.50	8568125
1,1,2,2-tetrachloroethane	ug/L	<0.50	<0.50	<0.50	0.50	8568125
1,2-dichlorobenzene	ug/L	<0.50	<0.50	<0.50	0.50	8568125
1,3-dichlorobenzene	ug/L	<0.50	<0.50	<0.50	0.50	8568125
1,4-dichlorobenzene	ug/L	<0.50	<0.50	<0.50	0.50	8568125
Chlorobenzene	ug/L	<0.50	1.3	1.3	0.50	8568125
Dibromomethane	ug/L	<0.90	<0.90	<0.90	0.90	8568125
Bromobenzene	ug/L	<2.0	<2.0	<2.0	2.0	8568125
1,2,3-trichlorobenzene	ug/L	<2.0	<2.0	<2.0	2.0	8568125
1,2,4-trichlorobenzene	ug/L	<2.0	<2.0	<2.0	2.0	8568125
Hexachlorobutadiene	ug/L	<0.50	<0.50	<0.50	0.50	8568125
VH C6-C10	ug/L	<300	<300	<300	300	8568125
Surrogate Recovery (%)						
1,4-Difluorobenzene (sur.)	%	105	105	104	N/A	8568125
4-Bromofluorobenzene (sur.)	%	99	99	98	N/A	8568125
D4-1,2-Dichloroethane (sur.)	%	106	106	105	N/A	8568125
RDL = Reportable Detection Limit						
N/A = Not Applicable						

Maxxam Job #: B715393
Report Date: 2017/03/09

GHD Limited
Client Project #: 56484-02
Your P.O. #: 73506861
Sampler Initials: JS

VOLATILE ORGANICS BY GC-MS (WATER)

Maxxam ID		QQ4127		
Sampling Date		2017/03/01		
COC Number		516800-05-01		
	UNITS	TRIP BLANK	RDL	QC Batch
Volatiles				
Chloromethane	ug/L	<1.0	1.0	8568125
Vinyl chloride	ug/L	<0.50	0.50	8568125
Chloroethane	ug/L	<1.0	1.0	8568125
Trichlorofluoromethane	ug/L	<4.0	4.0	8568125
1,1,2Trichloro-1,2,2Trifluoroethane	ug/L	<2.0	2.0	8568125
Dichlorodifluoromethane	ug/L	<2.0	2.0	8568125
1,1-dichloroethene	ug/L	<0.50	0.50	8568125
Dichloromethane	ug/L	<2.0	2.0	8568125
trans-1,2-dichloroethene	ug/L	<1.0	1.0	8568125
1,1-dichloroethane	ug/L	<0.50	0.50	8568125
cis-1,2-dichloroethene	ug/L	<1.0	1.0	8568125
Chloroform	ug/L	<1.0	1.0	8568125
1,1,1-trichloroethane	ug/L	<0.50	0.50	8568125
1,2-dichloroethane	ug/L	<0.50	0.50	8568125
Carbon tetrachloride	ug/L	<0.50	0.50	8568125
Benzene	ug/L	<0.40	0.40	8568125
Methyl-tert-butylether (MTBE)	ug/L	<4.0	4.0	8568125
1,2-dichloropropane	ug/L	<0.50	0.50	8568125
cis-1,3-dichloropropene	ug/L	<1.0	1.0	8568125
trans-1,3-dichloropropene	ug/L	<1.0	1.0	8568125
Bromomethane	ug/L	<1.0	1.0	8568125
1,1,2-trichloroethane	ug/L	<0.50	0.50	8568125
Trichloroethene	ug/L	<0.50	0.50	8568125
Chlorodibromomethane	ug/L	<1.0	1.0	8568125
1,2-dibromoethane	ug/L	<0.20	0.20	8568125
1,3-Butadiene	ug/L	<5.0	5.0	8568125
Tetrachloroethene	ug/L	<0.50	0.50	8568125
Bromodichloromethane	ug/L	<1.0	1.0	8568125
Toluene	ug/L	<0.40	0.40	8568125
Ethylbenzene	ug/L	<0.40	0.40	8568125
m & p-Xylene	ug/L	<0.40	0.40	8568125
Bromoform	ug/L	<1.0	1.0	8568125
RDL = Reportable Detection Limit				

Maxxam Job #: B715393
Report Date: 2017/03/09

GHD Limited
Client Project #: 56484-02
Your P.O. #: 73506861
Sampler Initials: JS

VOLATILE ORGANICS BY GC-MS (WATER)

Maxxam ID		QQ4127		
Sampling Date		2017/03/01		
COC Number		516800-05-01		
	UNITS	TRIP BLANK	RDL	QC Batch
Styrene	ug/L	<0.50	0.50	8568125
o-Xylene	ug/L	<0.40	0.40	8568125
Xylenes (Total)	ug/L	<0.40	0.40	8568125
1,1,1,2-tetrachloroethane	ug/L	<0.50	0.50	8568125
1,1,2,2-tetrachloroethane	ug/L	<0.50	0.50	8568125
1,2-dichlorobenzene	ug/L	<0.50	0.50	8568125
1,3-dichlorobenzene	ug/L	<0.50	0.50	8568125
1,4-dichlorobenzene	ug/L	<0.50	0.50	8568125
Chlorobenzene	ug/L	<0.50	0.50	8568125
Dibromomethane	ug/L	<0.90	0.90	8568125
Bromobenzene	ug/L	<2.0	2.0	8568125
1,2,3-trichlorobenzene	ug/L	<2.0	2.0	8568125
1,2,4-trichlorobenzene	ug/L	<2.0	2.0	8568125
Hexachlorobutadiene	ug/L	<0.50	0.50	8568125
VH C6-C10	ug/L	<300	300	8568125
Surrogate Recovery (%)				
1,4-Difluorobenzene (sur.)	%	105	N/A	8568125
4-Bromofluorobenzene (sur.)	%	98	N/A	8568125
D4-1,2-Dichloroethane (sur.)	%	104	N/A	8568125
RDL = Reportable Detection Limit				
N/A = Not Applicable				

Maxxam Job #: B715393
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GHD Limited
Client Project #: 56484-02
Your P.O. #: 73506861
Sampler Initials: JS

GENERAL COMMENTS

Results relate only to the items tested.

Maxxam Job #: B715393
Report Date: 2017/03/09

QUALITY ASSURANCE REPORT

GHD Limited
Client Project #: 56484-02
Your P.O. #: 73506861
Sampler Initials: JS

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
8568125	1,4-Difluorobenzene (sur.)	2017/03/03	90	70 - 130	104	70 - 130	103	%		
8568125	4-Bromofluorobenzene (sur.)	2017/03/03	92	70 - 130	107	70 - 130	92	%		
8568125	D4-1,2-Dichloroethane (sur.)	2017/03/03	88	70 - 130	101	70 - 130	96	%		
8568145	1,4-Difluorobenzene (sur.)	2017/03/07	102	70 - 130	102	70 - 130	102	%		
8568145	4-Bromofluorobenzene (sur.)	2017/03/07	104	70 - 130	107	70 - 130	102	%		
8568145	D4-1,2-Dichloroethane (sur.)	2017/03/07	106	70 - 130	104	70 - 130	102	%		
8567659	Dissolved Aluminum (Al)	2017/03/04	108 (1)	80 - 120	107	80 - 120	<3.0	ug/L	4.9 (3)	20
8567659	Dissolved Antimony (Sb)	2017/03/04	101 (1)	80 - 120	101	80 - 120	<0.50	ug/L	NC (3)	20
8567659	Dissolved Arsenic (As)	2017/03/04	100 (1)	80 - 120	100	80 - 120	<0.10	ug/L	6.6 (3)	20
8567659	Dissolved Barium (Ba)	2017/03/04	95 (1)	80 - 120	99	80 - 120	<1.0	ug/L	2.7 (3)	20
8567659	Dissolved Beryllium (Be)	2017/03/04	102 (1)	80 - 120	97	80 - 120	<0.10	ug/L	NC (3)	20
8567659	Dissolved Bismuth (Bi)	2017/03/04	99 (1)	80 - 120	100	80 - 120	<1.0	ug/L	NC (3)	20
8567659	Dissolved Boron (B)	2017/03/04	98 (1)	80 - 120	97	80 - 120	<50	ug/L	NC (3)	20
8567659	Dissolved Cadmium (Cd)	2017/03/04	102 (1)	80 - 120	99	80 - 120	<0.010	ug/L	NC (3)	20
8567659	Dissolved Chromium (Cr)	2017/03/04	98 (1)	80 - 120	101	80 - 120	<1.0	ug/L	NC (3)	20
8567659	Dissolved Cobalt (Co)	2017/03/04	96 (1)	80 - 120	100	80 - 120	<0.20	ug/L	NC (3)	20
8567659	Dissolved Copper (Cu)	2017/03/04	95 (1)	80 - 120	102	80 - 120	<0.20	ug/L	NC (3)	20
8567659	Dissolved Iron (Fe)	2017/03/04	121 (2,1)	80 - 120	109	80 - 120	<5.0	ug/L	NC (3)	20
8567659	Dissolved Lead (Pb)	2017/03/04	96 (1)	80 - 120	99	80 - 120	<0.20	ug/L	NC (3)	20
8567659	Dissolved Lithium (Li)	2017/03/04	93 (1)	80 - 120	95	80 - 120	<2.0	ug/L	NC (3)	20
8567659	Dissolved Manganese (Mn)	2017/03/04	95 (1)	80 - 120	100	80 - 120	<1.0	ug/L	NC (3)	20
8567659	Dissolved Molybdenum (Mo)	2017/03/04	103 (1)	80 - 120	101	80 - 120	<1.0	ug/L	NC (3)	20
8567659	Dissolved Nickel (Ni)	2017/03/04	95 (1)	80 - 120	101	80 - 120	<1.0	ug/L	NC (3)	20
8567659	Dissolved Selenium (Se)	2017/03/04	109 (1)	80 - 120	100	80 - 120	<0.10	ug/L	5.2 (3)	20
8567659	Dissolved Silicon (Si)	2017/03/04					<100	ug/L	2.7 (3)	20
8567659	Dissolved Silver (Ag)	2017/03/04	105 (1)	80 - 120	105	80 - 120	<0.020	ug/L	NC (3)	20
8567659	Dissolved Strontium (Sr)	2017/03/04	NC (1)	80 - 120	98	80 - 120	<1.0	ug/L	1.5 (3)	20
8567659	Dissolved Thallium (Tl)	2017/03/04	97 (1)	80 - 120	101	80 - 120	<0.010	ug/L	NC (3)	20
8567659	Dissolved Tin (Sn)	2017/03/04	101 (1)	80 - 120	102	80 - 120	<5.0	ug/L	NC (3)	20
8567659	Dissolved Titanium (Ti)	2017/03/04	99 (1)	80 - 120	98	80 - 120	<5.0	ug/L	NC (3)	20

Maxxam Job #: B715393
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QUALITY ASSURANCE REPORT(CONT'D)

GHD Limited
Client Project #: 56484-02
Your P.O. #: 73506861
Sampler Initials: JS

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
8567659	Dissolved Uranium (U)	2017/03/04	94 (1)	80 - 120	96	80 - 120	<0.10	ug/L	NC (3)	20
8567659	Dissolved Vanadium (V)	2017/03/04	95 (1)	80 - 120	96	80 - 120	<5.0	ug/L	NC (3)	20
8567659	Dissolved Zinc (Zn)	2017/03/04	101 (1)	80 - 120	100	80 - 120	<5.0	ug/L	NC (3)	20
8567659	Dissolved Zirconium (Zr)	2017/03/04					<0.50	ug/L	NC (3)	20
8567676	Alkalinity (PP as CaCO ₃)	2017/03/03					<0.50	mg/L	NC (5)	20
8567676	Alkalinity (Total as CaCO ₃)	2017/03/03	97 (4)	80 - 120	98	80 - 120	<0.50	mg/L	1.2 (5)	20
8567676	Bicarbonate (HCO ₃)	2017/03/03					<0.50	mg/L	1.2 (5)	20
8567676	Carbonate (CO ₃)	2017/03/03					<0.50	mg/L	NC (5)	20
8567676	Hydroxide (OH)	2017/03/03					<0.50	mg/L	NC (5)	20
8567683	Conductivity	2017/03/03			100	80 - 120	<1.0	uS/cm	1.3 (5)	20
8567685	pH	2017/03/03			102	97 - 103			0.13 (5)	N/A
8567689	Alkalinity (PP as CaCO ₃)	2017/03/04					<0.50	mg/L	NC (7)	20
8567689	Alkalinity (Total as CaCO ₃)	2017/03/04	NC (6)	80 - 120	100	80 - 120	<0.50	mg/L	0.020 (7)	20
8567689	Bicarbonate (HCO ₃)	2017/03/04					<0.50	mg/L	0.020 (7)	20
8567689	Carbonate (CO ₃)	2017/03/04					<0.50	mg/L	NC (7)	20
8567689	Hydroxide (OH)	2017/03/04					<0.50	mg/L	NC (7)	20
8567698	Conductivity	2017/03/04			101	80 - 120	<1.0	uS/cm	0.79 (7)	20
8567699	pH	2017/03/04			101	97 - 103			0.51 (7)	N/A
8567724	Dissolved Mercury (Hg)	2017/03/03	95	80 - 120	97	80 - 120	<0.010	ug/L	NC (8)	20
8567839	Dissolved Mercury (Hg)	2017/03/03	96	80 - 120	93	80 - 120	<0.010	ug/L	NC (8)	20
8568021	Orthophosphate (P)	2017/03/03	95 (9)	80 - 120	96	80 - 120	<0.0050	mg/L	NC (10)	20
8568125	1,1,1,2-tetrachloroethane	2017/03/03	88	70 - 130	102	70 - 130	<0.50	ug/L		
8568125	1,1,1-trichloroethane	2017/03/03	88	70 - 130	101	70 - 130	<0.50	ug/L		
8568125	1,1,2,2-tetrachloroethane	2017/03/03	83	70 - 130	91	70 - 130	<0.50	ug/L		
8568125	1,1,2Trichloro-1,2,2Trifluoroethane	2017/03/03					<2.0	ug/L		
8568125	1,1,2-trichloroethane	2017/03/03	88	70 - 130	102	70 - 130	<0.50	ug/L		
8568125	1,1-dichloroethane	2017/03/03	88	70 - 130	101	70 - 130	<0.50	ug/L		
8568125	1,1-dichloroethene	2017/03/03	87	70 - 130	99	70 - 130	<0.50	ug/L		
8568125	1,2,3-trichlorobenzene	2017/03/03	88	70 - 130	97	70 - 130	<2.0	ug/L		
8568125	1,2,4-trichlorobenzene	2017/03/03	93	70 - 130	102	70 - 130	<2.0	ug/L		

Maxxam Job #: B715393
Report Date: 2017/03/09

QUALITY ASSURANCE REPORT(CONT'D)

GHD Limited
Client Project #: 56484-02
Your P.O. #: 73506861
Sampler Initials: JS

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
8568125	1,2-dibromoethane	2017/03/03	88	70 - 130	102	70 - 130	<0.20	ug/L		
8568125	1,2-dichlorobenzene	2017/03/03	91	70 - 130	96	70 - 130	<0.50	ug/L		
8568125	1,2-dichloroethane	2017/03/03	86	70 - 130	93	70 - 130	<0.50	ug/L		
8568125	1,2-dichloropropane	2017/03/03	88	70 - 130	107	70 - 130	<0.50	ug/L		
8568125	1,3-Butadiene	2017/03/03					<5.0	ug/L		
8568125	1,3-dichlorobenzene	2017/03/03	98	70 - 130	100	70 - 130	<0.50	ug/L		
8568125	1,4-dichlorobenzene	2017/03/03	94	70 - 130	95	70 - 130	<0.50	ug/L		
8568125	Benzene	2017/03/03	86	70 - 130	100	70 - 130	<0.40	ug/L		
8568125	Bromobenzene	2017/03/03	97	70 - 130	98	70 - 130	<2.0	ug/L		
8568125	Bromodichloromethane	2017/03/03	85	70 - 130	100	70 - 130	<1.0	ug/L	11 (8)	30
8568125	Bromoform	2017/03/03	94	70 - 130	98	70 - 130	<1.0	ug/L	NC (8)	30
8568125	Bromomethane	2017/03/03	94	60 - 140	98	60 - 140	<1.0	ug/L		
8568125	Carbon tetrachloride	2017/03/03	79	70 - 130	110	70 - 130	<0.50	ug/L		
8568125	Chlorobenzene	2017/03/03	75	70 - 130	89	70 - 130	<0.50	ug/L		
8568125	Chlorodibromomethane	2017/03/03	87	70 - 130	101	70 - 130	<1.0	ug/L	NC (8)	30
8568125	Chloroethane	2017/03/03	93	60 - 140	105	60 - 140	<1.0	ug/L		
8568125	Chloroform	2017/03/03	NC	70 - 130	100	70 - 130	<1.0	ug/L	10 (8)	30
8568125	Chloromethane	2017/03/03	86	60 - 140	98	60 - 140	<1.0	ug/L		
8568125	cis-1,2-dichloroethene	2017/03/03	86	70 - 130	99	70 - 130	<1.0	ug/L		
8568125	cis-1,3-dichloropropene	2017/03/03	82	70 - 130	96	70 - 130	<1.0	ug/L		
8568125	Dibromomethane	2017/03/03	85	70 - 130	105	70 - 130	<0.90	ug/L		
8568125	Dichlorodifluoromethane	2017/03/03	71	60 - 140	81	60 - 140	<2.0	ug/L		
8568125	Dichloromethane	2017/03/03	87	70 - 130	100	70 - 130	<2.0	ug/L		
8568125	Ethylbenzene	2017/03/03	86	70 - 130	99	70 - 130	<0.40	ug/L		
8568125	Hexachlorobutadiene	2017/03/03	100	70 - 130	102	70 - 130	<0.50	ug/L		
8568125	m & p-Xylene	2017/03/03	93	70 - 130	107	70 - 130	<0.40	ug/L		
8568125	Methyl-tert-butylether (MTBE)	2017/03/03	81	70 - 130	94	70 - 130	<4.0	ug/L		
8568125	o-Xylene	2017/03/03	86	70 - 130	100	70 - 130	<0.40	ug/L		
8568125	Styrene	2017/03/03	92	70 - 130	107	70 - 130	<0.50	ug/L		
8568125	Tetrachloroethene	2017/03/03	92	70 - 130	104	70 - 130	<0.50	ug/L		

Maxxam Job #: B715393
Report Date: 2017/03/09

QUALITY ASSURANCE REPORT(CONT'D)

GHD Limited
Client Project #: 56484-02
Your P.O. #: 73506861
Sampler Initials: JS

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
8568125	Toluene	2017/03/03	91	70 - 130	105	70 - 130	<0.40	ug/L		
8568125	trans-1,2-dichloroethene	2017/03/03	88	70 - 130	99	70 - 130	<1.0	ug/L		
8568125	trans-1,3-dichloropropene	2017/03/03	88	70 - 130	103	70 - 130	<1.0	ug/L		
8568125	Trichloroethene	2017/03/03	89	70 - 130	101	70 - 130	<0.50	ug/L		
8568125	Trichlorofluoromethane	2017/03/03	78	60 - 140	89	60 - 140	<4.0	ug/L		
8568125	VH C6-C10	2017/03/03			88	70 - 130	<300	ug/L		
8568125	Vinyl chloride	2017/03/03	76	60 - 140	87	60 - 140	<0.50	ug/L		
8568125	Xylenes (Total)	2017/03/03					<0.40	ug/L		
8568145	1,1,1,2-tetrachloroethane	2017/03/07	108	70 - 130	104	70 - 130	<0.50	ug/L	NC (8)	30
8568145	1,1,1-trichloroethane	2017/03/07	107	70 - 130	101	70 - 130	<0.50	ug/L	NC (8)	30
8568145	1,1,2,2-tetrachloroethane	2017/03/07	90	70 - 130	95	70 - 130	<0.50	ug/L	NC (8)	30
8568145	1,1,2Trichloro-1,2,2Trifluoroethane	2017/03/07					<2.0	ug/L	NC (8)	30
8568145	1,1,2-trichloroethane	2017/03/07	107	70 - 130	104	70 - 130	<0.50	ug/L	NC (8)	30
8568145	1,1-dichloroethane	2017/03/07	107	70 - 130	101	70 - 130	<0.50	ug/L	1.8 (8)	30
8568145	1,1-dichloroethene	2017/03/07	105	70 - 130	98	70 - 130	<0.50	ug/L	NC (8)	30
8568145	1,2,3-trichlorobenzene	2017/03/07	101	70 - 130	108	70 - 130	<2.0	ug/L	NC (8)	30
8568145	1,2,4-trichlorobenzene	2017/03/07	98	70 - 130	101	70 - 130	<2.0	ug/L	NC (8)	30
8568145	1,2-dibromoethane	2017/03/07	107	70 - 130	104	70 - 130	<0.20	ug/L	NC (8)	30
8568145	1,2-dichlorobenzene	2017/03/07	95	70 - 130	98	70 - 130	<0.50	ug/L	NC (8)	30
8568145	1,2-dichloroethane	2017/03/07	103	70 - 130	95	70 - 130	<0.50	ug/L	NC (8)	30
8568145	1,2-dichloropropane	2017/03/07	113	70 - 130	108	70 - 130	<0.50	ug/L	NC (8)	30
8568145	1,3-Butadiene	2017/03/07					<5.0	ug/L	NC (8)	30
8568145	1,3-dichlorobenzene	2017/03/07	98	70 - 130	96	70 - 130	<0.50	ug/L	NC (8)	30
8568145	1,4-dichlorobenzene	2017/03/07	91	70 - 130	92	70 - 130	<0.50	ug/L	NC (8)	30
8568145	Benzene	2017/03/07	105	70 - 130	100	70 - 130	<0.40	ug/L	0.84 (8)	30
8568145	Bromobenzene	2017/03/07	101	70 - 130	98	70 - 130	<2.0	ug/L	NC (8)	30
8568145	Bromodichloromethane	2017/03/07	106	70 - 130	101	70 - 130	<1.0	ug/L	NC (8)	30
8568145	Bromoform	2017/03/07	100	70 - 130	102	70 - 130	<1.0	ug/L	NC (8)	30
8568145	Bromomethane	2017/03/07	97	60 - 140	104	60 - 140	<1.0	ug/L	NC (8)	30
8568145	Carbon tetrachloride	2017/03/07	103	70 - 130	94	70 - 130	<0.50	ug/L	NC (8)	30

Maxxam Job #: B715393
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QUALITY ASSURANCE REPORT(CONT'D)

GHD Limited
Client Project #: 56484-02
Your P.O. #: 73506861
Sampler Initials: JS

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
8568145	Chlorobenzene	2017/03/07	91	70 - 130	87	70 - 130	<0.50	ug/L	NC (8)	30
8568145	Chlorodibromomethane	2017/03/07	106	70 - 130	103	70 - 130	<1.0	ug/L	NC (8)	30
8568145	Chloroethane	2017/03/07	108	60 - 140	94	60 - 140	<1.0	ug/L	NC (8)	30
8568145	Chloroform	2017/03/07	107	70 - 130	102	70 - 130	<1.0	ug/L	NC (8)	30
8568145	Chloromethane	2017/03/07	96	60 - 140	92	60 - 140	<1.0	ug/L	NC (8)	30
8568145	cis-1,2-dichloroethene	2017/03/07	NC	70 - 130	98	70 - 130	<1.0	ug/L	0.50 (8)	30
8568145	cis-1,3-dichloropropene	2017/03/07	88	70 - 130	82	70 - 130	<1.0	ug/L	NC (8)	30
8568145	Dibromomethane	2017/03/07	112	70 - 130	109	70 - 130	<0.90	ug/L	NC (8)	30
8568145	Dichlorodifluoromethane	2017/03/07	80	60 - 140	77	60 - 140	<2.0	ug/L	NC (8)	30
8568145	Dichloromethane	2017/03/07	106	70 - 130	101	70 - 130	<2.0	ug/L	NC (8)	30
8568145	Ethylbenzene	2017/03/07	101	70 - 130	96	70 - 130	<0.40	ug/L	NC (8)	30
8568145	Hexachlorobutadiene	2017/03/07	103	70 - 130	102	70 - 130	<0.50	ug/L	NC (8)	30
8568145	m & p-Xylene	2017/03/07	108	70 - 130	103	70 - 130	<0.40	ug/L	NC (8)	30
8568145	Methyl-tert-butylether (MTBE)	2017/03/07	100	70 - 130	97	70 - 130	<4.0	ug/L	NC (8)	30
8568145	o-Xylene	2017/03/07	104	70 - 130	99	70 - 130	<0.40	ug/L	NC (8)	30
8568145	Styrene	2017/03/07	102	70 - 130	104	70 - 130	<0.50	ug/L	NC (8)	30
8568145	Tetrachloroethene	2017/03/07	107	70 - 130	100	70 - 130	<0.50	ug/L	NC (8)	30
8568145	Toluene	2017/03/07	109	70 - 130	103	70 - 130	<0.40	ug/L	NC (8)	30
8568145	trans-1,2-dichloroethene	2017/03/07	99	70 - 130	93	70 - 130	<1.0	ug/L	NC (8)	30
8568145	trans-1,3-dichloropropene	2017/03/07	93	70 - 130	88	70 - 130	<1.0	ug/L	NC (8)	30
8568145	Trichloroethene	2017/03/07	104	70 - 130	98	70 - 130	<0.50	ug/L	NC (8)	30
8568145	Trichlorofluoromethane	2017/03/07	94	60 - 140	89	60 - 140	<4.0	ug/L	NC (8)	30
8568145	VH C6-C10	2017/03/07			94	70 - 130	<300	ug/L	NC (8)	30
8568145	Vinyl chloride	2017/03/07	81	60 - 140	83	60 - 140	<0.50	ug/L	1.2 (8)	30
8568145	Xylenes (Total)	2017/03/07					<0.40	ug/L	NC (8)	30
8568147	Total Ammonia (N)	2017/03/03	NC	80 - 120	93	80 - 120	<0.0050	mg/L	2.0 (8)	20
8568150	Total Ammonia (N)	2017/03/03	89 (11)	80 - 120	100	80 - 120	<0.0050	mg/L	1.7 (12)	20
8568151	Total Ammonia (N)	2017/03/03	NC	80 - 120	103	80 - 120	<0.0050	mg/L	0.23 (8)	20
8568782	Nitrate plus Nitrite (N)	2017/03/03	99	80 - 120	105	80 - 120	<0.020	mg/L	NC (8)	25
8568783	Nitrite (N)	2017/03/03	98	80 - 120	102	80 - 120	<0.0050	mg/L	NC (8)	20

Maxxam Job #: B715393
Report Date: 2017/03/09

QUALITY ASSURANCE REPORT(CONT'D)

GHD Limited
Client Project #: 56484-02
Your P.O. #: 73506861
Sampler Initials: JS

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
8568785	Nitrate plus Nitrite (N)	2017/03/03	103 (13)	80 - 120	107	80 - 120	<0.020	mg/L	NC (14)	25
8568787	Nitrite (N)	2017/03/03	99 (13)	80 - 120	101	80 - 120	<0.0050	mg/L	NC (14)	20
8569325	Dissolved Chloride (Cl)	2017/03/03	110 (4)	80 - 120	98	80 - 120	<0.50	mg/L	0.91 (5)	20
8569327	Dissolved Sulphate (SO4)	2017/03/03	109 (4)	80 - 120	98	80 - 120	<0.50	mg/L	4.0 (5)	20
8569328	Dissolved Chloride (Cl)	2017/03/03	109	80 - 120	100	80 - 120	<0.50	mg/L	2.5 (8)	20
8569329	Dissolved Sulphate (SO4)	2017/03/03	NC	80 - 120	97	80 - 120	<0.50	mg/L	1.5 (8)	20
8570835	Fluoride (F)	2017/03/04	100 (15)	80 - 120	102	80 - 120	0.010, RDL=0.010	mg/L	5.1 (8)	20

Maxxam Job #: B715393
Report Date: 2017/03/09

QUALITY ASSURANCE REPORT(CONT'D)

GHD Limited
Client Project #: 56484-02
Your P.O. #: 73506861
Sampler Initials: JS

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
8571200	Fluoride (F)	2017/03/07	104	80 - 120	100	80 - 120	0.017, RDL=0.010	mg/L	3.4 (8)	20

N/A = Not Applicable

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

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

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

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

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

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

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

(1) Matrix Spike Parent ID [QQ4088-06]

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

(3) Duplicate Parent ID [QQ4088-06]

(4) Matrix Spike Parent ID [QQ4122-01]

(5) Duplicate Parent ID [QQ4122-01]

(6) Matrix Spike Parent ID [QQ4125-01]

(7) Duplicate Parent ID [QQ4096-01]

(8) Duplicate Parent ID

(9) Matrix Spike Parent ID [QQ4093-01]

(10) Duplicate Parent ID [QQ4093-01]

(11) Matrix Spike Parent ID [QQ4125-04]

(12) Duplicate Parent ID [QQ4125-04]

(13) Matrix Spike Parent ID [QQ4121-01]

(14) Duplicate Parent ID [QQ4121-01]

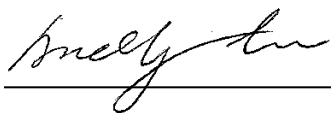
(15) Matrix Spike Parent ID [QQ4126-01]

Maxxam Job #: B715393
Report Date: 2017/03/09

GHD Limited
Client Project #: 56484-02
Your P.O. #: 73506861
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.



Maxxam Analytica International Corporation c/o Maxxam Analytica
4606 Canada Way, Burnaby, British Columbia Canada V5G 1K5 Tel: (604) 734 7276 Toll-free: 800-563-6256 Fax: (604) 731-2385 www.maxxam.ca

Chain Of Custody Record

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INVOICE TO:		Report Information		Project Information		Laboratory Use Only	
Company Name	#163 GHD Limited	Company Name		Quotation #	B61466	Maxxam Job #	Bottle Order #:
Contact Name	Alores MacPhee	Contact Name		P.O. #			
Address	651 COLBY DRIVE WATERLOO ON N2V 1C2	Address		Project #	Campbell River (Phase 02)	B715393	516800
Phone	(519) 884-0510 x	Phone		Project Name		Chain Of Custody Record	Project Manager
Email	alores.macphee@ghd.com, NationalEDDSupport@ma	Email		Site #			VJ Dec
				Sampled By	J. Stewart Mayle		

Regulatory Criteria:		ANALYSIS REQUESTED (PLEASE BE SPECIFIC)										Turnaround Time (TAT) Required:			
☐ CSR												Please provide advance notice for rush projects			
☐ CCME												Regular (Standard) TAT:			
☐ PC Water Quality												(will be applied if Rush TAT is not specified)			
☐ Other												Standard TAT = 5-7 Working days for most tests.			
												Please note: Standard TAT for certain tests such as BOD and Dissolved Metals are 1-5 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															
Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Metals Field Filtered? (Y/N)	Alkalinity (Speciated)	Ammonia-N	Anions (Cl, F, SO4, NO2, NO3)	pH	Conductivity	Dissolved Metals with Hg, Sulfur, Hardness	PO4	VOC/PH	# of Bottles	Comments
1	NO-SM24-290217-JS-01	28/02/17	720	W	Y	X	X	X	X	X	X	X	X	8	Short Hold Times!
2	-02		710		Y	X	X	X	X	X	X	X	X	8	
3	-03		720		Y	X	X	X	X	X	X	X	X	6	
4	-04		900		Y	X	X	X	X	X	X	X	X	8	
5	-05		1040		Y	X	X	X	X	X	X	X	X	6	
6	-06		1130		Y	X	X	X	X	X	X	X	X	6	
7	-07		1220		Y	X	X	X	X	X	X	X	X	8	
8	-08		1245		Y	X	X	X	X	X	X	X	X	8	
9	-09		1250		Y	X	X	X	X	X	X	X	X	8	
10	-10		1320		Y	X	X	X	X	X	X	X	X	8	

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	
James Stewart	17/03/01	12:00	Michelle von Schilling	17/03/01	14:25			
						Time Sensitive ☐	Temperature (°C) on Receipt: 4.5, 1	Custody Seal Intact on Cooler? ☐ Yes ☐ No
						4.6, 5		White: Maxxam Yellow: Client

Received by Laurei Berthier 20/03/02 08:50

11/12/11

Maxxam Analytica International Corporation c/o Maxxam Analytica

11/12/13



Maxxam Analytics International Corporation o/a Maxxam Analytics
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Chain Of Custody Record

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INVOICE TO:		Report Information		Project Information		Laboratory Use Only	
Company Name	#163 GHD Limited	Company Name		Quotation #	B61486	Maxxam Job #	Bottle Order #:
Contact Name	Airesse MacPhee	Contact Name		P.O. #		87153983	516800
Address	651 COLBY DRIVE	Address		Project #	Campbell River (Phase 02)	Chain Of Custody Record	Project Manager
	WATERLOO ON N2V 1C2			Project Name			
Phone	(519) 884-0510 x	Phone		Site #			VJ Occ
Email	airesse.macphee@ghd.com; NationalEDDSupport@ma	Email		Sampled By	J. Stewart Mayle		

Regulatory Criteria:		ANALYSIS REQUESTED (PLEASE BE SPECIFIC)		Turnaround Time (TAT) Required:	
☐ CSR		Metals Field Filtered ? (Y/N)		Please provide advance notice for rush projects	
☐ CCME		Alkalinity (Speciated)		Regular (Standard) TAT:	
☐ BC Water Quality		Ammonia-N		(will be applied if Rush TAT is not specified)	
☐ Other		Anions (Cl, F, SO4, NO2, NO3)		Standard TAT = 5-7 Working days for most tests.	
		pH		Please note: Standard TAT for certain tests such as BOD and Dissolved Metals are > 5 days - contact your Project Manager for details.	
		Conductivity		Job Specific Rush TAT (if applies to entire submission)	
		Dissolved Metals with Hg, Sulfur, Hardness		1 DAY ☐ 2 Day ☐ 3 Day ☐ Date Required: ☐	
		PO4		Rush Confirmation Number: ☐	
		VOC/MPH		(call lab for #)	

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 (Speciated)	Ammonia-N	Anions (Cl, F, SO4, NO2, NO3)	pH	Conductivity	Dissolved Metals with Hg, Sulfur, Hardness	PO4	VOC/MPH	# of Bottles	Comments		
1	W-56424-72017-JS-01	28/02/17	720	W	Y	X	X	X	X	X	X	X	X	8	Short Hold Times!		
2	-02		710		Y	X	X	X	X	X	X	X	X	8			
3	-03		720		Y	X	X	X	X	X	X	X		6			
4	-04		900		Y	X	X	X	X	X	X	X	X	8			
5	-05		1040		Y	X	X	X	X	X	X	X		6			
6	-06		1130		Y	X	X	X	X	X	X	X		6			
7	-07		1220		Y	X	X	X	X	X	X	X	X	8			
8	-08		1245		Y	X	X	X	X	X	X	X	X	8			
9	-09		1250		Y	X	X	X	X	X	X	X	X	8			
10	-10		1320		Y	X	X	X	X	X	X	X	X	8			

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			
James Stewart		17/03/01		12:00		Michelle von Schilling		17/03/01		14:25				Time Sensitive ☐			
														Temperature (°C) on Receipt		Custody Seal Intact on Cooler?	
														4, 5, 1		☐ Yes ☐ No	
														4, 6, 5		NA	

* 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.CATERMS.

* 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.

Received by: Laurei Bernier 2017/03/02 08:50

11/12/11/1



Maxxam Analyticals International Corporation o/a Maxxam Analyticals
4806 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 2 of 2

INVOICE TO:		Report Information		Project Information		Laboratory Use Only	
Company Name	#163 GHD Limited	Company Name		Quotation #	B61486	Maxxam Job #	20170302
Contact Name	Alesse MacPhee	Contact Name		P.O. #		Bottle Order #:	
Address	651 COLBY DRIVE	Address		Project #	Campbell River (Phase 02)	516800	
	WATERLOO ON N2V 1C2			Project Name		Chain Of Custody Record	Project Manager
Phone	(519) 884-0510 x	Phone		Site #			
Email	alesse.macphee@ghd.com; NationalEDDSupport@ma	Email		Sampled By	J Stewart moyle		

Regulatory Criteria:

- ☐ CSR
☐ CCME
☐ BC Water Quality
☐ Other

Special Instructions



B715393_COC

ANALYSIS REQUESTED (PLEASE BE SPECIFIC)

Turnaround Time (TAT) Required:

Please provide advance notice for rush projects

Regular (Standard) TAT:

(will be applied if Rush TAT is not specified)

Standard TAT = 5-7 Working days for most tests

Please note: Standard TAT for certain tests such as BOD and Dissolved Metals 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

Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Metals Field Filtered Y (Y/N)	Alkalinity (Speciated)	Ammonia-N	Anions (Cl, F, SO4, NO2, NO3)	pH	Conductivity	Dissolved Metals with Hg, Sulfur, Hardness	PO4	VOC/MPH	# of Bottles	Comments
1	WG-56474-020217-JS-11	28/02/17	1400	W	Y	X	X	X	X	X	X	X		6	Short Hold Times!
2	-12		1425	W	Y	X	X	X	X	X	X	X		8	
3	-13		1430	W	Y	X	X	X	X	X	X	X		8	
4	-14		1630	W	Y	X	X	X	X	X	X			6	
5	-15		1640	W	Y	X	X	X	X	X	X			6	
6	-16		1650	W	Y	X	X	X	X	X	X			6	
7	WG-56474-010317-JS-17	01/03/17	900	W	Y	X	X	X	X	X	X	X		6	
8	-18		9:35 10:30	W	Y	X	X	X	X	X	X	X		6	
9	-19		9:12:00	W	Y	X	X	X	X	X	X	X		6	
10	-20		13:00	W	Y	X	X	X	X	X	X	X		6	

* 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	
James Stewart		17/01/03	1200	Michelle von Schilling		17/03/01	14:35		Time Sensitive ☐	Temperature (°C) on Receipt: 45.1
									Custody Seal Intact on Cooler? ☐ Yes ☐ No	
									White: Maxxam Yellow: Client	

* UNLESS OTHERWISE AGREED TO IN WRITING, WORK SUBMITTED ON THIS CHAIN OF CUSTODY IS SUBJECT TO MAXXAM 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.

Received by Lauree Baerker 2017/03/02 08:50

Maxxam Analyticals International Corporation o/a Maxxam Analyticals

11/12/11

Your P.O. #: 73506861
Your Project #: 56484-02
Your C.O.C. #: 516800-02-01

Attention: Aïresse MacPhee

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

Report Date: 2017/03/09

Report #: R2354594

Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B715405

Received: 2017/03/01, 14:35

Sample Matrix: Water
Samples Received: 2

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity - Water (1)	2	2017/03/03	2017/03/04	BBY6SOP-00026	SM 22 2320 B m
Chloride by Automated Colourimetry (1)	2	N/A	2017/03/03	BBY6SOP-00011	SM 22 4500-Cl- E m
Conductance - water (1)	2	N/A	2017/03/04	BBY6SOP-00026	SM 22 2510 B m
Fluoride (1)	2	N/A	2017/03/07	BBY6SOP-00048	SM 22 4500-F C m
Hardness Total (calculated as CaCO ₃) (1)	2	N/A	2017/03/07	BBY WI-00033	Auto Calc
Hardness (calculated as CaCO ₃) (1)	2	N/A	2017/03/07	BBY WI-00033	Auto Calc
Mercury (Dissolved-LowLevel) by CVAf (1)	2	N/A	2017/03/03	BBY7SOP-00015	BCMOE BCLM Oct2013 m
Mercury (Total-LowLevel) by CVAf (1)	2	2017/03/06	2017/03/06	BBY7SOP-00015	BCMOE BCLM Oct2013 m
Na, K, Ca, Mg, S by CRC ICPMS (diss.) (1)	2	N/A	2017/03/07	BBY7SOP-00002	EPA 6020B R2 m
Elements by ICPMS Low Level (dissolved) (1)	2	N/A	2017/03/06	BBY7SOP-00002	EPA 6020B R2 m
Elements by ICPMS Digested LL (total) (1)	2	2017/03/03	2017/03/07	BBY7SOP-00003,	BCLM2005,EPA6020bR2m
Na, K, Ca, Mg, S by CRC ICPMS (total) (1)	2	N/A	2017/03/07	BBY7SOP-00003,	BCLM2005,EPA6020bR2m
Ammonia-N (Preserved) (1)	2	N/A	2017/03/03	BBY6SOP-00009	SM 22 4500-NH ₃ - G m
Nitrate + Nitrite (N) (1)	2	N/A	2017/03/03	BBY6SOP-00010	SM 22 4500-NO ₃ - I m
Nitrite (N) by CFA (1)	2	N/A	2017/03/03	BBY6SOP-00010	SM 22 4500-NO ₃ - I m
Nitrogen - Nitrate (as N) (1)	2	N/A	2017/03/04	BBY6SOP-00010	SM 22 4500-NO ₃ I m
Filter and HNO ₃ Preserve for Metals (1)	2	N/A	2017/03/04	BBY7 WI-00004	BCMOE Reqs 08/14
pH Water (1, 2)	2	N/A	2017/03/04	BBY6SOP-00026	SM 22 4500-H+ B m
Orthophosphate by Konelab (1)	2	N/A	2017/03/03	BBY6SOP-00013	SM 22 4500-P E m
Sulphate by Automated Colourimetry (1)	2	N/A	2017/03/03	BBY6SOP-00017	SM 22 4500-SO ₄ 2- E m

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 Vancouver

(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.

Your P.O. #: 73506861
Your Project #: 56484-02
Your C.O.C. #: 516800-02-01

Attention:Airesse MacPhee

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

Report Date: 2017/03/09
Report #: R2354594
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B715405
Received: 2017/03/01, 14:35

Encryption Key

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 #: B715405
Report Date: 2017/03/09

GHD Limited
Client Project #: 56484-02
Your P.O. #: 73506861
Sampler Initials: JS

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		QQ4145		QQ4146	QQ4146		
Sampling Date		2017/03/01 12:45		2017/03/01 13:30	2017/03/01 13:30		
COC Number		516800-02-01		516800-02-01	516800-02-01		
	UNITS	WS-56484-010317-JS-01	QC Batch	WS-56484-010317-JS-02	WS-56484-010317-JS-02 Lab-Dup	RDL	QC Batch
ANIONS							
Nitrite (N)	mg/L	<0.0050	8568790	<0.0050	N/A	0.0050	8568787
Calculated Parameters							
Filter and HNO3 Preservation	N/A	FIELD	ONSITE	FIELD	N/A	N/A	ONSITE
Total Hardness (CaCO3)	mg/L	8.16	8566576	24.6	N/A	0.50	8566576
Nitrate (N)	mg/L	0.026	8566580	0.150	N/A	0.020	8566580
Misc. Inorganics							
Fluoride (F)	mg/L	0.026	8571200	0.029	0.030	0.010	8571200
Dissolved Hardness (CaCO3)	mg/L	8.57	8566638	25.3	N/A	0.50	8566638
Alkalinity (Total as CaCO3)	mg/L	7.16	8567709	27.6	N/A	0.50	8567709
Alkalinity (PP as CaCO3)	mg/L	<0.50	8567709	<0.50	N/A	0.50	8567709
Bicarbonate (HCO3)	mg/L	8.74	8567709	33.6	N/A	0.50	8567709
Carbonate (CO3)	mg/L	<0.50	8567709	<0.50	N/A	0.50	8567709
Hydroxide (OH)	mg/L	<0.50	8567709	<0.50	N/A	0.50	8567709
Anions							
Dissolved Sulphate (SO4)	mg/L	1.42	8569333	2.05	N/A	0.50	8569329
Dissolved Chloride (Cl)	mg/L	3.1	8569331	3.2	N/A	0.50	8569328
Nutrients							
Orthophosphate (P)	mg/L	<0.0050	8568023	0.0096	N/A	0.0050	8568023
Total Ammonia (N)	mg/L	0.051	8568150	0.064	N/A	0.0050	8568150
Nitrate plus Nitrite (N)	mg/L	0.026	8568788	0.150	N/A	0.020	8568785
Physical Properties							
Conductivity	uS/cm	29.3	8567708	64.5	N/A	1.0	8567708
pH	pH	6.97	8567703	7.45	N/A	N/A	8567703
RDL = Reportable Detection Limit Lab-Dup = Laboratory Initiated Duplicate N/A = Not Applicable							

Maxxam Job #: B715405
Report Date: 2017/03/09

GHD Limited
Client Project #: 56484-02
Your P.O. #: 73506861
Sampler Initials: JS

MERCURY BY COLD VAPOR (WATER)

Maxxam ID		QQ4145	QQ4145	QQ4146		
Sampling Date		2017/03/01 12:45	2017/03/01 12:45	2017/03/01 13:30		
COC Number		516800-02-01	516800-02-01	516800-02-01		
	UNITS	WS-56484-010317-JS-01	WS-56484-010317-JS-01 Lab-Dup	WS-56484-010317-JS-02	RDL	QC Batch
Elements						
Dissolved Mercury (Hg)	ug/L	<0.0020	N/A	<0.0020	0.0020	8567677
Total Mercury (Hg)	ug/L	<0.0020	<0.0020	<0.0020	0.0020	8569197
RDL = Reportable Detection Limit						
Lab-Dup = Laboratory Initiated Duplicate						
N/A = Not Applicable						

Maxxam Job #: B715405
Report Date: 2017/03/09

GHD Limited
Client Project #: 56484-02
Your P.O. #: 73506861
Sampler Initials: JS

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		QQ4145		QQ4146		
Sampling Date		2017/03/01 12:45		2017/03/01 13:30		
COC Number		516800-02-01		516800-02-01		
	UNITS	WS-56484-010317-JS-01	QC Batch	WS-56484-010317-JS-02	RDL	QC Batch
Dissolved Metals by ICPMS						
Dissolved Aluminum (Al)	ug/L	53.3	8567977	28.7	0.50	8567977
Dissolved Antimony (Sb)	ug/L	<0.020	8567977	<0.020	0.020	8567977
Dissolved Arsenic (As)	ug/L	0.087	8567977	0.079	0.020	8567977
Dissolved Barium (Ba)	ug/L	1.46	8567977	0.817	0.020	8567977
Dissolved Beryllium (Be)	ug/L	<0.010	8567977	<0.010	0.010	8567977
Dissolved Bismuth (Bi)	ug/L	<0.0050	8567977	<0.0050	0.0050	8567977
Dissolved Boron (B)	ug/L	<10	8567977	<10	10	8567977
Dissolved Cadmium (Cd)	ug/L	0.0070	8567977	<0.0050	0.0050	8571841
Dissolved Chromium (Cr)	ug/L	<0.10	8567977	0.20	0.10	8567977
Dissolved Cobalt (Co)	ug/L	0.0500	8567977	0.199	0.0050	8567977
Dissolved Copper (Cu)	ug/L	0.211	8567977	0.736	0.050	8567977
Dissolved Iron (Fe)	ug/L	101	8567977	133	1.0	8567977
Dissolved Lead (Pb)	ug/L	0.0410	8567977	0.0160	0.0050	8567977
Dissolved Lithium (Li)	ug/L	<0.50	8567977	<0.50	0.50	8567977
Dissolved Manganese (Mn)	ug/L	13.4	8567977	44.0	0.050	8567977
Dissolved Molybdenum (Mo)	ug/L	<0.050	8567977	<0.050	0.050	8567977
Dissolved Nickel (Ni)	ug/L	0.118	8567977	0.096	0.020	8567977
Dissolved Selenium (Se)	ug/L	<0.040	8567977	0.063	0.040	8567977
Dissolved Silicon (Si)	ug/L	3180	8567977	5210	50	8567977
Dissolved Silver (Ag)	ug/L	<0.0050	8567977	<0.0050	0.0050	8567977
Dissolved Strontium (Sr)	ug/L	8.51	8567977	17.7	0.050	8567977
Dissolved Thallium (Tl)	ug/L	<0.0020	8567977	<0.0020	0.0020	8567977
Dissolved Tin (Sn)	ug/L	<0.20	8567977	<0.20	0.20	8567977
Dissolved Titanium (Ti)	ug/L	1.34	8567977	1.41	0.50	8567977
Dissolved Uranium (U)	ug/L	<0.0020	8567977	<0.0020	0.0020	8567977
Dissolved Vanadium (V)	ug/L	0.28	8567977	1.78	0.20	8567977
Dissolved Zinc (Zn)	ug/L	0.75	8567977	0.52	0.10	8567977
Dissolved Zirconium (Zr)	ug/L	<0.10	8567977	<0.10	0.10	8567977
Dissolved Calcium (Ca)	mg/L	2.02	8567186	5.40	0.050	8567186
Dissolved Magnesium (Mg)	mg/L	0.855	8567186	2.86	0.050	8567186
Dissolved Potassium (K)	mg/L	0.098	8567186	0.199	0.050	8567186
Dissolved Sodium (Na)	mg/L	2.52	8567186	3.29	0.050	8567186
RDL = Reportable Detection Limit						

Maxxam Job #: B715405
Report Date: 2017/03/09

GHD Limited
Client Project #: 56484-02
Your P.O. #: 73506861
Sampler Initials: JS

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		QQ4145		QQ4146		
Sampling Date		2017/03/01 12:45		2017/03/01 13:30		
COC Number		516800-02-01		516800-02-01		
	UNITS	WS-56484-010317-JS-01	QC Batch	WS-56484-010317-JS-02	RDL	QC Batch
Dissolved Sulphur (S)	mg/L	<3.0	8567186	<3.0	3.0	8567186
Total Metals by ICPMS						
Total Aluminum (Al)	ug/L	60.6	8568034	67.4	3.0	8568034
Total Antimony (Sb)	ug/L	0.023	8568034	0.023	0.020	8568034
Total Arsenic (As)	ug/L	0.072	8568034	0.100	0.020	8568034
Total Barium (Ba)	ug/L	1.35	8568034	0.881	0.050	8568034
Total Beryllium (Be)	ug/L	0.021	8568034	<0.010	0.010	8568034
Total Bismuth (Bi)	ug/L	<0.010	8568034	<0.010	0.010	8568034
Total Boron (B)	ug/L	<10	8568034	<10	10	8568034
Total Cadmium (Cd)	ug/L	0.0050	8568034	<0.0050	0.0050	8568034
Total Chromium (Cr)	ug/L	0.16	8568034	0.25	0.10	8568034
Total Cobalt (Co)	ug/L	0.060	8568034	0.218	0.010	8568034
Total Copper (Cu)	ug/L	0.63	8568034	1.16	0.20	8568034
Total Iron (Fe)	ug/L	124	8568034	213	5.0	8568034
Total Lead (Pb)	ug/L	0.076	8568034	0.043	0.020	8568034
Total Lithium (Li)	ug/L	<0.50	8568034	<0.50	0.50	8568034
Total Manganese (Mn)	ug/L	13.3	8568034	43.5	0.10	8568034
Total Molybdenum (Mo)	ug/L	<0.050	8568034	<0.050	0.050	8568034
Total Nickel (Ni)	ug/L	0.13	8568034	0.13	0.10	8568034
Total Selenium (Se)	ug/L	<0.040	8568034	0.062	0.040	8568034
Total Silicon (Si)	ug/L	3060	8568034	5120	50	8568034
Total Silver (Ag)	ug/L	<0.010	8568034	<0.010	0.010	8568034
Total Strontium (Sr)	ug/L	8.60	8568034	16.1	0.050	8568034
Total Thallium (Tl)	ug/L	<0.0020	8568034	0.0050	0.0020	8568034
Total Tin (Sn)	ug/L	<0.20	8568034	<0.20	0.20	8568034
Total Titanium (Ti)	ug/L	<2.0	8568034	5.6	2.0	8568034
Total Uranium (U)	ug/L	<0.0050	8568034	<0.0050	0.0050	8568034
Total Vanadium (V)	ug/L	0.33	8568034	2.09	0.20	8568034
Total Zinc (Zn)	ug/L	<1.0	8568034	<1.0	1.0	8568034
Total Zirconium (Zr)	ug/L	<0.10	8568034	<0.10	0.10	8568034
Total Calcium (Ca)	mg/L	1.91	8567187	5.24	0.25	8567187
Total Magnesium (Mg)	mg/L	0.82	8567187	2.80	0.25	8567187
Total Potassium (K)	mg/L	<0.25	8567187	<0.25	0.25	8567187
RDL = Reportable Detection Limit						

Maxxam Job #: B715405
Report Date: 2017/03/09

GHD Limited
Client Project #: 56484-02
Your P.O. #: 73506861
Sampler Initials: JS

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		QQ4145		QQ4146		
Sampling Date		2017/03/01 12:45		2017/03/01 13:30		
COC Number		516800-02-01		516800-02-01		
	UNITS	WS-56484-010317-JS-01	QC Batch	WS-56484-010317-JS-02	RDL	QC Batch
Total Sodium (Na)	mg/L	2.42	8567187	3.14	0.25	8567187
Total Sulphur (S)	mg/L	<3.0	8567187	<3.0	3.0	8567187
RDL = Reportable Detection Limit						

Maxxam Job #: B715405
Report Date: 2017/03/09

GHD Limited
Client Project #: 56484-02
Your P.O. #: 73506861
Sampler Initials: JS

GENERAL COMMENTS

Sample QQ4146, Elements by ICPMS Low Level (dissolved): Test repeated.

Results relate only to the items tested.

Maxxam Job #: B715405
Report Date: 2017/03/09

QUALITY ASSURANCE REPORT

GHD Limited
Client Project #: 56484-02
Your P.O. #: 73506861
Sampler Initials: JS

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
8567677	Dissolved Mercury (Hg)	2017/03/03	104	80 - 120	100	80 - 120	<0.0020	ug/L	NC (1)	20
8567703	pH	2017/03/04			102	97 - 103			0.65 (1)	N/A
8567708	Conductivity	2017/03/04			102	80 - 120	<1.0	uS/cm	4.5 (1)	20
8567709	Alkalinity (PP as CaCO3)	2017/03/04					<0.50	mg/L	NC (1)	20
8567709	Alkalinity (Total as CaCO3)	2017/03/04	NC	80 - 120	99	80 - 120	<0.50	mg/L	NC (1)	20
8567709	Bicarbonate (HCO3)	2017/03/04					<0.50	mg/L	NC (1)	20
8567709	Carbonate (CO3)	2017/03/04					<0.50	mg/L	NC (1)	20
8567709	Hydroxide (OH)	2017/03/04					<0.50	mg/L	NC (1)	20
8567977	Dissolved Aluminum (Al)	2017/03/06	105	80 - 120	109	80 - 120	<0.50	ug/L	13 (1)	20
8567977	Dissolved Antimony (Sb)	2017/03/06	100	80 - 120	98	80 - 120	<0.020	ug/L	NC (1)	20
8567977	Dissolved Arsenic (As)	2017/03/06	101	80 - 120	108	80 - 120	<0.020	ug/L	NC (1)	20
8567977	Dissolved Barium (Ba)	2017/03/06	98	80 - 120	103	80 - 120	<0.020	ug/L	1.0 (1)	20
8567977	Dissolved Beryllium (Be)	2017/03/06	102	80 - 120	98	80 - 120	<0.010	ug/L	NC (1)	20
8567977	Dissolved Bismuth (Bi)	2017/03/06	98	80 - 120	100	80 - 120	<0.0050	ug/L	NC (1)	20
8567977	Dissolved Boron (B)	2017/03/06	97	80 - 120	99	80 - 120	<10	ug/L	NC (1)	20
8567977	Dissolved Cadmium (Cd)	2017/03/06	98	80 - 120	106	80 - 120	<0.0050	ug/L	NC (1)	20
8567977	Dissolved Chromium (Cr)	2017/03/06	97	80 - 120	98	80 - 120	<0.10	ug/L	NC (1)	20
8567977	Dissolved Cobalt (Co)	2017/03/06	96	80 - 120	97	80 - 120	<0.0050	ug/L	NC (1)	20
8567977	Dissolved Copper (Cu)	2017/03/06	95	80 - 120	99	80 - 120	<0.050	ug/L	11 (1)	20
8567977	Dissolved Iron (Fe)	2017/03/06	101	80 - 120	105	80 - 120	<1.0	ug/L	NC (1)	20
8567977	Dissolved Lead (Pb)	2017/03/06	98	80 - 120	98	80 - 120	<0.0050	ug/L	5.4 (1)	20
8567977	Dissolved Lithium (Li)	2017/03/06	99	80 - 120	100	80 - 120	<0.50	ug/L	NC (1)	20
8567977	Dissolved Manganese (Mn)	2017/03/06	98	80 - 120	99	80 - 120	<0.050	ug/L	NC (1)	20
8567977	Dissolved Molybdenum (Mo)	2017/03/06	98	80 - 120	101	80 - 120	<0.050	ug/L	NC (1)	20
8567977	Dissolved Nickel (Ni)	2017/03/06	98	80 - 120	102	80 - 120	<0.020	ug/L	3.9 (1)	20
8567977	Dissolved Selenium (Se)	2017/03/06	102	80 - 120	105	80 - 120	<0.040	ug/L	NC (1)	20
8567977	Dissolved Silicon (Si)	2017/03/06					<50	ug/L	NC (1)	20
8567977	Dissolved Silver (Ag)	2017/03/06	100	80 - 120	101	80 - 120	<0.0050	ug/L	NC (1)	20
8567977	Dissolved Strontium (Sr)	2017/03/06	94	80 - 120	102	80 - 120	<0.050	ug/L	6.3 (1)	20
8567977	Dissolved Thallium (Tl)	2017/03/06	97	80 - 120	97	80 - 120	<0.0020	ug/L	NC (1)	20

Maxxam Job #: B715405
Report Date: 2017/03/09

QUALITY ASSURANCE REPORT(CONT'D)

GHD Limited
Client Project #: 56484-02
Your P.O. #: 73506861
Sampler Initials: JS

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
8567977	Dissolved Tin (Sn)	2017/03/06	97	80 - 120	99	80 - 120	<0.20	ug/L	NC (1)	20
8567977	Dissolved Titanium (Ti)	2017/03/06	87	80 - 120	113	80 - 120	<0.50	ug/L	NC (1)	20
8567977	Dissolved Uranium (U)	2017/03/06	100	80 - 120	95	80 - 120	<0.0020	ug/L	NC (1)	20
8567977	Dissolved Vanadium (V)	2017/03/06	95	80 - 120	98	80 - 120	<0.20	ug/L	NC (1)	20
8567977	Dissolved Zinc (Zn)	2017/03/06	97	80 - 120	99	80 - 120	<0.10	ug/L	12 (1)	20
8567977	Dissolved Zirconium (Zr)	2017/03/06					<0.10	ug/L	NC (1)	20
8568023	Orthophosphate (P)	2017/03/03	NC	80 - 120	93	80 - 120	<0.0050	mg/L	1.4 (1)	20
8568034	Total Aluminum (Al)	2017/03/07	109	80 - 120	112	80 - 120	<3.0	ug/L	1.6 (1)	20
8568034	Total Antimony (Sb)	2017/03/07	105	80 - 120	101	80 - 120	<0.020	ug/L	5.6 (1)	20
8568034	Total Arsenic (As)	2017/03/07	103	80 - 120	101	80 - 120	<0.020	ug/L	11 (1)	20
8568034	Total Barium (Ba)	2017/03/07	NC	80 - 120	102	80 - 120	<0.050	ug/L	2.6 (1)	20
8568034	Total Beryllium (Be)	2017/03/07	102	80 - 120	101	80 - 120	<0.010	ug/L	6.1 (1)	20
8568034	Total Bismuth (Bi)	2017/03/07	100	80 - 120	101	80 - 120	<0.010	ug/L	NC (1)	20
8568034	Total Boron (B)	2017/03/07	98	80 - 120	103	80 - 120	<10	ug/L	NC (1)	20
8568034	Total Cadmium (Cd)	2017/03/07	101	80 - 120	103	80 - 120	<0.0050	ug/L	NC (1)	20
8568034	Total Chromium (Cr)	2017/03/07	100	80 - 120	106	80 - 120	<0.10	ug/L	2.1 (1)	20
8568034	Total Cobalt (Co)	2017/03/07	96	80 - 120	104	80 - 120	<0.010	ug/L	2.2 (1)	20
8568034	Total Copper (Cu)	2017/03/07	97	80 - 120	106	80 - 120	<0.20	ug/L	12 (1)	20
8568034	Total Iron (Fe)	2017/03/07	98	80 - 120	107	80 - 120	<5.0	ug/L	15 (1)	20
8568034	Total Lead (Pb)	2017/03/07	100	80 - 120	102	80 - 120	<0.020	ug/L	NC (1)	20
8568034	Total Lithium (Li)	2017/03/07	101	80 - 120	104	80 - 120	<0.50	ug/L	4.7 (1)	20
8568034	Total Manganese (Mn)	2017/03/07	NC	80 - 120	103	80 - 120	<0.10	ug/L	3.2 (1)	20
8568034	Total Molybdenum (Mo)	2017/03/07	109	80 - 120	103	80 - 120	<0.050	ug/L	4.0 (1)	20
8568034	Total Nickel (Ni)	2017/03/07	95	80 - 120	105	80 - 120	<0.10	ug/L	5.2 (1)	20
8568034	Total Selenium (Se)	2017/03/07	106	80 - 120	107	80 - 120	<0.040	ug/L	18 (1)	20
8568034	Total Silicon (Si)	2017/03/07					<50	ug/L	4.7 (1)	20
8568034	Total Silver (Ag)	2017/03/07	104	80 - 120	104	80 - 120	<0.010	ug/L	NC (1)	20
8568034	Total Strontium (Sr)	2017/03/07	NC	80 - 120	101	80 - 120	<0.050	ug/L	1.6 (1)	20
8568034	Total Thallium (Tl)	2017/03/07	100	80 - 120	100	80 - 120	<0.0020	ug/L	NC (1)	20
8568034	Total Tin (Sn)	2017/03/07	102	80 - 120	105	80 - 120	<0.20	ug/L	NC (1)	20

Maxxam Job #: B715405
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QUALITY ASSURANCE REPORT(CONT'D)

GHD Limited
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Sampler Initials: JS

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
8568034	Total Titanium (Ti)	2017/03/07	88	80 - 120	97	80 - 120	<2.0	ug/L	NC (1)	20
8568034	Total Uranium (U)	2017/03/07	NC	80 - 120	102	80 - 120	<0.0050	ug/L	1.4 (1)	20
8568034	Total Vanadium (V)	2017/03/07	100	80 - 120	100	80 - 120	<0.20	ug/L	2.0 (1)	20
8568034	Total Zinc (Zn)	2017/03/07	102	80 - 120	104	80 - 120	<1.0	ug/L	1.5 (1)	20
8568034	Total Zirconium (Zr)	2017/03/07					<0.10	ug/L	11 (1)	20
8568150	Total Ammonia (N)	2017/03/03	89	80 - 120	100	80 - 120	<0.0050	mg/L	1.7 (1)	20
8568785	Nitrate plus Nitrite (N)	2017/03/03	103	80 - 120	107	80 - 120	<0.020	mg/L	NC (1)	25
8568787	Nitrite (N)	2017/03/03	99	80 - 120	101	80 - 120	<0.0050	mg/L	NC (1)	20
8568788	Nitrate plus Nitrite (N)	2017/03/03	102	80 - 120	105	80 - 120	<0.020	mg/L	1.6 (1)	25
8568790	Nitrite (N)	2017/03/03	97	80 - 120	102	80 - 120	<0.0050	mg/L	0.68 (1)	20
8569197	Total Mercury (Hg)	2017/03/06	94 (2)	80 - 120	95	80 - 120	<0.0020	ug/L	NC (3)	20
8569328	Dissolved Chloride (Cl)	2017/03/03	109	80 - 120	100	80 - 120	<0.50	mg/L	2.5 (1)	20
8569329	Dissolved Sulphate (SO4)	2017/03/03	NC	80 - 120	97	80 - 120	<0.50	mg/L	1.5 (1)	20
8569331	Dissolved Chloride (Cl)	2017/03/03			99	80 - 120	<0.50	mg/L		
8569333	Dissolved Sulphate (SO4)	2017/03/03	113	80 - 120	98	80 - 120	<0.50	mg/L	1.5 (1)	20
8571200	Fluoride (F)	2017/03/07	104 (4)	80 - 120	100	80 - 120	0.017, RDL=0.010	mg/L	3.4 (5)	20

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QUALITY ASSURANCE REPORT(CONT'D)

GHD Limited
Client Project #: 56484-02
Your P.O. #: 73506861
Sampler Initials: JS

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
8571841	Dissolved Cadmium (Cd)	2017/03/08	98	80 - 120	101	80 - 120	<0.0050	ug/L	13 (1)	20

N/A = Not Applicable

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

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

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

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

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

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

(1) Duplicate Parent ID

(2) Matrix Spike Parent ID [QQ4145-06]

(3) Duplicate Parent ID [QQ4145-06]

(4) Matrix Spike Parent ID [QQ4146-01]

(5) Duplicate Parent ID [QQ4146-01]

Maxxam Job #: B715405
Report Date: 2017/03/09

GHD Limited
Client Project #: 56484-02
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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.



Maxxam Analytics International Corporation o/a Maxxam Analytics
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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 #: B61466	Maxxam Job #: B 715405	Bottle Order #:			
Contact Name: Alesse MacPhee	Contact Name:	P.O. #:	Barcode: 516800				
Address: 651 COLBY DRIVE	Address:	Project #: Campbell River (Phase 02)	Chain Of Custody Record		Project Manager		
Address: WATERLOO ON N2V 1C2	Address:	Project Name:	Barcode: C4516800-02-01		VJ Oco		
Phone: (519) 884-0510 x	Phone:	Site #:					
Email: alessa.macphee@ghd.com; NationalEDDSupport@ma	Email:	Sampled By: J Stewart M Ock					

Regulatory Criteria:	Special Instructions:	ANALYSIS REQUESTED (PLEASE BE SPECIFIC):		Turnaround Time (TAT) Required:																																				
☐ CSR	Short hold times!	<table><tr><td>Alkalinity (Speciated)</td><td>Ammonia-N</td><td>Anions (Cl, F, SO4, NO2, NO3)</td><td>pH</td><td>Conductivity</td><td>Dissolved Metals with Hg, Sulfur, Hardness</td><td>PO4</td><td>VOC/MPH</td><td>Low level metals with Hg, Sulfur, Hardness</td></tr><tr><td>☐ CCME</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>☐ BC Water Quality</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>☐ Other</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr></table>		Alkalinity (Speciated)	Ammonia-N	Anions (Cl, F, SO4, NO2, NO3)	pH	Conductivity	Dissolved Metals with Hg, Sulfur, Hardness	PO4	VOC/MPH	Low level metals with Hg, Sulfur, Hardness	☐ CCME									☐ BC Water Quality									☐ Other									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 Dissolved Metals are 8 days - contact your Project Manager for details.
Alkalinity (Speciated)				Ammonia-N	Anions (Cl, F, SO4, NO2, NO3)	pH	Conductivity	Dissolved Metals with Hg, Sulfur, Hardness	PO4	VOC/MPH	Low level metals with Hg, Sulfur, Hardness																													
☐ CCME																																								
☐ BC Water Quality																																								
☐ Other																																								
Job Specific Rush TAT (if applies to entire submission)		1 DAY ☐ 2 Day ☐ 3 Day ☐ Data Required: ☐																																						
Rush Confirmation Number:		(call lab for #)																																						

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	Comments
1 WS-56484-01037-JS-01	Mar 1/17	12:45	VS		
2 -02	↓	13:30	↓		
3					
4					
5					
6					
7					
8					
9					
10					

RELINQUISHED BY: (Signature/Print)	Date: (YYMMDD)	Time	RECEIVED BY: (Signature/Print)	Date: (YYMMDD)	Time	# Jars used and not submitted	Time Sensitive	Temperature (°C) on Receipt	Custody Seal Intact on Cooler?
Michelle MacPhee	17/03/01		Michelle MacPhee	17/03/01	14:35		☐	4.5, 1 4.6, 5	☐ 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.

Revised by: Lauree Beathner 2017/03/02 08:50

11/1/21/11/1

GHD Field Sample Key (FSK)



SiteCampbell River 056484-02

Sample ReasonQ2

Sampler NameMichaela Dyck/Cassie Ragan

Sampling CompanyGHD Ltd.

Laboratory(s)Maxxam Analytics

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	Grab or Composite	Parent Sample ID for Field Dups	Footnote(s)	Volume of Water Purged	Field pH	Sample Temp.	Temp Units	Conductivity	Conductivity Units	Turbidity	Turbidity Units	DO	DO Units	Eh/ORP	Eh/ORP Units	TDS (g/L)
GROUNDWATER																					
WG-56484-290517-CR-01	EBA11-2	5/29/2017	12:00	N	WG	grab			110	6.61	12.37	C	214	uS	565	ntu	-	mg/L	234	mV	0.139
WG-56484-290517-CR-02	EBA04-3	5/29/2017	13:00	N	WG	grab			120	6.54	13.35	C	582	uS	3.5	ntu	-	mg/L	235	mV	0.373
WG-56484-290517-CR-03	MW01-16	5/29/2017	13:40	N	WG	grab			100	7.32	13.26	C	57	uS	18.7	ntu	-	mg/L	215	mV	0.037
WG-56484-290517-CR-04	EBA04-1	5/29/2017	14:00	N	WG	grab			-	7.85	14.03	C	81	uS	0.3	ntu	-	mg/L	175	mV	0.052
WG-56484-290517-CR-05	-	5/29/2017	14:05	FB	WG	grab			-	-	-	C	-	uS	-	ntu	-	mg/L	-	mV	-
WG-56484-290517-CR-06	109728	5/29/2017	14:25	N	WG	grab		1	-	7.65	14.22	C	199	uS	0.5	ntu	-	mg/L	184	mV	0.129
WG-56484-290517-CR-07	AG99-01	5/29/2017	15:30	N	WG	grab			106	7.5	14.16	C	219	uS	39.5	ntu	-	mg/L	202	mV	0.142
WG-56484-290517-CR-08	AG99-02	5/29/2017	16:30	N	WG	grab			150	7.12	13.4	C	211	uS	0.8	ntu	-	mg/L	235	mV	0.137
WG-56484-290517-CR-09	AG99-04	5/29/2017	17:30	N	WG	grab			142	7.05	14.92	C	91	uS	0.5	ntu	-	mg/L	234	mV	0.059
WG-56484-300517-CR-10	AG99-05	5/30/2017	9:00	N	WG	grab			186	7.73	13.75	C	227	uS	0.7	ntu	-	mg/L	196	mV	0.148
WG-56484-300517-CR-11	EBA11-3	5/30/2017	10:50	N	WG	grab			60	7.81	11.32	C	95	uS	5.8	ntu	-	mg/L	193	mV	0.062
WG-56484-300517-CR-12	EBA11-3	5/30/2017	10:55	FD	WG	grab	WG-56484-300517-CR-11		60	7.81	11.32	C	95	uS	5.8	ntu	-	mg/L	193	mV	0.062
WG-56484-300517-CR-13	EBA11-4	5/30/2017	12:30	N	WG	grab			51	6.57	11.42	C	118	uS	22.3	ntu	-	mg/L	247	mV	0.077
WG-56484-300517-CR-14	AG99-06	5/30/2017	12:20	N	WG	grab			30	7.06	12.38	C	303	uS	13.7	ntu	-	mg/L	244	mV	0.197
WG-56484-300517-CR-15	HBT94-3	5/30/2017	13:15	N	WG	grab			12	6.76	14.55	C	839	uS	30.8	ntu	-	mg/L	-44	mV	0.537
WG-56484-300517-CR-16	HBT94-3	5/30/2017	13:20	FD	WG	grab	WG-56484-300517-CR-15		12	6.76	14.55	C	839	uS	30.8	ntu	-	mg/L	-44	mV	0.537
WG-56484-300517-CR-17	HBT94-2	5/30/2017	14:00	N	WG	grab			102	6.88	14.06	C	1210	uS	4.3	ntu	-	mg/L	-33	mV	0.777
WG-56484-300517-CR-18	HBT94-1	5/30/2017	14:10	N	WG	grab			20	7.21	14.59	C	601	uS	1.8	ntu	-	mg/L	-46	mV	0.385
WG-56484-300517-CR-19	EBA04-7	5/30/2017	15:10	N	WG	grab			54	7.33	12.01	C	656	uS	6.2	ntu	-	mg/L	83	mV	0.420
WG-56484-300517-CR-20	EBA04-6	5/30/2017	15:30	N	WG	grab			136	7.24	12.2	C	676	uS	1.4	ntu	-	mg/L	91	mV	0.432
WG-56484-300517-CR-21	EBA11-1	5/30/2017	16:00	N	WG	grab			54	7.69	10.81	C	327	uS	22.8	ntu	-	mg/L	107	mV	0.211
SURFACE WATER																					
WS-56484-300517-CR-01	SW-1	5/30/2017	9:30	N	WS	grab			-	5.5	17.28	C	119	uS	1.1	ntu	11.29	mg/L	235	mV	0.076
WS-56484-300517-CR-02	SW03-17	5/30/2017	9:45	N	WS	grab			-	5.87	21.3	C	30	uS	8.7	ntu	5.68	mg/L	213	mV	0.020
WS-56484-300517-CR-03	SW-2	5/30/2017	16:30	N	WS	grab			-	7.83	16.01	C	85	uS	2.8	ntu	10.23	mg/L	106	mV	0.055

Footnotes

1. Wash plant tap

2.

3.

Key

Required Field

Populate When Appropriate

Field Data

Your P.O. #: 73506861
Your Project #: 56484-02 CAMPBELL RIVER
Site Location: CAMPBELL RIVER, BC
Your C.O.C. #: 524971-01-01, 524971-02-01

Attention: Michaela Dyck

GHD Limited
10271 Shellbridge Way
Suite 165
Richmond, BC
Canada V6X 2W8

Report Date: 2017/06/08
Report #: R2394175
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B742396

Received: 2017/05/31, 12:02

Sample Matrix: Water
Samples Received: 21

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity - Water (1)	21	2017/06/01	2017/06/02	BBY6SOP-00026	SM 22 2320 B m
Chloride by Automated Colourimetry (1)	20	N/A	2017/06/01	BBY6SOP-00011	SM 22 4500-Cl- E m
Chloride by Automated Colourimetry (1)	1	N/A	2017/06/02	BBY6SOP-00011	SM 22 4500-Cl- E m
Conductance - water (1)	21	N/A	2017/06/02	BBY6SOP-00026	SM 22 2510 B m
Fluoride (1)	21	N/A	2017/06/02	BBY6SOP-00048	SM 22 4500-F C m
Hardness (calculated as CaCO ₃) (1)	20	N/A	2017/06/05	BBY WI-00033	Auto Calc
Hardness (calculated as CaCO ₃) (1)	1	N/A	2017/06/07	BBY WI-00033	Auto Calc
Mercury (Dissolved) by CVAf (1)	21	N/A	2017/06/07	BBY7SOP-00015	BCMOE BCLM Oct2013 m
Na, K, Ca, Mg, S by CRC ICPMS (diss.) (1)	20	N/A	2017/06/05	BBY7SOP-00002	EPA 6020B R2 m
Na, K, Ca, Mg, S by CRC ICPMS (diss.) (1)	1	N/A	2017/06/07	BBY7SOP-00002	EPA 6020B R2 m
Elements by CRC ICPMS (dissolved) (1)	20	N/A	2017/06/02	BBY7SOP-00002	EPA 6020B R2 m
Elements by CRC ICPMS (dissolved) (1)	1	N/A	2017/06/06	BBY7SOP-00002	EPA 6020B R2 m
Ammonia-N (Preserved) (1)	20	N/A	2017/06/05	BBY6SOP-00009	SM 22 4500-NH ₃ - G m
Ammonia-N (Preserved) (1)	1	N/A	2017/06/07	BBY6SOP-00009	SM 22 4500-NH ₃ - G m
Nitrate + Nitrite (N) (1)	21	N/A	2017/06/01	BBY6SOP-00010	SM 22 4500-NO ₃ - I m
Nitrite (N) by CFA (1)	21	N/A	2017/06/01	BBY6SOP-00010	SM 22 4500-NO ₃ - I m
Nitrogen - Nitrate (as N) (1)	21	N/A	2017/06/03	BBY6SOP-00010	SM 22 4500-NO ₃ I m
Filter and HNO ₃ Preserve for Metals (1)	19	N/A	2017/06/01	BBY7 WI-00004	BCMOE Reqs 08/14
Filter and HNO ₃ Preserve for Metals (1)	1	N/A	2017/06/02	BBY7 WI-00004	BCMOE Reqs 08/14
Filter and HNO ₃ Preserve for Metals (1)	1	N/A	2017/06/03	BBY7 WI-00004	BCMOE Reqs 08/14
pH Water (1, 2)	21	N/A	2017/06/02	BBY6SOP-00026	SM 22 4500-H+ B m
Sulphate by Automated Colourimetry (1)	20	N/A	2017/06/01	BBY6SOP-00017	SM 22 4500-SO ₄ ²⁻ - E m
Sulphate by Automated Colourimetry (1)	1	N/A	2017/06/05	BBY6SOP-00017	SM 22 4500-SO ₄ ²⁻ - E m

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 Vancouver

(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.

Attention: Michaela Dyck

GHD Limited
10271 Shellbridge Way
Suite 165
Richmond, BC
Canada V6X 2W8

Your P.O. #: 73506861
Your Project #: 56484-02 CAMPBELL RIVER
Site Location: CAMPBELL RIVER, BC
Your C.O.C. #: 524971-01-01, 524971-02-01

Report Date: 2017/06/08
Report #: R2394175
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B742396
Received: 2017/05/31, 12:02

Encryption Key

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

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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 #: B742396
Report Date: 2017/06/08

GHD Limited
Client Project #: 56484-02 CAMPBELL RIVER
Site Location: CAMPBELL RIVER, BC
Your P.O. #: 73506861
Sampler Initials: MD

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		RE3500	RE3500	RE3501		
Sampling Date		2017/05/29 12:00	2017/05/29 12:00	2017/05/29 13:00		
COC Number		524971-01-01	524971-01-01	524971-01-01		
	UNITS	WG-56484-290517-CR-01	WG-56484-290517-CR-01 Lab-Dup	WG-56484-290517-CR-02	RDL	QC Batch
ANIONS						
Nitrite (N)	mg/L	<0.0050	N/A	<0.0050	0.0050	8651016
Calculated Parameters						
Filter and HNO3 Preservation	N/A	FIELD	N/A	FIELD	N/A	ONSITE
Nitrate (N)	mg/L	0.254	N/A	0.530	0.020	8646677
Misc. Inorganics						
Fluoride (F)	mg/L	0.020	N/A	0.015	0.010	8650683
Dissolved Hardness (CaCO3)	mg/L	102	N/A	302	0.50	8647536
Alkalinity (Total as CaCO3)	mg/L	109	N/A	303	0.50	8648415
Alkalinity (PP as CaCO3)	mg/L	<0.50	N/A	<0.50	0.50	8648415
Bicarbonate (HCO3)	mg/L	133	N/A	370	0.50	8648415
Carbonate (CO3)	mg/L	<0.50	N/A	<0.50	0.50	8648415
Hydroxide (OH)	mg/L	<0.50	N/A	<0.50	0.50	8648415
Anions						
Dissolved Sulphate (SO4)	mg/L	2.38	2.25	13.1	0.50	8649771
Dissolved Chloride (Cl)	mg/L	5.0	5.0	6.2	0.50	8649767
Nutrients						
Total Ammonia (N)	mg/L	0.025	N/A	0.031	0.0050	8652428
Nitrate plus Nitrite (N)	mg/L	0.254	N/A	0.530	0.020	8651015
Physical Properties						
Conductivity	uS/cm	223	N/A	590	1.0	8648412
pH	pH	8.27	N/A	8.21	N/A	8648404
RDL = Reportable Detection Limit Lab-Dup = Laboratory Initiated Duplicate N/A = Not Applicable						

Maxxam Job #: B742396
Report Date: 2017/06/08

GHD Limited
Client Project #: 56484-02 CAMPBELL RIVER
Site Location: CAMPBELL RIVER, BC
Your P.O. #: 73506861
Sampler Initials: MD

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		RE3502	RE3503	RE3503		
Sampling Date		2017/05/29 13:40	2017/05/29 14:00	2017/05/29 14:00		
COC Number		524971-01-01	524971-01-01	524971-01-01		
	UNITS	WG-56484-290517-CR-03	WG-56484-290517-CR-04	WG-56484-290517-CR-04 Lab-Dup	RDL	QC Batch
ANIONS						
Nitrite (N)	mg/L	0.0053	<0.0050	<0.0050	0.0050	8651016
Calculated Parameters						
Filter and HNO3 Preservation	N/A	FIELD	FIELD	N/A	N/A	ONSITE
Nitrate (N)	mg/L	0.112	0.062	N/A	0.020	8646677
Misc. Inorganics						
Fluoride (F)	mg/L	0.017	0.019	N/A	0.010	8650683
Dissolved Hardness (CaCO3)	mg/L	28.7	38.7	N/A	0.50	8647536
Alkalinity (Total as CaCO3)	mg/L	32.7	41.7	N/A	0.50	8648391
Alkalinity (PP as CaCO3)	mg/L	<0.50	<0.50	N/A	0.50	8648391
Bicarbonate (HCO3)	mg/L	39.9	50.8	N/A	0.50	8648391
Carbonate (CO3)	mg/L	<0.50	<0.50	N/A	0.50	8648391
Hydroxide (OH)	mg/L	<0.50	<0.50	N/A	0.50	8648391
Anions						
Dissolved Sulphate (SO4)	mg/L	2.81	2.87	N/A	0.50	8649771
Dissolved Chloride (Cl)	mg/L	1.3	1.1	N/A	0.50	8649767
Nutrients						
Total Ammonia (N)	mg/L	0.013	0.024	0.024	0.0050	8652428
Nitrate plus Nitrite (N)	mg/L	0.118	0.062	0.059	0.020	8651015
Physical Properties						
Conductivity	uS/cm	62.2	86.1	N/A	1.0	8648390
pH	pH	7.77	7.97	N/A	N/A	8648386
RDL = Reportable Detection Limit Lab-Dup = Laboratory Initiated Duplicate N/A = Not Applicable						

Maxxam Job #: B742396
Report Date: 2017/06/08

GHD Limited
Client Project #: 56484-02 CAMPBELL RIVER
Site Location: CAMPBELL RIVER, BC
Your P.O. #: 73506861
Sampler Initials: MD

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		RE3504		RE3505		
Sampling Date		2017/05/29 14:05		2017/05/29 14:25		
COC Number		524971-01-01		524971-01-01		
	UNITS	WG-56484-290517-CR-05	QC Batch	WG-56484-290517-CR-06	RDL	QC Batch
ANIONS						
Nitrite (N)	mg/L	<0.0050	8651016	<0.0050	0.0050	8651016
Calculated Parameters						
Filter and HNO3 Preservation	N/A	FIELD	ONSITE	LAB	N/A	8648381
Nitrate (N)	mg/L	<0.020	8646677	0.294	0.020	8646677
Misc. Inorganics						
Fluoride (F)	mg/L	<0.010	8651224	0.016	0.010	8651224
Dissolved Hardness (CaCO3)	mg/L	<0.50	8647536	106	0.50	8647536
Alkalinity (Total as CaCO3)	mg/L	<0.50	8648415	104	0.50	8648415
Alkalinity (PP as CaCO3)	mg/L	<0.50	8648415	0.63	0.50	8648415
Bicarbonate (HCO3)	mg/L	<0.50	8648415	125	0.50	8648415
Carbonate (CO3)	mg/L	<0.50	8648415	0.76	0.50	8648415
Hydroxide (OH)	mg/L	<0.50	8648415	<0.50	0.50	8648415
Anions						
Dissolved Sulphate (SO4)	mg/L	<0.50	8649771	3.23	0.50	8649771
Dissolved Chloride (Cl)	mg/L	<0.50	8649767	2.9	0.50	8652070
Nutrients						
Total Ammonia (N)	mg/L	<0.0050	8654745	0.032	0.0050	8652428
Nitrate plus Nitrite (N)	mg/L	<0.020	8651015	0.294	0.020	8651015
Physical Properties						
Conductivity	uS/cm	1.2	8648412	211	1.0	8648412
pH	pH	5.47	8648404	8.30	N/A	8648404
RDL = Reportable Detection Limit						
N/A = Not Applicable						

Maxxam Job #: B742396
Report Date: 2017/06/08

GHD Limited
Client Project #: 56484-02 CAMPBELL RIVER
Site Location: CAMPBELL RIVER, BC
Your P.O. #: 73506861
Sampler Initials: MD

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		RE3506	RE3506	RE3507		
Sampling Date		2017/05/29 15:30	2017/05/29 15:30	2017/05/29 16:30		
COC Number		524971-01-01	524971-01-01	524971-01-01		
	UNITS	WG-56484-290517-CR-07	WG-56484-290517-CR-07 Lab-Dup	WG-56484-290517-CR-08	RDL	QC Batch
ANIONS						
Nitrite (N)	mg/L	<0.0050	N/A	<0.0050	0.0050	8651016
Calculated Parameters						
Filter and HNO3 Preservation	N/A	FIELD	N/A	FIELD	N/A	ONSITE
Nitrate (N)	mg/L	0.306	N/A	0.153	0.020	8646677
Misc. Inorganics						
Fluoride (F)	mg/L	0.017	N/A	0.015	0.010	8650683
Dissolved Hardness (CaCO3)	mg/L	114	N/A	101	0.50	8647536
Alkalinity (Total as CaCO3)	mg/L	114	113	113	0.50	8648415
Alkalinity (PP as CaCO3)	mg/L	<0.50	<0.50	0.85	0.50	8648415
Bicarbonate (HCO3)	mg/L	139	138	136	0.50	8648415
Carbonate (CO3)	mg/L	<0.50	<0.50	1.02	0.50	8648415
Hydroxide (OH)	mg/L	<0.50	<0.50	<0.50	0.50	8648415
Anions						
Dissolved Sulphate (SO4)	mg/L	3.57	N/A	3.38	0.50	8649771
Dissolved Chloride (Cl)	mg/L	2.7	N/A	1.5	0.50	8649767
Nutrients						
Total Ammonia (N)	mg/L	0.022	N/A	0.023	0.0050	8652428
Nitrate plus Nitrite (N)	mg/L	0.306	N/A	0.153	0.020	8651015
Physical Properties						
Conductivity	uS/cm	230	229	219	1.0	8648412
pH	pH	8.27	8.29	8.32	N/A	8648404
RDL = Reportable Detection Limit Lab-Dup = Laboratory Initiated Duplicate N/A = Not Applicable						

Maxxam Job #: B742396
Report Date: 2017/06/08

GHD Limited
Client Project #: 56484-02 CAMPBELL RIVER
Site Location: CAMPBELL RIVER, BC
Your P.O. #: 73506861
Sampler Initials: MD

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		RE3508		RE3509	RE3509		
Sampling Date		2017/05/29 17:30		2017/05/30 09:00	2017/05/30 09:00		
COC Number		524971-01-01		524971-01-01	524971-01-01		
	UNITS	WG-56484-290517-CR-09	QC Batch	WG-56484-300517-CR-10	WG-56484-300517-CR-10 Lab-Dup	RDL	QC Batch
ANIONS							
Nitrite (N)	mg/L	<0.0050	8651016	<0.0050	N/A	0.0050	8651016
Calculated Parameters							
Filter and HNO ₃ Preservation	N/A	FIELD	ONSITE	FIELD	N/A	N/A	ONSITE
Nitrate (N)	mg/L	0.124	8646677	0.123	N/A	0.020	8646677
Misc. Inorganics							
Fluoride (F)	mg/L	0.017	8650683	0.014	0.015	0.010	8651224
Dissolved Hardness (CaCO ₃)	mg/L	44.0	8647536	108	N/A	0.50	8647536
Alkalinity (Total as CaCO ₃)	mg/L	47.6	8648415	115	N/A	0.50	8648415
Alkalinity (PP as CaCO ₃)	mg/L	<0.50	8648415	1.65	N/A	0.50	8648415
Bicarbonate (HCO ₃)	mg/L	58.0	8648415	136	N/A	0.50	8648415
Carbonate (CO ₃)	mg/L	<0.50	8648415	1.98	N/A	0.50	8648415
Hydroxide (OH)	mg/L	<0.50	8648415	<0.50	N/A	0.50	8648415
Anions							
Dissolved Sulphate (SO ₄)	mg/L	2.70	8649771	2.97	N/A	0.50	8649771
Dissolved Chloride (Cl)	mg/L	1.3	8649767	4.8	N/A	0.50	8649767
Nutrients							
Total Ammonia (N)	mg/L	0.013	8652428	0.011	N/A	0.0050	8652428
Nitrate plus Nitrite (N)	mg/L	0.124	8651015	0.123	N/A	0.020	8651015
Physical Properties							
Conductivity	uS/cm	94.7	8648412	235	N/A	1.0	8648412
pH	pH	7.98	8648404	8.34	N/A	N/A	8648404
RDL = Reportable Detection Limit							
Lab-Dup = Laboratory Initiated Duplicate							
N/A = Not Applicable							

Maxxam Job #: B742396
Report Date: 2017/06/08

GHD Limited
Client Project #: 56484-02 CAMPBELL RIVER
Site Location: CAMPBELL RIVER, BC
Your P.O. #: 73506861
Sampler Initials: MD

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		RE3510	RE3511		RE3512		
Sampling Date		2017/05/30 10:50	2017/05/30 10:55		2017/05/30 12:30		
COC Number		524971-02-01	524971-02-01		524971-02-01		
	UNITS	WG-56484-300517-CR-11	WG-56484-300517-CR-12	QC Batch	WG-56484-300517-CR-13	RDL	QC Batch
ANIONS							
Nitrite (N)	mg/L	<0.0050	<0.0050	8651013	0.0068	0.0050	8651016
Calculated Parameters							
Filter and HNO3 Preservation	N/A	FIELD	FIELD	ONSITE	FIELD	N/A	ONSITE
Nitrate (N)	mg/L	0.065	0.065	8646677	0.174	0.020	8646677
Misc. Inorganics							
Fluoride (F)	mg/L	0.016	0.016	8650683	0.021	0.010	8650683
Dissolved Hardness (CaCO3)	mg/L	44.4	45.8	8647536	52.5	0.50	8647536
Alkalinity (Total as CaCO3)	mg/L	45.9	44.1	8648391	52.3	0.50	8648415
Alkalinity (PP as CaCO3)	mg/L	<0.50	<0.50	8648391	<0.50	0.50	8648415
Bicarbonate (HCO3)	mg/L	56.0	53.7	8648391	63.9	0.50	8648415
Carbonate (CO3)	mg/L	<0.50	<0.50	8648391	<0.50	0.50	8648415
Hydroxide (OH)	mg/L	<0.50	<0.50	8648391	<0.50	0.50	8648415
Anions							
Dissolved Sulphate (SO4)	mg/L	3.12	3.14	8649764	2.07	0.50	8649771
Dissolved Chloride (Cl)	mg/L	2.9	2.9	8649759	6.6	0.50	8649767
Nutrients							
Total Ammonia (N)	mg/L	0.016	0.019	8652428	0.026	0.0050	8652428
Nitrate plus Nitrite (N)	mg/L	0.065	0.065	8651010	0.181	0.020	8651015
Physical Properties							
Conductivity	uS/cm	99.7	99.7	8648390	125	1.0	8648412
pH	pH	7.95	7.94	8648386	8.05	N/A	8648404
RDL = Reportable Detection Limit							
N/A = Not Applicable							

Maxxam Job #: B742396
Report Date: 2017/06/08

GHD Limited
Client Project #: 56484-02 CAMPBELL RIVER
Site Location: CAMPBELL RIVER, BC
Your P.O. #: 73506861
Sampler Initials: MD

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		RE3513		RE3514		
Sampling Date		2017/05/30 12:20		2017/05/30 13:15		
COC Number		524971-02-01		524971-02-01		
	UNITS	WG-56484-300517-CR-14	RDL	WG-56484-300517-CR-15	RDL	QC Batch
ANIONS						
Nitrite (N)	mg/L	<0.0050	0.0050	<0.0050	0.0050	8651016
Calculated Parameters						
Filter and HNO3 Preservation	N/A	FIELD	N/A	FIELD	N/A	ONSITE
Nitrate (N)	mg/L	0.377	0.020	0.049	0.020	8646677
Misc. Inorganics						
Fluoride (F)	mg/L	0.023	0.010	0.022	0.010	8650683
Dissolved Hardness (CaCO3)	mg/L	134	0.50	275	0.50	8647536
Alkalinity (Total as CaCO3)	mg/L	95.9	0.50	373	0.50	8648391
Alkalinity (PP as CaCO3)	mg/L	<0.50	0.50	<0.50	0.50	8648391
Bicarbonate (HCO3)	mg/L	117	0.50	455	0.50	8648391
Carbonate (CO3)	mg/L	<0.50	0.50	<0.50	0.50	8648391
Hydroxide (OH)	mg/L	<0.50	0.50	<0.50	0.50	8648391
Anions						
Dissolved Sulphate (SO4)	mg/L	3.27	0.50	<0.50	0.50	8649764
Dissolved Chloride (Cl)	mg/L	37	0.50	51	0.50	8649759
Nutrients						
Total Ammonia (N)	mg/L	0.026	0.0050	15 (1)	0.10	8652428
Nitrate plus Nitrite (N)	mg/L	0.377	0.020	0.049	0.020	8651015
Physical Properties						
Conductivity	uS/cm	321	1.0	867	1.0	8648390
pH	pH	8.16	N/A	7.94	N/A	8648386
RDL = Reportable Detection Limit						
N/A = Not Applicable						
(1) Detection limits raised due to dilution to bring analyte within the calibrated range.						

Maxxam Job #: B742396
Report Date: 2017/06/08

GHD Limited
Client Project #: 56484-02 CAMPBELL RIVER
Site Location: CAMPBELL RIVER, BC
Your P.O. #: 73506861
Sampler Initials: MD

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		RE3515			RE3516		
Sampling Date		2017/05/30 13:20			2017/05/30 14:00		
COC Number		524971-02-01			524971-02-01		
	UNITS	WG-56484-300517-CR-16	RDL	QC Batch	WG-56484-300517-CR-17	RDL	QC Batch
ANIONS							
Nitrite (N)	mg/L	<0.0050	0.0050	8651016	<0.0050	0.0050	8651013
Calculated Parameters							
Filter and HNO3 Preservation	N/A	FIELD	N/A	ONSITE	FIELD	N/A	ONSITE
Nitrate (N)	mg/L	<0.020	0.020	8646677	<0.020	0.020	8646677
Misc. Inorganics							
Fluoride (F)	mg/L	0.021	0.010	8650683	0.017	0.010	8650683
Dissolved Hardness (CaCO3)	mg/L	272	0.50	8647536	508	0.50	8647536
Alkalinity (Total as CaCO3)	mg/L	372	0.50	8648391	610	0.50	8648391
Alkalinity (PP as CaCO3)	mg/L	<0.50	0.50	8648391	<0.50	0.50	8648391
Bicarbonate (HCO3)	mg/L	454	0.50	8648391	745	0.50	8648391
Carbonate (CO3)	mg/L	<0.50	0.50	8648391	<0.50	0.50	8648391
Hydroxide (OH)	mg/L	<0.50	0.50	8648391	<0.50	0.50	8648391
Anions							
Dissolved Sulphate (SO4)	mg/L	<0.50	0.50	8649764	2.09	0.50	8649764
Dissolved Chloride (Cl)	mg/L	51	0.50	8649759	56	0.50	8649759
Nutrients							
Total Ammonia (N)	mg/L	16 (1)	0.25	8652426	5.3 (1)	0.050	8652428
Nitrate plus Nitrite (N)	mg/L	<0.020	0.020	8651015	<0.020	0.020	8651010
Physical Properties							
Conductivity	uS/cm	866	1.0	8648390	1250	1.0	8648390
pH	pH	8.03	N/A	8648386	7.46	N/A	8648386
RDL = Reportable Detection Limit							
N/A = Not Applicable							
(1) Detection limits raised due to dilution to bring analyte within the calibrated range.							

Maxxam Job #: B742396
Report Date: 2017/06/08

GHD Limited
Client Project #: 56484-02 CAMPBELL RIVER
Site Location: CAMPBELL RIVER, BC
Your P.O. #: 73506861
Sampler Initials: MD

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		RE3517			RE3518		
Sampling Date		2017/05/30 14:10			2017/05/30 15:10		
COC Number		524971-02-01			524971-02-01		
	UNITS	WG-56484-300517-CR-18	RDL	QC Batch	WG-56484-300517-CR-19	RDL	QC Batch
ANIONS							
Nitrite (N)	mg/L	<0.0050	0.0050	8651013	<0.0050	0.0050	8651016
Calculated Parameters							
Filter and HNO3 Preservation	N/A	FIELD	N/A	ONSITE	FIELD	N/A	ONSITE
Nitrate (N)	mg/L	0.057	0.020	8646677	3.21	0.10	8646677
Misc. Inorganics							
Fluoride (F)	mg/L	0.017	0.010	8650683	0.015	0.010	8650683
Dissolved Hardness (CaCO3)	mg/L	199	0.50	8647536	321	0.50	8647536
Alkalinity (Total as CaCO3)	mg/L	223	0.50	8648391	329	0.50	8648391
Alkalinity (PP as CaCO3)	mg/L	<0.50	0.50	8648391	<0.50	0.50	8648391
Bicarbonate (HCO3)	mg/L	272	0.50	8648391	402	0.50	8648391
Carbonate (CO3)	mg/L	<0.50	0.50	8648391	<0.50	0.50	8648391
Hydroxide (OH)	mg/L	<0.50	0.50	8648391	<0.50	0.50	8648391
Anions							
Dissolved Sulphate (SO4)	mg/L	1.03	0.50	8653449	13.6	0.50	8649764
Dissolved Chloride (Cl)	mg/L	17	0.50	8649759	19	0.50	8649759
Nutrients							
Total Ammonia (N)	mg/L	2.8 (1)	0.050	8652428	0.025	0.0050	8652426
Nitrate plus Nitrite (N)	mg/L	0.057	0.020	8651010	3.21 (1)	0.10	8651015
Physical Properties							
Conductivity	uS/cm	478	1.0	8648390	696	1.0	8648390
pH	pH	7.89	N/A	8648386	8.06	N/A	8648386
RDL = Reportable Detection Limit							
N/A = Not Applicable							
(1) Detection limits raised due to dilution to bring analyte within the calibrated range.							

Maxxam Job #: B742396
Report Date: 2017/06/08

GHD Limited
Client Project #: 56484-02 CAMPBELL RIVER
Site Location: CAMPBELL RIVER, BC
Your P.O. #: 73506861
Sampler Initials: MD

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		RE3519		RE3520		
Sampling Date		2017/05/30 15:30		2017/05/30 16:00		
COC Number		524971-02-01		524971-02-01		
	UNITS	WG-56484-300517-CR-20	RDL	WG-56484-300517-CR-21	RDL	QC Batch
ANIONS						
Nitrite (N)	mg/L	<0.0050	0.0050	0.0055	0.0050	8651013
Calculated Parameters						
Filter and HNO3 Preservation	N/A	FIELD	N/A	FIELD	N/A	ONSITE
Nitrate (N)	mg/L	2.66	0.10	1.96	0.020	8646677
Misc. Inorganics						
Fluoride (F)	mg/L	0.013	0.010	0.018	0.010	8650683
Dissolved Hardness (CaCO3)	mg/L	363	0.50	161	0.50	8647536
Alkalinity (Total as CaCO3)	mg/L	361	0.50	154	0.50	8648391
Alkalinity (PP as CaCO3)	mg/L	<0.50	0.50	<0.50	0.50	8648391
Bicarbonate (HCO3)	mg/L	441	0.50	188	0.50	8648391
Carbonate (CO3)	mg/L	<0.50	0.50	<0.50	0.50	8648391
Hydroxide (OH)	mg/L	<0.50	0.50	<0.50	0.50	8648391
Anions						
Dissolved Sulphate (SO4)	mg/L	10.9	0.50	14.7	0.50	8649764
Dissolved Chloride (Cl)	mg/L	7.6	0.50	4.9	0.50	8649759
Nutrients						
Total Ammonia (N)	mg/L	0.022	0.0050	0.019	0.0050	8652426
Nitrate plus Nitrite (N)	mg/L	2.66 (1)	0.10	1.96	0.020	8651010
Physical Properties						
Conductivity	uS/cm	699	1.0	345	1.0	8648390
pH	pH	8.13	N/A	8.25	N/A	8648386
RDL = Reportable Detection Limit						
N/A = Not Applicable						
(1) Detection limits raised due to dilution to bring analyte within the calibrated range.						

Maxxam Job #: B742396
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GHD Limited
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Site Location: CAMPBELL RIVER, BC
Your P.O. #: 73506861
Sampler Initials: MD

MERCURY BY COLD VAPOR (WATER)

Maxxam ID		RE3500	RE3500	RE3501		
Sampling Date		2017/05/29 12:00	2017/05/29 12:00	2017/05/29 13:00		
COC Number		524971-01-01	524971-01-01	524971-01-01		
	UNITS	WG-56484-290517-CR-01	WG-56484-290517-CR-01 Lab-Dup	WG-56484-290517-CR-02	RDL	QC Batch

Elements

Dissolved Mercury (Hg)	ug/L	<0.010	<0.010	<0.010	0.010	8653345

RDL = Reportable Detection Limit

Lab-Dup = Laboratory Initiated Duplicate

Maxxam ID		RE3502	RE3503	RE3504		
Sampling Date		2017/05/29 13:40	2017/05/29 14:00	2017/05/29 14:05		
COC Number		524971-01-01	524971-01-01	524971-01-01		
	UNITS	WG-56484-290517-CR-03	WG-56484-290517-CR-04	WG-56484-290517-CR-05	RDL	QC Batch

Elements

Dissolved Mercury (Hg)	ug/L	<0.010	<0.010	<0.010	0.010	8653345

RDL = Reportable Detection Limit

Maxxam ID		RE3505	RE3506	RE3507		
Sampling Date		2017/05/29 14:25	2017/05/29 15:30	2017/05/29 16:30		
COC Number		524971-01-01	524971-01-01	524971-01-01		
	UNITS	WG-56484-290517-CR-06	WG-56484-290517-CR-07	WG-56484-290517-CR-08	RDL	QC Batch

Elements

Dissolved Mercury (Hg)	ug/L	<0.010	<0.010	<0.010	0.010	8653345

RDL = Reportable Detection Limit

Maxxam ID		RE3508	RE3509	RE3510		
Sampling Date		2017/05/29 17:30	2017/05/30 09:00	2017/05/30 10:50		
COC Number		524971-01-01	524971-01-01	524971-02-01		
	UNITS	WG-56484-290517-CR-09	WG-56484-300517-CR-10	WG-56484-300517-CR-11	RDL	QC Batch

Elements

Dissolved Mercury (Hg)	ug/L	<0.010	<0.010	<0.010	0.010	8653345

RDL = Reportable Detection Limit

Maxxam Job #: B742396
Report Date: 2017/06/08

GHD Limited
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Your P.O. #: 73506861
Sampler Initials: MD

MERCURY BY COLD VAPOR (WATER)

Maxxam ID		RE3511	RE3512	RE3513		
Sampling Date		2017/05/30 10:55	2017/05/30 12:30	2017/05/30 12:20		
COC Number		524971-02-01	524971-02-01	524971-02-01		
	UNITS	WG-56484-300517-CR-12	WG-56484-300517-CR-13	WG-56484-300517-CR-14	RDL	QC Batch

Elements						
Dissolved Mercury (Hg)	ug/L	<0.010	<0.010	<0.010	0.010	8653345
RDL = Reportable Detection Limit						

Maxxam ID		RE3514	RE3515	RE3516		
Sampling Date		2017/05/30 13:15	2017/05/30 13:20	2017/05/30 14:00		
COC Number		524971-02-01	524971-02-01	524971-02-01		
	UNITS	WG-56484-300517-CR-15	WG-56484-300517-CR-16	WG-56484-300517-CR-17	RDL	QC Batch

Elements						
Dissolved Mercury (Hg)	ug/L	<0.010	<0.010	<0.010	0.010	8653345
RDL = Reportable Detection Limit						

Maxxam ID		RE3517	RE3518	RE3519		
Sampling Date		2017/05/30 14:10	2017/05/30 15:10	2017/05/30 15:30		
COC Number		524971-02-01	524971-02-01	524971-02-01		
	UNITS	WG-56484-300517-CR-18	WG-56484-300517-CR-19	WG-56484-300517-CR-20	RDL	QC Batch

Elements						
Dissolved Mercury (Hg)	ug/L	<0.010	<0.010	<0.010	0.010	8653345
RDL = Reportable Detection Limit						

Maxxam ID		RE3520		
Sampling Date		2017/05/30 16:00		
COC Number		524971-02-01		
	UNITS	WG-56484-300517-CR-21	RDL	QC Batch

Elements				
Dissolved Mercury (Hg)	ug/L	<0.010	0.010	8653544
RDL = Reportable Detection Limit				

Maxxam Job #: B742396
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GHD Limited
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Site Location: CAMPBELL RIVER, BC
Your P.O. #: 73506861
Sampler Initials: MD

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		RE3500	RE3500	RE3501		
Sampling Date		2017/05/29 12:00	2017/05/29 12:00	2017/05/29 13:00		
COC Number		524971-01-01	524971-01-01	524971-01-01		
	UNITS	WG-56484-290517-CR-01	WG-56484-290517-CR-01 Lab-Dup	WG-56484-290517-CR-02	RDL	QC Batch
Dissolved Metals by ICPMS						
Dissolved Aluminum (Al)	ug/L	7.8	8.2	<3.0	3.0	8648994
Dissolved Antimony (Sb)	ug/L	<0.50	<0.50	<0.50	0.50	8648994
Dissolved Arsenic (As)	ug/L	0.14	0.13	<0.10	0.10	8648994
Dissolved Barium (Ba)	ug/L	5.3	5.3	10.7	1.0	8648994
Dissolved Beryllium (Be)	ug/L	<0.10	<0.10	<0.10	0.10	8648994
Dissolved Bismuth (Bi)	ug/L	<1.0	<1.0	<1.0	1.0	8648994
Dissolved Boron (B)	ug/L	<50	<50	<50	50	8648994
Dissolved Cadmium (Cd)	ug/L	<0.010	<0.010	<0.010	0.010	8648994
Dissolved Chromium (Cr)	ug/L	2.3	2.4	<1.0	1.0	8648994
Dissolved Cobalt (Co)	ug/L	<0.20	<0.20	<0.20	0.20	8648994
Dissolved Copper (Cu)	ug/L	<0.20	<0.20	0.22	0.20	8648994
Dissolved Iron (Fe)	ug/L	<5.0	<5.0	<5.0	5.0	8648994
Dissolved Lead (Pb)	ug/L	<0.20	<0.20	<0.20	0.20	8648994
Dissolved Lithium (Li)	ug/L	<2.0	<2.0	<2.0	2.0	8648994
Dissolved Manganese (Mn)	ug/L	<1.0	<1.0	<1.0	1.0	8648994
Dissolved Molybdenum (Mo)	ug/L	<1.0	<1.0	<1.0	1.0	8648994
Dissolved Nickel (Ni)	ug/L	<1.0	<1.0	<1.0	1.0	8648994
Dissolved Phosphorus (P)	ug/L	<10	<10	<10	10	8648994
Dissolved Selenium (Se)	ug/L	0.14	0.13	0.11	0.10	8648994
Dissolved Silicon (Si)	ug/L	8630	8630	8020	100	8648994
Dissolved Silver (Ag)	ug/L	<0.020	<0.020	<0.020	0.020	8648994
Dissolved Strontium (Sr)	ug/L	58.8	57.7	218	1.0	8648994
Dissolved Thallium (Tl)	ug/L	<0.010	<0.010	<0.010	0.010	8648994
Dissolved Tin (Sn)	ug/L	<5.0	<5.0	<5.0	5.0	8648994
Dissolved Titanium (Ti)	ug/L	<5.0	<5.0	<5.0	5.0	8648994
Dissolved Uranium (U)	ug/L	0.15	0.14	0.26	0.10	8648994
Dissolved Vanadium (V)	ug/L	<5.0	<5.0	<5.0	5.0	8648994
Dissolved Zinc (Zn)	ug/L	<5.0	<5.0	<5.0	5.0	8648994
Dissolved Zirconium (Zr)	ug/L	<0.10	<0.10	<0.10	0.10	8648994
RDL = Reportable Detection Limit						
Lab-Dup = Laboratory Initiated Duplicate						

Maxxam Job #: B742396
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GHD Limited
Client Project #: 56484-02 CAMPBELL RIVER
Site Location: CAMPBELL RIVER, BC
Your P.O. #: 73506861
Sampler Initials: MD

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		RE3500	RE3500	RE3501		
Sampling Date		2017/05/29 12:00	2017/05/29 12:00	2017/05/29 13:00		
COC Number		524971-01-01	524971-01-01	524971-01-01		
	UNITS	WG-56484-290517-CR-01	WG-56484-290517-CR-01 Lab-Dup	WG-56484-290517-CR-02	RDL	QC Batch
Dissolved Calcium (Ca)	mg/L	27.0	N/A	101	0.050	8646941
Dissolved Magnesium (Mg)	mg/L	8.49	N/A	12.1	0.050	8646941
Dissolved Potassium (K)	mg/L	0.407	N/A	0.950	0.050	8646941
Dissolved Sodium (Na)	mg/L	3.81	N/A	3.38	0.050	8646941
Dissolved Sulphur (S)	mg/L	<3.0	N/A	4.9	3.0	8646941
RDL = Reportable Detection Limit Lab-Dup = Laboratory Initiated Duplicate N/A = Not Applicable						

Maxxam Job #: B742396
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GHD Limited
Client Project #: 56484-02 CAMPBELL RIVER
Site Location: CAMPBELL RIVER, BC
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Sampler Initials: MD

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		RE3502	RE3503	RE3504		
Sampling Date		2017/05/29 13:40	2017/05/29 14:00	2017/05/29 14:05		
COC Number		524971-01-01	524971-01-01	524971-01-01		
	UNITS	WG-56484-290517-CR-03	WG-56484-290517-CR-04	WG-56484-290517-CR-05	RDL	QC Batch
Dissolved Metals by ICPMS						
Dissolved Aluminum (Al)	ug/L	6.0	8.4	3.6	3.0	8648994
Dissolved Antimony (Sb)	ug/L	<0.50	<0.50	<0.50	0.50	8648994
Dissolved Arsenic (As)	ug/L	0.11	0.79	<0.10	0.10	8648994
Dissolved Barium (Ba)	ug/L	2.1	<1.0	<1.0	1.0	8648994
Dissolved Beryllium (Be)	ug/L	<0.10	<0.10	<0.10	0.10	8648994
Dissolved Bismuth (Bi)	ug/L	<1.0	<1.0	<1.0	1.0	8648994
Dissolved Boron (B)	ug/L	<50	<50	<50	50	8648994
Dissolved Cadmium (Cd)	ug/L	<0.010	<0.010	<0.010	0.010	8648994
Dissolved Chromium (Cr)	ug/L	<1.0	<1.0	<1.0	1.0	8648994
Dissolved Cobalt (Co)	ug/L	<0.20	<0.20	<0.20	0.20	8648994
Dissolved Copper (Cu)	ug/L	0.45	0.91	<0.20	0.20	8648994
Dissolved Iron (Fe)	ug/L	<5.0	<5.0	<5.0	5.0	8648994
Dissolved Lead (Pb)	ug/L	<0.20	<0.20	<0.20	0.20	8648994
Dissolved Lithium (Li)	ug/L	<2.0	<2.0	<2.0	2.0	8648994
Dissolved Manganese (Mn)	ug/L	<1.0	<1.0	<1.0	1.0	8648994
Dissolved Molybdenum (Mo)	ug/L	<1.0	<1.0	<1.0	1.0	8648994
Dissolved Nickel (Ni)	ug/L	<1.0	<1.0	<1.0	1.0	8648994
Dissolved Phosphorus (P)	ug/L	<10	16	<10	10	8648994
Dissolved Selenium (Se)	ug/L	<0.10	0.14	<0.10	0.10	8648994
Dissolved Silicon (Si)	ug/L	4020	6220	<100	100	8648994
Dissolved Silver (Ag)	ug/L	<0.020	<0.020	<0.020	0.020	8648994
Dissolved Strontium (Sr)	ug/L	12.5	19.9	<1.0	1.0	8648994
Dissolved Thallium (Tl)	ug/L	<0.010	<0.010	<0.010	0.010	8648994
Dissolved Tin (Sn)	ug/L	<5.0	<5.0	<5.0	5.0	8648994
Dissolved Titanium (Ti)	ug/L	<5.0	<5.0	<5.0	5.0	8648994
Dissolved Uranium (U)	ug/L	<0.10	<0.10	<0.10	0.10	8648994
Dissolved Vanadium (V)	ug/L	<5.0	5.7	<5.0	5.0	8648994
Dissolved Zinc (Zn)	ug/L	<5.0	6.7	<5.0	5.0	8648994
Dissolved Zirconium (Zr)	ug/L	<0.10	<0.10	<0.10	0.10	8648994
Dissolved Calcium (Ca)	mg/L	9.29	12.1	<0.050	0.050	8646941
RDL = Reportable Detection Limit						

Maxxam Job #: B742396
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GHD Limited
Client Project #: 56484-02 CAMPBELL RIVER
Site Location: CAMPBELL RIVER, BC
Your P.O. #: 73506861
Sampler Initials: MD

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		RE3502	RE3503	RE3504		
Sampling Date		2017/05/29 13:40	2017/05/29 14:00	2017/05/29 14:05		
COC Number		524971-01-01	524971-01-01	524971-01-01		
	UNITS	WG-56484-290517-CR-03	WG-56484-290517-CR-04	WG-56484-290517-CR-05	RDL	QC Batch
Dissolved Magnesium (Mg)	mg/L	1.34	2.08	<0.050	0.050	8646941
Dissolved Potassium (K)	mg/L	0.159	0.300	<0.050	0.050	8646941
Dissolved Sodium (Na)	mg/L	1.03	1.41	<0.050	0.050	8646941
Dissolved Sulphur (S)	mg/L	<3.0	<3.0	<3.0	3.0	8646941
RDL = Reportable Detection Limit						

Maxxam Job #: B742396
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GHD Limited
Client Project #: 56484-02 CAMPBELL RIVER
Site Location: CAMPBELL RIVER, BC
Your P.O. #: 73506861
Sampler Initials: MD

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		RE3505		RE3506	RE3507		
Sampling Date		2017/05/29 14:25		2017/05/29 15:30	2017/05/29 16:30		
COC Number		524971-01-01		524971-01-01	524971-01-01		
	UNITS	WG-56484-290517-CR-06	QC Batch	WG-56484-290517-CR-07	WG-56484-290517-CR-08	RDL	QC Batch

Dissolved Metals by ICPMS							
Dissolved Aluminum (Al)	ug/L	3.6	8649559	6.8	9.6	3.0	8648994
Dissolved Antimony (Sb)	ug/L	<0.50	8649559	<0.50	<0.50	0.50	8648994
Dissolved Arsenic (As)	ug/L	0.25	8649559	0.80	2.10	0.10	8648994
Dissolved Barium (Ba)	ug/L	2.5	8649559	2.2	5.2	1.0	8648994
Dissolved Beryllium (Be)	ug/L	<0.10	8649559	<0.10	<0.10	0.10	8648994
Dissolved Bismuth (Bi)	ug/L	<1.0	8649559	<1.0	<1.0	1.0	8648994
Dissolved Boron (B)	ug/L	<50	8649559	<50	<50	50	8648994
Dissolved Cadmium (Cd)	ug/L	<0.010	8649559	<0.010	0.021	0.010	8648994
Dissolved Chromium (Cr)	ug/L	<1.0	8649559	<1.0	<1.0	1.0	8648994
Dissolved Cobalt (Co)	ug/L	<0.20	8649559	<0.20	<0.20	0.20	8648994
Dissolved Copper (Cu)	ug/L	0.22	8649559	0.66	0.35	0.20	8648994
Dissolved Iron (Fe)	ug/L	6.3	8649559	<5.0	<5.0	5.0	8648994
Dissolved Lead (Pb)	ug/L	<0.20	8649559	<0.20	<0.20	0.20	8648994
Dissolved Lithium (Li)	ug/L	<2.0	8649559	<2.0	<2.0	2.0	8648994
Dissolved Manganese (Mn)	ug/L	<1.0	8649559	<1.0	<1.0	1.0	8648994
Dissolved Molybdenum (Mo)	ug/L	<1.0	8649559	<1.0	<1.0	1.0	8648994
Dissolved Nickel (Ni)	ug/L	<1.0	8649559	<1.0	<1.0	1.0	8648994
Dissolved Phosphorus (P)	ug/L	<10	8649559	15	53	10	8648994
Dissolved Selenium (Se)	ug/L	0.11	8649559	0.12	0.17	0.10	8648994
Dissolved Silicon (Si)	ug/L	6780	8649559	6900	5630	100	8648994
Dissolved Silver (Ag)	ug/L	<0.020	8649559	<0.020	<0.020	0.020	8648994
Dissolved Strontium (Sr)	ug/L	62.1	8649559	59.7	44.2	1.0	8648994
Dissolved Thallium (Tl)	ug/L	<0.010	8649559	<0.010	<0.010	0.010	8648994
Dissolved Tin (Sn)	ug/L	<5.0	8649559	<5.0	<5.0	5.0	8648994
Dissolved Titanium (Ti)	ug/L	<5.0	8649559	<5.0	<5.0	5.0	8648994
Dissolved Uranium (U)	ug/L	<0.10	8649559	<0.10	0.35	0.10	8648994
Dissolved Vanadium (V)	ug/L	<5.0	8649559	5.3	17.8	5.0	8648994
Dissolved Zinc (Zn)	ug/L	<5.0	8649559	<5.0	<5.0	5.0	8648994
Dissolved Zirconium (Zr)	ug/L	<0.10	8649559	<0.10	<0.10	0.10	8648994
Dissolved Calcium (Ca)	mg/L	35.9	8646941	36.8	32.3	0.050	8646941

RDL = Reportable Detection Limit

Maxxam Job #: B742396
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GHD Limited
Client Project #: 56484-02 CAMPBELL RIVER
Site Location: CAMPBELL RIVER, BC
Your P.O. #: 73506861
Sampler Initials: MD

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		RE3505		RE3506	RE3507		
Sampling Date		2017/05/29 14:25		2017/05/29 15:30	2017/05/29 16:30		
COC Number		524971-01-01		524971-01-01	524971-01-01		
	UNITS	WG-56484-290517-CR-06	QC Batch	WG-56484-290517-CR-07	WG-56484-290517-CR-08	RDL	QC Batch
Dissolved Magnesium (Mg)	mg/L	4.11	8646941	5.30	4.95	0.050	8646941
Dissolved Potassium (K)	mg/L	0.647	8646941	0.797	1.26	0.050	8646941
Dissolved Sodium (Na)	mg/L	2.06	8646941	1.89	1.60	0.050	8646941
Dissolved Sulphur (S)	mg/L	<3.0	8646941	<3.0	<3.0	3.0	8646941
RDL = Reportable Detection Limit							

Maxxam Job #: B742396
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GHD Limited
Client Project #: 56484-02 CAMPBELL RIVER
Site Location: CAMPBELL RIVER, BC
Your P.O. #: 73506861
Sampler Initials: MD

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		RE3508	RE3509	RE3510		
Sampling Date		2017/05/29 17:30	2017/05/30 09:00	2017/05/30 10:50		
COC Number		524971-01-01	524971-01-01	524971-02-01		
	UNITS	WG-56484-290517-CR-09	WG-56484-300517-CR-10	WG-56484-300517-CR-11	RDL	QC Batch
Dissolved Metals by ICPMS						
Dissolved Aluminum (Al)	ug/L	7.1	6.0	<3.0	3.0	8648994
Dissolved Antimony (Sb)	ug/L	<0.50	<0.50	<0.50	0.50	8648994
Dissolved Arsenic (As)	ug/L	0.49	0.44	0.20	0.10	8648994
Dissolved Barium (Ba)	ug/L	<1.0	1.7	<1.0	1.0	8648994
Dissolved Beryllium (Be)	ug/L	<0.10	<0.10	<0.10	0.10	8648994
Dissolved Bismuth (Bi)	ug/L	<1.0	<1.0	<1.0	1.0	8648994
Dissolved Boron (B)	ug/L	<50	69	<50	50	8648994
Dissolved Cadmium (Cd)	ug/L	<0.010	<0.010	<0.010	0.010	8648994
Dissolved Chromium (Cr)	ug/L	<1.0	<1.0	<1.0	1.0	8648994
Dissolved Cobalt (Co)	ug/L	<0.20	<0.20	<0.20	0.20	8648994
Dissolved Copper (Cu)	ug/L	0.39	2.07	<0.20	0.20	8648994
Dissolved Iron (Fe)	ug/L	<5.0	<5.0	<5.0	5.0	8648994
Dissolved Lead (Pb)	ug/L	<0.20	<0.20	<0.20	0.20	8648994
Dissolved Lithium (Li)	ug/L	<2.0	<2.0	<2.0	2.0	8648994
Dissolved Manganese (Mn)	ug/L	<1.0	<1.0	<1.0	1.0	8648994
Dissolved Molybdenum (Mo)	ug/L	<1.0	<1.0	<1.0	1.0	8648994
Dissolved Nickel (Ni)	ug/L	<1.0	<1.0	<1.0	1.0	8648994
Dissolved Phosphorus (P)	ug/L	<10	<10	26	10	8648994
Dissolved Selenium (Se)	ug/L	<0.10	<0.10	0.14	0.10	8648994
Dissolved Silicon (Si)	ug/L	4190	4930	4630	100	8648994
Dissolved Silver (Ag)	ug/L	<0.020	<0.020	<0.020	0.020	8648994
Dissolved Strontium (Sr)	ug/L	24.1	62.6	24.5	1.0	8648994
Dissolved Thallium (Tl)	ug/L	<0.010	<0.010	<0.010	0.010	8648994
Dissolved Tin (Sn)	ug/L	<5.0	<5.0	<5.0	5.0	8648994
Dissolved Titanium (Ti)	ug/L	<5.0	<5.0	<5.0	5.0	8648994
Dissolved Uranium (U)	ug/L	<0.10	0.15	<0.10	0.10	8648994
Dissolved Vanadium (V)	ug/L	<5.0	<5.0	<5.0	5.0	8648994
Dissolved Zinc (Zn)	ug/L	<5.0	<5.0	<5.0	5.0	8648994
Dissolved Zirconium (Zr)	ug/L	<0.10	<0.10	<0.10	0.10	8648994
Dissolved Calcium (Ca)	mg/L	15.0	36.1	14.1	0.050	8646941
RDL = Reportable Detection Limit						

Maxxam Job #: B742396
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GHD Limited
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Site Location: CAMPBELL RIVER, BC
Your P.O. #: 73506861
Sampler Initials: MD

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		RE3508	RE3509	RE3510		
Sampling Date		2017/05/29 17:30	2017/05/30 09:00	2017/05/30 10:50		
COC Number		524971-01-01	524971-01-01	524971-02-01		
	UNITS	WG-56484-290517-CR-09	WG-56484-300517-CR-10	WG-56484-300517-CR-11	RDL	QC Batch
Dissolved Magnesium (Mg)	mg/L	1.61	4.40	2.25	0.050	8646941
Dissolved Potassium (K)	mg/L	0.313	0.604	0.253	0.050	8646941
Dissolved Sodium (Na)	mg/L	1.34	2.52	1.40	0.050	8646941
Dissolved Sulphur (S)	mg/L	<3.0	<3.0	<3.0	3.0	8646941
RDL = Reportable Detection Limit						

Maxxam Job #: B742396
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GHD Limited
Client Project #: 56484-02 CAMPBELL RIVER
Site Location: CAMPBELL RIVER, BC
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Sampler Initials: MD

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		RE3511	RE3512	RE3513		
Sampling Date		2017/05/30 10:55	2017/05/30 12:30	2017/05/30 12:20		
COC Number		524971-02-01	524971-02-01	524971-02-01		
	UNITS	WG-56484-300517-CR-12	WG-56484-300517-CR-13	WG-56484-300517-CR-14	RDL	QC Batch
Dissolved Metals by ICPMS						
Dissolved Aluminum (Al)	ug/L	<3.0	10.4	5.6	3.0	8648994
Dissolved Antimony (Sb)	ug/L	<0.50	<0.50	<0.50	0.50	8648994
Dissolved Arsenic (As)	ug/L	0.21	1.98	<0.10	0.10	8648994
Dissolved Barium (Ba)	ug/L	<1.0	1.5	2.3	1.0	8648994
Dissolved Beryllium (Be)	ug/L	<0.10	<0.10	<0.10	0.10	8648994
Dissolved Bismuth (Bi)	ug/L	<1.0	<1.0	<1.0	1.0	8648994
Dissolved Boron (B)	ug/L	<50	<50	<50	50	8648994
Dissolved Cadmium (Cd)	ug/L	<0.010	<0.010	0.032	0.010	8648994
Dissolved Chromium (Cr)	ug/L	<1.0	1.6	<1.0	1.0	8648994
Dissolved Cobalt (Co)	ug/L	<0.20	<0.20	<0.20	0.20	8648994
Dissolved Copper (Cu)	ug/L	<0.20	0.27	0.28	0.20	8648994
Dissolved Iron (Fe)	ug/L	<5.0	<5.0	<5.0	5.0	8648994
Dissolved Lead (Pb)	ug/L	<0.20	<0.20	<0.20	0.20	8648994
Dissolved Lithium (Li)	ug/L	<2.0	<2.0	<2.0	2.0	8648994
Dissolved Manganese (Mn)	ug/L	<1.0	<1.0	<1.0	1.0	8648994
Dissolved Molybdenum (Mo)	ug/L	<1.0	<1.0	<1.0	1.0	8648994
Dissolved Nickel (Ni)	ug/L	<1.0	<1.0	<1.0	1.0	8648994
Dissolved Phosphorus (P)	ug/L	28	51	27	10	8648994
Dissolved Selenium (Se)	ug/L	0.15	0.22	0.16	0.10	8648994
Dissolved Silicon (Si)	ug/L	4560	6310	4940	100	8648994
Dissolved Silver (Ag)	ug/L	<0.020	<0.020	<0.020	0.020	8648994
Dissolved Strontium (Sr)	ug/L	24.7	29.4	112	1.0	8648994
Dissolved Thallium (Tl)	ug/L	<0.010	<0.010	<0.010	0.010	8648994
Dissolved Tin (Sn)	ug/L	<5.0	<5.0	<5.0	5.0	8648994
Dissolved Titanium (Ti)	ug/L	<5.0	<5.0	<5.0	5.0	8648994
Dissolved Uranium (U)	ug/L	<0.10	0.29	0.15	0.10	8648994
Dissolved Vanadium (V)	ug/L	<5.0	16.8	<5.0	5.0	8648994
Dissolved Zinc (Zn)	ug/L	<5.0	<5.0	<5.0	5.0	8648994
Dissolved Zirconium (Zr)	ug/L	<0.10	<0.10	<0.10	0.10	8648994
Dissolved Calcium (Ca)	mg/L	14.5	16.0	41.4	0.050	8646941
RDL = Reportable Detection Limit						

Maxxam Job #: B742396
Report Date: 2017/06/08

GHD Limited
Client Project #: 56484-02 CAMPBELL RIVER
Site Location: CAMPBELL RIVER, BC
Your P.O. #: 73506861
Sampler Initials: MD

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		RE3511	RE3512	RE3513		
Sampling Date		2017/05/30 10:55	2017/05/30 12:30	2017/05/30 12:20		
COC Number		524971-02-01	524971-02-01	524971-02-01		
	UNITS	WG-56484-300517-CR-12	WG-56484-300517-CR-13	WG-56484-300517-CR-14	RDL	QC Batch
Dissolved Magnesium (Mg)	mg/L	2.32	3.02	7.38	0.050	8646941
Dissolved Potassium (K)	mg/L	0.254	0.866	0.450	0.050	8646941
Dissolved Sodium (Na)	mg/L	1.41	2.68	3.55	0.050	8646941
Dissolved Sulphur (S)	mg/L	<3.0	<3.0	<3.0	3.0	8646941
RDL = Reportable Detection Limit						

Maxxam Job #: B742396
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GHD Limited
Client Project #: 56484-02 CAMPBELL RIVER
Site Location: CAMPBELL RIVER, BC
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Sampler Initials: MD

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		RE3514	RE3515	RE3516		
Sampling Date		2017/05/30 13:15	2017/05/30 13:20	2017/05/30 14:00		
COC Number		524971-02-01	524971-02-01	524971-02-01		
	UNITS	WG-56484-300517-CR-15	WG-56484-300517-CR-16	WG-56484-300517-CR-17	RDL	QC Batch
Dissolved Metals by ICPMS						
Dissolved Aluminum (Al)	ug/L	<3.0	9.3	4.1	3.0	8648994
Dissolved Antimony (Sb)	ug/L	<0.50	<0.50	<0.50	0.50	8648994
Dissolved Arsenic (As)	ug/L	3.27	3.15	4.35	0.10	8648994
Dissolved Barium (Ba)	ug/L	27.8	28.9	40.6	1.0	8648994
Dissolved Beryllium (Be)	ug/L	<0.10	<0.10	<0.10	0.10	8648994
Dissolved Bismuth (Bi)	ug/L	<1.0	<1.0	<1.0	1.0	8648994
Dissolved Boron (B)	ug/L	506	509	586	50	8648994
Dissolved Cadmium (Cd)	ug/L	<0.010	<0.010	0.065	0.010	8648994
Dissolved Chromium (Cr)	ug/L	<1.0	<1.0	<1.0	1.0	8648994
Dissolved Cobalt (Co)	ug/L	0.86	0.84	0.63	0.20	8648994
Dissolved Copper (Cu)	ug/L	0.32	0.36	0.66	0.20	8648994
Dissolved Iron (Fe)	ug/L	2640	2640	1650	5.0	8648994
Dissolved Lead (Pb)	ug/L	<0.20	<0.20	<0.20	0.20	8648994
Dissolved Lithium (Li)	ug/L	<2.0	<2.0	<2.0	2.0	8648994
Dissolved Manganese (Mn)	ug/L	2340	2230	5030	1.0	8648994
Dissolved Molybdenum (Mo)	ug/L	<1.0	<1.0	<1.0	1.0	8648994
Dissolved Nickel (Ni)	ug/L	3.4	3.3	2.9	1.0	8648994
Dissolved Phosphorus (P)	ug/L	34	43	32	10	8648994
Dissolved Selenium (Se)	ug/L	<0.10	<0.10	<0.10	0.10	8648994
Dissolved Silicon (Si)	ug/L	15400	15600	12900	100	8648994
Dissolved Silver (Ag)	ug/L	<0.020	<0.020	<0.020	0.020	8648994
Dissolved Strontium (Sr)	ug/L	344	332	650	1.0	8648994
Dissolved Thallium (Tl)	ug/L	<0.010	<0.010	<0.010	0.010	8648994
Dissolved Tin (Sn)	ug/L	<5.0	<5.0	<5.0	5.0	8648994
Dissolved Titanium (Ti)	ug/L	<5.0	<5.0	<5.0	5.0	8648994
Dissolved Uranium (U)	ug/L	0.16	0.16	0.43	0.10	8648994
Dissolved Vanadium (V)	ug/L	<5.0	<5.0	<5.0	5.0	8648994
Dissolved Zinc (Zn)	ug/L	<5.0	<5.0	<5.0	5.0	8648994
Dissolved Zirconium (Zr)	ug/L	<0.10	<0.10	0.40	0.10	8648994
Dissolved Calcium (Ca)	mg/L	85.5	84.8	173	0.050	8646941
RDL = Reportable Detection Limit						

Maxxam Job #: B742396
Report Date: 2017/06/08

GHD Limited
Client Project #: 56484-02 CAMPBELL RIVER
Site Location: CAMPBELL RIVER, BC
Your P.O. #: 73506861
Sampler Initials: MD

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		RE3514	RE3515	RE3516		
Sampling Date		2017/05/30 13:15	2017/05/30 13:20	2017/05/30 14:00		
COC Number		524971-02-01	524971-02-01	524971-02-01		
	UNITS	WG-56484-300517-CR-15	WG-56484-300517-CR-16	WG-56484-300517-CR-17	RDL	QC Batch
Dissolved Magnesium (Mg)	mg/L	15.0	14.6	18.2	0.050	8646941
Dissolved Potassium (K)	mg/L	8.46	8.25	6.18	0.050	8646941
Dissolved Sodium (Na)	mg/L	41.3	40.7	68.1	0.050	8646941
Dissolved Sulphur (S)	mg/L	<3.0	<3.0	<3.0	3.0	8646941
RDL = Reportable Detection Limit						

Maxxam Job #: B742396
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GHD Limited
Client Project #: 56484-02 CAMPBELL RIVER
Site Location: CAMPBELL RIVER, BC
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Sampler Initials: MD

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		RE3517	RE3518	RE3519		
Sampling Date		2017/05/30 14:10	2017/05/30 15:10	2017/05/30 15:30		
COC Number		524971-02-01	524971-02-01	524971-02-01		
	UNITS	WG-56484-300517-CR-18	WG-56484-300517-CR-19	WG-56484-300517-CR-20	RDL	QC Batch
Dissolved Metals by ICPMS						
Dissolved Aluminum (Al)	ug/L	8.2	<3.0	<3.0	3.0	8648994
Dissolved Antimony (Sb)	ug/L	<0.50	<0.50	<0.50	0.50	8648994
Dissolved Arsenic (As)	ug/L	0.64	0.13	<0.10	0.10	8648994
Dissolved Barium (Ba)	ug/L	12.5	12.7	9.7	1.0	8648994
Dissolved Beryllium (Be)	ug/L	<0.10	<0.10	<0.10	0.10	8648994
Dissolved Bismuth (Bi)	ug/L	<1.0	<1.0	<1.0	1.0	8648994
Dissolved Boron (B)	ug/L	205	230	122	50	8648994
Dissolved Cadmium (Cd)	ug/L	<0.010	0.025	0.013	0.010	8648994
Dissolved Chromium (Cr)	ug/L	<1.0	<1.0	<1.0	1.0	8648994
Dissolved Cobalt (Co)	ug/L	0.29	0.26	<0.20	0.20	8648994
Dissolved Copper (Cu)	ug/L	0.93	1.58	1.15	0.20	8648994
Dissolved Iron (Fe)	ug/L	2210	6.5	<5.0	5.0	8648994
Dissolved Lead (Pb)	ug/L	<0.20	<0.20	<0.20	0.20	8648994
Dissolved Lithium (Li)	ug/L	<2.0	<2.0	<2.0	2.0	8648994
Dissolved Manganese (Mn)	ug/L	1890	55.4	<1.0	1.0	8648994
Dissolved Molybdenum (Mo)	ug/L	<1.0	<1.0	<1.0	1.0	8648994
Dissolved Nickel (Ni)	ug/L	1.0	1.0	<1.0	1.0	8648994
Dissolved Phosphorus (P)	ug/L	<10	<10	<10	10	8648994
Dissolved Selenium (Se)	ug/L	<0.10	<0.10	<0.10	0.10	8648994
Dissolved Silicon (Si)	ug/L	7960	13400	13000	100	8648994
Dissolved Silver (Ag)	ug/L	<0.020	<0.020	<0.020	0.020	8648994
Dissolved Strontium (Sr)	ug/L	201	271	266	1.0	8648994
Dissolved Thallium (Tl)	ug/L	<0.010	<0.010	<0.010	0.010	8648994
Dissolved Tin (Sn)	ug/L	<5.0	<5.0	<5.0	5.0	8648994
Dissolved Titanium (Ti)	ug/L	<5.0	<5.0	<5.0	5.0	8648994
Dissolved Uranium (U)	ug/L	<0.10	0.80	0.36	0.10	8648994
Dissolved Vanadium (V)	ug/L	<5.0	<5.0	<5.0	5.0	8648994
Dissolved Zinc (Zn)	ug/L	<5.0	<5.0	<5.0	5.0	8648994
Dissolved Zirconium (Zr)	ug/L	<0.10	<0.10	<0.10	0.10	8648994
Dissolved Calcium (Ca)	mg/L	67.6	91.5	110	0.050	8646941
RDL = Reportable Detection Limit						

Maxxam Job #: B742396
Report Date: 2017/06/08

GHD Limited
Client Project #: 56484-02 CAMPBELL RIVER
Site Location: CAMPBELL RIVER, BC
Your P.O. #: 73506861
Sampler Initials: MD

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		RE3517	RE3518	RE3519		
Sampling Date		2017/05/30 14:10	2017/05/30 15:10	2017/05/30 15:30		
COC Number		524971-02-01	524971-02-01	524971-02-01		
	UNITS	WG-56484-300517-CR-18	WG-56484-300517-CR-19	WG-56484-300517-CR-20	RDL	QC Batch
Dissolved Magnesium (Mg)	mg/L	7.35	22.4	21.5	0.050	8646941
Dissolved Potassium (K)	mg/L	3.23	2.06	1.55	0.050	8646941
Dissolved Sodium (Na)	mg/L	21.0	18.3	6.61	0.050	8646941
Dissolved Sulphur (S)	mg/L	<3.0	5.5	3.9	3.0	8646941
RDL = Reportable Detection Limit						

Maxxam Job #: B742396
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GHD Limited
Client Project #: 56484-02 CAMPBELL RIVER
Site Location: CAMPBELL RIVER, BC
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Sampler Initials: MD

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		RE3520		
Sampling Date		2017/05/30 16:00		
COC Number		524971-02-01		
	UNITS	WG-56484-300517-CR-21	RDL	QC Batch
Dissolved Metals by ICPMS				
Dissolved Aluminum (Al)	ug/L	43.7	3.0	8648994
Dissolved Antimony (Sb)	ug/L	<0.50	0.50	8648994
Dissolved Arsenic (As)	ug/L	0.23	0.10	8648994
Dissolved Barium (Ba)	ug/L	4.4	1.0	8648994
Dissolved Beryllium (Be)	ug/L	<0.10	0.10	8648994
Dissolved Bismuth (Bi)	ug/L	<1.0	1.0	8648994
Dissolved Boron (B)	ug/L	101	50	8648994
Dissolved Cadmium (Cd)	ug/L	<0.010	0.010	8648994
Dissolved Chromium (Cr)	ug/L	1.6	1.0	8648994
Dissolved Cobalt (Co)	ug/L	<0.20	0.20	8648994
Dissolved Copper (Cu)	ug/L	0.75	0.20	8648994
Dissolved Iron (Fe)	ug/L	11.7	5.0	8648994
Dissolved Lead (Pb)	ug/L	<0.20	0.20	8648994
Dissolved Lithium (Li)	ug/L	<2.0	2.0	8648994
Dissolved Manganese (Mn)	ug/L	<1.0	1.0	8648994
Dissolved Molybdenum (Mo)	ug/L	<1.0	1.0	8648994
Dissolved Nickel (Ni)	ug/L	<1.0	1.0	8648994
Dissolved Phosphorus (P)	ug/L	23	10	8648994
Dissolved Selenium (Se)	ug/L	<0.10	0.10	8648994
Dissolved Silicon (Si)	ug/L	7730	100	8648994
Dissolved Silver (Ag)	ug/L	<0.020	0.020	8648994
Dissolved Strontium (Sr)	ug/L	106	1.0	8648994
Dissolved Thallium (Tl)	ug/L	<0.010	0.010	8648994
Dissolved Tin (Sn)	ug/L	<5.0	5.0	8648994
Dissolved Titanium (Ti)	ug/L	<5.0	5.0	8648994
Dissolved Uranium (U)	ug/L	0.39	0.10	8648994
Dissolved Vanadium (V)	ug/L	5.2	5.0	8648994
Dissolved Zinc (Zn)	ug/L	<5.0	5.0	8648994
Dissolved Zirconium (Zr)	ug/L	<0.10	0.10	8648994
Dissolved Calcium (Ca)	mg/L	47.6	0.050	8646941
RDL = Reportable Detection Limit				

Maxxam Job #: B742396
Report Date: 2017/06/08

GHD Limited
Client Project #: 56484-02 CAMPBELL RIVER
Site Location: CAMPBELL RIVER, BC
Your P.O. #: 73506861
Sampler Initials: MD

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		RE3520		
Sampling Date		2017/05/30 16:00		
COC Number		524971-02-01		
	UNITS	WG-56484-300517-CR-21	RDL	QC Batch
Dissolved Magnesium (Mg)	mg/L	10.2	0.050	8646941
Dissolved Potassium (K)	mg/L	0.718	0.050	8646941
Dissolved Sodium (Na)	mg/L	4.70	0.050	8646941
Dissolved Sulphur (S)	mg/L	4.8	3.0	8646941
RDL = Reportable Detection Limit				

Maxxam Job #: B742396
Report Date: 2017/06/08

GHD Limited
Client Project #: 56484-02 CAMPBELL RIVER
Site Location: CAMPBELL RIVER, BC
Your P.O. #: 73506861
Sampler Initials: MD

GENERAL COMMENTS

Results relate only to the items tested.

Maxxam Job #: B742396
Report Date: 2017/06/08

QUALITY ASSURANCE REPORT

GHD Limited
Client Project #: 56484-02 CAMPBELL RIVER
Site Location: CAMPBELL RIVER, BC
Your P.O. #: 73506861
Sampler Initials: MD

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
8648386	pH	2017/06/02			102	97 - 103			0.44 (1)	N/A
8648390	Conductivity	2017/06/02			101	80 - 120	<1.0	uS/cm	0.62 (1)	20
8648391	Alkalinity (PP as CaCO ₃)	2017/06/02					<0.50	mg/L	NC (1)	20
8648391	Alkalinity (Total as CaCO ₃)	2017/06/02	NC	80 - 120	92	80 - 120	<0.50	mg/L	8.4 (1)	20
8648391	Bicarbonate (HCO ₃)	2017/06/02					<0.50	mg/L	8.4 (1)	20
8648391	Carbonate (CO ₃)	2017/06/02					<0.50	mg/L	NC (1)	20
8648391	Hydroxide (OH)	2017/06/02					<0.50	mg/L	NC (1)	20
8648404	pH	2017/06/02			102	97 - 103			0.24 (2)	N/A
8648412	Conductivity	2017/06/02			101	80 - 120	<1.0	uS/cm	0.44 (2)	20
8648415	Alkalinity (PP as CaCO ₃)	2017/06/02					<0.50	mg/L	NC (2)	20
8648415	Alkalinity (Total as CaCO ₃)	2017/06/02	NC (3)	80 - 120	95	80 - 120	<0.50	mg/L	0.86 (2)	20
8648415	Bicarbonate (HCO ₃)	2017/06/02					<0.50	mg/L	0.86 (2)	20
8648415	Carbonate (CO ₃)	2017/06/02					<0.50	mg/L	NC (2)	20
8648415	Hydroxide (OH)	2017/06/02					<0.50	mg/L	NC (2)	20
8648994	Dissolved Aluminum (Al)	2017/06/02	108 (4)	80 - 120	112	80 - 120	<3.0	ug/L	4.5 (5)	20
8648994	Dissolved Antimony (Sb)	2017/06/02	105 (4)	80 - 120	104	80 - 120	<0.50	ug/L	NC (5)	20
8648994	Dissolved Arsenic (As)	2017/06/02	107 (4)	80 - 120	98	80 - 120	<0.10	ug/L	5.0 (5)	20
8648994	Dissolved Barium (Ba)	2017/06/02	102 (4)	80 - 120	111	80 - 120	<1.0	ug/L	0.58 (5)	20
8648994	Dissolved Beryllium (Be)	2017/06/02	109 (4)	80 - 120	107	80 - 120	<0.10	ug/L	NC (5)	20
8648994	Dissolved Bismuth (Bi)	2017/06/02	105 (4)	80 - 120	108	80 - 120	<1.0	ug/L	NC (5)	20
8648994	Dissolved Boron (B)	2017/06/02	102 (4)	80 - 120	106	80 - 120	<50	ug/L	NC (5)	20
8648994	Dissolved Cadmium (Cd)	2017/06/02	110 (4)	80 - 120	101	80 - 120	<0.010	ug/L	NC (5)	20
8648994	Dissolved Chromium (Cr)	2017/06/02	100 (4)	80 - 120	104	80 - 120	<1.0	ug/L	4.2 (5)	20
8648994	Dissolved Cobalt (Co)	2017/06/02	98 (4)	80 - 120	103	80 - 120	<0.20	ug/L	NC (5)	20
8648994	Dissolved Copper (Cu)	2017/06/02	96 (4)	80 - 120	104	80 - 120	<0.20	ug/L	NC (5)	20
8648994	Dissolved Iron (Fe)	2017/06/02	98 (4)	80 - 120	105	80 - 120	<5.0	ug/L	NC (5)	20
8648994	Dissolved Lead (Pb)	2017/06/02	106 (4)	80 - 120	109	80 - 120	<0.20	ug/L	NC (5)	20
8648994	Dissolved Lithium (Li)	2017/06/02	105 (4)	80 - 120	108	80 - 120	<2.0	ug/L	NC (5)	20
8648994	Dissolved Manganese (Mn)	2017/06/02	101 (4)	80 - 120	104	80 - 120	<1.0	ug/L	NC (5)	20
8648994	Dissolved Molybdenum (Mo)	2017/06/02	105 (4)	80 - 120	109	80 - 120	<1.0	ug/L	NC (5)	20

Maxxam Job #: B742396
Report Date: 2017/06/08

QUALITY ASSURANCE REPORT(CONT'D)

GHD Limited
Client Project #: 56484-02 CAMPBELL RIVER
Site Location: CAMPBELL RIVER, BC
Your P.O. #: 73506861
Sampler Initials: MD

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
8648994	Dissolved Nickel (Ni)	2017/06/02	97 (4)	80 - 120	103	80 - 120	<1.0	ug/L	NC (5)	20
8648994	Dissolved Phosphorus (P)	2017/06/02					<10	ug/L	NC (5)	20
8648994	Dissolved Selenium (Se)	2017/06/02	106 (4)	80 - 120	100	80 - 120	<0.10	ug/L	6.4 (5)	20
8648994	Dissolved Silicon (Si)	2017/06/02					<100	ug/L	0.034 (5)	20
8648994	Dissolved Silver (Ag)	2017/06/02	105 (4)	80 - 120	113	80 - 120	<0.020	ug/L	NC (5)	20
8648994	Dissolved Strontium (Sr)	2017/06/02	NC (4)	80 - 120	99	80 - 120	<1.0	ug/L	1.9 (5)	20
8648994	Dissolved Thallium (Tl)	2017/06/02	104 (4)	80 - 120	108	80 - 120	<0.010	ug/L	NC (5)	20
8648994	Dissolved Tin (Sn)	2017/06/02	100 (4)	80 - 120	109	80 - 120	<5.0	ug/L	NC (5)	20
8648994	Dissolved Titanium (Ti)	2017/06/02	100 (4)	80 - 120	102	80 - 120	<5.0	ug/L	NC (5)	20
8648994	Dissolved Uranium (U)	2017/06/02	108 (4)	80 - 120	110	80 - 120	<0.10	ug/L	1.8 (5)	20
8648994	Dissolved Vanadium (V)	2017/06/02	100 (4)	80 - 120	104	80 - 120	<5.0	ug/L	NC (5)	20
8648994	Dissolved Zinc (Zn)	2017/06/02	107 (4)	80 - 120	100	80 - 120	<5.0	ug/L	NC (5)	20
8648994	Dissolved Zirconium (Zr)	2017/06/02					<0.10	ug/L	NC (5)	20
8649559	Dissolved Aluminum (Al)	2017/06/06	105	80 - 120	107	80 - 120	<3.0	ug/L	5.3 (1)	20
8649559	Dissolved Antimony (Sb)	2017/06/06	103	80 - 120	101	80 - 120	<0.50	ug/L	NC (1)	20
8649559	Dissolved Arsenic (As)	2017/06/06	105	80 - 120	102	80 - 120	<0.10	ug/L	11 (1)	20
8649559	Dissolved Barium (Ba)	2017/06/06	NC	80 - 120	98	80 - 120	<1.0	ug/L	3.3 (1)	20
8649559	Dissolved Beryllium (Be)	2017/06/06	100	80 - 120	99	80 - 120	<0.10	ug/L	NC (1)	20
8649559	Dissolved Bismuth (Bi)	2017/06/06	91	80 - 120	96	80 - 120	<1.0	ug/L	NC (1)	20
8649559	Dissolved Boron (B)	2017/06/06	90	80 - 120	98	80 - 120	<50	ug/L	NC (1)	20
8649559	Dissolved Cadmium (Cd)	2017/06/06	116	80 - 120	102	80 - 120	<0.010	ug/L	0.91 (1)	20
8649559	Dissolved Chromium (Cr)	2017/06/06	100	80 - 120	101	80 - 120	<1.0	ug/L	NC (1)	20
8649559	Dissolved Cobalt (Co)	2017/06/06	96	80 - 120	100	80 - 120	<0.20	ug/L	0.89 (1)	20
8649559	Dissolved Copper (Cu)	2017/06/06	95	80 - 120	100	80 - 120	<0.20	ug/L	0.52 (1)	20
8649559	Dissolved Iron (Fe)	2017/06/06	113	80 - 120	108	80 - 120	<5.0	ug/L	4.3 (1)	20
8649559	Dissolved Lead (Pb)	2017/06/06	97	80 - 120	96	80 - 120	<0.20	ug/L	3.7 (1)	20
8649559	Dissolved Lithium (Li)	2017/06/06	99	80 - 120	100	80 - 120	<2.0	ug/L	NC (1)	20
8649559	Dissolved Manganese (Mn)	2017/06/06	NC	80 - 120	101	80 - 120	<1.0	ug/L	0.15 (1)	20
8649559	Dissolved Molybdenum (Mo)	2017/06/06	109	80 - 120	102	80 - 120	<1.0	ug/L	NC (1)	20
8649559	Dissolved Nickel (Ni)	2017/06/06	97	80 - 120	102	80 - 120	<1.0	ug/L	0.86 (1)	20

Maxxam Job #: B742396
Report Date: 2017/06/08

QUALITY ASSURANCE REPORT(CONT'D)

GHD Limited
Client Project #: 56484-02 CAMPBELL RIVER
Site Location: CAMPBELL RIVER, BC
Your P.O. #: 73506861
Sampler Initials: MD

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
8649559	Dissolved Phosphorus (P)	2017/06/06					<10	ug/L		
8649559	Dissolved Selenium (Se)	2017/06/06	103	80 - 120	98	80 - 120	<0.10	ug/L	4.4 (1)	20
8649559	Dissolved Silicon (Si)	2017/06/06					<100	ug/L	2.7 (1)	20
8649559	Dissolved Silver (Ag)	2017/06/06	104	80 - 120	104	80 - 120	<0.020	ug/L	NC (1)	20
8649559	Dissolved Strontium (Sr)	2017/06/06	NC	80 - 120	99	80 - 120	<1.0	ug/L	0.081 (1)	20
8649559	Dissolved Thallium (Tl)	2017/06/06	101	80 - 120	98	80 - 120	<0.010	ug/L	NC (1)	20
8649559	Dissolved Tin (Sn)	2017/06/06	95	80 - 120	101	80 - 120	<5.0	ug/L	NC (1)	20
8649559	Dissolved Titanium (Ti)	2017/06/06	98	80 - 120	100	80 - 120	<5.0	ug/L	NC (1)	20
8649559	Dissolved Uranium (U)	2017/06/06	102	80 - 120	96	80 - 120	<0.10	ug/L	2.7 (1)	20
8649559	Dissolved Vanadium (V)	2017/06/06	101	80 - 120	100	80 - 120	<5.0	ug/L	NC (1)	20
8649559	Dissolved Zinc (Zn)	2017/06/06	NC	80 - 120	102	80 - 120	<5.0	ug/L	0.72 (1)	20
8649559	Dissolved Zirconium (Zr)	2017/06/06					<0.10	ug/L	NC (1)	20
8649759	Dissolved Chloride (Cl)	2017/06/01	111	80 - 120	97	80 - 120	<0.50	mg/L	4.9 (1)	20
8649764	Dissolved Sulphate (SO4)	2017/06/01			93	80 - 120	<0.50	mg/L		
8649767	Dissolved Chloride (Cl)	2017/06/01	112 (6)	80 - 120	98	80 - 120	<0.50	mg/L	0.44 (7)	20
8649771	Dissolved Sulphate (SO4)	2017/06/01	111 (6)	80 - 120	93	80 - 120	<0.50	mg/L	5.4 (7)	20
8650683	Fluoride (F)	2017/06/02	94	80 - 120	102	80 - 120	0.011, RDL=0.010	mg/L	NC (1)	20
8651010	Nitrate plus Nitrite (N)	2017/06/01	106	80 - 120	108	80 - 120	<0.020	mg/L	NC (1)	25
8651013	Nitrite (N)	2017/06/01	NC	80 - 120	95	80 - 120	<0.0050	mg/L	NC (1)	20
8651015	Nitrate plus Nitrite (N)	2017/06/01	106 (8)	80 - 120	105	80 - 120	<0.020	mg/L	4.6 (9)	25
8651016	Nitrite (N)	2017/06/01	98 (8)	80 - 120	96	80 - 120	<0.0050	mg/L	NC (9)	20
8651224	Fluoride (F)	2017/06/02	100	80 - 120	102	80 - 120	0.011, RDL=0.010	mg/L	6.9 (10)	20
8652070	Dissolved Chloride (Cl)	2017/06/02	114	80 - 120	103	80 - 120	<0.50	mg/L	0.37 (1)	20
8652426	Total Ammonia (N)	2017/06/05	NC	80 - 120	97	80 - 120	<0.0050	mg/L	1.4 (1)	20
8652428	Total Ammonia (N)	2017/06/05	110 (11)	80 - 120	99	80 - 120	<0.0050	mg/L	1.2 (12)	20
8653345	Dissolved Mercury (Hg)	2017/06/07	107 (13)	80 - 120	107	80 - 120	<0.010	ug/L	NC (14)	20
8653449	Dissolved Sulphate (SO4)	2017/06/05	101	80 - 120	102	80 - 120	<0.50	mg/L	NC (1)	20
8653544	Dissolved Mercury (Hg)	2017/06/07	108	80 - 120	107	80 - 120	<0.010	ug/L	NC (1)	20

Maxxam Job #: B742396
Report Date: 2017/06/08

QUALITY ASSURANCE REPORT(CONT'D)

GHD Limited
Client Project #: 56484-02 CAMPBELL RIVER
Site Location: CAMPBELL RIVER, BC
Your P.O. #: 73506861
Sampler Initials: MD

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
8654745	Total Ammonia (N)	2017/06/07	102	80 - 120	100	80 - 120	<0.0050	mg/L	0.88 (1)	20

N/A = Not Applicable

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 $\leq 2 \times \text{RDL}$).

(1) Duplicate Parent ID

(2) Duplicate Parent ID [RE3506-01]

(3) Matrix Spike Parent ID [RE3506-01]

(4) Matrix Spike Parent ID [RE3500-03]

(5) Duplicate Parent ID [RE3500-03]

(6) Matrix Spike Parent ID [RE3500-01]

(7) Duplicate Parent ID [RE3500-01]

(8) Matrix Spike Parent ID [RE3503-01]

(9) Duplicate Parent ID [RE3503-01]

(10) Duplicate Parent ID [RE3509-01]

(11) Matrix Spike Parent ID [RE3503-05]

(12) Duplicate Parent ID [RE3503-05]

(13) Matrix Spike Parent ID [RE3500-04]

(14) Duplicate Parent ID [RE3500-04]

Maxxam Job #: B742396
Report Date: 2017/06/08

GHD Limited
Client Project #: 56484-02 CAMPBELL RIVER
Site Location: CAMPBELL RIVER, BC
Your P.O. #: 73506861
Sampler Initials: MD

VALIDATION SIGNATURE PAGE

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



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.



Maxxam Analytics International Corporation o/a Maxxam Analytics
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C1

1 of 2

INVOICE TO:		Report Information		Project Information	
Company Name	#163 GHD Limited	Company Name	#28639 GHD Limited	Quotation #	B70472
Contact Name	Airesse MacPhee	Contact Name	Michaela Dyck	P.O. #	
Address	651 COLBY DRIVE WATERLOO ON N2V 1C2	Address	10271 Shellbridge Way Suite 165 Richmond BC V6X 2W8	Project #	56484-02
Phone	(519) 884-0510 x	Phone	(604) 214-0510 x234	Project Name	Campbell River WMA
Email	airesse.macphee@ghd.com; NationalEDDSupport@ma	Email	Michaela.dyck@ghd.com; airesse.macphee@ghd.com	Site #	
				Sampled By	M. Dyck C. Ragen



B742396_COC



C8524971-01-01

VJ Coo

Regulatory Criteria:		Special Instructions		ANALYSIS REQUESTED (PLEASE BE SPECIFIC)										Turnaround Time (TAT) Required:					
☐ CSR														Please provide advance notice for rush projects.					
☐ CCME														Regular (Standard) TAT:					
☐ BC Water Quality														(will be applied if Rush TAT is not specified):					
☐ Other														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 #)					
														# of Bottles					
														Comments					
Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Metals Field Filtered ? (Y/N)	ANIONS (Cl, F, SO4, NO2, NO3)	Alkalinity, pH	Ammonia-N	Conductivity	Dissolved Metals (including Hg, Phosphorus, Sulfur and Hardness)	Total Metals (including Hg, Phosphorus, Sulfur and Hardness)								
1	WG-56484-290517-CR-01	May 29/17	12:00	WG Y	X	X	X	X	X										S
2	-02		13:00																
3	-03		13:40																
4	-04		14:00																
5	-05		14:05																
6	-06		14:25																
7	-07		15:30																
8	-08		16:30																
9	WG-56484-300517-CR-09		17:30																
10	WG-56484-300517-CR-10	May 30/17	9:00																

RECEIVED BY: (Signature/Print)		Date: (YY/MM/DD)		Time		# Jars used and not submitted		Lab Use Only	
Michaela Dyck		17/05/17		12:02				Custody Seal Intact on Cooler?	
								☐ 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.

RON MARUE

2017/05/31 17:35

7,8,7 CS: NA
7,7,7 ICE-PRESENT.

Maxxam Analytics International Corporation o/a Maxxam Analytics

Maxxam Maxxam Analytics International Corporation o/a Maxxam Analytics
4802 Canada Way, Burnaby, British Columbia Canada V5G 1K5 Tel: (604) 734 7276 Toll-free: 800-563-6266 Fax: (604) 731 2386 www.maxxam.ca

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Barcode: B742396_COC

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

Report Information: #28639 GHD Limited
Company Name: Michaela Dyck
Contact Name: 10271 Shellbridge Way Suite 165
Address: Richmond BC V6X 2W8
Phone: (604) 214-0510 x234 Fax: (604) 214-0510 x234
Email: Michaela.dyck@ghd.com; aïresse.macphee@ghd.com

Project Information: Quotation # B70472
P.O. #
Project # 56484-02
Project Name Campbell River
Site #
Sampled By M. Dyck CR-10

Chain Of Custody Record: Project Manager VJ Occ

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: (cal lab for #)

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

Special Instructions

ANALYSIS REQUESTED (PLEASE BE SPECIFIC):
Metals Field Filtered ? (Y/N)
ANIONS (Cl, F, SO4, NO2, NO3)
Alkalinity, pH
Ammonia-N
Conductivity
Dissolved Metals (including Hg, Phosphorus, Sulfur and Hardness)
Total Metals (including Hg, Phosphorus, Sulfur and Hardness)

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)	ANIONS (Cl, F, SO4, NO2, NO3)	Alkalinity, pH	Ammonia-N	Conductivity	Dissolved Metals (including Hg, Phosphorus, Sulfur and Hardness)	Total Metals (including Hg, Phosphorus, Sulfur and Hardness)	# of Bottles	Comments
1	WG-56484-300517-CR-11	May 30/17	10:50	WG	Y	Y	Y	X	X	X		5	dissolved metals
2	-12		10:55										field filtered
3	-13		12:30										+ preserved
4	-14		12:20										
5	-15		13:15										SHORT HOLD
6	-16		13:20										TIMES!
7	-17		14:00										
8	-18		14:10										
9	-19		15:10										
10	-20		15:30										
	-21		16:00										

RELINQUISHED BY: (Signature/Print) Michael Dyck Date: (YY/MM/DD) 17/05/17 Time: 12:02
RECEIVED BY: (Signature/Print) M. Dyck Date: (YY/MM/DD) 17/05/17 Time: 10:02
jars used and not submitted: 5/1/12
Lab Use Only: Time Sensitive ☐ Temperature ☐ Receipt: 5/1/12
Custody Seal Intact on Cooler? ☐ Yes ☐ No
White Maxxam: ☐ Yellow: Client

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.

Maxxam Analytics International Corporation o/a Maxxam Analytics

for Lou HAPUE 2017/05/31 17:35 7,8,7 7,7,7 CS:NA ICE PRESENT

Your P.O. #: 73506861
Your Project #: 56484-02
Site Location: CAMPBELL RIVER
Your C.O.C. #: 524971-03-01

Attention: Michaela Dyck

GHD Limited
10271 Shellbridge Way
Suite 165
Richmond, BC
Canada V6X 2W8

Report Date: 2017/06/08
Report #: R2394284
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B742419

Received: 2017/05/31, 12:02

Sample Matrix: Water
Samples Received: 3

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity - Water	3	2017/06/02	2017/06/02	BBY6SOP-00026	SM 22 2320 B m
Chloride by Automated Colourimetry	3	N/A	2017/06/01	BBY6SOP-00011	SM 22 4500-Cl- E m
Conductance - water	3	N/A	2017/06/02	BBY6SOP-00026	SM 22 2510 B m
Fluoride	3	N/A	2017/06/02	BBY6SOP-00048	SM 22 4500-F C m
Hardness Total (calculated as CaCO ₃)	3	N/A	2017/06/06	BBY WI-00033	Auto Calc
Hardness (calculated as CaCO ₃)	3	N/A	2017/06/05	BBY WI-00033	Auto Calc
Mercury (Dissolved-LowLevel) by CVAf	3	N/A	2017/06/05	BBY7SOP-00015	BCMOE BCLM Oct2013 m
Mercury (Total-LowLevel) by CVAf	3	2017/06/05	2017/06/05	BBY7SOP-00015	BCMOE BCLM Oct2013 m
Na, K, Ca, Mg, S by CRC ICPMS (diss.)	3	N/A	2017/06/05	BBY7SOP-00002	EPA 6020B R2 m
Elements by ICPMS Low Level (dissolved)	3	N/A	2017/06/05	BBY7SOP-00002	EPA 6020B R2 m
Elements by ICPMS Digested LL (total)	3	2017/06/03	2017/06/05	BBY7SOP-00003,	BCLM2005,EPA6020bR2m
Na, K, Ca, Mg, S by CRC ICPMS (total)	3	N/A	2017/06/06	BBY7SOP-00003,	BCLM2005,EPA6020bR2m
Ammonia-N (Preserved)	3	N/A	2017/06/05	BBY6SOP-00009	SM 22 4500-NH ₃ - G m
Nitrate + Nitrite (N)	3	N/A	2017/06/01	BBY6SOP-00010	SM 22 4500-NO ₃ - I m
Nitrite (N) by CFA	3	N/A	2017/06/01	BBY6SOP-00010	SM 22 4500-NO ₃ - I m
Nitrogen - Nitrate (as N)	3	N/A	2017/06/03	BBY6SOP-00010	SM 22 4500-NO ₃ I m
Filter and HNO ₃ Preserve for Metals	3	N/A	2017/06/01	BBY7 WI-00004	BCMOE Reqs 08/14
pH Water (1)	3	N/A	2017/06/02	BBY6SOP-00026	SM 22 4500-H+ B m
Sulphate by Automated Colourimetry	3	N/A	2017/06/01	BBY6SOP-00017	SM 22 4500-SO ₄ 2- E 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.

Your P.O. #: 73506861
Your Project #: 56484-02
Site Location: CAMPBELL RIVER
Your C.O.C. #: 524971-03-01

Attention: Michaela Dyck

GHD Limited
10271 Shellbridge Way
Suite 165
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Canada V6X 2W8

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CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B742419

Received: 2017/05/31, 12:02

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) 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

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 #: B742419
Report Date: 2017/06/08

GHD Limited
Client Project #: 56484-02
Site Location: CAMPBELL RIVER
Your P.O. #: 73506861
Sampler Initials: MD

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		RE3563	RE3563		RE3564		
Sampling Date		2017/05/30 09:30	2017/05/30 09:30		2017/05/30 09:45		
COC Number		524971-03-01	524971-03-01		524971-03-01		
	UNITS	WS-56484-300517-CR-01	WS-56484-300517-CR-01 Lab-Dup	QC Batch	WS-56484-300517-CR-02	RDL	QC Batch
ANIONS							
Nitrite (N)	mg/L	<0.0050	<0.0050	8651018	<0.0050	0.0050	8651018
Calculated Parameters							
Filter and HNO3 Preservation	N/A	LAB	N/A	8648381	LAB	N/A	8648381
Nitrate (N)	mg/L	0.027	N/A	8648066	<0.020	0.020	8648066
Misc. Inorganics							
Fluoride (F)	mg/L	0.017	N/A	8651224	0.017	0.010	8651224
Alkalinity (Total as CaCO3)	mg/L	10.4	N/A	8649762	8.16	0.50	8649762
Alkalinity (PP as CaCO3)	mg/L	<0.50	N/A	8649762	<0.50	0.50	8649762
Bicarbonate (HCO3)	mg/L	12.7	N/A	8649762	9.96	0.50	8649762
Carbonate (CO3)	mg/L	<0.50	N/A	8649762	<0.50	0.50	8649762
Hydroxide (OH)	mg/L	<0.50	N/A	8649762	<0.50	0.50	8649762
Anions							
Dissolved Sulphate (SO4)	mg/L	<0.50	N/A	8649782	<0.50	0.50	8649782
Dissolved Chloride (Cl)	mg/L	3.4	N/A	8649776	3.1	0.50	8649776
Nutrients							
Total Ammonia (N)	mg/L	0.094	0.089	8652429	0.046	0.0050	8652428
Nitrate plus Nitrite (N)	mg/L	0.027	0.024	8651017	<0.020	0.020	8651017
Physical Properties							
Conductivity	uS/cm	35.7	N/A	8649760	29.5	1.0	8649760
pH	pH	7.13	N/A	8649754	7.02	N/A	8649754
RDL = Reportable Detection Limit							
Lab-Dup = Laboratory Initiated Duplicate							
N/A = Not Applicable							

Maxxam Job #: B742419
Report Date: 2017/06/08

GHD Limited
Client Project #: 56484-02
Site Location: CAMPBELL RIVER
Your P.O. #: 73506861
Sampler Initials: MD

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		RE3565	RE3565		
Sampling Date		2017/05/30 16:30	2017/05/30 16:30		
COC Number		524971-03-01	524971-03-01		
	UNITS	WS-56484-300517-CR-03	WS-56484-300517-CR-03 Lab-Dup	RDL	QC Batch
ANIONS					
Nitrite (N)	mg/L	<0.0050	N/A	0.0050	8651018
Calculated Parameters					
Filter and HNO ₃ Preservation	N/A	LAB	N/A	N/A	8648381
Nitrate (N)	mg/L	<0.020	N/A	0.020	8648066
Misc. Inorganics					
Fluoride (F)	mg/L	0.028	N/A	0.010	8651224
Alkalinity (Total as CaCO ₃)	mg/L	34.1	33.7	0.50	8649762
Alkalinity (PP as CaCO ₃)	mg/L	<0.50	<0.50	0.50	8649762
Bicarbonate (HCO ₃)	mg/L	41.6	41.1	0.50	8649762
Carbonate (CO ₃)	mg/L	<0.50	<0.50	0.50	8649762
Hydroxide (OH)	mg/L	<0.50	<0.50	0.50	8649762
Anions					
Dissolved Sulphate (SO ₄)	mg/L	<0.50	N/A	0.50	8649782
Dissolved Chloride (Cl)	mg/L	3.8	N/A	0.50	8649776
Nutrients					
Total Ammonia (N)	mg/L	0.041	N/A	0.0050	8652429
Nitrate plus Nitrite (N)	mg/L	<0.020	N/A	0.020	8651017
Physical Properties					
Conductivity	uS/cm	76.8	76.0	1.0	8649760
pH	pH	7.29	7.31	N/A	8649754
RDL = Reportable Detection Limit					
Lab-Dup = Laboratory Initiated Duplicate					
N/A = Not Applicable					

Maxxam Job #: B742419
Report Date: 2017/06/08

GHD Limited
Client Project #: 56484-02
Site Location: CAMPBELL RIVER
Your P.O. #: 73506861
Sampler Initials: MD

LOW LEVEL DISSOLVED METALS WITH CV HG (WATER)

Maxxam ID		RE3563	RE3564	RE3565		
Sampling Date		2017/05/30 09:30	2017/05/30 09:45	2017/05/30 16:30		
COC Number		524971-03-01	524971-03-01	524971-03-01		
	UNITS	WS-56484-300517-CR-01	WS-56484-300517-CR-02	WS-56484-300517-CR-03	RDL	QC Batch
Misc. Inorganics						
Dissolved Hardness (CaCO ₃)	mg/L	11.7	9.09	31.8	0.50	8648064
Elements						
Dissolved Mercury (Hg)	ug/L	0.0021	<0.0020	0.0024	0.0020	8652242
Dissolved Metals by ICPMS						
Dissolved Aluminum (Al)	ug/L	71.9	41.1	62.1	0.50	8648902
Dissolved Antimony (Sb)	ug/L	0.022	<0.020	0.023	0.020	8648902
Dissolved Arsenic (As)	ug/L	0.175	0.109 (1)	0.291	0.020	8648902
Dissolved Barium (Ba)	ug/L	2.08	1.55	1.84	0.020	8648902
Dissolved Beryllium (Be)	ug/L	<0.010	<0.010	<0.010	0.010	8648902
Dissolved Bismuth (Bi)	ug/L	<0.0050	<0.0050	<0.0050	0.0050	8648902
Dissolved Boron (B)	ug/L	<10	<10	<10	10	8648902
Dissolved Cadmium (Cd)	ug/L	0.0080	<0.0050	0.0070	0.0050	8648902
Dissolved Chromium (Cr)	ug/L	0.16	<0.10	0.41	0.10	8648902
Dissolved Cobalt (Co)	ug/L	0.126	0.0520	0.421	0.0050	8648902
Dissolved Copper (Cu)	ug/L	0.451	0.238	1.00	0.050	8648902
Dissolved Iron (Fe)	ug/L	275	104	1100	1.0	8648902
Dissolved Lead (Pb)	ug/L	0.122	0.0380	0.0670	0.0050	8648902
Dissolved Lithium (Li)	ug/L	<0.50	<0.50	<0.50	0.50	8648902
Dissolved Manganese (Mn)	ug/L	50.8	11.4	65.2	0.050	8648902
Dissolved Molybdenum (Mo)	ug/L	<0.050	<0.050	0.058	0.050	8648902
Dissolved Nickel (Ni)	ug/L	0.186	0.107	0.284	0.020	8648902
Dissolved Phosphorus (P)	ug/L	15.4	6.7	39.7	2.0	8648902
Dissolved Selenium (Se)	ug/L	0.042	<0.040	0.125	0.040	8648902
Dissolved Silicon (Si)	ug/L	3570	2880	4680	50	8648902
Dissolved Silver (Ag)	ug/L	<0.0050	<0.0050	0.0090	0.0050	8648902
Dissolved Strontium (Sr)	ug/L	12.1	9.68	22.8	0.050	8648902
Dissolved Thallium (Tl)	ug/L	0.0030	<0.0020	0.0030	0.0020	8648902
Dissolved Tin (Sn)	ug/L	<0.20	<0.20	<0.20	0.20	8648902
Dissolved Titanium (Ti)	ug/L	2.80	0.73	5.20	0.50	8648902
Dissolved Uranium (U)	ug/L	0.0020	<0.0020	0.0020	0.0020	8648902
RDL = Reportable Detection Limit						
(1) Dissolved greater than total. Reanalysis yields similar results.						

Maxxam Job #: B742419
Report Date: 2017/06/08

GHD Limited
Client Project #: 56484-02
Site Location: CAMPBELL RIVER
Your P.O. #: 73506861
Sampler Initials: MD

LOW LEVEL DISSOLVED METALS WITH CV HG (WATER)

Maxxam ID		RE3563	RE3564	RE3565		
Sampling Date		2017/05/30 09:30	2017/05/30 09:45	2017/05/30 16:30		
COC Number		524971-03-01	524971-03-01	524971-03-01		
	UNITS	WS-56484-300517-CR-01	WS-56484-300517-CR-02	WS-56484-300517-CR-03	RDL	QC Batch
Dissolved Vanadium (V)	ug/L	0.56	<0.20	1.74	0.20	8648902
Dissolved Zinc (Zn)	ug/L	1.00	0.64	1.00	0.10	8648902
Dissolved Zirconium (Zr)	ug/L	<0.10	<0.10	0.14	0.10	8648902
Dissolved Calcium (Ca)	mg/L	2.85	2.19	6.83	0.050	8648192
Dissolved Magnesium (Mg)	mg/L	1.11	0.881	3.57	0.050	8648192
Dissolved Potassium (K)	mg/L	0.150	0.162	0.333	0.050	8648192
Dissolved Sodium (Na)	mg/L	2.74	2.65	3.77	0.050	8648192
Dissolved Sulphur (S)	mg/L	<3.0	<3.0	<3.0	3.0	8648192
RDL = Reportable Detection Limit						

Maxxam Job #: B742419
Report Date: 2017/06/08

GHD Limited
Client Project #: 56484-02
Site Location: CAMPBELL RIVER
Your P.O. #: 73506861
Sampler Initials: MD

LL TOTAL METALS (DIGESTED) WITH CV HG

Maxxam ID		RE3563	RE3564	RE3565		
Sampling Date		2017/05/30 09:30	2017/05/30 09:45	2017/05/30 16:30		
COC Number		524971-03-01	524971-03-01	524971-03-01		
	UNITS	WS-56484-300517-CR-01	WS-56484-300517-CR-02	WS-56484-300517-CR-03	RDL	QC Batch

Calculated Parameters						
Total Hardness (CaCO ₃)	mg/L	12.4	9.05	33.1	0.50	8648191
Elements						
Total Mercury (Hg)	ug/L	0.0020	<0.0020	0.0033	0.0020	8652251
Total Metals by ICPMS						
Total Aluminum (Al)	ug/L	120	50.1	98.3	3.0	8650853
Total Antimony (Sb)	ug/L	<0.020	<0.020	<0.020	0.020	8650853
Total Arsenic (As)	ug/L	0.184	0.070	0.332	0.020	8650853
Total Barium (Ba)	ug/L	2.43	1.57	2.82	0.050	8650853
Total Beryllium (Be)	ug/L	<0.010	<0.010	<0.010	0.010	8650853
Total Bismuth (Bi)	ug/L	<0.010	<0.010	<0.010	0.010	8650853
Total Boron (B)	ug/L	<10	<10	<10	10	8650853
Total Cadmium (Cd)	ug/L	0.0122	<0.0050	0.0125	0.0050	8650853
Total Chromium (Cr)	ug/L	0.34	0.14	0.49	0.10	8650853
Total Cobalt (Co)	ug/L	0.208	0.059	0.803	0.010	8650853
Total Copper (Cu)	ug/L	0.49	0.29	1.51	0.10	8650853
Total Iron (Fe)	ug/L	460	118	1640	5.0	8650853
Total Lead (Pb)	ug/L	0.231	0.053	0.115	0.020	8650853
Total Lithium (Li)	ug/L	<0.50	<0.50	<0.50	0.50	8650853
Total Manganese (Mn)	ug/L	71.4	12.3	106	0.10	8650853
Total Molybdenum (Mo)	ug/L	0.051	<0.050	0.090	0.050	8650853
Total Nickel (Ni)	ug/L	0.28	0.13	0.33	0.10	8650853
Total Phosphorus (P)	ug/L	19.1	17.4	61.9	5.0	8650853
Total Selenium (Se)	ug/L	0.053	<0.040	0.138	0.040	8650853
Total Silicon (Si)	ug/L	3670	3110	5560	50	8650853
Total Silver (Ag)	ug/L	<0.010	<0.010	0.011	0.010	8650853
Total Strontium (Sr)	ug/L	13.1	10.3	24.7	0.050	8650853
Total Thallium (Tl)	ug/L	0.0038	<0.0020	0.0030	0.0020	8650853
Total Tin (Sn)	ug/L	<0.20	<0.20	<0.20	0.20	8650853
Total Titanium (Ti)	ug/L	5.0	<2.0	6.2	2.0	8650853
Total Uranium (U)	ug/L	<0.0050	<0.0050	<0.0050	0.0050	8650853
RDL = Reportable Detection Limit						

Maxxam Job #: B742419
Report Date: 2017/06/08

GHD Limited
Client Project #: 56484-02
Site Location: CAMPBELL RIVER
Your P.O. #: 73506861
Sampler Initials: MD

LL TOTAL METALS (DIGESTED) WITH CV HG

Maxxam ID		RE3563	RE3564	RE3565		
Sampling Date		2017/05/30 09:30	2017/05/30 09:45	2017/05/30 16:30		
COC Number		524971-03-01	524971-03-01	524971-03-01		
	UNITS	WS-56484-300517-CR-01	WS-56484-300517-CR-02	WS-56484-300517-CR-03	RDL	QC Batch
Total Vanadium (V)	ug/L	<0.20	<0.20	1.84	0.20	8650853
Total Zinc (Zn)	ug/L	1.6	2.2	3.1	1.0	8650853
Total Zirconium (Zr)	ug/L	<0.10	<0.10	<0.10	0.10	8650853
Total Calcium (Ca)	mg/L	2.98	2.10	7.05	0.25	8648193
Total Magnesium (Mg)	mg/L	1.21	0.93	3.77	0.25	8648193
Total Potassium (K)	mg/L	<0.25	<0.25	0.36	0.25	8648193
Total Sodium (Na)	mg/L	2.65	2.50	3.80	0.25	8648193
Total Sulphur (S)	mg/L	<3.0	<3.0	<3.0	3.0	8648193
RDL = Reportable Detection Limit						

Maxxam Job #: B742419
Report Date: 2017/06/08

GHD Limited
Client Project #: 56484-02
Site Location: CAMPBELL RIVER
Your P.O. #: 73506861
Sampler Initials: MD

GENERAL COMMENTS

Results relate only to the items tested.

Maxxam Job #: B742419
Report Date: 2017/06/08

QUALITY ASSURANCE REPORT

GHD Limited
Client Project #: 56484-02
Site Location: CAMPBELL RIVER
Your P.O. #: 73506861
Sampler Initials: MD

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
8648902	Dissolved Aluminum (Al)	2017/06/05	113	80 - 120	109	80 - 120	<0.50	ug/L	6.5 (1)	20
8648902	Dissolved Antimony (Sb)	2017/06/05	103	80 - 120	98	80 - 120	<0.020	ug/L	12 (1)	20
8648902	Dissolved Arsenic (As)	2017/06/05	99	80 - 120	98	80 - 120	<0.020	ug/L	1.2 (1)	20
8648902	Dissolved Barium (Ba)	2017/06/05	NC	80 - 120	99	80 - 120	<0.020	ug/L	1.3 (1)	20
8648902	Dissolved Beryllium (Be)	2017/06/05	100	80 - 120	98	80 - 120	<0.010	ug/L	NC (1)	20
8648902	Dissolved Bismuth (Bi)	2017/06/05	95	80 - 120	99	80 - 120	<0.0050	ug/L	NC (1)	20
8648902	Dissolved Boron (B)	2017/06/05	100	80 - 120	97	80 - 120	<10	ug/L	0.93 (1)	20
8648902	Dissolved Cadmium (Cd)	2017/06/05	101	80 - 120	101	80 - 120	<0.0050	ug/L	NC (1)	20
8648902	Dissolved Chromium (Cr)	2017/06/05	100	80 - 120	102	80 - 120	<0.10	ug/L	NC (1)	20
8648902	Dissolved Cobalt (Co)	2017/06/05	96	80 - 120	98	80 - 120	<0.0050	ug/L	0 (1)	20
8648902	Dissolved Copper (Cu)	2017/06/05	95	80 - 120	97	80 - 120	<0.050	ug/L	0.32 (1)	20
8648902	Dissolved Iron (Fe)	2017/06/05	100	80 - 120	102	80 - 120	<1.0	ug/L	0.96 (1)	20
8648902	Dissolved Lead (Pb)	2017/06/05	102	80 - 120	101	80 - 120	<0.0050	ug/L	20 (1)	20
8648902	Dissolved Lithium (Li)	2017/06/05	105	80 - 120	102	80 - 120	<0.50	ug/L	2.6 (1)	20
8648902	Dissolved Manganese (Mn)	2017/06/05	95	80 - 120	97	80 - 120	<0.050	ug/L	10 (1)	20
8648902	Dissolved Molybdenum (Mo)	2017/06/05	99	80 - 120	101	80 - 120	<0.050	ug/L	0.75 (1)	20
8648902	Dissolved Nickel (Ni)	2017/06/05	99	80 - 120	102	80 - 120	<0.020	ug/L	0.69 (1)	20
8648902	Dissolved Phosphorus (P)	2017/06/05					<2.0	ug/L		
8648902	Dissolved Selenium (Se)	2017/06/05	108	80 - 120	105	80 - 120	<0.040	ug/L	4.9 (1)	20
8648902	Dissolved Silicon (Si)	2017/06/05					<50	ug/L	1.6 (1)	20
8648902	Dissolved Silver (Ag)	2017/06/05	108	80 - 120	107	80 - 120	<0.0050	ug/L	NC (1)	20
8648902	Dissolved Strontium (Sr)	2017/06/05	NC	80 - 120	97	80 - 120	<0.050	ug/L	0.042 (1)	20
8648902	Dissolved Thallium (Tl)	2017/06/05	103	80 - 120	102	80 - 120	<0.0020	ug/L	NC (1)	20
8648902	Dissolved Tin (Sn)	2017/06/05	106	80 - 120	104	80 - 120	<0.20	ug/L	NC (1)	20
8648902	Dissolved Titanium (Ti)	2017/06/05	116	80 - 120	112	80 - 120	<0.50	ug/L	NC (1)	20
8648902	Dissolved Uranium (U)	2017/06/05	102	80 - 120	98	80 - 120	<0.0020	ug/L	1.7 (1)	20
8648902	Dissolved Vanadium (V)	2017/06/05	103	80 - 120	102	80 - 120	<0.20	ug/L	NC (1)	20
8648902	Dissolved Zinc (Zn)	2017/06/05	100	80 - 120	99	80 - 120	<0.10	ug/L	3.5 (1)	20
8648902	Dissolved Zirconium (Zr)	2017/06/05					<0.10	ug/L	NC (1)	20
8649754	pH	2017/06/02			101	97 - 103			0.27 (2)	N/A

Maxxam Job #: B742419
Report Date: 2017/06/08

QUALITY ASSURANCE REPORT(CONT'D)

GHD Limited
Client Project #: 56484-02
Site Location: CAMPBELL RIVER
Your P.O. #: 73506861
Sampler Initials: MD

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
8649760	Conductivity	2017/06/02			98	80 - 120	<1.0	uS/cm	1.0 (2)	20
8649762	Alkalinity (PP as CaCO3)	2017/06/02					<0.50	mg/L	NC (2)	20
8649762	Alkalinity (Total as CaCO3)	2017/06/02	NC	80 - 120	98	80 - 120	<0.50	mg/L	1.2 (2)	20
8649762	Bicarbonate (HCO3)	2017/06/02					<0.50	mg/L	1.2 (2)	20
8649762	Carbonate (CO3)	2017/06/02					<0.50	mg/L	NC (2)	20
8649762	Hydroxide (OH)	2017/06/02					<0.50	mg/L	NC (2)	20
8649776	Dissolved Chloride (Cl)	2017/06/01			96	80 - 120	<0.50	mg/L		
8649782	Dissolved Sulphate (SO4)	2017/06/01	NC	80 - 120	94	80 - 120	<0.50	mg/L	2.5 (1)	20
8650853	Total Aluminum (Al)	2017/06/05	115	80 - 120	109	80 - 120	<3.0	ug/L		
8650853	Total Antimony (Sb)	2017/06/05	NC	80 - 120	102	80 - 120	<0.020	ug/L		
8650853	Total Arsenic (As)	2017/06/05	NC	80 - 120	99	80 - 120	<0.020	ug/L	1.7 (1)	20
8650853	Total Barium (Ba)	2017/06/05	NC	80 - 120	101	80 - 120	<0.050	ug/L		
8650853	Total Beryllium (Be)	2017/06/05	114	80 - 120	107	80 - 120	<0.010	ug/L		
8650853	Total Bismuth (Bi)	2017/06/05	80	80 - 120	98	80 - 120	<0.010	ug/L		
8650853	Total Boron (B)	2017/06/05	NC	80 - 120	104	80 - 120	<10	ug/L		
8650853	Total Cadmium (Cd)	2017/06/05	109	80 - 120	103	80 - 120	<0.0050	ug/L		
8650853	Total Chromium (Cr)	2017/06/05	97	80 - 120	98	80 - 120	<0.10	ug/L		
8650853	Total Cobalt (Co)	2017/06/05	96	80 - 120	97	80 - 120	<0.010	ug/L		
8650853	Total Copper (Cu)	2017/06/05	100	80 - 120	101	80 - 120	<0.10	ug/L		
8650853	Total Iron (Fe)	2017/06/05	NC	80 - 120	102	80 - 120	<5.0	ug/L		
8650853	Total Lead (Pb)	2017/06/05	85	80 - 120	101	80 - 120	<0.020	ug/L		
8650853	Total Lithium (Li)	2017/06/05	NC	80 - 120	110	80 - 120	<0.50	ug/L		
8650853	Total Manganese (Mn)	2017/06/05	NC	80 - 120	100	80 - 120	<0.10	ug/L		
8650853	Total Molybdenum (Mo)	2017/06/05	NC	80 - 120	99	80 - 120	<0.050	ug/L		
8650853	Total Nickel (Ni)	2017/06/05	97	80 - 120	99	80 - 120	<0.10	ug/L		
8650853	Total Phosphorus (P)	2017/06/05					<5.0	ug/L		
8650853	Total Selenium (Se)	2017/06/05	117	80 - 120	105	80 - 120	<0.040	ug/L		
8650853	Total Silicon (Si)	2017/06/05					<50	ug/L		
8650853	Total Silver (Ag)	2017/06/05	100	80 - 120	103	80 - 120	<0.010	ug/L		
8650853	Total Strontium (Sr)	2017/06/05	NC	80 - 120	100	80 - 120	<0.050	ug/L		

Maxxam Job #: B742419
Report Date: 2017/06/08

QUALITY ASSURANCE REPORT(CONT'D)

GHD Limited
Client Project #: 56484-02
Site Location: CAMPBELL RIVER
Your P.O. #: 73506861
Sampler Initials: MD

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
8650853	Total Thallium (Tl)	2017/06/05	102	80 - 120	100	80 - 120	<0.0020	ug/L		
8650853	Total Tin (Sn)	2017/06/05	98	80 - 120	101	80 - 120	<0.20	ug/L		
8650853	Total Titanium (Ti)	2017/06/05	97	80 - 120	104	80 - 120	<2.0	ug/L		
8650853	Total Uranium (U)	2017/06/05	103	80 - 120	99	80 - 120	<0.0050	ug/L		
8650853	Total Vanadium (V)	2017/06/05	103	80 - 120	99	80 - 120	<0.20	ug/L		
8650853	Total Zinc (Zn)	2017/06/05	78 (3)	80 - 120	102	80 - 120	<1.0	ug/L		
8650853	Total Zirconium (Zr)	2017/06/05					<0.10	ug/L		
8651017	Nitrate plus Nitrite (N)	2017/06/01	103 (4)	80 - 120	104	80 - 120	<0.020	mg/L	14 (5)	25
8651018	Nitrite (N)	2017/06/01	97 (4)	80 - 120	96	80 - 120	<0.0050	mg/L	NC (5)	20
8651224	Fluoride (F)	2017/06/02	100	80 - 120	102	80 - 120	0.011, RDL=0.010	mg/L	6.9 (1)	20
8652242	Dissolved Mercury (Hg)	2017/06/05	93	80 - 120	97	80 - 120	<0.0020	ug/L	NC (1)	20
8652251	Total Mercury (Hg)	2017/06/05	95	80 - 120	98	80 - 120	<0.0020	ug/L	NC (1)	20
8652428	Total Ammonia (N)	2017/06/05	110	80 - 120	99	80 - 120	<0.0050	mg/L	1.2 (1)	20

Maxxam Job #: B742419
Report Date: 2017/06/08

QUALITY ASSURANCE REPORT(CONT'D)

GHD Limited
Client Project #: 56484-02
Site Location: CAMPBELL RIVER
Your P.O. #: 73506861
Sampler Initials: MD

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
8652429	Total Ammonia (N)	2017/06/05	100 (6)	80 - 120	101	80 - 120	<0.0050	mg/L	6.4 (7)	20

N/A = Not Applicable

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 $\leq 2 \times \text{RDL}$).

(1) Duplicate Parent ID

(2) Duplicate Parent ID [RE3565-01]

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

(4) Matrix Spike Parent ID [RE3563-01]

(5) Duplicate Parent ID [RE3563-01]

(6) Matrix Spike Parent ID [RE3563-07]

(7) Duplicate Parent ID [RE3563-07]

Maxxam Job #: B742419
Report Date: 2017/06/08

GHD Limited
Client Project #: 56484-02
Site Location: CAMPBELL RIVER
Your P.O. #: 73506861
Sampler Initials: MD

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.

Maxxam Maxxim Analytics International Corporation of Maxxim Analytics
4606 Canada Way, Burnaby, British Columbia Canada V5G 1K3 Tel: (604) 734 7276 Toll-free 800-563-6266 Fax: (604) 731 2386 www.maxxim.ca

Page 1 of 1

INVOICE TO: #163 GHD Limited
Company Name: Aïresse MacPhee
Contact Name: 551 COLBY DRIVE
Address: WATERLOO ON N2V 1C2
Phone: (519) 884-0510 x Fax: (519) 725-1394 x
Email: aïresse.macphee@ghd.com; NationalEDDSupport@ma

Report Information
Company Name: #28639 GHD Limited
Contact Name: Michaela Dyck
Address: 10271 Shellbridge Way Suite 165
Richmond BC V6X 2W8
Phone: (604) 214-0510 x234 Fax:
Email: Michaela.dyck@ghd.com; aïresse.macphee@ghd.com

Project Information
Duration #: B70472
P.O. #: 56484-02
Project #: Campbell R. ver...
Project Name: M...
Site #: ...
Sampled By: ...

Barcode
B742419_COC
Chain Of Custody Record
Project Manager
VJ Occ

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

Special Instructions

ANALYSIS REQUESTED (PLEASE BE SPECIFIC)

Turnaround Time (TAT) Required:
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

Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Metals Filtered ? (Y/N)	ANIONS (Cl, F, SO4, NO2, NO3)	Alkalinity, pH	Ammonia-N	Conductivity	Dissolved Metals (including Hg, Phosphorus, Sulfur and Hardness)	Total Metals (including Hg, Phosphorus, Sulfur and Hardness)	# of Bottles	Comments
WS-56484-300517-CR-01		May 30/17	9:30	WSN		X	X	X	X	X	X	7	dissolved metals
	↓ -02	↓	9:45	↓	↓	↓	↓	↓	↓	↓	↓	↓	NOT field filtered
	↓ -03	↓	16:30	↓	↓	↓	↓	↓	↓	↓	↓	↓	or preserved.
													SHORT HOLD
													TIMES.

RELINQUISHED BY: (Signature/Print) **DATE: (YYMM/DD)** **TIME** **RECEIVED BY: (Signature/Print)** **DATE: (YYMM/DD)** **TIME** **# jars used and not submitted** **Lab Use Only**

Time Sensitive ☐ **Temperature (°C) on Receipt** 5/4/2 **Custody Seal Intact on Cooler?** ☒ Yes ☐ No

White Maxxim **Yellow Client**

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.

**Raw MARUE 2017/05/31 17:35 7,8,7 Cs: NA
7,7,7 ICE-PRESENT.**

Your P.O. #: 73506861
Your Project #: 56484-02
Site Location: CAMPBELL RIVER WMC
Your C.O.C. #: 525065-01-01, 525065-02-01

Attention: Michaela Dyck

GHD Limited
10271 Shellbridge Way
Suite 165
Richmond, BC
Canada V6X 2W8

Report Date: 2017/09/12
Report #: R2442956
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B775636

Received: 2017/09/05, 15:45

Sample Matrix: GROUND WATER
Samples Received: 22

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity - Water	14	2017/09/08	2017/09/09	BBY6SOP-00026	SM 22 2320 B m
Alkalinity - Water	7	2017/09/09	2017/09/09	BBY6SOP-00026	SM 22 2320 B m
Chloride by Automated Colourimetry	21	N/A	2017/09/07	BBY6SOP-00011	SM 22 4500-Cl- E m
Conductance - water	14	2017/09/08	2017/09/09	BBY6SOP-00026	SM 22 2510 B m
Conductance - water	7	2017/09/09	2017/09/09	BBY6SOP-00026	SM 22 2510 B m
Fluoride	21	N/A	2017/09/11	BBY6SOP-00048	SM 22 4500-F C m
Hardness (calculated as CaCO ₃)	21	N/A	2017/09/11	BBY WI-00033	Auto Calc
Mercury (Dissolved) by CVAf	16	N/A	2017/09/11	BBY7SOP-00015	BCMOE BCLM Oct2013 m
Mercury (Dissolved) by CVAf	5	N/A	2017/09/12	BBY7SOP-00015	BCMOE BCLM Oct2013 m
Na, K, Ca, Mg, S by CRC ICPMS (diss.)	21	N/A	2017/09/11	BBY7SOP-00002	EPA 6020B R2 m
Elements by CRC ICPMS (dissolved)	21	N/A	2017/09/09	BBY7SOP-00002	EPA 6020B R2 m
Ammonia-N (Preserved)	21	N/A	2017/09/11	BBY6SOP-00009	EPA 350.1 m
Nitrate + Nitrite (N)	21	N/A	2017/09/08	BBY6SOP-00010	SM 22 4500-NO ₃ - I m
Nitrite (N) by CFA	21	N/A	2017/09/08	BBY6SOP-00010	SM 22 4500-NO ₃ - I m
Nitrogen - Nitrate (as N)	21	N/A	2017/09/09	BBY WI-00033	Auto Calc
Filter and HNO ₃ Preserve for Metals	19	N/A	2017/09/09	BBY7 WI-00004	BCMOE Reqs 08/14
Filter and HNO ₃ Preserve for Metals	2	N/A	2017/09/11	BBY7 WI-00004	BCMOE Reqs 08/14
pH Water (1)	14	2017/09/08	2017/09/09	BBY6SOP-00026	SM 22 4500-H+ B m
pH Water (1)	7	2017/09/09	2017/09/09	BBY6SOP-00026	SM 22 4500-H+ B m
Sulphate by Automated Colourimetry	20	N/A	2017/09/07	BBY6SOP-00017	SM 22 4500-SO ₄ 2- E m
Sulphate by Automated Colourimetry	1	N/A	2017/09/08	BBY6SOP-00017	SM 22 4500-SO ₄ 2- E m
VOCs, VH, F1, LH in Water by HS GC/MS	6	2017/09/08	2017/09/08	BBY8SOP-00009/11/12	BC Lab Manual 2017 m
VOCs, VH, F1, LH in Water by HS GC/MS	4	2017/09/08	2017/09/09	BBY8SOP-00009/11/12	BC Lab Manual 2017 m
Volatile HC-BTEX	10	N/A	2017/09/09	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.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Maxxam's profession using

Your P.O. #: 73506861
Your Project #: 56484-02
Site Location: CAMPBELL RIVER WMC
Your C.O.C. #: 525065-01-01, 525065-02-01

Attention: Michaela Dyck

GHD Limited
10271 Shellbridge Way
Suite 165
Richmond, BC
Canada V6X 2W8

Report Date: 2017/09/12
Report #: R2442956
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B775636

Received: 2017/09/05, 15:45

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.

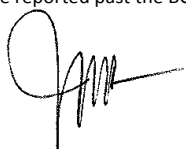
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

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) 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



VJ Oco
Burnaby Project Manager
13 Sep 2017 13:43:14

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 #: B775636
Report Date: 2017/09/12

GHD Limited
Client Project #: 56484-02
Site Location: CAMPBELL RIVER WMC
Your P.O. #: 73506861

RESULTS OF CHEMICAL ANALYSES OF GROUND WATER

Maxxam ID		RW8389		RW8390		
Sampling Date		2017/09/04 11:30		2017/09/04 12:40		
COC Number		525065-01-01		525065-01-01		
	UNITS	WG-56484-040917-CR-01	QC Batch	WG-56484-040917-CR-02	RDL	QC Batch
ANIONS						
Nitrite (N)	mg/L	<0.0050	8752916	<0.0050	0.0050	8752916
Calculated Parameters						
Filter and HNO3 Preservation	N/A	FIELD	ONSITE	FIELD	N/A	ONSITE
Nitrate (N)	mg/L	0.070	8748807	0.091	0.020	8748807
Misc. Inorganics						
Fluoride (F)	mg/L	0.021	8755113	0.025	0.020	8755113
Alkalinity (Total as CaCO3)	mg/L	34.5	8751392	44.0	1.0	8751392
Alkalinity (PP as CaCO3)	mg/L	<1.0	8751392	<1.0	1.0	8751392
Bicarbonate (HCO3)	mg/L	42.1	8751392	53.7	1.0	8751392
Carbonate (CO3)	mg/L	<1.0	8751392	<1.0	1.0	8751392
Hydroxide (OH)	mg/L	<1.0	8751392	<1.0	1.0	8751392
Anions						
Dissolved Sulphate (SO4)	mg/L	2.0	8751431	2.4	1.0	8751431
Dissolved Chloride (Cl)	mg/L	<1.0	8751427	1.0	1.0	8751427
Nutrients						
Total Ammonia (N)	mg/L	<0.020	8753630	<0.020	0.020	8753631
Nitrate plus Nitrite (N)	mg/L	0.070	8752915	0.091	0.020	8752915
Physical Properties						
Conductivity	uS/cm	76.6	8751391	92.9	2.0	8751391
pH	pH	7.74	8751387	7.91	N/A	8751387
RDL = Reportable Detection Limit						
N/A = Not Applicable						

Maxxam Job #: B775636
Report Date: 2017/09/12

GHD Limited
Client Project #: 56484-02
Site Location: CAMPBELL RIVER WMC
Your P.O. #: 73506861

RESULTS OF CHEMICAL ANALYSES OF GROUND WATER

Maxxam ID		RW8391	RW8391		RW8392		
Sampling Date		2017/09/04 14:00	2017/09/04 14:00		2017/09/04 14:40		
COC Number		525065-01-01	525065-01-01		525065-01-01		
	UNITS	WG-56484-040917-CR-03	WG-56484-040917-CR-03 Lab-Dup	QC Batch	WG-56484-040917-CR-04	RDL	QC Batch
ANIONS							
Nitrite (N)	mg/L	<0.0050	N/A	8752916	<0.0050	0.0050	8752918
Calculated Parameters							
Filter and HNO3 Preservation	N/A	FIELD	N/A	ONSITE	FIELD	N/A	ONSITE
Nitrate (N)	mg/L	0.250	N/A	8748807	0.278	0.020	8748807
Misc. Inorganics							
Fluoride (F)	mg/L	0.029	N/A	8755118	0.028	0.020	8755118
Alkalinity (Total as CaCO3)	mg/L	106	107	8752595	128	1.0	8752595
Alkalinity (PP as CaCO3)	mg/L	<1.0	<1.0	8752595	<1.0	1.0	8752595
Bicarbonate (HCO3)	mg/L	129	131	8752595	156	1.0	8752595
Carbonate (CO3)	mg/L	<1.0	<1.0	8752595	<1.0	1.0	8752595
Hydroxide (OH)	mg/L	<1.0	<1.0	8752595	<1.0	1.0	8752595
Anions							
Dissolved Sulphate (SO4)	mg/L	3.1	N/A	8751442	3.0	1.0	8751442
Dissolved Chloride (Cl)	mg/L	2.8	N/A	8751438	7.1	1.0	8751438
Nutrients							
Total Ammonia (N)	mg/L	<0.020	N/A	8753631	0.029	0.020	8753631
Nitrate plus Nitrite (N)	mg/L	0.250	N/A	8752915	0.278	0.020	8752917
Physical Properties							
Conductivity	uS/cm	209	N/A	8752594	259	2.0	8752594
pH	pH	8.18	8.21	8752576	8.26	N/A	8752576
RDL = Reportable Detection Limit Lab-Dup = Laboratory Initiated Duplicate N/A = Not Applicable							

Maxxam Job #: B775636
Report Date: 2017/09/12

GHD Limited
Client Project #: 56484-02
Site Location: CAMPBELL RIVER WMC
Your P.O. #: 73506861

RESULTS OF CHEMICAL ANALYSES OF GROUND WATER

Maxxam ID		RW8392		RW8393		
Sampling Date		2017/09/04 14:40		2017/09/04 15:40		
COC Number		525065-01-01		525065-01-01		
	UNITS	WG-56484-040917-CR-04 Lab-Dup	QC Batch	WG-56484-040917-CR-05	RDL	QC Batch
ANIONS						
Nitrite (N)	mg/L	<0.0050	8752918	<0.0050	0.0050	8752916
Calculated Parameters						
Filter and HNO3 Preservation	N/A	N/A	ONSITE	FIELD	N/A	ONSITE
Nitrate (N)	mg/L	N/A	8748807	0.323	0.020	8748807
Misc. Inorganics						
Fluoride (F)	mg/L	N/A	8755118	<0.020	0.020	8755113
Alkalinity (Total as CaCO3)	mg/L	N/A	8752595	300	1.0	8752595
Alkalinity (PP as CaCO3)	mg/L	N/A	8752595	<1.0	1.0	8752595
Bicarbonate (HCO3)	mg/L	N/A	8752595	366	1.0	8752595
Carbonate (CO3)	mg/L	N/A	8752595	<1.0	1.0	8752595
Hydroxide (OH)	mg/L	N/A	8752595	<1.0	1.0	8752595
Anions						
Dissolved Sulphate (SO4)	mg/L	N/A	8751442	10.3	1.0	8751431
Dissolved Chloride (Cl)	mg/L	N/A	8751438	5.0	1.0	8751427
Nutrients						
Total Ammonia (N)	mg/L	N/A	8753631	<0.020	0.020	8753631
Nitrate plus Nitrite (N)	mg/L	0.278	8752917	0.323	0.020	8752915
Physical Properties						
Conductivity	uS/cm	N/A	8752594	563	2.0	8752594
pH	pH	N/A	8752576	8.24	N/A	8752576
RDL = Reportable Detection Limit Lab-Dup = Laboratory Initiated Duplicate N/A = Not Applicable						

Maxxam Job #: B775636
Report Date: 2017/09/12

GHD Limited
Client Project #: 56484-02
Site Location: CAMPBELL RIVER WMC
Your P.O. #: 73506861

RESULTS OF CHEMICAL ANALYSES OF GROUND WATER

Maxxam ID		RW8394	RW8394		RW8395		
Sampling Date		2017/09/04 16:10	2017/09/04 16:10		2017/09/04 16:30		
COC Number		525065-01-01	525065-01-01		525065-01-01		
	UNITS	WG-56484-040917-CR-06	WG-56484-040917-CR-06 Lab-Dup	QC Batch	WG-56484-040917-CR-07	RDL	QC Batch
ANIONS							
Nitrite (N)	mg/L	<0.0050	N/A	8752918	<0.0050	0.0050	8752916
Calculated Parameters							
Filter and HNO3 Preservation	N/A	FIELD	N/A	ONSITE	FIELD	N/A	ONSITE
Nitrate (N)	mg/L	0.068	N/A	8748807	<0.020	0.020	8748807
Misc. Inorganics							
Fluoride (F)	mg/L	0.022	0.022	8755118	<0.020	0.020	8755113
Alkalinity (Total as CaCO3)	mg/L	42.9	N/A	8752595	<1.0	1.0	8751392
Alkalinity (PP as CaCO3)	mg/L	<1.0	N/A	8752595	<1.0	1.0	8751392
Bicarbonate (HCO3)	mg/L	52.4	N/A	8752595	<1.0	1.0	8751392
Carbonate (CO3)	mg/L	<1.0	N/A	8752595	<1.0	1.0	8751392
Hydroxide (OH)	mg/L	<1.0	N/A	8752595	<1.0	1.0	8751392
Anions							
Dissolved Sulphate (SO4)	mg/L	1.9	N/A	8751431	<1.0	1.0	8751431
Dissolved Chloride (Cl)	mg/L	<1.0	N/A	8751427	<1.0	1.0	8751427
Nutrients							
Total Ammonia (N)	mg/L	<0.020	N/A	8753631	<0.020	0.020	8753631
Nitrate plus Nitrite (N)	mg/L	0.068	N/A	8752917	<0.020	0.020	8752915
Physical Properties							
Conductivity	uS/cm	85.4	N/A	8752594	<2.0	2.0	8751391
pH	pH	7.83	N/A	8752576	5.78	N/A	8751387
RDL = Reportable Detection Limit							
Lab-Dup = Laboratory Initiated Duplicate							
N/A = Not Applicable							

Maxxam Job #: B775636
Report Date: 2017/09/12

GHD Limited
Client Project #: 56484-02
Site Location: CAMPBELL RIVER WMC
Your P.O. #: 73506861

RESULTS OF CHEMICAL ANALYSES OF GROUND WATER

Maxxam ID		RW8395	RW8396		RW8397		
Sampling Date		2017/09/04 16:30	2017/09/04 17:20		2017/09/04 18:00		
COC Number		525065-01-01	525065-01-01		525065-01-01		
	UNITS	WG-56484-040917-CR-07 Lab-Dup	WG-56484-040917-CR-08	QC Batch	WG-56484-040917-CR-09	RDL	QC Batch
ANIONS							
Nitrite (N)	mg/L	<0.0050	<0.0050	8752916	0.0055	0.0050	8752918
Calculated Parameters							
Filter and HNO3 Preservation	N/A	N/A	FIELD	ONSITE	FIELD	N/A	ONSITE
Nitrate (N)	mg/L	N/A	0.589	8748807	0.100	0.020	8748807
Misc. Inorganics							
Fluoride (F)	mg/L	N/A	0.024	8755113	0.028	0.020	8755118
Alkalinity (Total as CaCO3)	mg/L	N/A	49.8	8751392	53.3	1.0	8751392
Alkalinity (PP as CaCO3)	mg/L	N/A	<1.0	8751392	<1.0	1.0	8751392
Bicarbonate (HCO3)	mg/L	N/A	60.7	8751392	65.0	1.0	8751392
Carbonate (CO3)	mg/L	N/A	<1.0	8751392	<1.0	1.0	8751392
Hydroxide (OH)	mg/L	N/A	<1.0	8751392	<1.0	1.0	8751392
Anions							
Dissolved Sulphate (SO4)	mg/L	N/A	2.7	8751431	1.6	1.0	8751431
Dissolved Chloride (Cl)	mg/L	N/A	4.8	8751427	4.8	1.0	8751427
Nutrients							
Total Ammonia (N)	mg/L	N/A	0.043	8753631	<0.020	0.020	8753631
Nitrate plus Nitrite (N)	mg/L	<0.020	0.589	8752915	0.106	0.020	8752917
Physical Properties							
Conductivity	uS/cm	N/A	124	8751391	118	2.0	8751391
pH	pH	N/A	7.98	8751387	7.96	N/A	8751387
RDL = Reportable Detection Limit Lab-Dup = Laboratory Initiated Duplicate N/A = Not Applicable							

Maxxam Job #: B775636
Report Date: 2017/09/12

GHD Limited
Client Project #: 56484-02
Site Location: CAMPBELL RIVER WMC
Your P.O. #: 73506861

RESULTS OF CHEMICAL ANALYSES OF GROUND WATER

Maxxam ID		RW8397		RW8398		
Sampling Date		2017/09/04 18:00		2017/09/04 18:05		
COC Number		525065-01-01		525065-01-01		
	UNITS	WG-56484-040917-CR-09 Lab-Dup	QC Batch	WG-56484-040917-CR-10	RDL	QC Batch
ANIONS						
Nitrite (N)	mg/L	N/A	8752918	0.0064	0.0050	8752916
Calculated Parameters						
Filter and HNO3 Preservation	N/A	N/A	ONSITE	FIELD	N/A	ONSITE
Nitrate (N)	mg/L	N/A	8748807	0.103	0.020	8748807
Misc. Inorganics						
Fluoride (F)	mg/L	N/A	8755118	0.025	0.020	8755113
Alkalinity (Total as CaCO3)	mg/L	N/A	8751392	52.9	1.0	8751392
Alkalinity (PP as CaCO3)	mg/L	N/A	8751392	<1.0	1.0	8751392
Bicarbonate (HCO3)	mg/L	N/A	8751392	64.6	1.0	8751392
Carbonate (CO3)	mg/L	N/A	8751392	<1.0	1.0	8751392
Hydroxide (OH)	mg/L	N/A	8751392	<1.0	1.0	8751392
Anions						
Dissolved Sulphate (SO4)	mg/L	N/A	8751431	3.0	1.0	8751425
Dissolved Chloride (Cl)	mg/L	N/A	8751427	4.8	1.0	8751423
Nutrients						
Total Ammonia (N)	mg/L	<0.020	8753631	<0.020	0.020	8753631
Nitrate plus Nitrite (N)	mg/L	N/A	8752917	0.109	0.020	8752915
Physical Properties						
Conductivity	uS/cm	N/A	8751391	119	2.0	8751391
pH	pH	N/A	8751387	8.00	N/A	8751387
RDL = Reportable Detection Limit Lab-Dup = Laboratory Initiated Duplicate N/A = Not Applicable						

Maxxam Job #: B775636
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GHD Limited
Client Project #: 56484-02
Site Location: CAMPBELL RIVER WMC
Your P.O. #: 73506861

RESULTS OF CHEMICAL ANALYSES OF GROUND WATER

Maxxam ID		RW8399			RW8400		
Sampling Date		2017/09/04 17:45			2017/09/04 18:20		
COC Number		525065-02-01			525065-02-01		
	UNITS	WG-56484-040917-CR-11	RDL	QC Batch	WG-56484-040917-CR-12	RDL	QC Batch
ANIONS							
Nitrite (N)	mg/L	<0.0050	0.0050	8752918	<0.0050	0.0050	8752918
Calculated Parameters							
Filter and HNO3 Preservation	N/A	FIELD	N/A	ONSITE	FIELD	N/A	ONSITE
Nitrate (N)	mg/L	0.182	0.020	8748807	<0.020	0.020	8748807
Misc. Inorganics							
Fluoride (F)	mg/L	0.030	0.020	8755118	0.034	0.020	8755118
Alkalinity (Total as CaCO3)	mg/L	127	1.0	8751392	332	1.0	8752595
Alkalinity (PP as CaCO3)	mg/L	<1.0	1.0	8751392	<1.0	1.0	8752595
Bicarbonate (HCO3)	mg/L	155	1.0	8751392	405	1.0	8752595
Carbonate (CO3)	mg/L	<1.0	1.0	8751392	<1.0	1.0	8752595
Hydroxide (OH)	mg/L	<1.0	1.0	8751392	<1.0	1.0	8752595
Anions							
Dissolved Sulphate (SO4)	mg/L	4.0	1.0	8751431	2.6	1.0	8751431
Dissolved Chloride (Cl)	mg/L	16	1.0	8751427	48	1.0	8751427
Nutrients							
Total Ammonia (N)	mg/L	<0.020	0.020	8753631	15 (1)	0.20	8753630
Nitrate plus Nitrite (N)	mg/L	0.182	0.020	8752917	<0.020	0.020	8752917
Physical Properties							
Conductivity	uS/cm	298	2.0	8751391	776	2.0	8752594
pH	pH	8.27	N/A	8751387	7.86	N/A	8752576
RDL = Reportable Detection Limit							
N/A = Not Applicable							
(1) Detection limits raised due to dilution to bring analyte within the calibrated range.							

Maxxam Job #: B775636
Report Date: 2017/09/12

GHD Limited
Client Project #: 56484-02
Site Location: CAMPBELL RIVER WMC
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RESULTS OF CHEMICAL ANALYSES OF GROUND WATER

Maxxam ID		RW8401		RW8402		
Sampling Date		2017/09/04 19:30		2017/09/04 19:35		
COC Number		525065-02-01		525065-02-01		
	UNITS	WG-56484-040917-CR-13	QC Batch	WG-56484-040917-CR-14	RDL	QC Batch
ANIONS						
Nitrite (N)	mg/L	<0.0050	8752918	<0.0050	0.0050	8752916
Calculated Parameters						
Filter and HNO3 Preservation	N/A	FIELD	ONSITE	FIELD	N/A	ONSITE
Nitrate (N)	mg/L	<0.020	8748807	<0.020	0.020	8748807
Misc. Inorganics						
Fluoride (F)	mg/L	0.025	8755118	0.025	0.020	8755113
Alkalinity (Total as CaCO3)	mg/L	250	8752595	242	1.0	8751392
Alkalinity (PP as CaCO3)	mg/L	<1.0	8752595	<1.0	1.0	8751392
Bicarbonate (HCO3)	mg/L	305	8752595	295	1.0	8751392
Carbonate (CO3)	mg/L	<1.0	8752595	<1.0	1.0	8751392
Hydroxide (OH)	mg/L	<1.0	8752595	<1.0	1.0	8751392
Anions						
Dissolved Sulphate (SO4)	mg/L	1.9	8751431	2.1	1.0	8751431
Dissolved Chloride (Cl)	mg/L	19	8751427	19	1.0	8751427
Nutrients						
Total Ammonia (N)	mg/L	15 (1)	8753630	15 (1)	0.20	8753631
Nitrate plus Nitrite (N)	mg/L	<0.020	8752917	<0.020	0.020	8752915
Physical Properties						
Conductivity	uS/cm	531	8752594	520	2.0	8751391
pH	pH	8.27	8752576	8.27	N/A	8751387
RDL = Reportable Detection Limit						
N/A = Not Applicable						
(1) Detection limits raised due to dilution to bring analyte within the calibrated range.						

Maxxam Job #: B775636
Report Date: 2017/09/12

GHD Limited
Client Project #: 56484-02
Site Location: CAMPBELL RIVER WMC
Your P.O. #: 73506861

RESULTS OF CHEMICAL ANALYSES OF GROUND WATER

Maxxam ID		RW8403			RW8404		
Sampling Date		2017/09/04 19:45			2017/09/05 09:30		
COC Number		525065-02-01			525065-02-01		
	UNITS	WG-56484-040917-CR-15	RDL	QC Batch	WG-J6484-050917-CR-16	RDL	QC Batch
ANIONS							
Nitrite (N)	mg/L	<0.0050	0.0050	8752916	<0.0050	0.0050	8752918
Calculated Parameters							
Filter and HNO3 Preservation	N/A	FIELD	N/A	ONSITE	FIELD	N/A	ONSITE
Nitrate (N)	mg/L	<0.020	0.020	8748807	0.072	0.020	8748807
Misc. Inorganics							
Fluoride (F)	mg/L	0.023	0.020	8755113	0.024	0.020	8755118
Alkalinity (Total as CaCO3)	mg/L	262	1.0	8752595	46.5	1.0	8751392
Alkalinity (PP as CaCO3)	mg/L	<1.0	1.0	8752595	<1.0	1.0	8751392
Bicarbonate (HCO3)	mg/L	319	1.0	8752595	56.8	1.0	8751392
Carbonate (CO3)	mg/L	<1.0	1.0	8752595	<1.0	1.0	8751392
Hydroxide (OH)	mg/L	<1.0	1.0	8752595	<1.0	1.0	8751392
Anions							
Dissolved Sulphate (SO4)	mg/L	<1.0	1.0	8751431	2.1	1.0	8751431
Dissolved Chloride (Cl)	mg/L	30	1.0	8751427	<1.0	1.0	8751427
Nutrients							
Total Ammonia (N)	mg/L	4.1 (1)	0.10	8753631	<0.020	0.020	8753631
Nitrate plus Nitrite (N)	mg/L	<0.020	0.020	8752915	0.072	0.020	8752917
Physical Properties							
Conductivity	uS/cm	575	2.0	8752594	98.1	2.0	8751391
pH	pH	8.28	N/A	8752576	8.00	N/A	8751387
RDL = Reportable Detection Limit							
N/A = Not Applicable							
(1) Detection limits raised due to dilution to bring analyte within the calibrated range.							

Maxxam Job #: B775636
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GHD Limited
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Site Location: CAMPBELL RIVER WMC
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RESULTS OF CHEMICAL ANALYSES OF GROUND WATER

Maxxam ID		RW8404	RW8405		RW8406		
Sampling Date		2017/09/05 09:30	2017/09/05 11:30		2017/09/05 12:40		
COC Number		525065-02-01	525065-02-01		525065-02-01		
	UNITS	WG-J6484-050917-CR-16 Lab-Dup	WG-J6484-050917-CR-17	QC Batch	WG-J6484-050917-CR-18	RDL	QC Batch
ANIONS							
Nitrite (N)	mg/L	N/A	<0.0050	8752918	<0.0050	0.0050	8752918
Calculated Parameters							
Filter and HNO3 Preservation	N/A	N/A	FIELD	ONSITE	FIELD	N/A	ONSITE
Nitrate (N)	mg/L	N/A	0.174	8748807	0.154	0.020	8748807
Misc. Inorganics							
Fluoride (F)	mg/L	N/A	0.031	8755118	0.024	0.020	8755118
Alkalinity (Total as CaCO3)	mg/L	N/A	94.7	8751392	49.0	1.0	8751392
Alkalinity (PP as CaCO3)	mg/L	N/A	<1.0	8751392	<1.0	1.0	8751392
Bicarbonate (HCO3)	mg/L	N/A	116	8751392	59.8	1.0	8751392
Carbonate (CO3)	mg/L	N/A	<1.0	8751392	<1.0	1.0	8751392
Hydroxide (OH)	mg/L	N/A	<1.0	8751392	<1.0	1.0	8751392
Anions							
Dissolved Sulphate (SO4)	mg/L	2.1	3.1	8751431	2.1	1.0	8751431
Dissolved Chloride (Cl)	mg/L	<1.0	1.7	8751427	1.2	1.0	8751427
Nutrients							
Total Ammonia (N)	mg/L	N/A	<0.020	8753631	<0.020	0.020	8753630
Nitrate plus Nitrite (N)	mg/L	N/A	0.174	8752917	0.154	0.020	8752917
Physical Properties							
Conductivity	uS/cm	N/A	190	8751391	101	2.0	8751391
pH	pH	N/A	8.21	8751387	7.98	N/A	8751387
RDL = Reportable Detection Limit Lab-Dup = Laboratory Initiated Duplicate N/A = Not Applicable							

Maxxam Job #: B775636
Report Date: 2017/09/12

GHD Limited
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Site Location: CAMPBELL RIVER WMC
Your P.O. #: 73506861

RESULTS OF CHEMICAL ANALYSES OF GROUND WATER

Maxxam ID		RW8407			RW8408		
Sampling Date		2017/09/05 13:45			2017/09/05 14:30		
COC Number		525065-02-01			525065-02-01		
	UNITS	WG-J6484-050917-CR-19	RDL	QC Batch	WG-J6484-050917-CR-20	RDL	QC Batch
ANIONS							
Nitrite (N)	mg/L	<0.0050	0.0050	8752916	<0.0050	0.0050	8752916
Calculated Parameters							
Filter and HNO3 Preservation	N/A	FIELD	N/A	ONSITE	FIELD	N/A	ONSITE
Nitrate (N)	mg/L	1.01	0.020	8748807	2.61	0.10	8748807
Misc. Inorganics							
Fluoride (F)	mg/L	0.023	0.020	8755113	<0.020	0.020	8755113
Alkalinity (Total as CaCO3)	mg/L	152	1.0	8751392	295	1.0	8751392
Alkalinity (PP as CaCO3)	mg/L	1.4	1.0	8751392	<1.0	1.0	8751392
Bicarbonate (HCO3)	mg/L	182	1.0	8751392	360	1.0	8751392
Carbonate (CO3)	mg/L	1.7	1.0	8751392	<1.0	1.0	8751392
Hydroxide (OH)	mg/L	<1.0	1.0	8751392	<1.0	1.0	8751392
Anions							
Dissolved Sulphate (SO4)	mg/L	10.0	1.0	8751431	13.6	1.0	8753697
Dissolved Chloride (Cl)	mg/L	4.3	1.0	8751427	5.9	1.0	8751423
Nutrients							
Total Ammonia (N)	mg/L	0.024	0.020	8753630	0.025	0.020	8753631
Nitrate plus Nitrite (N)	mg/L	1.01	0.020	8752915	2.61 (1)	0.10	8752915
Physical Properties							
Conductivity	uS/cm	321	2.0	8751391	582	2.0	8751391
pH	pH	8.32	N/A	8751387	8.17	N/A	8751387
RDL = Reportable Detection Limit							
N/A = Not Applicable							
(1) Detection limits raised due to dilution to bring analyte within the calibrated range.							

Maxxam Job #: B775636
Report Date: 2017/09/12

GHD Limited
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Site Location: CAMPBELL RIVER WMC
Your P.O. #: 73506861

RESULTS OF CHEMICAL ANALYSES OF GROUND WATER

Maxxam ID		RW8409		
Sampling Date		2017/09/05 14:50		
COC Number		525065-02-01		
	UNITS	WG-J6484-050917-CR-21	RDL	QC Batch
ANIONS				
Nitrite (N)	mg/L	<0.0050	0.0050	8752916
Calculated Parameters				
Filter and HNO3 Preservation	N/A	FIELD	N/A	ONSITE
Nitrate (N)	mg/L	4.07	0.10	8748807
Misc. Inorganics				
Fluoride (F)	mg/L	0.022	0.020	8755113
Alkalinity (Total as CaCO3)	mg/L	301	1.0	8751392
Alkalinity (PP as CaCO3)	mg/L	<1.0	1.0	8751392
Bicarbonate (HCO3)	mg/L	367	1.0	8751392
Carbonate (CO3)	mg/L	<1.0	1.0	8751392
Hydroxide (OH)	mg/L	<1.0	1.0	8751392
Anions				
Dissolved Sulphate (SO4)	mg/L	12.0	1.0	8751431
Dissolved Chloride (Cl)	mg/L	67	1.0	8751427
Nutrients				
Total Ammonia (N)	mg/L	0.048	0.020	8753630
Nitrate plus Nitrite (N)	mg/L	4.07 (1)	0.10	8752915
Physical Properties				
Conductivity	uS/cm	791	2.0	8751391
pH	pH	8.04	N/A	8751387
RDL = Reportable Detection Limit N/A = Not Applicable (1) Detection limits raised due to dilution to bring analyte within the calibrated range.				

Maxxam Job #: B775636
Report Date: 2017/09/12

GHD Limited
Client Project #: 56484-02
Site Location: CAMPBELL RIVER WMC
Your P.O. #: 73506861

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

Maxxam ID		RW8389	RW8389	RW8390		
Sampling Date		2017/09/04 11:30	2017/09/04 11:30	2017/09/04 12:40		
COC Number		525065-01-01	525065-01-01	525065-01-01		
	UNITS	WG-56484-040917-CR-01	WG-56484-040917-CR-01 Lab-Dup	WG-56484-040917-CR-02	RDL	QC Batch
Misc. Inorganics						
Dissolved Hardness (CaCO3)	mg/L	33.0	N/A	40.6	0.50	8748607
Elements						
Dissolved Mercury (Hg)	ug/L	<0.010	N/A	<0.010	0.010	8753729
Dissolved Metals by ICPMS						
Dissolved Aluminum (Al)	ug/L	3.1	3.1	<3.0	3.0	8751435
Dissolved Antimony (Sb)	ug/L	<0.50	<0.50	<0.50	0.50	8751435
Dissolved Arsenic (As)	ug/L	<0.10	<0.10	<0.10	0.10	8751435
Dissolved Barium (Ba)	ug/L	1.9	1.9	<1.0	1.0	8751435
Dissolved Beryllium (Be)	ug/L	<0.10	<0.10	<0.10	0.10	8751435
Dissolved Bismuth (Bi)	ug/L	<1.0	<1.0	<1.0	1.0	8751435
Dissolved Boron (B)	ug/L	<50	<50	<50	50	8751435
Dissolved Cadmium (Cd)	ug/L	<0.010	<0.010	<0.010	0.010	8751435
Dissolved Chromium (Cr)	ug/L	<1.0	<1.0	<1.0	1.0	8751435
Dissolved Cobalt (Co)	ug/L	<0.20	<0.20	<0.20	0.20	8751435
Dissolved Copper (Cu)	ug/L	<0.20	<0.20	<0.20	0.20	8751435
Dissolved Iron (Fe)	ug/L	<5.0	<5.0	<5.0	5.0	8751435
Dissolved Lead (Pb)	ug/L	<0.20	<0.20	<0.20	0.20	8751435
Dissolved Lithium (Li)	ug/L	<2.0	<2.0	<2.0	2.0	8751435
Dissolved Manganese (Mn)	ug/L	<1.0	<1.0	<1.0	1.0	8751435
Dissolved Molybdenum (Mo)	ug/L	<1.0	<1.0	<1.0	1.0	8751435
Dissolved Nickel (Ni)	ug/L	<1.0	<1.0	<1.0	1.0	8751435
Dissolved Phosphorus (P)	ug/L	<10	<10	<10	10	8751435
Dissolved Selenium (Se)	ug/L	0.10	0.11	0.15	0.10	8751435
Dissolved Silicon (Si)	ug/L	3780	3820	5620	100	8751435
Dissolved Silver (Ag)	ug/L	<0.020	<0.020	<0.020	0.020	8751435
Dissolved Strontium (Sr)	ug/L	15.2	15.3	22.4	1.0	8751435
Dissolved Thallium (Tl)	ug/L	<0.010	<0.010	<0.010	0.010	8751435
Dissolved Tin (Sn)	ug/L	<5.0	<5.0	<5.0	5.0	8751435
Dissolved Titanium (Ti)	ug/L	<5.0	<5.0	<5.0	5.0	8751435
Dissolved Uranium (U)	ug/L	<0.10	<0.10	<0.10	0.10	8751435
RDL = Reportable Detection Limit						
Lab-Dup = Laboratory Initiated Duplicate						
N/A = Not Applicable						

Maxxam Job #: B775636
Report Date: 2017/09/12

GHD Limited
Client Project #: 56484-02
Site Location: CAMPBELL RIVER WMC
Your P.O. #: 73506861

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

Maxxam ID		RW8389	RW8389	RW8390		
Sampling Date		2017/09/04 11:30	2017/09/04 11:30	2017/09/04 12:40		
COC Number		525065-01-01	525065-01-01	525065-01-01		
	UNITS	WG-56484-040917-CR-01	WG-56484-040917-CR-01 Lab-Dup	WG-56484-040917-CR-02	RDL	QC Batch
Dissolved Vanadium (V)	ug/L	<5.0	<5.0	<5.0	5.0	8751435
Dissolved Zinc (Zn)	ug/L	<5.0	<5.0	<5.0	5.0	8751435
Dissolved Zirconium (Zr)	ug/L	<0.10	<0.10	<0.10	0.10	8751435
Dissolved Calcium (Ca)	mg/L	10.4	N/A	13.1	0.050	8748633
Dissolved Magnesium (Mg)	mg/L	1.72	N/A	1.89	0.050	8748633
Dissolved Potassium (K)	mg/L	0.150	N/A	0.162	0.050	8748633
Dissolved Sodium (Na)	mg/L	1.13	N/A	2.74	0.050	8748633
Dissolved Sulphur (S)	mg/L	<3.0	N/A	<3.0	3.0	8748633
RDL = Reportable Detection Limit Lab-Dup = Laboratory Initiated Duplicate N/A = Not Applicable						

Maxxam Job #: B775636
Report Date: 2017/09/12

GHD Limited
Client Project #: 56484-02
Site Location: CAMPBELL RIVER WMC
Your P.O. #: 73506861

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

Maxxam ID		RW8391	RW8392	RW8393		
Sampling Date		2017/09/04 14:00	2017/09/04 14:40	2017/09/04 15:40		
COC Number		525065-01-01	525065-01-01	525065-01-01		
	UNITS	WG-56484-040917-CR-03	WG-56484-040917-CR-04	WG-56484-040917-CR-05	RDL	QC Batch
Misc. Inorganics						
Dissolved Hardness (CaCO ₃)	mg/L	97.7	121	302	0.50	8748607
Elements						
Dissolved Mercury (Hg)	ug/L	<0.010	<0.010	<0.010	0.010	8753729
Dissolved Metals by ICPMS						
Dissolved Aluminum (Al)	ug/L	9.5	3.2	<3.0	3.0	8751435
Dissolved Antimony (Sb)	ug/L	<0.50	<0.50	<0.50	0.50	8751435
Dissolved Arsenic (As)	ug/L	0.73	0.14	<0.10	0.10	8751435
Dissolved Barium (Ba)	ug/L	2.0	7.0	10.2	1.0	8751435
Dissolved Beryllium (Be)	ug/L	<0.10	<0.10	<0.10	0.10	8751435
Dissolved Bismuth (Bi)	ug/L	<1.0	<1.0	<1.0	1.0	8751435
Dissolved Boron (B)	ug/L	<50	<50	<50	50	8751435
Dissolved Cadmium (Cd)	ug/L	0.016	<0.010	<0.010	0.010	8751435
Dissolved Chromium (Cr)	ug/L	<1.0	1.7	<1.0	1.0	8751435
Dissolved Cobalt (Co)	ug/L	<0.20	<0.20	<0.20	0.20	8751435
Dissolved Copper (Cu)	ug/L	0.26	<0.20	<0.20	0.20	8751435
Dissolved Iron (Fe)	ug/L	<5.0	<5.0	<5.0	5.0	8751435
Dissolved Lead (Pb)	ug/L	<0.20	<0.20	<0.20	0.20	8751435
Dissolved Lithium (Li)	ug/L	<2.0	<2.0	<2.0	2.0	8751435
Dissolved Manganese (Mn)	ug/L	<1.0	<1.0	<1.0	1.0	8751435
Dissolved Molybdenum (Mo)	ug/L	<1.0	<1.0	<1.0	1.0	8751435
Dissolved Nickel (Ni)	ug/L	<1.0	<1.0	<1.0	1.0	8751435
Dissolved Phosphorus (P)	ug/L	37	<10	<10	10	8751435
Dissolved Selenium (Se)	ug/L	0.12	0.15	<0.10	0.10	8751435
Dissolved Silicon (Si)	ug/L	6540	8320	7710	100	8751435
Dissolved Silver (Ag)	ug/L	<0.020	<0.020	<0.020	0.020	8751435
Dissolved Strontium (Sr)	ug/L	52.1	67.7	205	1.0	8751435
Dissolved Thallium (Tl)	ug/L	<0.010	<0.010	<0.010	0.010	8751435
Dissolved Tin (Sn)	ug/L	<5.0	<5.0	<5.0	5.0	8751435
Dissolved Titanium (Ti)	ug/L	<5.0	<5.0	<5.0	5.0	8751435
Dissolved Uranium (U)	ug/L	<0.10	0.20	0.22	0.10	8751435
Dissolved Vanadium (V)	ug/L	5.4	<5.0	<5.0	5.0	8751435
RDL = Reportable Detection Limit						

Maxxam Job #: B775636
Report Date: 2017/09/12

GHD Limited
Client Project #: 56484-02
Site Location: CAMPBELL RIVER WMC
Your P.O. #: 73506861

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

Maxxam ID		RW8391	RW8392	RW8393		
Sampling Date		2017/09/04 14:00	2017/09/04 14:40	2017/09/04 15:40		
COC Number		525065-01-01	525065-01-01	525065-01-01		
	UNITS	WG-56484-040917-CR-03	WG-56484-040917-CR-04	WG-56484-040917-CR-05	RDL	QC Batch
Dissolved Zinc (Zn)	ug/L	<5.0	<5.0	<5.0	5.0	8751435
Dissolved Zirconium (Zr)	ug/L	<0.10	<0.10	<0.10	0.10	8751435
Dissolved Calcium (Ca)	mg/L	31.4	33.0	100	0.050	8748633
Dissolved Magnesium (Mg)	mg/L	4.68	9.34	12.4	0.050	8748633
Dissolved Potassium (K)	mg/L	0.778	0.513	0.914	0.050	8748633
Dissolved Sodium (Na)	mg/L	1.93	3.54	3.70	0.050	8748633
Dissolved Sulphur (S)	mg/L	<3.0	<3.0	3.7	3.0	8748633
RDL = Reportable Detection Limit						

Maxxam Job #: B775636
Report Date: 2017/09/12

GHD Limited
Client Project #: 56484-02
Site Location: CAMPBELL RIVER WMC
Your P.O. #: 73506861

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

Maxxam ID		RW8394	RW8395	RW8396		
Sampling Date		2017/09/04 16:10	2017/09/04 16:30	2017/09/04 17:20		
COC Number		525065-01-01	525065-01-01	525065-01-01		
	UNITS	WG-56484-040917-CR-06	WG-56484-040917-CR-07	WG-56484-040917-CR-08	RDL	QC Batch
Misc. Inorganics						
Dissolved Hardness (CaCO ₃)	mg/L	38.2	<0.50	54.3	0.50	8748607
Elements						
Dissolved Mercury (Hg)	ug/L	<0.010	<0.010	<0.010	0.010	8753729
Dissolved Metals by ICPMS						
Dissolved Aluminum (Al)	ug/L	6.5	<3.0	<3.0	3.0	8751435
Dissolved Antimony (Sb)	ug/L	<0.50	<0.50	<0.50	0.50	8751435
Dissolved Arsenic (As)	ug/L	0.33	<0.10	0.18	0.10	8751435
Dissolved Barium (Ba)	ug/L	<1.0	<1.0	<1.0	1.0	8751435
Dissolved Beryllium (Be)	ug/L	<0.10	<0.10	<0.10	0.10	8751435
Dissolved Bismuth (Bi)	ug/L	<1.0	<1.0	<1.0	1.0	8751435
Dissolved Boron (B)	ug/L	<50	<50	<50	50	8751435
Dissolved Cadmium (Cd)	ug/L	<0.010	<0.010	<0.010	0.010	8751435
Dissolved Chromium (Cr)	ug/L	<1.0	<1.0	<1.0	1.0	8751435
Dissolved Cobalt (Co)	ug/L	<0.20	<0.20	<0.20	0.20	8751435
Dissolved Copper (Cu)	ug/L	0.90	<0.20	<0.20	0.20	8751435
Dissolved Iron (Fe)	ug/L	33.9	<5.0	<5.0	5.0	8751435
Dissolved Lead (Pb)	ug/L	<0.20	<0.20	<0.20	0.20	8751435
Dissolved Lithium (Li)	ug/L	<2.0	<2.0	<2.0	2.0	8751435
Dissolved Manganese (Mn)	ug/L	<1.0	<1.0	<1.0	1.0	8751435
Dissolved Molybdenum (Mo)	ug/L	<1.0	<1.0	<1.0	1.0	8751435
Dissolved Nickel (Ni)	ug/L	<1.0	<1.0	<1.0	1.0	8751435
Dissolved Phosphorus (P)	ug/L	<10	<10	24	10	8751435
Dissolved Selenium (Se)	ug/L	0.10	<0.10	0.15	0.10	8751435
Dissolved Silicon (Si)	ug/L	3570	<100	4520	100	8751435
Dissolved Silver (Ag)	ug/L	<0.020	<0.020	<0.020	0.020	8751435
Dissolved Strontium (Sr)	ug/L	19.6	<1.0	29.6	1.0	8751435
Dissolved Thallium (Tl)	ug/L	<0.010	<0.010	<0.010	0.010	8751435
Dissolved Tin (Sn)	ug/L	<5.0	<5.0	<5.0	5.0	8751435
Dissolved Titanium (Ti)	ug/L	<5.0	<5.0	<5.0	5.0	8751435
Dissolved Uranium (U)	ug/L	<0.10	<0.10	<0.10	0.10	8751435
Dissolved Vanadium (V)	ug/L	<5.0	<5.0	<5.0	5.0	8751435
RDL = Reportable Detection Limit						

Maxxam Job #: B775636
Report Date: 2017/09/12

GHD Limited
Client Project #: 56484-02
Site Location: CAMPBELL RIVER WMC
Your P.O. #: 73506861

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

Maxxam ID		RW8394	RW8395	RW8396		
Sampling Date		2017/09/04 16:10	2017/09/04 16:30	2017/09/04 17:20		
COC Number		525065-01-01	525065-01-01	525065-01-01		
	UNITS	WG-56484-040917-CR-06	WG-56484-040917-CR-07	WG-56484-040917-CR-08	RDL	QC Batch
Dissolved Zinc (Zn)	ug/L	10.5	<5.0	<5.0	5.0	8751435
Dissolved Zirconium (Zr)	ug/L	<0.10	<0.10	<0.10	0.10	8751435
Dissolved Calcium (Ca)	mg/L	12.5	<0.050	17.1	0.050	8748633
Dissolved Magnesium (Mg)	mg/L	1.72	<0.050	2.84	0.050	8748633
Dissolved Potassium (K)	mg/L	0.235	<0.050	0.272	0.050	8748633
Dissolved Sodium (Na)	mg/L	0.995	<0.050	1.57	0.050	8748633
Dissolved Sulphur (S)	mg/L	<3.0	<3.0	<3.0	3.0	8748633
RDL = Reportable Detection Limit						

Maxxam Job #: B775636
Report Date: 2017/09/12

GHD Limited
Client Project #: 56484-02
Site Location: CAMPBELL RIVER WMC
Your P.O. #: 73506861

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

Maxxam ID		RW8397	RW8398	RW8399		
Sampling Date		2017/09/04 18:00	2017/09/04 18:05	2017/09/04 17:45		
COC Number		525065-01-01	525065-01-01	525065-02-01		
	UNITS	WG-56484-040917-CR-09	WG-56484-040917-CR-10	WG-56484-040917-CR-11	RDL	QC Batch
Misc. Inorganics						
Dissolved Hardness (CaCO ₃)	mg/L	49.8	49.9	140	0.50	8748607
Elements						
Dissolved Mercury (Hg)	ug/L	<0.010	<0.010	<0.010	0.010	8753729
Dissolved Metals by ICPMS						
Dissolved Aluminum (Al)	ug/L	3.7	4.3	<3.0	3.0	8751435
Dissolved Antimony (Sb)	ug/L	<0.50	<0.50	<0.50	0.50	8751435
Dissolved Arsenic (As)	ug/L	1.76	1.71	0.10	0.10	8751435
Dissolved Barium (Ba)	ug/L	1.4	1.4	<1.0	1.0	8751435
Dissolved Beryllium (Be)	ug/L	<0.10	<0.10	<0.10	0.10	8751435
Dissolved Bismuth (Bi)	ug/L	<1.0	<1.0	<1.0	1.0	8751435
Dissolved Boron (B)	ug/L	<50	<50	<50	50	8751435
Dissolved Cadmium (Cd)	ug/L	<0.010	<0.010	0.011	0.010	8751435
Dissolved Chromium (Cr)	ug/L	<1.0	<1.0	<1.0	1.0	8751435
Dissolved Cobalt (Co)	ug/L	<0.20	<0.20	<0.20	0.20	8751435
Dissolved Copper (Cu)	ug/L	<0.20	<0.20	0.77	0.20	8751435
Dissolved Iron (Fe)	ug/L	<5.0	<5.0	<5.0	5.0	8751435
Dissolved Lead (Pb)	ug/L	<0.20	<0.20	<0.20	0.20	8751435
Dissolved Lithium (Li)	ug/L	<2.0	<2.0	<2.0	2.0	8751435
Dissolved Manganese (Mn)	ug/L	<1.0	<1.0	<1.0	1.0	8751435
Dissolved Molybdenum (Mo)	ug/L	<1.0	<1.0	<1.0	1.0	8751435
Dissolved Nickel (Ni)	ug/L	<1.0	<1.0	<1.0	1.0	8751435
Dissolved Phosphorus (P)	ug/L	44	47	28	10	8751435
Dissolved Selenium (Se)	ug/L	0.16	0.17	0.15	0.10	8751435
Dissolved Silicon (Si)	ug/L	5770	5900	4870	100	8751435
Dissolved Silver (Ag)	ug/L	<0.020	<0.020	<0.020	0.020	8751435
Dissolved Strontium (Sr)	ug/L	28.0	27.4	113	1.0	8751435
Dissolved Thallium (Tl)	ug/L	<0.010	<0.010	<0.010	0.010	8751435
Dissolved Tin (Sn)	ug/L	<5.0	<5.0	<5.0	5.0	8751435
Dissolved Titanium (Ti)	ug/L	<5.0	<5.0	<5.0	5.0	8751435
Dissolved Uranium (U)	ug/L	0.27	0.26	0.26	0.10	8751435
Dissolved Vanadium (V)	ug/L	15.1	15.1	<5.0	5.0	8751435
RDL = Reportable Detection Limit						

Maxxam Job #: B775636
Report Date: 2017/09/12

GHD Limited
Client Project #: 56484-02
Site Location: CAMPBELL RIVER WMC
Your P.O. #: 73506861

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

Maxxam ID		RW8397	RW8398	RW8399		
Sampling Date		2017/09/04 18:00	2017/09/04 18:05	2017/09/04 17:45		
COC Number		525065-01-01	525065-01-01	525065-02-01		
	UNITS	WG-56484-040917-CR-09	WG-56484-040917-CR-10	WG-56484-040917-CR-11	RDL	QC Batch
Dissolved Zinc (Zn)	ug/L	<5.0	<5.0	<5.0	5.0	8751435
Dissolved Zirconium (Zr)	ug/L	<0.10	<0.10	<0.10	0.10	8751435
Dissolved Calcium (Ca)	mg/L	15.3	15.4	43.8	0.050	8748633
Dissolved Magnesium (Mg)	mg/L	2.80	2.76	7.45	0.050	8748633
Dissolved Potassium (K)	mg/L	0.865	0.884	0.460	0.050	8748633
Dissolved Sodium (Na)	mg/L	2.67	2.70	4.08	0.050	8748633
Dissolved Sulphur (S)	mg/L	<3.0	<3.0	<3.0	3.0	8748633
RDL = Reportable Detection Limit						

Maxxam Job #: B775636
Report Date: 2017/09/12

GHD Limited
Client Project #: 56484-02
Site Location: CAMPBELL RIVER WMC
Your P.O. #: 73506861

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

Maxxam ID		RW8400	RW8401	RW8402		
Sampling Date		2017/09/04 18:20	2017/09/04 19:30	2017/09/04 19:35		
COC Number		525065-02-01	525065-02-01	525065-02-01		
	UNITS	WG-56484-040917-CR-12	WG-56484-040917-CR-13	WG-56484-040917-CR-14	RDL	QC Batch
Misc. Inorganics						
Dissolved Hardness (CaCO ₃)	mg/L	214	136	142	0.50	8748607
Elements						
Dissolved Mercury (Hg)	ug/L	<0.010	<0.010	<0.010	0.010	8753729
Dissolved Metals by ICPMS						
Dissolved Aluminum (Al)	ug/L	<3.0	4.6	4.5	3.0	8751435
Dissolved Antimony (Sb)	ug/L	<0.50	<0.50	<0.50	0.50	8751435
Dissolved Arsenic (As)	ug/L	2.81	3.12	2.97	0.10	8751435
Dissolved Barium (Ba)	ug/L	28.3	16.4	16.7	1.0	8751435
Dissolved Beryllium (Be)	ug/L	<0.10	<0.10	<0.10	0.10	8751435
Dissolved Bismuth (Bi)	ug/L	<1.0	<1.0	<1.0	1.0	8751435
Dissolved Boron (B)	ug/L	321	595	602	50	8751435
Dissolved Cadmium (Cd)	ug/L	0.012	0.039	0.040	0.010	8751435
Dissolved Chromium (Cr)	ug/L	<1.0	<1.0	<1.0	1.0	8751435
Dissolved Cobalt (Co)	ug/L	1.70	0.35	0.33	0.20	8751435
Dissolved Copper (Cu)	ug/L	<0.20	0.44	0.39	0.20	8751435
Dissolved Iron (Fe)	ug/L	3070	628	643	5.0	8751435
Dissolved Lead (Pb)	ug/L	<0.20	<0.20	<0.20	0.20	8751435
Dissolved Lithium (Li)	ug/L	<2.0	<2.0	<2.0	2.0	8751435
Dissolved Manganese (Mn)	ug/L	2240	1540	1540	1.0	8751435
Dissolved Molybdenum (Mo)	ug/L	<1.0	<1.0	<1.0	1.0	8751435
Dissolved Nickel (Ni)	ug/L	2.8	2.4	2.5	1.0	8751435
Dissolved Phosphorus (P)	ug/L	23	24	25	10	8751435
Dissolved Selenium (Se)	ug/L	<0.10	<0.10	<0.10	0.10	8751435
Dissolved Silicon (Si)	ug/L	13700	10700	10700	100	8751435
Dissolved Silver (Ag)	ug/L	<0.020	<0.020	<0.020	0.020	8751435
Dissolved Strontium (Sr)	ug/L	261	212	213	1.0	8751435
Dissolved Thallium (Tl)	ug/L	<0.010	<0.010	<0.010	0.010	8751435
Dissolved Tin (Sn)	ug/L	<5.0	<5.0	<5.0	5.0	8751435
Dissolved Titanium (Ti)	ug/L	<5.0	<5.0	<5.0	5.0	8751435
Dissolved Uranium (U)	ug/L	0.18	0.11	0.10	0.10	8751435
Dissolved Vanadium (V)	ug/L	<5.0	<5.0	<5.0	5.0	8751435
RDL = Reportable Detection Limit						

Maxxam Job #: B775636
Report Date: 2017/09/12

GHD Limited
Client Project #: 56484-02
Site Location: CAMPBELL RIVER WMC
Your P.O. #: 73506861

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

Maxxam ID		RW8400	RW8401	RW8402		
Sampling Date		2017/09/04 18:20	2017/09/04 19:30	2017/09/04 19:35		
COC Number		525065-02-01	525065-02-01	525065-02-01		
	UNITS	WG-56484-040917-CR-12	WG-56484-040917-CR-13	WG-56484-040917-CR-14	RDL	QC Batch
Dissolved Zinc (Zn)	ug/L	<5.0	<5.0	<5.0	5.0	8751435
Dissolved Zirconium (Zr)	ug/L	<0.10	<0.10	<0.10	0.10	8751435
Dissolved Calcium (Ca)	mg/L	67.1	46.7	48.9	0.050	8748633
Dissolved Magnesium (Mg)	mg/L	11.3	4.72	4.81	0.050	8748633
Dissolved Potassium (K)	mg/L	7.81	5.34	5.29	0.050	8748633
Dissolved Sodium (Na)	mg/L	45.4	32.0	32.4	0.050	8748633
Dissolved Sulphur (S)	mg/L	<3.0	<3.0	<3.0	3.0	8748633
RDL = Reportable Detection Limit						

Maxxam Job #: B775636
Report Date: 2017/09/12

GHD Limited
Client Project #: 56484-02
Site Location: CAMPBELL RIVER WMC
Your P.O. #: 73506861

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

Maxxam ID		RW8403	RW8404		RW8405		
Sampling Date		2017/09/04 19:45	2017/09/05 09:30		2017/09/05 11:30		
COC Number		525065-02-01	525065-02-01		525065-02-01		
	UNITS	WG-56484-040917-CR-15	WG-J6484-050917-CR-16	QC Batch	WG-J6484-050917-CR-17	RDL	QC Batch
Misc. Inorganics							
Dissolved Hardness (CaCO ₃)	mg/L	219	41.2	8748607	90.9	0.50	8748607
Elements							
Dissolved Mercury (Hg)	ug/L	<0.010	<0.010	8753729	<0.010	0.010	8755063
Dissolved Metals by ICPMS							
Dissolved Aluminum (Al)	ug/L	5.1	6.3	8751435	6.7	3.0	8751435
Dissolved Antimony (Sb)	ug/L	<0.50	<0.50	8751435	<0.50	0.50	8751435
Dissolved Arsenic (As)	ug/L	0.83	0.59	8751435	2.08	0.10	8751435
Dissolved Barium (Ba)	ug/L	10.7	<1.0	8751435	4.6	1.0	8751435
Dissolved Beryllium (Be)	ug/L	<0.10	<0.10	8751435	<0.10	0.10	8751435
Dissolved Bismuth (Bi)	ug/L	<1.0	<1.0	8751435	<1.0	1.0	8751435
Dissolved Boron (B)	ug/L	172	<50	8751435	<50	50	8751435
Dissolved Cadmium (Cd)	ug/L	0.012	<0.010	8751435	<0.010	0.010	8751435
Dissolved Chromium (Cr)	ug/L	<1.0	<1.0	8751435	<1.0	1.0	8751435
Dissolved Cobalt (Co)	ug/L	0.26	<0.20	8751435	<0.20	0.20	8751435
Dissolved Copper (Cu)	ug/L	0.51	0.22	8751435	0.23	0.20	8751435
Dissolved Iron (Fe)	ug/L	1580	<5.0	8751435	<5.0	5.0	8751435
Dissolved Lead (Pb)	ug/L	<0.20	<0.20	8751435	<0.20	0.20	8751435
Dissolved Lithium (Li)	ug/L	<2.0	<2.0	8751435	<2.0	2.0	8751435
Dissolved Manganese (Mn)	ug/L	2000	<1.0	8751435	<1.0	1.0	8751435
Dissolved Molybdenum (Mo)	ug/L	<1.0	<1.0	8751435	<1.0	1.0	8751435
Dissolved Nickel (Ni)	ug/L	1.1	<1.0	8751435	<1.0	1.0	8751435
Dissolved Phosphorus (P)	ug/L	86	10	8751435	34	10	8751435
Dissolved Selenium (Se)	ug/L	<0.10	<0.10	8751435	0.17	0.10	8751435
Dissolved Silicon (Si)	ug/L	7420	4360	8751435	5280	100	8751435
Dissolved Silver (Ag)	ug/L	<0.020	<0.020	8751435	<0.020	0.020	8751435
Dissolved Strontium (Sr)	ug/L	199	22.1	8751435	36.8	1.0	8751435
Dissolved Thallium (Tl)	ug/L	<0.010	<0.010	8751435	<0.010	0.010	8751435
Dissolved Tin (Sn)	ug/L	<5.0	<5.0	8751435	<5.0	5.0	8751435
Dissolved Titanium (Ti)	ug/L	<5.0	<5.0	8751435	<5.0	5.0	8751435
Dissolved Uranium (U)	ug/L	0.11	<0.10	8751435	0.24	0.10	8751435
Dissolved Vanadium (V)	ug/L	<5.0	<5.0	8751435	18.5	5.0	8751435
RDL = Reportable Detection Limit							

Maxxam Job #: B775636
Report Date: 2017/09/12

GHD Limited
Client Project #: 56484-02
Site Location: CAMPBELL RIVER WMC
Your P.O. #: 73506861

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

Maxxam ID		RW8403	RW8404		RW8405		
Sampling Date		2017/09/04 19:45	2017/09/05 09:30		2017/09/05 11:30		
COC Number		525065-02-01	525065-02-01		525065-02-01		
	UNITS	WG-56484-040917-CR-15	WG-J6484-050917-CR-16	QC Batch	WG-J6484-050917-CR-17	RDL	QC Batch
Dissolved Zinc (Zn)	ug/L	<5.0	<5.0	8751435	<5.0	5.0	8751435
Dissolved Zirconium (Zr)	ug/L	<0.10	<0.10	8751435	<0.10	0.10	8751435
Dissolved Calcium (Ca)	mg/L	73.9	13.9	8748633	29.1	0.050	8748633
Dissolved Magnesium (Mg)	mg/L	8.36	1.58	8748633	4.45	0.050	8748633
Dissolved Potassium (K)	mg/L	3.49	0.382	8748633	1.17	0.050	8748633
Dissolved Sodium (Na)	mg/L	22.9	2.39	8748633	1.54	0.050	8748633
Dissolved Sulphur (S)	mg/L	<3.0	<3.0	8748633	<3.0	3.0	8748633
RDL = Reportable Detection Limit							

Maxxam Job #: B775636
Report Date: 2017/09/12

GHD Limited
Client Project #: 56484-02
Site Location: CAMPBELL RIVER WMC
Your P.O. #: 73506861

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

Maxxam ID		RW8406	RW8407		RW8408		
Sampling Date		2017/09/05 12:40	2017/09/05 13:45		2017/09/05 14:30		
COC Number		525065-02-01	525065-02-01		525065-02-01		
	UNITS	WG-J6484-050917-CR-18	WG-J6484-050917-CR-19	QC Batch	WG-J6484-050917-CR-20	RDL	QC Batch
Misc. Inorganics							
Dissolved Hardness (CaCO ₃)	mg/L	47.8	153	8748607	321	0.50	8748607
Elements							
Dissolved Mercury (Hg)	ug/L	<0.010	<0.010	8755063	<0.010	0.010	8755063
Dissolved Metals by ICPMS							
Dissolved Aluminum (Al)	ug/L	5.7	3.2	8751435	<3.0	3.0	8751439
Dissolved Antimony (Sb)	ug/L	<0.50	<0.50	8751435	<0.50	0.50	8751439
Dissolved Arsenic (As)	ug/L	0.35	0.23	8751435	<0.10	0.10	8751439
Dissolved Barium (Ba)	ug/L	2.5	4.6	8751435	8.6	1.0	8751439
Dissolved Beryllium (Be)	ug/L	<0.10	<0.10	8751435	<0.10	0.10	8751439
Dissolved Bismuth (Bi)	ug/L	<1.0	<1.0	8751435	<1.0	1.0	8751439
Dissolved Boron (B)	ug/L	<50	82	8751435	108	50	8751439
Dissolved Cadmium (Cd)	ug/L	<0.010	<0.010	8751435	0.014	0.010	8751439
Dissolved Chromium (Cr)	ug/L	<1.0	1.5	8751435	<1.0	1.0	8751439
Dissolved Cobalt (Co)	ug/L	<0.20	<0.20	8751435	<0.20	0.20	8751439
Dissolved Copper (Cu)	ug/L	0.21	<0.20	8751435	0.51	0.20	8751439
Dissolved Iron (Fe)	ug/L	<5.0	<5.0	8751435	<5.0	5.0	8751439
Dissolved Lead (Pb)	ug/L	0.24	<0.20	8751435	<0.20	0.20	8751439
Dissolved Lithium (Li)	ug/L	<2.0	<2.0	8751435	<2.0	2.0	8751439
Dissolved Manganese (Mn)	ug/L	<1.0	<1.0	8751435	<1.0	1.0	8751439
Dissolved Molybdenum (Mo)	ug/L	<1.0	<1.0	8751435	<1.0	1.0	8751439
Dissolved Nickel (Ni)	ug/L	<1.0	<1.0	8751435	<1.0	1.0	8751439
Dissolved Phosphorus (P)	ug/L	<10	25	8751435	<10	10	8751439
Dissolved Selenium (Se)	ug/L	0.11	<0.10	8751435	<0.10	0.10	8751439
Dissolved Silicon (Si)	ug/L	4170	7640	8751435	11700	100	8751439
Dissolved Silver (Ag)	ug/L	<0.020	<0.020	8751435	<0.020	0.020	8751439
Dissolved Strontium (Sr)	ug/L	24.1	95.4	8751435	213	1.0	8751439
Dissolved Thallium (Tl)	ug/L	<0.010	<0.010	8751435	<0.010	0.010	8751439
Dissolved Tin (Sn)	ug/L	<5.0	<5.0	8751435	<5.0	5.0	8751439
Dissolved Titanium (Ti)	ug/L	<5.0	<5.0	8751435	<5.0	5.0	8751439
Dissolved Uranium (U)	ug/L	<0.10	0.34	8751435	0.30	0.10	8751439
Dissolved Vanadium (V)	ug/L	<5.0	5.6	8751435	<5.0	5.0	8751439
RDL = Reportable Detection Limit							

Maxxam Job #: B775636
Report Date: 2017/09/12

GHD Limited
Client Project #: 56484-02
Site Location: CAMPBELL RIVER WMC
Your P.O. #: 73506861

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

Maxxam ID		RW8406	RW8407		RW8408		
Sampling Date		2017/09/05 12:40	2017/09/05 13:45		2017/09/05 14:30		
COC Number		525065-02-01	525065-02-01		525065-02-01		
	UNITS	WG-J6484-050917-CR-18	WG-J6484-050917-CR-19	QC Batch	WG-J6484-050917-CR-20	RDL	QC Batch
Dissolved Zinc (Zn)	ug/L	<5.0	<5.0	8751435	<5.0	5.0	8751439
Dissolved Zirconium (Zr)	ug/L	<0.10	<0.10	8751435	<0.10	0.10	8751439
Dissolved Calcium (Ca)	mg/L	16.4	45.0	8748633	99.0	0.050	8748633
Dissolved Magnesium (Mg)	mg/L	1.69	9.99	8748633	17.8	0.050	8748633
Dissolved Potassium (K)	mg/L	0.274	0.725	8748633	1.38	0.050	8748633
Dissolved Sodium (Na)	mg/L	1.32	4.91	8748633	6.46	0.050	8748633
Dissolved Sulphur (S)	mg/L	<3.0	3.8	8748633	3.9	3.0	8748633
RDL = Reportable Detection Limit							

Maxxam Job #: B775636
Report Date: 2017/09/12

GHD Limited
Client Project #: 56484-02
Site Location: CAMPBELL RIVER WMC
Your P.O. #: 73506861

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

Maxxam ID		RW8409		
Sampling Date		2017/09/05 14:50		
COC Number		525065-02-01		
	UNITS	WG-J6484-050917-CR-21	RDL	QC Batch
Misc. Inorganics				
Dissolved Hardness (CaCO ₃)	mg/L	377	0.50	8748607
Elements				
Dissolved Mercury (Hg)	ug/L	<0.010	0.010	8755063
Dissolved Metals by ICPMS				
Dissolved Aluminum (Al)	ug/L	<3.0	3.0	8751439
Dissolved Antimony (Sb)	ug/L	<0.50	0.50	8751439
Dissolved Arsenic (As)	ug/L	0.12	0.10	8751439
Dissolved Barium (Ba)	ug/L	15.6	1.0	8751439
Dissolved Beryllium (Be)	ug/L	<0.10	0.10	8751439
Dissolved Bismuth (Bi)	ug/L	<1.0	1.0	8751439
Dissolved Boron (B)	ug/L	212	50	8751439
Dissolved Cadmium (Cd)	ug/L	0.031	0.010	8751439
Dissolved Chromium (Cr)	ug/L	<1.0	1.0	8751439
Dissolved Cobalt (Co)	ug/L	0.31	0.20	8751439
Dissolved Copper (Cu)	ug/L	1.64	0.20	8751439
Dissolved Iron (Fe)	ug/L	<5.0	5.0	8751439
Dissolved Lead (Pb)	ug/L	<0.20	0.20	8751439
Dissolved Lithium (Li)	ug/L	<2.0	2.0	8751439
Dissolved Manganese (Mn)	ug/L	68.9	1.0	8751439
Dissolved Molybdenum (Mo)	ug/L	<1.0	1.0	8751439
Dissolved Nickel (Ni)	ug/L	<1.0	1.0	8751439
Dissolved Phosphorus (P)	ug/L	<10	10	8751439
Dissolved Selenium (Se)	ug/L	<0.10	0.10	8751439
Dissolved Silicon (Si)	ug/L	11700	100	8751439
Dissolved Silver (Ag)	ug/L	<0.020	0.020	8751439
Dissolved Strontium (Sr)	ug/L	303	1.0	8751439
Dissolved Thallium (Tl)	ug/L	<0.010	0.010	8751439
Dissolved Tin (Sn)	ug/L	<5.0	5.0	8751439
Dissolved Titanium (Ti)	ug/L	<5.0	5.0	8751439
Dissolved Uranium (U)	ug/L	0.72	0.10	8751439
Dissolved Vanadium (V)	ug/L	<5.0	5.0	8751439
RDL = Reportable Detection Limit				

Maxxam Job #: B775636
Report Date: 2017/09/12

GHD Limited
Client Project #: 56484-02
Site Location: CAMPBELL RIVER WMC
Your P.O. #: 73506861

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

Maxxam ID		RW8409		
Sampling Date		2017/09/05 14:50		
COC Number		525065-02-01		
	UNITS	WG-J6484-050917-CR-21	RDL	QC Batch
Dissolved Zinc (Zn)	ug/L	<5.0	5.0	8751439
Dissolved Zirconium (Zr)	ug/L	<0.10	0.10	8751439
Dissolved Calcium (Ca)	mg/L	110	0.050	8748633
Dissolved Magnesium (Mg)	mg/L	24.9	0.050	8748633
Dissolved Potassium (K)	mg/L	2.02	0.050	8748633
Dissolved Sodium (Na)	mg/L	18.2	0.050	8748633
Dissolved Sulphur (S)	mg/L	4.4	3.0	8748633
RDL = Reportable Detection Limit				

Maxxam Job #: B775636
Report Date: 2017/09/12

GHD Limited
Client Project #: 56484-02
Site Location: CAMPBELL RIVER WMC
Your P.O. #: 73506861

CSR VOC + VPH IN WATER (GROUND WATER)

Maxxam ID		RW8389	RW8389	RW8390		
Sampling Date		2017/09/04 11:30	2017/09/04 11:30	2017/09/04 12:40		
COC Number		525065-01-01	525065-01-01	525065-01-01		
	UNITS	WG-56484-040917-CR-01	WG-56484-040917-CR-01 Lab-Dup	WG-56484-040917-CR-02	RDL	QC Batch

Volatiles						
VPH (VHW6 to 10 - BTEX)	ug/L	<300	N/A	<300	300	8748544
Chloromethane	ug/L	<1.0	<1.0	<1.0	1.0	8752085
Vinyl chloride	ug/L	<0.50	<0.50	<0.50	0.50	8752085
Chloroethane	ug/L	<1.0	<1.0	<1.0	1.0	8752085
Trichlorofluoromethane	ug/L	<4.0	<4.0	<4.0	4.0	8752085
1,1,2Trichloro-1,2,2Trifluoroethane	ug/L	<2.0	<2.0	<2.0	2.0	8752085
Dichlorodifluoromethane	ug/L	<2.0	<2.0	<2.0	2.0	8752085
1,1-dichloroethene	ug/L	<0.50	<0.50	<0.50	0.50	8752085
Dichloromethane	ug/L	<2.0	<2.0	<2.0	2.0	8752085
trans-1,2-dichloroethene	ug/L	<1.0	<1.0	<1.0	1.0	8752085
1,1-dichloroethane	ug/L	<0.50	<0.50	<0.50	0.50	8752085
cis-1,2-dichloroethene	ug/L	<1.0	<1.0	<1.0	1.0	8752085
Chloroform	ug/L	<1.0	<1.0	<1.0	1.0	8752085
1,1,1-trichloroethane	ug/L	<0.50	<0.50	<0.50	0.50	8752085
1,2-dichloroethane	ug/L	<0.50	<0.50	<0.50	0.50	8752085
Carbon tetrachloride	ug/L	<0.50	<0.50	<0.50	0.50	8752085
Benzene	ug/L	<0.40	<0.40	<0.40	0.40	8752085
Methyl-tert-butylether (MTBE)	ug/L	<4.0	<4.0	<4.0	4.0	8752085
1,2-dichloropropane	ug/L	<0.50	<0.50	<0.50	0.50	8752085
cis-1,3-dichloropropene	ug/L	<1.0	<1.0	<1.0	1.0	8752085
trans-1,3-dichloropropene	ug/L	<1.0	<1.0	<1.0	1.0	8752085
Bromomethane	ug/L	<1.0	<1.0	<1.0	1.0	8752085
1,1,2-trichloroethane	ug/L	<0.50	<0.50	<0.50	0.50	8752085
Trichloroethene	ug/L	<0.50	<0.50	<0.50	0.50	8752085
Chlorodibromomethane	ug/L	<1.0	<1.0	<1.0	1.0	8752085
1,2-dibromoethane	ug/L	<0.20	<0.20	<0.20	0.20	8752085
Tetrachloroethene	ug/L	<0.50	<0.50	<0.50	0.50	8752085
Bromodichloromethane	ug/L	<1.0	<1.0	<1.0	1.0	8752085
Toluene	ug/L	<0.40	<0.40	<0.40	0.40	8752085
Ethylbenzene	ug/L	<0.40	<0.40	<0.40	0.40	8752085

RDL = Reportable Detection Limit

Lab-Dup = Laboratory Initiated Duplicate

N/A = Not Applicable

Maxxam Job #: B775636
Report Date: 2017/09/12

GHD Limited
Client Project #: 56484-02
Site Location: CAMPBELL RIVER WMC
Your P.O. #: 73506861

CSR VOC + VPH IN WATER (GROUND WATER)

Maxxam ID		RW8389	RW8389	RW8390		
Sampling Date		2017/09/04 11:30	2017/09/04 11:30	2017/09/04 12:40		
COC Number		525065-01-01	525065-01-01	525065-01-01		
	UNITS	WG-56484-040917-CR-01	WG-56484-040917-CR-01 Lab-Dup	WG-56484-040917-CR-02	RDL	QC Batch
m & p-Xylene	ug/L	<0.40	<0.40	<0.40	0.40	8752085
Bromoform	ug/L	<1.0	<1.0	<1.0	1.0	8752085
Styrene	ug/L	<0.50	<0.50	<0.50	0.50	8752085
o-Xylene	ug/L	<0.40	<0.40	<0.40	0.40	8752085
Xylenes (Total)	ug/L	<0.40	<0.40	<0.40	0.40	8752085
1,1,1,2-tetrachloroethane	ug/L	<0.50	<0.50	<0.50	0.50	8752085
1,1,2,2-tetrachloroethane	ug/L	<0.50	<0.50	<0.50	0.50	8752085
1,2-dichlorobenzene	ug/L	<0.50	<0.50	<0.50	0.50	8752085
1,3-dichlorobenzene	ug/L	<0.50	<0.50	<0.50	0.50	8752085
1,4-dichlorobenzene	ug/L	<0.50	<0.50	<0.50	0.50	8752085
Chlorobenzene	ug/L	<0.50	<0.50	<0.50	0.50	8752085
1,2,3-trichlorobenzene	ug/L	<2.0	<2.0	<2.0	2.0	8752085
1,2,4-trichlorobenzene	ug/L	<2.0	<2.0	<2.0	2.0	8752085
Hexachlorobutadiene	ug/L	<0.50	<0.50	<0.50	0.50	8752085
VH C6-C10	ug/L	<300	<300	<300	300	8752085
Surrogate Recovery (%)						
1,4-Difluorobenzene (sur.)	%	105	105	105	N/A	8752085
4-Bromofluorobenzene (sur.)	%	96	100	96	N/A	8752085
D4-1,2-Dichloroethane (sur.)	%	103	103	104	N/A	8752085
RDL = Reportable Detection Limit Lab-Dup = Laboratory Initiated Duplicate N/A = Not Applicable						

Maxxam Job #: B775636
Report Date: 2017/09/12

GHD Limited
Client Project #: 56484-02
Site Location: CAMPBELL RIVER WMC
Your P.O. #: 73506861

CSR VOC + VPH IN WATER (GROUND WATER)

Maxxam ID		RW8396	RW8397	RW8398		
Sampling Date		2017/09/04 17:20	2017/09/04 18:00	2017/09/04 18:05		
COC Number		525065-01-01	525065-01-01	525065-01-01		
	UNITS	WG-56484-040917-CR-08	WG-56484-040917-CR-09	WG-56484-040917-CR-10	RDL	QC Batch
Volatiles						
VPH (VHW6 to 10 - BTEX)	ug/L	<300	<300	<300	300	8748544
Chloromethane	ug/L	<1.0	<1.0	<1.0	1.0	8752085
Vinyl chloride	ug/L	<0.50	<0.50	<0.50	0.50	8752085
Chloroethane	ug/L	<1.0	<1.0	<1.0	1.0	8752085
Trichlorofluoromethane	ug/L	<4.0	<4.0	<4.0	4.0	8752085
1,1,2Trichloro-1,2,2Trifluoroethane	ug/L	<2.0	<2.0	<2.0	2.0	8752085
Dichlorodifluoromethane	ug/L	<2.0	<2.0	<2.0	2.0	8752085
1,1-dichloroethene	ug/L	<0.50	<0.50	<0.50	0.50	8752085
Dichloromethane	ug/L	<2.0	<2.0	<2.0	2.0	8752085
trans-1,2-dichloroethene	ug/L	<1.0	<1.0	<1.0	1.0	8752085
1,1-dichloroethane	ug/L	<0.50	<0.50	<0.50	0.50	8752085
cis-1,2-dichloroethene	ug/L	<1.0	<1.0	<1.0	1.0	8752085
Chloroform	ug/L	<1.0	<1.0	<1.0	1.0	8752085
1,1,1-trichloroethane	ug/L	<0.50	<0.50	<0.50	0.50	8752085
1,2-dichloroethane	ug/L	<0.50	<0.50	<0.50	0.50	8752085
Carbon tetrachloride	ug/L	<0.50	<0.50	<0.50	0.50	8752085
Benzene	ug/L	<0.40	<0.40	<0.40	0.40	8752085
Methyl-tert-butylether (MTBE)	ug/L	<4.0	<4.0	<4.0	4.0	8752085
1,2-dichloropropane	ug/L	<0.50	<0.50	<0.50	0.50	8752085
cis-1,3-dichloropropene	ug/L	<1.0	<1.0	<1.0	1.0	8752085
trans-1,3-dichloropropene	ug/L	<1.0	<1.0	<1.0	1.0	8752085
Bromomethane	ug/L	<1.0	<1.0	<1.0	1.0	8752085
1,1,2-trichloroethane	ug/L	<0.50	<0.50	<0.50	0.50	8752085
Trichloroethene	ug/L	<0.50	<0.50	<0.50	0.50	8752085
Chlorodibromomethane	ug/L	<1.0	<1.0	<1.0	1.0	8752085
1,2-dibromoethane	ug/L	<0.20	<0.20	<0.20	0.20	8752085
Tetrachloroethene	ug/L	<0.50	<0.50	<0.50	0.50	8752085
Bromodichloromethane	ug/L	<1.0	<1.0	<1.0	1.0	8752085
Toluene	ug/L	<0.40	<0.40	<0.40	0.40	8752085
Ethylbenzene	ug/L	<0.40	<0.40	<0.40	0.40	8752085
m & p-Xylene	ug/L	<0.40	<0.40	<0.40	0.40	8752085
RDL = Reportable Detection Limit						

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GHD Limited
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Site Location: CAMPBELL RIVER WMC
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CSR VOC + VPH IN WATER (GROUND WATER)

Maxxam ID		RW8396	RW8397	RW8398		
Sampling Date		2017/09/04 17:20	2017/09/04 18:00	2017/09/04 18:05		
COC Number		525065-01-01	525065-01-01	525065-01-01		
	UNITS	WG-56484-040917-CR-08	WG-56484-040917-CR-09	WG-56484-040917-CR-10	RDL	QC Batch
Bromoform	ug/L	<1.0	<1.0	<1.0	1.0	8752085
Styrene	ug/L	<0.50	<0.50	<0.50	0.50	8752085
o-Xylene	ug/L	<0.40	<0.40	<0.40	0.40	8752085
Xylenes (Total)	ug/L	<0.40	<0.40	<0.40	0.40	8752085
1,1,1,2-tetrachloroethane	ug/L	<0.50	<0.50	<0.50	0.50	8752085
1,1,2,2-tetrachloroethane	ug/L	<0.50	<0.50	<0.50	0.50	8752085
1,2-dichlorobenzene	ug/L	<0.50	<0.50	<0.50	0.50	8752085
1,3-dichlorobenzene	ug/L	<0.50	<0.50	<0.50	0.50	8752085
1,4-dichlorobenzene	ug/L	<0.50	<0.50	<0.50	0.50	8752085
Chlorobenzene	ug/L	<0.50	<0.50	<0.50	0.50	8752085
1,2,3-trichlorobenzene	ug/L	<2.0	<2.0	<2.0	2.0	8752085
1,2,4-trichlorobenzene	ug/L	<2.0	<2.0	<2.0	2.0	8752085
Hexachlorobutadiene	ug/L	<0.50	<0.50	<0.50	0.50	8752085
VH C6-C10	ug/L	<300	<300	<300	300	8752085
Surrogate Recovery (%)						
1,4-Difluorobenzene (sur.)	%	105	106	98	N/A	8752085
4-Bromofluorobenzene (sur.)	%	94	95	89	N/A	8752085
D4-1,2-Dichloroethane (sur.)	%	100	101	95	N/A	8752085
RDL = Reportable Detection Limit						
N/A = Not Applicable						

Maxxam Job #: B775636
Report Date: 2017/09/12

GHD Limited
Client Project #: 56484-02
Site Location: CAMPBELL RIVER WMC
Your P.O. #: 73506861

CSR VOC + VPH IN WATER (GROUND WATER)

Maxxam ID		RW8399	RW8400	RW8407		
Sampling Date		2017/09/04 17:45	2017/09/04 18:20	2017/09/05 13:45		
COC Number		525065-02-01	525065-02-01	525065-02-01		
	UNITS	WG-56484-040917-CR-11	WG-56484-040917-CR-12	WG-J6484-050917-CR-19	RDL	QC Batch
Volatiles						
VPH (VHW6 to 10 - BTEX)	ug/L	<300	<300	<300	300	8748544
Chloromethane	ug/L	<1.0	<1.0	<1.0	1.0	8752085
Vinyl chloride	ug/L	<0.50	<0.50	<0.50	0.50	8752085
Chloroethane	ug/L	<1.0	<1.0	<1.0	1.0	8752085
Trichlorofluoromethane	ug/L	<4.0	<4.0	<4.0	4.0	8752085
1,1,2Trichloro-1,2,2Trifluoroethane	ug/L	<2.0	<2.0	<2.0	2.0	8752085
Dichlorodifluoromethane	ug/L	<2.0	<2.0	<2.0	2.0	8752085
1,1-dichloroethene	ug/L	<0.50	<0.50	<0.50	0.50	8752085
Dichloromethane	ug/L	<2.0	<2.0	<2.0	2.0	8752085
trans-1,2-dichloroethene	ug/L	<1.0	<1.0	<1.0	1.0	8752085
1,1-dichloroethane	ug/L	<0.50	<0.50	<0.50	0.50	8752085
cis-1,2-dichloroethene	ug/L	<1.0	<1.0	<1.0	1.0	8752085
Chloroform	ug/L	<1.0	<1.0	<1.0	1.0	8752085
1,1,1-trichloroethane	ug/L	<0.50	<0.50	<0.50	0.50	8752085
1,2-dichloroethane	ug/L	<0.50	<0.50	<0.50	0.50	8752085
Carbon tetrachloride	ug/L	<0.50	<0.50	<0.50	0.50	8752085
Benzene	ug/L	<0.40	<0.40	<0.40	0.40	8752085
Methyl-tert-butylether (MTBE)	ug/L	<4.0	<4.0	<4.0	4.0	8752085
1,2-dichloropropane	ug/L	<0.50	<0.50	<0.50	0.50	8752085
cis-1,3-dichloropropene	ug/L	<1.0	<1.0	<1.0	1.0	8752085
trans-1,3-dichloropropene	ug/L	<1.0	<1.0	<1.0	1.0	8752085
Bromomethane	ug/L	<1.0	<1.0	<1.0	1.0	8752085
1,1,2-trichloroethane	ug/L	<0.50	<0.50	<0.50	0.50	8752085
Trichloroethene	ug/L	<0.50	<0.50	<0.50	0.50	8752085
Chlorodibromomethane	ug/L	<1.0	<1.0	<1.0	1.0	8752085
1,2-dibromoethane	ug/L	<0.20	<0.20	<0.20	0.20	8752085
Tetrachloroethene	ug/L	<0.50	<0.50	<0.50	0.50	8752085
Bromodichloromethane	ug/L	<1.0	<1.0	<1.0	1.0	8752085
Toluene	ug/L	<0.40	<0.40	<0.40	0.40	8752085
Ethylbenzene	ug/L	<0.40	<0.40	<0.40	0.40	8752085
m & p-Xylene	ug/L	<0.40	<0.40	<0.40	0.40	8752085
RDL = Reportable Detection Limit						

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Client Project #: 56484-02
Site Location: CAMPBELL RIVER WMC
Your P.O. #: 73506861

CSR VOC + VPH IN WATER (GROUND WATER)

Maxxam ID		RW8399	RW8400	RW8407		
Sampling Date		2017/09/04 17:45	2017/09/04 18:20	2017/09/05 13:45		
COC Number		525065-02-01	525065-02-01	525065-02-01		
	UNITS	WG-56484-040917-CR-11	WG-56484-040917-CR-12	WG-J6484-050917-CR-19	RDL	QC Batch
Bromoform	ug/L	<1.0	<1.0	<1.0	1.0	8752085
Styrene	ug/L	<0.50	<0.50	<0.50	0.50	8752085
o-Xylene	ug/L	<0.40	<0.40	<0.40	0.40	8752085
Xylenes (Total)	ug/L	<0.40	<0.40	<0.40	0.40	8752085
1,1,1,2-tetrachloroethane	ug/L	<0.50	<0.50	<0.50	0.50	8752085
1,1,2,2-tetrachloroethane	ug/L	<0.50	<0.50	<0.50	0.50	8752085
1,2-dichlorobenzene	ug/L	<0.50	<0.50	<0.50	0.50	8752085
1,3-dichlorobenzene	ug/L	<0.50	<0.50	<0.50	0.50	8752085
1,4-dichlorobenzene	ug/L	<0.50	<0.50	<0.50	0.50	8752085
Chlorobenzene	ug/L	<0.50	0.52	<0.50	0.50	8752085
1,2,3-trichlorobenzene	ug/L	<2.0	<2.0	<2.0	2.0	8752085
1,2,4-trichlorobenzene	ug/L	<2.0	<2.0	<2.0	2.0	8752085
Hexachlorobutadiene	ug/L	<0.50	<0.50	<0.50	0.50	8752085
VH C6-C10	ug/L	<300	<300	<300	300	8752085
Surrogate Recovery (%)						
1,4-Difluorobenzene (sur.)	%	86	89	106	N/A	8752085
4-Bromofluorobenzene (sur.)	%	78	80	92	N/A	8752085
D4-1,2-Dichloroethane (sur.)	%	83	86	104	N/A	8752085
RDL = Reportable Detection Limit						
N/A = Not Applicable						

Maxxam Job #: B775636
Report Date: 2017/09/12

GHD Limited
Client Project #: 56484-02
Site Location: CAMPBELL RIVER WMC
Your P.O. #: 73506861

CSR VOC + VPH IN WATER (GROUND WATER)

Maxxam ID		RW8409	RW8432		
Sampling Date		2017/09/05 14:50			
COC Number		525065-02-01	525065-01-01		
	UNITS	WG-J6484-050917-CR-21	TRIP BLANK	RDL	QC Batch
Volatiles					
VPH (VHW6 to 10 - BTEX)	ug/L	<300	<300	300	8748544
Chloromethane	ug/L	<1.0	<1.0	1.0	8752085
Vinyl chloride	ug/L	<0.50	<0.50	0.50	8752085
Chloroethane	ug/L	<1.0	<1.0	1.0	8752085
Trichlorofluoromethane	ug/L	<4.0	<4.0	4.0	8752085
1,1,2Trichloro-1,2,2Trifluoroethane	ug/L	<2.0	<2.0	2.0	8752085
Dichlorodifluoromethane	ug/L	<2.0	<2.0	2.0	8752085
1,1-dichloroethene	ug/L	<0.50	<0.50	0.50	8752085
Dichloromethane	ug/L	<2.0	<2.0	2.0	8752085
trans-1,2-dichloroethene	ug/L	<1.0	<1.0	1.0	8752085
1,1-dichloroethane	ug/L	<0.50	<0.50	0.50	8752085
cis-1,2-dichloroethene	ug/L	<1.0	<1.0	1.0	8752085
Chloroform	ug/L	<1.0	<1.0	1.0	8752085
1,1,1-trichloroethane	ug/L	<0.50	<0.50	0.50	8752085
1,2-dichloroethane	ug/L	<0.50	<0.50	0.50	8752085
Carbon tetrachloride	ug/L	<0.50	<0.50	0.50	8752085
Benzene	ug/L	<0.40	<0.40	0.40	8752085
Methyl-tert-butylether (MTBE)	ug/L	<4.0	<4.0	4.0	8752085
1,2-dichloropropane	ug/L	<0.50	<0.50	0.50	8752085
cis-1,3-dichloropropene	ug/L	<1.0	<1.0	1.0	8752085
trans-1,3-dichloropropene	ug/L	<1.0	<1.0	1.0	8752085
Bromomethane	ug/L	<1.0	<1.0	1.0	8752085
1,1,2-trichloroethane	ug/L	<0.50	<0.50	0.50	8752085
Trichloroethene	ug/L	<0.50	<0.50	0.50	8752085
Chlorodibromomethane	ug/L	<1.0	<1.0	1.0	8752085
1,2-dibromoethane	ug/L	<0.20	<0.20	0.20	8752085
Tetrachloroethene	ug/L	<0.50	<0.50	0.50	8752085
Bromodichloromethane	ug/L	<1.0	<1.0	1.0	8752085
Toluene	ug/L	<0.40	<0.40	0.40	8752085
Ethylbenzene	ug/L	<0.40	<0.40	0.40	8752085
m & p-Xylene	ug/L	<0.40	<0.40	0.40	8752085
RDL = Reportable Detection Limit					

Maxxam Job #: B775636
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GHD Limited
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CSR VOC + VPH IN WATER (GROUND WATER)

Maxxam ID		RW8409	RW8432		
Sampling Date		2017/09/05 14:50			
COC Number		525065-02-01	525065-01-01		
	UNITS	WG-J6484-050917-CR-21	TRIP BLANK	RDL	QC Batch
Bromoform	ug/L	<1.0	<1.0	1.0	8752085
Styrene	ug/L	<0.50	<0.50	0.50	8752085
o-Xylene	ug/L	<0.40	<0.40	0.40	8752085
Xylenes (Total)	ug/L	<0.40	<0.40	0.40	8752085
1,1,1,2-tetrachloroethane	ug/L	<0.50	<0.50	0.50	8752085
1,1,2,2-tetrachloroethane	ug/L	<0.50	<0.50	0.50	8752085
1,2-dichlorobenzene	ug/L	<0.50	<0.50	0.50	8752085
1,3-dichlorobenzene	ug/L	<0.50	<0.50	0.50	8752085
1,4-dichlorobenzene	ug/L	<0.50	<0.50	0.50	8752085
Chlorobenzene	ug/L	<0.50	<0.50	0.50	8752085
1,2,3-trichlorobenzene	ug/L	<2.0	<2.0	2.0	8752085
1,2,4-trichlorobenzene	ug/L	<2.0	<2.0	2.0	8752085
Hexachlorobutadiene	ug/L	<0.50	<0.50	0.50	8752085
VH C6-C10	ug/L	<300	<300	300	8752085
Surrogate Recovery (%)					
1,4-Difluorobenzene (sur.)	%	98	105	N/A	8752085
4-Bromofluorobenzene (sur.)	%	87	94	N/A	8752085
D4-1,2-Dichloroethane (sur.)	%	97	101	N/A	8752085
RDL = Reportable Detection Limit N/A = Not Applicable					

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GENERAL COMMENTS

Sample RW8389 [WG-56484-040917-CR-01] : Sample was analyzed past method specified hold time for Nitrate + Nitrite (N). {Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised.} Sample was analyzed past method specified hold time for Nitrite (N) by CFA.

Sample RW8390 [WG-56484-040917-CR-02] : Sample was analyzed past method specified hold time for Nitrate + Nitrite (N). {Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised.} Sample was analyzed past method specified hold time for Nitrite (N) by CFA.

Sample RW8391 [WG-56484-040917-CR-03] : Sample was analyzed past method specified hold time for Nitrate + Nitrite (N). {Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised.} Sample was analyzed past method specified hold time for Nitrite (N) by CFA.

Sample RW8392 [WG-56484-040917-CR-04] : Sample was analyzed past method specified hold time for Nitrate + Nitrite (N). {Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised.} Sample was analyzed past method specified hold time for Nitrite (N) by CFA.

Sample RW8393 [WG-56484-040917-CR-05] : Sample was analyzed past method specified hold time for Nitrate + Nitrite (N). {Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised.} Sample was analyzed past method specified hold time for Nitrite (N) by CFA.

Sample RW8394 [WG-56484-040917-CR-06] : Sample was analyzed past method specified hold time for Nitrate + Nitrite (N). {Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised.} Sample was analyzed past method specified hold time for Nitrite (N) by CFA.

Sample RW8395 [WG-56484-040917-CR-07] : Sample was analyzed past method specified hold time for Nitrate + Nitrite (N). {Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised.} Sample was analyzed past method specified hold time for Nitrite (N) by CFA.

Sample RW8396 [WG-56484-040917-CR-08] : Sample was analyzed past method specified hold time for Nitrate + Nitrite (N). {Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised.} Sample was analyzed past method specified hold time for Nitrite (N) by CFA.

Sample RW8397 [WG-56484-040917-CR-09] : Sample was analyzed past method specified hold time for Nitrate + Nitrite (N). {Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised.} Sample was analyzed past method specified hold time for Nitrite (N) by CFA.

Sample RW8398 [WG-56484-040917-CR-10] : Sample was analyzed past method specified hold time for Nitrate + Nitrite (N). {Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised.} Sample was analyzed past method specified hold time for Nitrite (N) by CFA.

Sample RW8399 [WG-56484-040917-CR-11] : Sample was analyzed past method specified hold time for Nitrate + Nitrite (N). {Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised.} Sample was analyzed past method specified hold time for Nitrite (N) by CFA.

Sample RW8400 [WG-56484-040917-CR-12] : Sample was analyzed past method specified hold time for Nitrate + Nitrite (N). {Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised.} Sample was analyzed past method specified hold time for Nitrite (N) by CFA.

Sample RW8401 [WG-56484-040917-CR-13] : Sample was analyzed past method specified hold time for Nitrate + Nitrite (N). {Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised.} Sample was analyzed past method specified hold time for Nitrite (N) by CFA.

Sample RW8402 [WG-56484-040917-CR-14] : Sample was analyzed past method specified hold time for Nitrate + Nitrite (N). {Exceedance of hold

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time increases the uncertainty of test results but does not necessarily imply that results are compromised.} Sample was analyzed past method specified hold time for Nitrite (N) by CFA.

Sample RW8403 [WG-56484-040917-CR-15] : Sample was analyzed past method specified hold time for Nitrate + Nitrite (N). {Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised.} Sample was analyzed past method specified hold time for Nitrite (N) by CFA.

Results relate only to the items tested.

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QUALITY ASSURANCE REPORT

GHD Limited
Client Project #: 56484-02
Site Location: CAMPBELL RIVER WMC
Your P.O. #: 73506861

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
8752085	1,4-Difluorobenzene (sur.)	2017/09/08	104 (6)	70 - 130	108	70 - 130	90	%		
8752085	4-Bromofluorobenzene (sur.)	2017/09/08	108 (6)	70 - 130	99	70 - 130	77	%		
8752085	D4-1,2-Dichloroethane (sur.)	2017/09/08	104 (6)	70 - 130	96	70 - 130	78	%		
8751387	pH	2017/09/09			102	97 - 103			0 (1)	20
8751391	Conductivity	2017/09/09			101	80 - 120	<2.0	uS/cm	0.49 (1)	20
8751392	Alkalinity (PP as CaCO ₃)	2017/09/09					<1.0	mg/L	2.3 (1)	20
8751392	Alkalinity (Total as CaCO ₃)	2017/09/09	NC (2)	80 - 120	103	80 - 120	<1.0	mg/L	1.8 (1)	20
8751392	Bicarbonate (HCO ₃)	2017/09/09					<1.0	mg/L	1.9 (1)	20
8751392	Carbonate (CO ₃)	2017/09/09					<1.0	mg/L	2.3 (1)	20
8751392	Hydroxide (OH)	2017/09/09					<1.0	mg/L	NC (1)	20
8751423	Dissolved Chloride (Cl)	2017/09/07	NC	80 - 120	95	80 - 120	<1.0	mg/L	1.9 (1)	20
8751425	Dissolved Sulphate (SO ₄)	2017/09/07	NC	80 - 120	93	80 - 120	<1.0	mg/L		
8751427	Dissolved Chloride (Cl)	2017/09/07	108	80 - 120	96	80 - 120	<1.0	mg/L	NC (1)	20
8751431	Dissolved Sulphate (SO ₄)	2017/09/07	110	80 - 120	95	80 - 120	<1.0	mg/L	2.3 (1)	20
8751435	Dissolved Aluminum (Al)	2017/09/09	105 (4)	80 - 120	106	80 - 120	<3.0	ug/L	1.1 (5)	20
8751435	Dissolved Antimony (Sb)	2017/09/09	100 (4)	80 - 120	99	80 - 120	<0.50	ug/L	NC (5)	20
8751435	Dissolved Arsenic (As)	2017/09/09	102 (4)	80 - 120	106	80 - 120	<0.10	ug/L	NC (5)	20
8751435	Dissolved Barium (Ba)	2017/09/09	103 (4)	80 - 120	104	80 - 120	<1.0	ug/L	0.90 (5)	20
8751435	Dissolved Beryllium (Be)	2017/09/09	102 (4)	80 - 120	98	80 - 120	<0.10	ug/L	NC (5)	20
8751435	Dissolved Bismuth (Bi)	2017/09/09	102 (4)	80 - 120	101	80 - 120	<1.0	ug/L	NC (5)	20
8751435	Dissolved Boron (B)	2017/09/09	97 (4)	80 - 120	96	80 - 120	<50	ug/L	NC (5)	20
8751435	Dissolved Cadmium (Cd)	2017/09/09	98 (4)	80 - 120	98	80 - 120	<0.010	ug/L	NC (5)	20
8751435	Dissolved Chromium (Cr)	2017/09/09	96 (4)	80 - 120	102	80 - 120	<1.0	ug/L	NC (5)	20
8751435	Dissolved Cobalt (Co)	2017/09/09	94 (4)	80 - 120	100	80 - 120	<0.20	ug/L	NC (5)	20
8751435	Dissolved Copper (Cu)	2017/09/09	95 (4)	80 - 120	103	80 - 120	<0.20	ug/L	NC (5)	20
8751435	Dissolved Iron (Fe)	2017/09/09	105 (4)	80 - 120	102	80 - 120	<5.0	ug/L	NC (5)	20
8751435	Dissolved Lead (Pb)	2017/09/09	102 (4)	80 - 120	101	80 - 120	<0.20	ug/L	NC (5)	20
8751435	Dissolved Lithium (Li)	2017/09/09	99 (4)	80 - 120	99	80 - 120	<2.0	ug/L	NC (5)	20
8751435	Dissolved Manganese (Mn)	2017/09/09	97 (4)	80 - 120	102	80 - 120	<1.0	ug/L	NC (5)	20
8751435	Dissolved Molybdenum (Mo)	2017/09/09	101 (4)	80 - 120	100	80 - 120	<1.0	ug/L	NC (5)	20
8751435	Dissolved Nickel (Ni)	2017/09/09	95 (4)	80 - 120	102	80 - 120	<1.0	ug/L	NC (5)	20

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QUALITY ASSURANCE REPORT(CONT'D)

GHD Limited
Client Project #: 56484-02
Site Location: CAMPBELL RIVER WMC
Your P.O. #: 73506861

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
8751435	Dissolved Phosphorus (P)	2017/09/09					<10	ug/L	NC (5)	20
8751435	Dissolved Selenium (Se)	2017/09/09	99 (4)	80 - 120	99	80 - 120	<0.10	ug/L	10 (5)	20
8751435	Dissolved Silicon (Si)	2017/09/09					<100	ug/L	1.0 (5)	20
8751435	Dissolved Silver (Ag)	2017/09/09	106 (4)	80 - 120	106	80 - 120	<0.020	ug/L	NC (5)	20
8751435	Dissolved Strontium (Sr)	2017/09/09	NC (4)	80 - 120	103	80 - 120	<1.0	ug/L	0.54 (5)	20
8751435	Dissolved Thallium (Tl)	2017/09/09	101 (4)	80 - 120	100	80 - 120	<0.010	ug/L	NC (5)	20
8751435	Dissolved Tin (Sn)	2017/09/09	96 (4)	80 - 120	96	80 - 120	<5.0	ug/L	NC (5)	20
8751435	Dissolved Titanium (Ti)	2017/09/09	94 (4)	80 - 120	108	80 - 120	<5.0	ug/L	NC (5)	20
8751435	Dissolved Uranium (U)	2017/09/09	106 (4)	80 - 120	102	80 - 120	<0.10	ug/L	NC (5)	20
8751435	Dissolved Vanadium (V)	2017/09/09	97 (4)	80 - 120	102	80 - 120	<5.0	ug/L	NC (5)	20
8751435	Dissolved Zinc (Zn)	2017/09/09	98 (4)	80 - 120	104	80 - 120	<5.0	ug/L	NC (5)	20
8751435	Dissolved Zirconium (Zr)	2017/09/09	102 (4)	80 - 120	99	80 - 120	<0.10	ug/L	NC (5)	20
8751438	Dissolved Chloride (Cl)	2017/09/07	112	80 - 120	97	80 - 120	<1.0	mg/L	0.39 (1)	20
8751439	Dissolved Aluminum (Al)	2017/09/09	NC	80 - 120	103	80 - 120	<3.0	ug/L	0.20 (1)	20
8751439	Dissolved Antimony (Sb)	2017/09/09	NC	80 - 120	100	80 - 120	<0.50	ug/L	1.4 (1)	20
8751439	Dissolved Arsenic (As)	2017/09/09	101	80 - 120	102	80 - 120	<0.10	ug/L	0.79 (1)	20
8751439	Dissolved Barium (Ba)	2017/09/09	104	80 - 120	101	80 - 120	<1.0	ug/L	4.1 (1)	20
8751439	Dissolved Beryllium (Be)	2017/09/09	98	80 - 120	101	80 - 120	<0.10	ug/L	NC (1)	20
8751439	Dissolved Bismuth (Bi)	2017/09/09	103	80 - 120	105	80 - 120	<1.0	ug/L	NC (1)	20
8751439	Dissolved Boron (B)	2017/09/09	NC	80 - 120	97	80 - 120	<50	ug/L	2.8 (1)	20
8751439	Dissolved Cadmium (Cd)	2017/09/09	101	80 - 120	101	80 - 120	<0.010	ug/L	NC (1)	20
8751439	Dissolved Chromium (Cr)	2017/09/09	100	80 - 120	105	80 - 120	<1.0	ug/L	2.3 (1)	20
8751439	Dissolved Cobalt (Co)	2017/09/09	102	80 - 120	107	80 - 120	<0.20	ug/L	NC (1)	20
8751439	Dissolved Copper (Cu)	2017/09/09	99	80 - 120	104	80 - 120	<0.20	ug/L	2.9 (1)	20
8751439	Dissolved Iron (Fe)	2017/09/09	101	80 - 120	105	80 - 120	<5.0	ug/L	1.2 (1)	20
8751439	Dissolved Lead (Pb)	2017/09/09	102	80 - 120	105	80 - 120	<0.20	ug/L	NC (1)	20
8751439	Dissolved Lithium (Li)	2017/09/09	96	80 - 120	99	80 - 120	<2.0	ug/L	1.6 (1)	20
8751439	Dissolved Manganese (Mn)	2017/09/09	100	80 - 120	102	80 - 120	<1.0	ug/L	6.1 (1)	20
8751439	Dissolved Molybdenum (Mo)	2017/09/09	NC	80 - 120	111	80 - 120	<1.0	ug/L	0.71 (1)	20
8751439	Dissolved Nickel (Ni)	2017/09/09	99	80 - 120	103	80 - 120	<1.0	ug/L	0.74 (1)	20
8751439	Dissolved Phosphorus (P)	2017/09/09					<10	ug/L		

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GHD Limited
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Your P.O. #: 73506861

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
8751439	Dissolved Selenium (Se)	2017/09/09	102	80 - 120	108	80 - 120	<0.10	ug/L	2.8 (1)	20
8751439	Dissolved Silicon (Si)	2017/09/09					<100	ug/L	0.30 (1)	20
8751439	Dissolved Silver (Ag)	2017/09/09	107	80 - 120	110	80 - 120	<0.020	ug/L	NC (1)	20
8751439	Dissolved Strontium (Sr)	2017/09/09	NC	80 - 120	101	80 - 120	<1.0	ug/L	2.1 (1)	20
8751439	Dissolved Thallium (Tl)	2017/09/09	102	80 - 120	104	80 - 120	<0.010	ug/L	NC (1)	20
8751439	Dissolved Tin (Sn)	2017/09/09	NC	80 - 120	96	80 - 120	<5.0	ug/L	NC (1)	20
8751439	Dissolved Titanium (Ti)	2017/09/09	100	80 - 120	103	80 - 120	<5.0	ug/L	NC (1)	20
8751439	Dissolved Uranium (U)	2017/09/09	107	80 - 120	106	80 - 120	<0.10	ug/L	NC (1)	20
8751439	Dissolved Vanadium (V)	2017/09/09	98	80 - 120	105	80 - 120	<5.0	ug/L	1.0 (1)	20
8751439	Dissolved Zinc (Zn)	2017/09/09	103	80 - 120	102	80 - 120	<5.0	ug/L	NC (1)	20
8751439	Dissolved Zirconium (Zr)	2017/09/09	105	80 - 120	101	80 - 120	<0.10	ug/L	NC (1)	20
8751442	Dissolved Sulphate (SO4)	2017/09/07	NC	80 - 120	94	80 - 120	<1.0	mg/L		
8752085	1,1,1,2-tetrachloroethane	2017/09/08	93 (6)	70 - 130	86	70 - 130	<0.50	ug/L	NC (7)	30
8752085	1,1,1-trichloroethane	2017/09/08	95 (6)	70 - 130	88	70 - 130	<0.50	ug/L	NC (7)	30
8752085	1,1,2,2-tetrachloroethane	2017/09/08	104 (6)	70 - 130	81	70 - 130	<0.50	ug/L	NC (7)	30
8752085	1,1,2-Trichloro-1,2,2-Trifluoroethane	2017/09/08					<2.0	ug/L	NC (7)	30
8752085	1,1,2-trichloroethane	2017/09/08	97 (6)	70 - 130	87	70 - 130	<0.50	ug/L	NC (7)	30
8752085	1,1-dichloroethane	2017/09/08	89 (6)	70 - 130	83	70 - 130	<0.50	ug/L	NC (7)	30
8752085	1,1-dichloroethene	2017/09/08	92 (6)	70 - 130	85	70 - 130	<0.50	ug/L	NC (7)	30
8752085	1,2,3-trichlorobenzene	2017/09/08	112 (6)	70 - 130	83	70 - 130	<2.0	ug/L	NC (7)	30
8752085	1,2,4-trichlorobenzene	2017/09/08	105 (6)	70 - 130	84	70 - 130	<2.0	ug/L	NC (7)	30
8752085	1,2-dibromoethane	2017/09/08	97 (6)	70 - 130	87	70 - 130	<0.20	ug/L	NC (7)	30
8752085	1,2-dichlorobenzene	2017/09/08	103 (6)	70 - 130	90	70 - 130	<0.50	ug/L	NC (7)	30
8752085	1,2-dichloroethane	2017/09/08	99 (6)	70 - 130	87	70 - 130	<0.50	ug/L	NC (7)	30
8752085	1,2-dichloropropane	2017/09/08	107 (6)	70 - 130	94	70 - 130	<0.50	ug/L	NC (7)	30
8752085	1,3-dichlorobenzene	2017/09/08	99 (6)	70 - 130	91	70 - 130	<0.50	ug/L	NC (7)	30
8752085	1,4-dichlorobenzene	2017/09/08	98 (6)	70 - 130	88	70 - 130	<0.50	ug/L	NC (7)	30
8752085	Benzene	2017/09/08	94 (6)	70 - 130	88	70 - 130	<0.40	ug/L	NC (7)	30
8752085	Bromodichloromethane	2017/09/08	95 (6)	70 - 130	87	70 - 130	<1.0	ug/L	NC (7)	30
8752085	Bromoform	2017/09/08	96 (6)	70 - 130	84	70 - 130	<1.0	ug/L	NC (7)	30
8752085	Bromomethane	2017/09/08	110 (6)	60 - 140	105	60 - 140	<1.0	ug/L	NC (7)	30

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GHD Limited
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Your P.O. #: 73506861

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
8752085	Carbon tetrachloride	2017/09/08	90 (6)	70 - 130	85	70 - 130	<0.50	ug/L	NC (7)	30
8752085	Chlorobenzene	2017/09/08	95 (6)	70 - 130	86	70 - 130	<0.50	ug/L	NC (7)	30
8752085	Chlorodibromomethane	2017/09/08	98 (6)	70 - 130	87	70 - 130	<1.0	ug/L	NC (7)	30
8752085	Chloroethane	2017/09/08	85 (6)	60 - 140	92	60 - 140	<1.0	ug/L	NC (7)	30
8752085	Chloroform	2017/09/08	93 (6)	70 - 130	86	70 - 130	<1.0	ug/L	NC (7)	30
8752085	Chloromethane	2017/09/08	102 (6)	60 - 140	94	60 - 140	<1.0	ug/L	NC (7)	30
8752085	cis-1,2-dichloroethene	2017/09/08	98 (6)	70 - 130	91	70 - 130	<1.0	ug/L	NC (7)	30
8752085	cis-1,3-dichloropropene	2017/09/08	99 (6)	70 - 130	89	70 - 130	<1.0	ug/L	NC (7)	30
8752085	Dichlorodifluoromethane	2017/09/08	117 (6)	60 - 140	111	60 - 140	<2.0	ug/L	NC (7)	30
8752085	Dichloromethane	2017/09/08	96 (6)	70 - 130	89	70 - 130	<2.0	ug/L	NC (7)	30
8752085	Ethylbenzene	2017/09/08	98 (6)	70 - 130	91	70 - 130	<0.40	ug/L	NC (7)	30
8752085	Hexachlorobutadiene	2017/09/08	98 (6)	70 - 130	87	70 - 130	<0.50	ug/L	NC (7)	30
8752085	m & p-Xylene	2017/09/08	99 (6)	70 - 130	90	70 - 130	<0.40	ug/L	NC (7)	30
8752085	Methyl-tert-butylether (MTBE)	2017/09/08	106 (6)	70 - 130	97	70 - 130	<4.0	ug/L	NC (7)	30
8752085	o-Xylene	2017/09/08	101 (6)	70 - 130	92	70 - 130	<0.40	ug/L	NC (7)	30
8752085	Styrene	2017/09/08	105 (6)	70 - 130	95	70 - 130	<0.50	ug/L	NC (7)	30
8752085	Tetrachloroethene	2017/09/08	96 (6)	70 - 130	88	70 - 130	<0.50	ug/L	NC (7)	30
8752085	Toluene	2017/09/08	95 (6)	70 - 130	87	70 - 130	<0.40	ug/L	NC (7)	30
8752085	trans-1,2-dichloroethene	2017/09/08	92 (6)	70 - 130	85	70 - 130	<1.0	ug/L	NC (7)	30
8752085	trans-1,3-dichloropropene	2017/09/08	96 (6)	70 - 130	88	70 - 130	<1.0	ug/L	NC (7)	30
8752085	Trichloroethene	2017/09/08	97 (6)	70 - 130	91	70 - 130	<0.50	ug/L	NC (7)	30
8752085	Trichlorofluoromethane	2017/09/08	100 (6)	60 - 140	112	60 - 140	<4.0	ug/L	NC (7)	30
8752085	VH C6-C10	2017/09/08			92	70 - 130	<300	ug/L	NC (7)	30
8752085	Vinyl chloride	2017/09/08	113 (6)	60 - 140	104	60 - 140	<0.50	ug/L	NC (7)	30
8752085	Xylenes (Total)	2017/09/08					<0.40	ug/L	NC (7)	30
8752576	pH	2017/09/09			102	97 - 103			0.37 (8)	20
8752594	Conductivity	2017/09/09			101	80 - 120	<2.0	uS/cm		
8752595	Alkalinity (PP as CaCO3)	2017/09/09					<1.0	mg/L	NC (8)	20
8752595	Alkalinity (Total as CaCO3)	2017/09/09	NC (9)	80 - 120	101	80 - 120	<1.0	mg/L	1.4 (8)	20
8752595	Bicarbonate (HCO3)	2017/09/09					<1.0	mg/L	1.4 (8)	20
8752595	Carbonate (CO3)	2017/09/09					<1.0	mg/L	NC (8)	20

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GHD Limited
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Your P.O. #: 73506861

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
8752595	Hydroxide (OH)	2017/09/09					<1.0	mg/L	NC (8)	20
8752915	Nitrate plus Nitrite (N)	2017/09/08	104 (10)	80 - 120	105	80 - 120	<0.020	mg/L	NC (11)	25
8752916	Nitrite (N)	2017/09/08	98 (10)	80 - 120	101	80 - 120	<0.0050	mg/L	NC (11)	20
8752917	Nitrate plus Nitrite (N)	2017/09/08	102 (12)	80 - 120	105	80 - 120	<0.020	mg/L	0.18 (13)	25
8752918	Nitrite (N)	2017/09/08	97 (12)	80 - 120	101	80 - 120	<0.0050	mg/L	NC (13)	20
8753630	Total Ammonia (N)	2017/09/11	NC	80 - 120	96	80 - 120	<0.020	mg/L	2.2 (1)	20
8753631	Total Ammonia (N)	2017/09/11	98 (14)	80 - 120	99	80 - 120	<0.020	mg/L	NC (15)	20
8753697	Dissolved Sulphate (SO4)	2017/09/08	105 (16)	80 - 120	100	80 - 120	<1.0	mg/L	NC (1)	20
8753729	Dissolved Mercury (Hg)	2017/09/11	84	80 - 120	100	80 - 120	<0.010	ug/L	NC (1)	20
8755063	Dissolved Mercury (Hg)	2017/09/12	108	80 - 120	100	80 - 120	<0.010	ug/L	NC (1)	20
8755113	Fluoride (F)	2017/09/11	NC	80 - 120	106	80 - 120	<0.020	mg/L	0 (1)	20

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QUALITY ASSURANCE REPORT(CONT'D)

GHD Limited
Client Project #: 56484-02
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Your P.O. #: 73506861

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
8755118	Fluoride (F)	2017/09/11	106 (17)	80 - 120	102	80 - 120	<0.020	mg/L	0 (18)	20

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

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

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

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

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

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

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

(1) Duplicate Parent ID

(2) Matrix Spike Parent ID [RW8402-01]

(3) Duplicate Parent ID [RW8404-02]

(4) Matrix Spike Parent ID [RW8389-03]

(5) Duplicate Parent ID [RW8389-03]

(6) Matrix Spike Parent ID [RW8389-06]

(7) Duplicate Parent ID [RW8389-06]

(8) Duplicate Parent ID [RW8391-01]

(9) Matrix Spike Parent ID [RW8391-01]

(10) Matrix Spike Parent ID [RW8395-02]

(11) Duplicate Parent ID [RW8395-02]

(12) Matrix Spike Parent ID [RW8392-02]

(13) Duplicate Parent ID [RW8392-02]

(14) Matrix Spike Parent ID [RW8397-05]

(15) Duplicate Parent ID [RW8397-05]

(16) Matrix Spike Parent ID [RW8408-02]

(17) Matrix Spike Parent ID [RW8394-02]

(18) Duplicate Parent ID [RW8394-02]

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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.

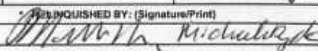
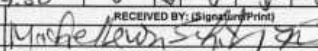
Maxxam Analytics International Corporation o/a Maxxam Analytics



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 2385 www.maxxam.ca

Chain Of Custody Record

Page 2 of 2

INVOICE TO:		Report Information		Project Information		Laboratory Use Only	
Company Name	#163 GHD Limited	Company Name	#28639 GHD Limited	Quotation #	B70472	Maxxam Job #	Bottle Order #:
Contact Name	Airesse MacPhee	Contact Name	Michaela Dyck	P.O. #	73506861		
Address	651 COLBY DRIVE WATERLOO ON N2V 1C2	Address	10271 Shellbridge Way Suite 165 Richmond BC V6X 2W8	Project #	56484-02	Chain Of Custody Record	Project Manager
Phone	(519) 884-0510 x	Phone	(604) 214-0510 x234	Project Name	Campbell River WHC		
Email	airesse.macphee@ghd.com; NationalEDDSupport@ma	Email	Michaela.dyck@ghd.com; airesse.macphee@ghd.com	Site #			VJ Oco
Regulatory Criteria		Special Instructions		ANALYSIS REQUESTED (PLEASE BE SPECIFIC)		Turnaround Time (TAT) Required:	
☐ CSR ☐ CCME ☐ BC Water Quality ☐ Other		dissolved metals + Hg Dieldr. Filtered + preserved		Metals Field Filtered? (Y/N) ANIONS (Cl, F, SO4, NO2, NO3) Alkalinity, pH Ammonia-N Conductivity Dissolved Metals (including Hg, Phosphorus, Sulfur and Hardness) Low Level Dissolved Metals (w Hg, Phos, Sulfur and Hardness) Low Level Total Metals (w Hg, Phos, Sulfur and Hardness) VOC/MPH		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							
Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Metals Field Filtered? (Y/N)	# of Bottles	Comments
1	WG-56484-040917-CR-11	Sept 17	17:45	WG	Y	7	
2	-12		18:20			7	
3	-13		19:30			5	
4	-14		19:35				
5	-15		19:45				
6	WG-56484-050917-CR-16	Sept 17	9:30				
7	-17		11:30				
8	-18		12:40				
9	-19		13:45			7	
10	-20		14:30			5	
	-21		14:50			7	
RELINQUISHED BY: (Signature/Print)		Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)		Date: (YY/MM/DD)	Time
		17/09/05	15:45			17/09/05	15:50
# Jars used and not submitted		Time Sensitive		Temperature (°C) on Receipt		Custody Seal Intact on Cooler?	
		☐		7, 3, 4		☐ 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.							

05-Sep-17 15:45
VJ Oco
MBU
B775636
12, 2, 2



GHD Field Sample Key (FSK)

Site	Campbell River 056484-02
Sample Reason	Q4 2017 Sampling Event
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 (L)	Field pH (su)	Conductivity (uS/cm)	Turbidity (NTU)	DO (mg/L)	Sample Temp (Celsius)	Eh/ORP (mV)	TDS(g/L)
WG-56484-261117-CR-01	MW01-16	11/26/2017	12:55	N	WG	Grab			104	6.60	107	10.2	11.91	13.40	226	0.071
WG-56484-261117-CR-02	FIELD BLANK	11/26/2017	13:30	FB	WG	Grab			-	-	-	-	-		-	-
WG-56484-261117-CR-03	AG99-01	11/26/2017	14:00	N	WG	Grab			176	7.28	230	4.0	11.34	11.80	216	0.150
WG-56484-261117-CR-04	AG99-02	11/26/2017	15:00	N	WG	Grab			200	7.98	460	0.8	8.86	10.90	198	0.300
WG-56484-271117-CR-05	AG99-04	11/27/2017	16:30	N	WG	Grab			144	7.11	133	0.6	6.20	9.13	174	0.086
WG-56484-281117-CR-06	AG99-06	11/28/2017	9:30	N	WG	Grab			40	7.54	301	9.0	9.82	8.34	217	0.196
WG-56484-281117-CR-07	EBA11-3	11/28/2017	8:40	N	WG	Grab			90	6.54	502	0.9	8.78	10.43	230	0.321
WG-56484-281117-CR-08	EBA11-3	11/28/2017	8:45	FD	WG	Grab	WG-56484-281117-CR-07		90	6.54	502	0.9	8.78	10.43	230	0.321
WG-56484-281117-CR-09	EBA11-4	11/28/2017	9:40	N	WG	Grab			68	7.25	132	11.9	12.43	10.56	206	0.086
WG-56484-281117-CR-10	AG99-05	11/28/2017	11:30	N	WG	Grab			240	8.14	105	3.2	11.60	9.92	193	0.069
WG-56484-281117-CR-11	EBA11-2	11/28/2017	12:50	N	WG	Grab			60	7.76	252	110.0	7.44	8.97	213	0.164
WG-56484-281117-CR-12	EBA04-3	11/28/2017	13:30	N	WG	Grab			112	7.32	576	1.1	5.89	9.19	221	0.370
WG-56484-281117-CR-13	EBA04-1	11/28/2017	14:00	N	WG	Grab			-	8.44	98	0.4	12.23	8.41	180	0.063
WG-56484-281117-CR-14	EBA04-6	11/28/2017	14:50	N	WG	Grab			144	7.31	655	0.7	11.72	9.50	205	0.419
WG-56484-281117-CR-15	EBA04-6	11/28/2017	14:55	FD	WG	Grab	WG-56484-281117-CR-14		144	7.31	655	0.7	11.72	9.50	205	0.419
WG-56484-281117-CR-16	EBA04-7	11/28/2017	14:30	N	WG	Grab			60	7.12	995	3.1	11.67	9.38	212	0.637
WG-56484-281117-CR-17	EBA11-1	11/28/2017	15:40	N	WG	Grab			64	7.69	244	5.0	7.72	8.25	175	0.159
WG-56484-281117-CR-18	HBT94-3	11/28/2017	16:10	N	WG	Grab			19	6.82	936	0.8	3.82	10.97	-42	0.599
WG-56484-281117-CR-19	HBT94-1	11/28/2017	16:30	N	WG	Grab			17	7.13	607	0.7	1.01	10.96	-60	0.388
WG-56484-281117-CR-20	HBT94-2	11/28/2017	17:00	N	WG	Grab			120	7.41	330	5.1	1.89	10.84	-52	0.208
SURFACE WATER																
WS-56484-281117-CR-01	SW-1	11/28/2017	11:00	N	WS	Grab			-	7.50	37	0.3	13.56	5.00	176	0.024
WS-56484-281117-CR-02	SW03-17	11/28/2017	12:00	N	WS	Grab			-	7.73	36	0.1	13.04	5.89	192	0.023
WS-56484-281117-CR-03	SW-2	11/28/2017	15:30	N	WS	Grab			-	6.81	83	1.3	2.67	7.21	176	0.054

Footnotes

1. AM02-1 and GLL93-4 were dry
2.

Key

Required Field

Populate When Appropriate

Field Data

Your P.O. #: 73506861
Your Project #: 56484-02
Site Location: CAMPBELL RIVER, BC
Your C.O.C. #: 525068-04-01

Attention: Aïresse MacPhee

GHD Limited
10271 Shellbridge Way
Suite 165
Richmond, BC
Canada V6X 2W8

Report Date: 2017/12/07
Report #: R2488265
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B7A6363

Received: 2017/11/29, 10:45

Sample Matrix: Water
Samples Received: 3

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity - Water	3	2017/11/30	2017/11/30	BBY6SOP-00026	SM 22 2320 B m
Chloride by Automated Colourimetry	3	N/A	2017/11/30	BBY6SOP-00011	SM 22 4500-Cl- E m
Conductance - water	3	2017/11/30	2017/11/30	BBY6SOP-00026	SM 22 2510 B m
Fluoride	3	N/A	2017/12/01	BBY6SOP-00048	SM 22 4500-F C m
Hardness Total (calculated as CaCO ₃) (1)	1	N/A	2017/12/05	BBY WI-00033	Auto Calc
Hardness Total (calculated as CaCO ₃) (1)	1	N/A	2017/12/06	BBY WI-00033	Auto Calc
Hardness Total (calculated as CaCO ₃) (1)	1	N/A	2017/12/07	BBY WI-00033	Auto Calc
Hardness (calculated as CaCO ₃)	2	N/A	2017/12/01	BBY WI-00033	Auto Calc
Hardness (calculated as CaCO ₃)	1	N/A	2017/12/06	BBY WI-00033	Auto Calc
Mercury (Dissolved-LowLevel) by CVAf	3	N/A	2017/12/05	BBY7SOP-00015	BCMOE BCLM Oct2013 m
Mercury (Total-LowLevel) by CVAf	3	2017/12/05	2017/12/05	BBY7SOP-00015	BCMOE BCLM Oct2013 m
Na, K, Ca, Mg, S by CRC ICPMS (diss.)	3	N/A	2017/12/01	BBY7SOP-00002	EPA 6020B R2 m
Elements by ICPMS Low Level (dissolved)	3	N/A	2017/12/01	BBY7SOP-00002	EPA 6020B R2 m
Elements by ICPMS Digested LL (total)	2	2017/12/02	2017/12/04	BBY7SOP-00003,	BCLM2005,EPA6020bR2m
Na, K, Ca, Mg, S by CRC ICPMS (total)	1	N/A	2017/12/05	BBY7SOP-00003,	BCLM2005,EPA6020bR2m
Na, K, Ca, Mg, S by CRC ICPMS (total)	1	N/A	2017/12/06	BBY7SOP-00003,	BCLM2005,EPA6020bR2m
Na, K, Ca, Mg, S by CRC ICPMS (total)	1	N/A	2017/12/07	BBY7SOP-00003,	BCLM2005,EPA6020bR2m
Elements by ICPMS Low Level (total)	1	N/A	2017/12/07	BBY7SOP-00003,	BCLM2005,EPA6020bR2m
Ammonia-N (Preserved)	3	N/A	2017/11/30	BBY6SOP-00009	EPA 350.1 m
Nitrate + Nitrite (N)	3	N/A	2017/11/30	BBY6SOP-00010	SM 22 4500-NO ₃ - I m
Nitrite (N) by CFA	3	N/A	2017/11/30	BBY6SOP-00010	SM 22 4500-NO ₃ - I m
Nitrogen - Nitrate (as N)	3	N/A	2017/12/01	BBY WI-00033	Auto Calc
Filter and HNO ₃ Preserve for Metals	3	N/A	2017/11/30	BBY7 WI-00004	BCMOE Reqs 08/14
pH Water (2)	3	2017/11/30	2017/11/30	BBY6SOP-00026	SM 22 4500-H+ B m
Sulphate by Automated Colourimetry	3	N/A	2017/11/30	BBY6SOP-00017	SM 22 4500-SO ₄ 2- E 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.

Your P.O. #: 73506861
Your Project #: 56484-02
Site Location: CAMPBELL RIVER, BC
Your C.O.C. #: 525068-04-01

Attention: Aïresse MacPhee

GHD Limited
10271 Shellbridge Way
Suite 165
Richmond, BC
Canada V6X 2W8

Report Date: 2017/12/07
Report #: R2488265
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B7A6363

Received: 2017/11/29, 10:45

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) "Total Hardness" was calculated from Total Ca and Mg concentrations and may be biased high (Hardness, or Dissolved Hardness, calculated from Dissolved Ca and Mg, should be used for compliance if available).

(2) 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

Dan Woolger
Project Manager
08 Dec 2017 09:40:57

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

cosign

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 #: B7A6363
Report Date: 2017/12/07

GHD Limited
Client Project #: 56484-02
Site Location: CAMPBELL RIVER, BC
Your P.O. #: 73506861
Sampler Initials: CR

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		SO9077	SO9078	SO9079		
Sampling Date		2017/11/28 11:00	2011/11/28 12:00	2017/11/28 15:30		
COC Number		525068-04-01	525068-04-01	525068-04-01		
	UNITS	WS-56484-281117-CR-01	WS-56484-281117-CR-02	WS-56484-281117-CR-03	RDL	QC Batch
ANIONS						
Nitrite (N)	mg/L	<0.0050	<0.0050	<0.0050	0.0050	8848993
Calculated Parameters						
Filter and HNO3 Preservation	N/A	LAB	LAB	LAB	N/A	8847787
Nitrate (N)	mg/L	<0.020	<0.020	0.063	0.020	8847380
Misc. Inorganics						
Fluoride (F)	mg/L	<0.020	<0.020	<0.020	0.020	8849219
Alkalinity (Total as CaCO3)	mg/L	7.9	7.7	16.0	1.0	8848083
Alkalinity (PP as CaCO3)	mg/L	<1.0	<1.0	<1.0	1.0	8848083
Bicarbonate (HCO3)	mg/L	9.6	9.4	19.6	1.0	8848083
Carbonate (CO3)	mg/L	<1.0	<1.0	<1.0	1.0	8848083
Hydroxide (OH)	mg/L	<1.0	<1.0	<1.0	1.0	8848083
Anions						
Dissolved Sulphate (SO4)	mg/L	<1.0	<1.0	2.9	1.0	8848862
Dissolved Chloride (Cl)	mg/L	3.6	3.8	6.3	1.0	8848855
Nutrients						
Total Ammonia (N)	mg/L	<0.020	<0.020	<0.020	0.020	8848342
Nitrate plus Nitrite (N)	mg/L	<0.020	<0.020	0.063	0.020	8848991
Physical Properties						
Conductivity	uS/cm	30.4	31.2	69.5	2.0	8848082
pH	pH	7.01	7.03	6.86	N/A	8848078
RDL = Reportable Detection Limit						
N/A = Not Applicable						

Maxxam Job #: B7A6363
Report Date: 2017/12/07

GHD Limited
Client Project #: 56484-02
Site Location: CAMPBELL RIVER, BC
Your P.O. #: 73506861
Sampler Initials: CR

LOW LEVEL DISSOLVED METALS WITH CV HG (WATER)

Maxxam ID		SO9077	SO9077	SO9078		
Sampling Date		2017/11/28 11:00	2017/11/28 11:00	2017/11/28 12:00		
COC Number		525068-04-01	525068-04-01	525068-04-01		
	UNITS	WS-56484-281117-CR-01	WS-56484-281117-CR-01 Lab-Dup	WS-56484-281117-CR-02	RDL	QC Batch
Misc. Inorganics						
Dissolved Hardness (CaCO ₃)	mg/L	9.22	N/A	9.07	0.50	8847273
Elements						
Dissolved Mercury (Hg)	ug/L	<0.0020	<0.0020	<0.0020	0.0020	8852229
Dissolved Metals by ICPMS						
Dissolved Aluminum (Al)	ug/L	45.3	N/A	38.3	0.50	8847862
Dissolved Antimony (Sb)	ug/L	0.030	N/A	0.026	0.020	8847862
Dissolved Arsenic (As)	ug/L	0.113	N/A	0.111	0.020	8847862
Dissolved Barium (Ba)	ug/L	1.37	N/A	1.38	0.020	8847862
Dissolved Beryllium (Be)	ug/L	<0.010	N/A	<0.010	0.010	8847862
Dissolved Bismuth (Bi)	ug/L	<0.0050	N/A	<0.0050	0.0050	8847862
Dissolved Boron (B)	ug/L	<10	N/A	<10	10	8847862
Dissolved Cadmium (Cd)	ug/L	<0.0050	N/A	<0.0050	0.0050	8847862
Dissolved Chromium (Cr)	ug/L	0.10	N/A	<0.10	0.10	8847862
Dissolved Cobalt (Co)	ug/L	0.0214	N/A	0.0217	0.0050	8847862
Dissolved Copper (Cu)	ug/L	0.269	N/A	0.220	0.050	8847862
Dissolved Iron (Fe)	ug/L	67.2	N/A	62.4	1.0	8847862
Dissolved Lead (Pb)	ug/L	0.0213	N/A	0.0103	0.0050	8847862
Dissolved Lithium (Li)	ug/L	<0.50	N/A	<0.50	0.50	8847862
Dissolved Manganese (Mn)	ug/L	4.01	N/A	5.29	0.050	8847862
Dissolved Molybdenum (Mo)	ug/L	<0.050	N/A	<0.050	0.050	8847862
Dissolved Nickel (Ni)	ug/L	0.112	N/A	0.110	0.020	8847862
Dissolved Phosphorus (P)	ug/L	4.2	N/A	3.1	2.0	8847862
Dissolved Selenium (Se)	ug/L	<0.040	N/A	0.043	0.040	8847862
Dissolved Silicon (Si)	ug/L	2350	N/A	2350	50	8847862
Dissolved Silver (Ag)	ug/L	<0.0050	N/A	<0.0050	0.0050	8847862
Dissolved Strontium (Sr)	ug/L	9.19	N/A	9.35	0.050	8847862
Dissolved Thallium (Tl)	ug/L	<0.0020	N/A	<0.0020	0.0020	8847862
Dissolved Tin (Sn)	ug/L	<0.20	N/A	<0.20	0.20	8847862
Dissolved Titanium (Ti)	ug/L	0.61	N/A	<0.50	0.50	8847862
RDL = Reportable Detection Limit						
Lab-Dup = Laboratory Initiated Duplicate						
N/A = Not Applicable						

Maxxam Job #: B7A6363
Report Date: 2017/12/07

GHD Limited
Client Project #: 56484-02
Site Location: CAMPBELL RIVER, BC
Your P.O. #: 73506861
Sampler Initials: CR

LOW LEVEL DISSOLVED METALS WITH CV HG (WATER)

Maxxam ID		SO9077	SO9077	SO9078		
Sampling Date		2017/11/28 11:00	2017/11/28 11:00	2017/11/28 12:00		
COC Number		525068-04-01	525068-04-01	525068-04-01		
	UNITS	WS-56484-281117-CR-01	WS-56484-281117-CR-01 Lab-Dup	WS-56484-281117-CR-02	RDL	QC Batch
Dissolved Uranium (U)	ug/L	0.0028	N/A	<0.0020	0.0020	8847862
Dissolved Vanadium (V)	ug/L	0.21	N/A	<0.20	0.20	8847862
Dissolved Zinc (Zn)	ug/L	0.77	N/A	0.72	0.10	8847862
Dissolved Zirconium (Zr)	ug/L	<0.10	N/A	<0.10	0.10	8847862
Dissolved Calcium (Ca)	mg/L	2.15	N/A	2.14	0.050	8847502
Dissolved Magnesium (Mg)	mg/L	0.936	N/A	0.906	0.050	8847502
Dissolved Potassium (K)	mg/L	0.133	N/A	0.132	0.050	8847502
Dissolved Sodium (Na)	mg/L	2.65	N/A	2.57	0.050	8847502
Dissolved Sulphur (S)	mg/L	<3.0	N/A	<3.0	3.0	8847502
Dissolved Sulphur (S)	ug/L	<600	N/A	<600	600	8847862
RDL = Reportable Detection Limit Lab-Dup = Laboratory Initiated Duplicate N/A = Not Applicable						

Maxxam Job #: B7A6363
Report Date: 2017/12/07

GHD Limited
Client Project #: 56484-02
Site Location: CAMPBELL RIVER, BC
Your P.O. #: 73506861
Sampler Initials: CR

LOW LEVEL DISSOLVED METALS WITH CV HG (WATER)

Maxxam ID		SO9079		
Sampling Date		2017/11/28 15:30		
COC Number		525068-04-01		
	UNITS	WS-56484-281117-CR-03	RDL	QC Batch
Misc. Inorganics				
Dissolved Hardness (CaCO ₃)	mg/L	24.3	0.50	8852063
Elements				
Dissolved Mercury (Hg)	ug/L	0.0034	0.0020	8852229
Dissolved Metals by ICPMS				
Dissolved Aluminum (Al)	ug/L	204	0.50	8847862
Dissolved Antimony (Sb)	ug/L	0.065	0.020	8847862
Dissolved Arsenic (As)	ug/L	0.213	0.020	8847862
Dissolved Barium (Ba)	ug/L	2.00	0.020	8847862
Dissolved Beryllium (Be)	ug/L	<0.010	0.010	8847862
Dissolved Bismuth (Bi)	ug/L	<0.0050	0.0050	8852664
Dissolved Boron (B)	ug/L	<10	10	8852664
Dissolved Cadmium (Cd)	ug/L	0.0179	0.0050	8852664
Dissolved Chromium (Cr)	ug/L	0.53	0.10	8847862
Dissolved Cobalt (Co)	ug/L	0.656	0.0050	8847862
Dissolved Copper (Cu)	ug/L	2.73	0.050	8847862
Dissolved Iron (Fe)	ug/L	241	1.0	8852664
Dissolved Lead (Pb)	ug/L	0.0529	0.0050	8847862
Dissolved Lithium (Li)	ug/L	<0.50	0.50	8847862
Dissolved Manganese (Mn)	ug/L	104	0.050	8847862
Dissolved Molybdenum (Mo)	ug/L	<0.050	0.050	8847862
Dissolved Nickel (Ni)	ug/L	0.323	0.020	8847862
Dissolved Phosphorus (P)	ug/L	20.6	2.0	8847862
Dissolved Selenium (Se)	ug/L	0.087	0.040	8847862
Dissolved Silicon (Si)	ug/L	6670	50	8847862
Dissolved Silver (Ag)	ug/L	0.0160	0.0050	8847862
Dissolved Strontium (Sr)	ug/L	17.0	0.050	8847862
Dissolved Thallium (Tl)	ug/L	0.0027	0.0020	8852664
Dissolved Tin (Sn)	ug/L	<0.20	0.20	8847862
Dissolved Titanium (Ti)	ug/L	7.77	0.50	8847862
Dissolved Uranium (U)	ug/L	0.0054	0.0020	8852664
RDL = Reportable Detection Limit				

Maxxam Job #: B7A6363
Report Date: 2017/12/07

GHD Limited
Client Project #: 56484-02
Site Location: CAMPBELL RIVER, BC
Your P.O. #: 73506861
Sampler Initials: CR

LOW LEVEL DISSOLVED METALS WITH CV HG (WATER)

Maxxam ID		SO9079		
Sampling Date		2017/11/28 15:30		
COC Number		525068-04-01		
	UNITS	WS-56484-281117-CR-03	RDL	QC Batch
Dissolved Vanadium (V)	ug/L	4.24	0.20	8847862
Dissolved Zinc (Zn)	ug/L	1.85	0.10	8847862
Dissolved Zirconium (Zr)	ug/L	0.32	0.10	8852664
Dissolved Calcium (Ca)	mg/L	5.25	0.050	8847502
Dissolved Magnesium (Mg)	mg/L	2.71	0.050	8852270
Dissolved Potassium (K)	mg/L	0.645	0.050	8847502
Dissolved Sodium (Na)	mg/L	4.17	0.050	8847502
Dissolved Sulphur (S)	mg/L	<3.0	3.0	8847502
Dissolved Sulphur (S)	ug/L	1010	600	8847862
RDL = Reportable Detection Limit				

Maxxam Job #: B7A6363
Report Date: 2017/12/07

GHD Limited
Client Project #: 56484-02
Site Location: CAMPBELL RIVER, BC
Your P.O. #: 73506861
Sampler Initials: CR

LOW LEVEL TOTAL METALS WITH CV HG (WATER)

Maxxam ID		SO9078		
Sampling Date		2011/11/28 12:00		
COC Number		525068-04-01		
	UNITS	WS-56484-281117-CR-02	RDL	QC Batch
Calculated Parameters				
Total Hardness (CaCO ₃)	mg/L	8.88	0.50	8847272
Elements				
Total Mercury (Hg)	ug/L	<0.0020	0.0020	8852258
Total Metals by ICPMS				
Total Aluminum (Al)	ug/L	42.1	0.50	8853900
Total Antimony (Sb)	ug/L	0.023	0.020	8853900
Total Arsenic (As)	ug/L	0.227	0.020	8853900
Total Barium (Ba)	ug/L	1.88	0.020	8853900
Total Beryllium (Be)	ug/L	<0.010	0.010	8853900
Total Bismuth (Bi)	ug/L	0.0054	0.0050	8853900
Total Boron (B)	ug/L	<10	10	8853900
Total Cadmium (Cd)	ug/L	0.0724	0.0050	8853900
Total Chromium (Cr)	ug/L	0.35	0.10	8853900
Total Cobalt (Co)	ug/L	0.0513	0.0050	8853900
Total Copper (Cu)	ug/L	2.02	0.050	8853900
Total Iron (Fe)	ug/L	87.9	1.0	8853900
Total Lead (Pb)	ug/L	0.108	0.0050	8853900
Total Lithium (Li)	ug/L	<0.50	0.50	8853900
Total Manganese (Mn)	ug/L	10.2	0.050	8853900
Total Molybdenum (Mo)	ug/L	<0.050	0.050	8853900
Total Nickel (Ni)	ug/L	0.323	0.020	8853900
Total Phosphorus (P)	ug/L	14.4	2.0	8853900
Total Selenium (Se)	ug/L	<0.040	0.040	8853900
Total Silicon (Si)	ug/L	2410	50	8853900
Total Silver (Ag)	ug/L	<0.0050	0.0050	8853900
Total Strontium (Sr)	ug/L	9.60	0.050	8853900
Total Thallium (Tl)	ug/L	0.0158	0.0020	8853900
Total Tin (Sn)	ug/L	<0.20	0.20	8853900
Total Titanium (Ti)	ug/L	0.63	0.50	8853900
Total Uranium (U)	ug/L	0.140	0.0020	8853900
RDL = Reportable Detection Limit				

Maxxam Job #: B7A6363
Report Date: 2017/12/07

GHD Limited
Client Project #: 56484-02
Site Location: CAMPBELL RIVER, BC
Your P.O. #: 73506861
Sampler Initials: CR

LOW LEVEL TOTAL METALS WITH CV HG (WATER)

Maxxam ID		SO9078		
Sampling Date		2011/11/28 12:00		
COC Number		525068-04-01		
	UNITS	WS-56484-281117-CR-02	RDL	QC Batch
Total Vanadium (V)	ug/L	<0.20	0.20	8853900
Total Zinc (Zn)	ug/L	7.85	0.10	8853900
Total Zirconium (Zr)	ug/L	<0.10	0.10	8853900
Total Calcium (Ca)	mg/L	2.10	0.050	8847379
Total Magnesium (Mg)	mg/L	0.885	0.050	8847379
Total Potassium (K)	mg/L	0.146	0.050	8847379
Total Sodium (Na)	mg/L	2.54	0.050	8847379
Total Sulphur (S)	mg/L	<3.0	3.0	8847379
Total Sulphur (S)	ug/L	<600	600	8853900
RDL = Reportable Detection Limit				

Maxxam Job #: B7A6363
Report Date: 2017/12/07

GHD Limited
Client Project #: 56484-02
Site Location: CAMPBELL RIVER, BC
Your P.O. #: 73506861
Sampler Initials: CR

LL TOTAL METALS (DIGESTED) WITH CV HG

Maxxam ID		SO9077	SO9077	SO9079		
Sampling Date		2017/11/28 11:00	2017/11/28 11:00	2017/11/28 15:30		
COC Number		525068-04-01	525068-04-01	525068-04-01		
	UNITS	WS-56484-281117-CR-01	WS-56484-281117-CR-01 Lab-Dup	WS-56484-281117-CR-03	RDL	QC Batch
Calculated Parameters						
Total Hardness (CaCO ₃)	mg/L	8.78	N/A	22.8	0.50	8847272
Elements						
Total Mercury (Hg)	ug/L	<0.0020	N/A	0.0024	0.0020	8852258
Total Metals by ICPMS						
Total Aluminum (Al)	ug/L	43.6	41.4	250	3.0	8849959
Total Antimony (Sb)	ug/L	0.028	0.028	0.070	0.020	8849959
Total Arsenic (As)	ug/L	0.117	0.119	0.226	0.020	8849959
Total Barium (Ba)	ug/L	1.65	1.63	2.67	0.050	8849959
Total Beryllium (Be)	ug/L	<0.010	<0.010	<0.010	0.010	8849959
Total Bismuth (Bi)	ug/L	<0.010	<0.010	<0.010	0.010	8849959
Total Boron (B)	ug/L	<10	<10	<10	10	8849959
Total Cadmium (Cd)	ug/L	<0.0050	<0.0050	0.0223	0.0050	8849959
Total Chromium (Cr)	ug/L	0.34	0.34	1.00	0.10	8849959
Total Cobalt (Co)	ug/L	0.039	0.038	0.776	0.010	8849959
Total Copper (Cu)	ug/L	0.71	0.68	3.43	0.10	8849959
Total Iron (Fe)	ug/L	99.6	95.7	333	5.0	8849959
Total Lead (Pb)	ug/L	0.046	0.046	0.088	0.020	8849959
Total Lithium (Li)	ug/L	<0.50	<0.50	<0.50	0.50	8849959
Total Manganese (Mn)	ug/L	7.97	7.73	115	0.10	8849959
Total Molybdenum (Mo)	ug/L	<0.050	0.051	0.061	0.050	8849959
Total Nickel (Ni)	ug/L	0.30	0.35	0.49	0.10	8849959
Total Phosphorus (P)	ug/L	<5.0	<5.0	38.3	5.0	8849959
Total Selenium (Se)	ug/L	0.050	0.042	0.109	0.040	8849959
Total Silicon (Si)	ug/L	2160	2120	5970	50	8849959
Total Silver (Ag)	ug/L	<0.010	<0.010	0.024	0.010	8849959
Total Strontium (Sr)	ug/L	11.0	11.0	17.9	0.050	8849959
Total Thallium (Tl)	ug/L	<0.0020	<0.0020	0.0034	0.0020	8849959
Total Tin (Sn)	ug/L	<0.20	<0.20	<0.20	0.20	8849959
Total Titanium (Ti)	ug/L	<2.0	<2.0	21.4	2.0	8849959
RDL = Reportable Detection Limit						
Lab-Dup = Laboratory Initiated Duplicate						
N/A = Not Applicable						

Maxxam Job #: B7A6363
Report Date: 2017/12/07

GHD Limited
Client Project #: 56484-02
Site Location: CAMPBELL RIVER, BC
Your P.O. #: 73506861
Sampler Initials: CR

LL TOTAL METALS (DIGESTED) WITH CV HG

Maxxam ID		SO9077	SO9077	SO9079		
Sampling Date		2017/11/28 11:00	2017/11/28 11:00	2017/11/28 15:30		
COC Number		525068-04-01	525068-04-01	525068-04-01		
	UNITS	WS-56484-281117-CR-01	WS-56484-281117-CR-01 Lab-Dup	WS-56484-281117-CR-03	RDL	QC Batch
Total Uranium (U)	ug/L	<0.0050	<0.0050	0.0069	0.0050	8849959
Total Vanadium (V)	ug/L	0.29	0.28	5.28	0.20	8849959
Total Zinc (Zn)	ug/L	7.9	7.5	2.4	1.0	8849959
Total Zirconium (Zr)	ug/L	<0.10	<0.10	0.23	0.10	8849959
Total Calcium (Ca)	mg/L	2.19	N/A	4.98	0.25	8847379
Total Magnesium (Mg)	mg/L	0.80	N/A	2.52	0.25	8847379
Total Potassium (K)	mg/L	<0.25	N/A	0.65	0.25	8847379
Total Sodium (Na)	mg/L	2.37	N/A	3.68	0.25	8847379
Total Sulphur (S)	mg/L	<3.0	N/A	<3.0	3.0	8847379
RDL = Reportable Detection Limit Lab-Dup = Laboratory Initiated Duplicate N/A = Not Applicable						

Maxxam Job #: B7A6363
Report Date: 2017/12/07

GHD Limited
Client Project #: 56484-02
Site Location: CAMPBELL RIVER, BC
Your P.O. #: 73506861
Sampler Initials: CR

GENERAL COMMENTS

Sample SO9078 [WS-56484-281117-CR-02] : Sample analyzed past method specified hold time for Alkalinity - Water. {Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised.} Sample received past method specified hold time for Alkalinity - Water. Sample analyzed past method specified hold time for Conductance - water. Sample received past method specified hold time for Conductance - water. Sample received past method specified hold time for Ammonia-N (Preserved). Sample received past method specified hold time for Fluoride. Sample received past method specified hold time for Nitrate + Nitrite (N). Sample received past method specified hold time for Nitrite (N) by CFA. Sample was analyzed past method specified hold time for Chloride by Automated Colourimetry. Sample received past method specified hold time for Chloride by Automated Colourimetry. Sample was analyzed past method specified hold time for Sulphate by Automated Colourimetry. Sample received past method specified hold time for Sulphate by Automated Colourimetry. Sample was analyzed past method specified hold time for Nitrate + Nitrite (N). Sample was analyzed past method specified hold time for Nitrite (N) by CFA. Sample was analyzed past method specified hold time for Ammonia-N (Preserved). Sample was analyzed past method specified hold time for Fluoride.

Sample SO9079, Elements by ICPMS Low Level (dissolved): Test repeated.

Sample SO9079, Na, K, Ca, Mg, S by CRC ICPMS (diss.): Test repeated.

Results relate only to the items tested.

Maxxam Job #: B7A6363
Report Date: 2017/12/07

QUALITY ASSURANCE REPORT

GHD Limited
Client Project #: 56484-02
Site Location: CAMPBELL RIVER, BC
Your P.O. #: 73506861
Sampler Initials: CR

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
8847862	Dissolved Aluminum (Al)	2017/11/30	108	80 - 120	110	80 - 120	<0.50	ug/L	17 (1)	20
8847862	Dissolved Antimony (Sb)	2017/11/30	96	80 - 120	99	80 - 120	<0.020	ug/L	NC (1)	20
8847862	Dissolved Arsenic (As)	2017/11/30	98	80 - 120	98	80 - 120	<0.020	ug/L	NC (1)	20
8847862	Dissolved Barium (Ba)	2017/11/30	93	80 - 120	97	80 - 120	<0.020	ug/L	9.7 (1)	20
8847862	Dissolved Beryllium (Be)	2017/11/30	95	80 - 120	95	80 - 120	<0.010	ug/L	NC (1)	20
8847862	Dissolved Bismuth (Bi)	2017/11/30	94	80 - 120	101	80 - 120	<0.0050	ug/L	NC (1)	20
8847862	Dissolved Boron (B)	2017/11/30	89	80 - 120	89	80 - 120	<10	ug/L	NC (1)	20
8847862	Dissolved Cadmium (Cd)	2017/11/30	97	80 - 120	99	80 - 120	<0.0050	ug/L	NC (1)	20
8847862	Dissolved Chromium (Cr)	2017/11/30	98	80 - 120	101	80 - 120	<0.10	ug/L	NC (1)	20
8847862	Dissolved Cobalt (Co)	2017/11/30	96	80 - 120	98	80 - 120	<0.0050	ug/L	NC (1)	20
8847862	Dissolved Copper (Cu)	2017/11/30	96	80 - 120	98	80 - 120	<0.050	ug/L	NC (1)	20
8847862	Dissolved Iron (Fe)	2017/11/30	104	80 - 120	107	80 - 120	<1.0	ug/L	NC (1)	20
8847862	Dissolved Lead (Pb)	2017/11/30	97	80 - 120	100	80 - 120	<0.0050	ug/L	NC (1)	20
8847862	Dissolved Lithium (Li)	2017/11/30	96	80 - 120	97	80 - 120	<0.50	ug/L	NC (1)	20
8847862	Dissolved Manganese (Mn)	2017/11/30	100	80 - 120	102	80 - 120	<0.050	ug/L	NC (1)	20
8847862	Dissolved Molybdenum (Mo)	2017/11/30	99	80 - 120	100	80 - 120	<0.050	ug/L	NC (1)	20
8847862	Dissolved Nickel (Ni)	2017/11/30	99	80 - 120	104	80 - 120	<0.020	ug/L	NC (1)	20
8847862	Dissolved Phosphorus (P)	2017/11/30					<2.0	ug/L		
8847862	Dissolved Selenium (Se)	2017/11/30	103	80 - 120	105	80 - 120	<0.040	ug/L	NC (1)	20
8847862	Dissolved Silicon (Si)	2017/11/30					<50	ug/L	NC (1)	20
8847862	Dissolved Silver (Ag)	2017/11/30	104	80 - 120	105	80 - 120	<0.0050	ug/L	NC (1)	20
8847862	Dissolved Strontium (Sr)	2017/11/30	97	80 - 120	99	80 - 120	<0.050	ug/L	1.3 (1)	20
8847862	Dissolved Sulphur (S)	2017/11/30					<600	ug/L		
8847862	Dissolved Thallium (Tl)	2017/11/30	97	80 - 120	100	80 - 120	<0.0020	ug/L	NC (1)	20
8847862	Dissolved Tin (Sn)	2017/11/30	92	80 - 120	98	80 - 120	<0.20	ug/L	NC (1)	20
8847862	Dissolved Titanium (Ti)	2017/11/30	94	80 - 120	99	80 - 120	<0.50	ug/L	NC (1)	20
8847862	Dissolved Uranium (U)	2017/11/30	93	80 - 120	96	80 - 120	<0.0020	ug/L	NC (1)	20
8847862	Dissolved Vanadium (V)	2017/11/30	96	80 - 120	99	80 - 120	<0.20	ug/L	NC (1)	20
8847862	Dissolved Zinc (Zn)	2017/11/30	103	80 - 120	105	80 - 120	<0.10	ug/L	5.3 (1)	20
8847862	Dissolved Zirconium (Zr)	2017/11/30	97	80 - 120	96	80 - 120	<0.10	ug/L	NC (1)	20

Maxxam Job #: B7A6363
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QUALITY ASSURANCE REPORT(CONT'D)

GHD Limited
Client Project #: 56484-02
Site Location: CAMPBELL RIVER, BC
Your P.O. #: 73506861
Sampler Initials: CR

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
8848078	pH	2017/11/30			101	97 - 103				
8848082	Conductivity	2017/11/30			100	80 - 120	<2.0	uS/cm		
8848083	Alkalinity (PP as CaCO ₃)	2017/11/30					<1.0	mg/L		
8848083	Alkalinity (Total as CaCO ₃)	2017/11/30			98	80 - 120	<1.0	mg/L		
8848083	Bicarbonate (HCO ₃)	2017/11/30					<1.0	mg/L		
8848083	Carbonate (CO ₃)	2017/11/30					<1.0	mg/L		
8848083	Hydroxide (OH)	2017/11/30					<1.0	mg/L		
8848342	Total Ammonia (N)	2017/11/30	112	80 - 120	99	80 - 120	<0.020	mg/L	5.0 (1)	20
8848855	Dissolved Chloride (Cl)	2017/11/30			98	80 - 120	<1.0	mg/L		
8848862	Dissolved Sulphate (SO ₄)	2017/11/30			97	80 - 120	<1.0	mg/L		
8848991	Nitrate plus Nitrite (N)	2017/11/30	100	80 - 120	107	80 - 120	<0.020	mg/L	NC (1)	25
8848993	Nitrite (N)	2017/11/30	97	80 - 120	102	80 - 120	<0.0050	mg/L	NC (1)	20
8849219	Fluoride (F)	2017/12/01	98	80 - 120	100	80 - 120	<0.020	mg/L	NC (1)	20
8849959	Total Aluminum (Al)	2017/12/04	89 (2)	80 - 120	86	80 - 120	<3.0	ug/L	5.2 (3)	20
8849959	Total Antimony (Sb)	2017/12/04	107 (2)	80 - 120	105	80 - 120	<0.020	ug/L	0 (3)	20
8849959	Total Arsenic (As)	2017/12/04	106 (2)	80 - 120	103	80 - 120	<0.020	ug/L	2.1 (3)	20
8849959	Total Barium (Ba)	2017/12/04	102 (2)	80 - 120	100	80 - 120	<0.050	ug/L	1.3 (3)	20
8849959	Total Beryllium (Be)	2017/12/04	97 (2)	80 - 120	94	80 - 120	<0.010	ug/L	NC (3)	20
8849959	Total Bismuth (Bi)	2017/12/04	99 (2)	80 - 120	99	80 - 120	<0.010	ug/L	NC (3)	20
8849959	Total Boron (B)	2017/12/04	89 (2)	80 - 120	86	80 - 120	<10	ug/L	NC (3)	20
8849959	Total Cadmium (Cd)	2017/12/04	106 (2)	80 - 120	102	80 - 120	<0.0050	ug/L	NC (3)	20
8849959	Total Chromium (Cr)	2017/12/04	102 (2)	80 - 120	101	80 - 120	<0.10	ug/L	0.73 (3)	20
8849959	Total Cobalt (Co)	2017/12/04	100 (2)	80 - 120	98	80 - 120	<0.010	ug/L	3.1 (3)	20
8849959	Total Copper (Cu)	2017/12/04	103 (2)	80 - 120	101	80 - 120	<0.10	ug/L	3.8 (3)	20
8849959	Total Iron (Fe)	2017/12/04	106 (2)	80 - 120	104	80 - 120	<5.0	ug/L	4.0 (3)	20
8849959	Total Lead (Pb)	2017/12/04	98 (2)	80 - 120	97	80 - 120	<0.020	ug/L	1.5 (3)	20
8849959	Total Lithium (Li)	2017/12/04	91 (2)	80 - 120	89	80 - 120	<0.50	ug/L	NC (3)	20
8849959	Total Manganese (Mn)	2017/12/04	101 (2)	80 - 120	100	80 - 120	<0.10	ug/L	3.1 (3)	20
8849959	Total Molybdenum (Mo)	2017/12/04	108 (2)	80 - 120	104	80 - 120	<0.050	ug/L	2.8 (3)	20
8849959	Total Nickel (Ni)	2017/12/04	103 (2)	80 - 120	102	80 - 120	<0.10	ug/L	17 (3)	20

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QUALITY ASSURANCE REPORT(CONT'D)

GHD Limited
Client Project #: 56484-02
Site Location: CAMPBELL RIVER, BC
Your P.O. #: 73506861
Sampler Initials: CR

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
8849959	Total Phosphorus (P)	2017/12/04					<5.0	ug/L	NC (3)	20
8849959	Total Selenium (Se)	2017/12/04	107 (2)	80 - 120	104	80 - 120	<0.040	ug/L	18 (3)	20
8849959	Total Silicon (Si)	2017/12/04					<50	ug/L	2.0 (3)	20
8849959	Total Silver (Ag)	2017/12/04	110 (2)	80 - 120	109	80 - 120	<0.010	ug/L	NC (3)	20
8849959	Total Strontium (Sr)	2017/12/04	NC (2)	80 - 120	99	80 - 120	<0.050	ug/L	0.080 (3)	20
8849959	Total Thallium (Tl)	2017/12/04	100 (2)	80 - 120	99	80 - 120	<0.0020	ug/L	NC (3)	20
8849959	Total Tin (Sn)	2017/12/04	108 (2)	80 - 120	108	80 - 120	<0.20	ug/L	NC (3)	20
8849959	Total Titanium (Ti)	2017/12/04	102 (2)	80 - 120	99	80 - 120	<2.0	ug/L	NC (3)	20
8849959	Total Uranium (U)	2017/12/04	99 (2)	80 - 120	97	80 - 120	<0.0050	ug/L	NC (3)	20
8849959	Total Vanadium (V)	2017/12/04	105 (2)	80 - 120	101	80 - 120	<0.20	ug/L	4.0 (3)	20
8849959	Total Zinc (Zn)	2017/12/04	102 (2)	80 - 120	99	80 - 120	<1.0	ug/L	4.9 (3)	20
8849959	Total Zirconium (Zr)	2017/12/04	89 (2)	80 - 120	97	80 - 120	<0.10	ug/L	NC (3)	20
8852229	Dissolved Mercury (Hg)	2017/12/05	94 (4)	80 - 120	96	80 - 120	<0.0020	ug/L	NC (5)	20
8852258	Total Mercury (Hg)	2017/12/05	88	80 - 120	90	80 - 120	<0.0020	ug/L	NC (1)	20
8852664	Dissolved Bismuth (Bi)	2017/12/05			98	80 - 120	<0.0050	ug/L		
8852664	Dissolved Boron (B)	2017/12/05			102	80 - 120	<10	ug/L		
8852664	Dissolved Cadmium (Cd)	2017/12/05			98	80 - 120	<0.0050	ug/L		
8852664	Dissolved Iron (Fe)	2017/12/05			106	80 - 120	<1.0	ug/L		
8852664	Dissolved Thallium (Tl)	2017/12/05			98	80 - 120	<0.0020	ug/L		
8852664	Dissolved Uranium (U)	2017/12/05			95	80 - 120	<0.0020	ug/L		
8852664	Dissolved Zirconium (Zr)	2017/12/05			96	80 - 120	<0.10	ug/L		
8853900	Total Aluminum (Al)	2017/12/07	103	80 - 120	107	80 - 120	<0.50	ug/L	11 (1)	20
8853900	Total Antimony (Sb)	2017/12/07	103	80 - 120	106	80 - 120	<0.020	ug/L	5.7 (1)	20
8853900	Total Arsenic (As)	2017/12/07	104	80 - 120	108	80 - 120	<0.020	ug/L	3.0 (1)	20
8853900	Total Barium (Ba)	2017/12/07	NC	80 - 120	105	80 - 120	<0.020	ug/L	0.17 (1)	20
8853900	Total Beryllium (Be)	2017/12/07	102	80 - 120	108	80 - 120	<0.010	ug/L	NC (1)	20
8853900	Total Bismuth (Bi)	2017/12/07	93	80 - 120	104	80 - 120	<0.0050	ug/L	NC (1)	20
8853900	Total Boron (B)	2017/12/07	98	80 - 120	110	80 - 120	<10	ug/L	NC (1)	20
8853900	Total Cadmium (Cd)	2017/12/07	102	80 - 120	106	80 - 120	<0.0050	ug/L	NC (1)	20
8853900	Total Chromium (Cr)	2017/12/07	98	80 - 120	104	80 - 120	<0.10	ug/L	NC (1)	20

Maxxam Job #: B7A6363
Report Date: 2017/12/07

QUALITY ASSURANCE REPORT(CONT'D)

GHD Limited
Client Project #: 56484-02
Site Location: CAMPBELL RIVER, BC
Your P.O. #: 73506861
Sampler Initials: CR

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
8853900	Total Cobalt (Co)	2017/12/07	94	80 - 120	102	80 - 120	<0.0050	ug/L	2.6 (1)	20
8853900	Total Copper (Cu)	2017/12/07	93	80 - 120	104	80 - 120	<0.050	ug/L	5.7 (1)	20
8853900	Total Iron (Fe)	2017/12/07	NC	80 - 120	110	80 - 120	<1.0	ug/L	1.1 (1)	20
8853900	Total Lead (Pb)	2017/12/07	94	80 - 120	104	80 - 120	<0.0050	ug/L	2.8 (1)	20
8853900	Total Lithium (Li)	2017/12/07	97	80 - 120	108	80 - 120	<0.50	ug/L	1.5 (1)	20
8853900	Total Manganese (Mn)	2017/12/07	NC	80 - 120	103	80 - 120	<0.050	ug/L	1.6 (1)	20
8853900	Total Molybdenum (Mo)	2017/12/07	103	80 - 120	110	80 - 120	<0.050	ug/L	8.9 (1)	20
8853900	Total Nickel (Ni)	2017/12/07	95	80 - 120	106	80 - 120	<0.020	ug/L	9.6 (1)	20
8853900	Total Phosphorus (P)	2017/12/07					<2.0	ug/L		
8853900	Total Selenium (Se)	2017/12/07	104	80 - 120	111	80 - 120	<0.040	ug/L	NC (1)	20
8853900	Total Silicon (Si)	2017/12/07					<50	ug/L	0.89 (1)	20
8853900	Total Silver (Ag)	2017/12/07	108	80 - 120	113	80 - 120	<0.0050	ug/L	NC (1)	20
8853900	Total Strontium (Sr)	2017/12/07	NC	80 - 120	105	80 - 120	<0.050	ug/L	0.29 (1)	20
8853900	Total Sulphur (S)	2017/12/07					<600	ug/L		
8853900	Total Thallium (Tl)	2017/12/07	94	80 - 120	103	80 - 120	<0.0020	ug/L	NC (1)	20
8853900	Total Tin (Sn)	2017/12/07	103	80 - 120	103	80 - 120	<0.20	ug/L	NC (1)	20
8853900	Total Titanium (Ti)	2017/12/07	89	80 - 120	107	80 - 120	<0.50	ug/L	NC (1)	20
8853900	Total Uranium (U)	2017/12/07	92	80 - 120	98	80 - 120	<0.0020	ug/L	1.7 (1)	20
8853900	Total Vanadium (V)	2017/12/07	100	80 - 120	105	80 - 120	<0.20	ug/L	NC (1)	20
8853900	Total Zinc (Zn)	2017/12/07	NC	80 - 120	106	80 - 120	<0.10	ug/L	1.6 (1)	20

Maxxam Job #: B7A6363
Report Date: 2017/12/07

QUALITY ASSURANCE REPORT(CONT'D)

GHD Limited
Client Project #: 56484-02
Site Location: CAMPBELL RIVER, BC
Your P.O. #: 73506861
Sampler Initials: CR

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
8853900	Total Zirconium (Zr)	2017/12/07	101	80 - 120	103	80 - 120	<0.10	ug/L	NC (1)	20
Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement. Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference. Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy. Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination. NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration) NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL). (1) Duplicate Parent ID (2) Matrix Spike Parent ID [SO9077-05] (3) Duplicate Parent ID [SO9077-05] (4) Matrix Spike Parent ID [SO9077-04] (5) Duplicate Parent ID [SO9077-04]										

Maxxam Job #: B7A6363
Report Date: 2017/12/07

GHD Limited
Client Project #: 56484-02
Site Location: CAMPBELL RIVER, BC
Your P.O. #: 73506861
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

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 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 2385 www.maxxam.ca

INVOICE TO:		Report Information		Project Information	
Company Name	#163 GHD Limited	Company Name	#28639 GHD Limited	Quotation #	B70472
Contact Name	Airesse MacPhee	Contact Name	Michaela Dyck	P.O. #	73506861
Address	651 COLBY DRIVE WATERLOO ON N2V 1C2	Address	10271 Shelbridge Way Suite 165 Richmond BC V6X 2W8	Project #	56484-02
Phone	(519) 884-0510 x	Phone	(604) 214-0510 x234	Site #	
Email	airesse.macphee@ghd.com; NationalEDDSupport@ma	Email	Michaela.dyck@ghd.com; airesse.macphee@ghd.com	Sampled By	C. RAGAN & T. DICKENS



B7A6363_COC

Page	1 of 1
Bottle Order #:	525058
Project Manager	VJ Oco

Regulatory Criteria:		Special Instructions		ANALYSIS REQUESTED (PLEASE BE SPECIFIC)										Turnaround Time (TAT) Required:		
☐ CSR															Please provide advance notice for rush projects	
☐ CCME															Regular (Standard) TAT: (will be applied if Rush TAT is not specified): Standard TAT = 5-7 Working days for most tests.	
☐ BC Water Quality															Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.	
☐ Other															Job Specific Rush TAT (if applies to entire submission) 1 DAY ☐ 2 Day ☐ 3 Day ☐ Date Required: ☐	
SAMPLES MUST BE KEPT COOL (< 10°C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM														Rush Confirmation Number: ☐		
															(call lab for #)	
															Comments	
1	WS-S4184-281117-CR-01	Nov 28 2017	11:00	W	N	X	X	X	X		X	X			7	Total metals preserved. Dissolved metals NOT preserved. Dissolved Hg preservative rinsed out. No field filtering
2	↓	↓	12:00	↓	↓	↓	↓	↓	↓		↓	↓			7	
3	↓	↓	15:30	↓	↓	↓	↓	↓	↓		↓	↓			7	
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		
C. RAGAN & T. DICKENS		17/11/29	11:00	Michaela Dyck		17/11/29	10:45	NA	Time Sensitive	Temperature (°C) on Receipt	Custody Seal Intact on Cooler?
M. Schilling		17/11/29	15:00	Michaela Dyck		17/11/30	08:40	NA	☐	4, 3, 4	☐ 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.

1113R3,2
100 XG

Maxxam Analytics International Corporation o/a Maxxam Analytics

Your P.O. #: 73506861
Your Project #: 56484-02
Site Location: HORNBY ISLAND, BC
Your C.O.C. #: 525068-02-01, 525068-05-01

Attention: Aïresse MacPhee

GHD Limited
10271 Shellbridge Way
Suite 165
Richmond, BC
Canada V6X 2W8

Report Date: 2017/12/06
Report #: R2487281
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B7A6372

Received: 2017/11/29, 10:45

Sample Matrix: Water
Samples Received: 15

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity - Water	14	2017/11/30	2017/12/01	BBY6SOP-00026	SM 22 2320 B m
Alkalinity - Water	1	2017/12/01	2017/12/02	BBY6SOP-00026	SM 22 2320 B m
Chloride by Automated Colourimetry	14	N/A	2017/12/01	BBY6SOP-00011	SM 22 4500-Cl- E m
Chloride by Automated Colourimetry	1	N/A	2017/12/04	BBY6SOP-00011	SM 22 4500-Cl- E m
Conductance - water	14	2017/11/30	2017/12/02	BBY6SOP-00026	SM 22 2510 B m
Conductance - water	1	2017/12/01	2017/12/02	BBY6SOP-00026	SM 22 2510 B m
Fluoride	15	N/A	2017/12/01	BBY6SOP-00048	SM 22 4500-F C m
Hardness (calculated as CaCO ₃)	15	N/A	2017/12/05	BBY WI-00033	Auto Calc
Mercury (Dissolved) by CVAf	15	N/A	2017/12/05	BBY7SOP-00015	BCMOE BCLM Oct2013 m
Na, K, Ca, Mg, S by CRC ICPMS (diss.)	15	N/A	2017/12/05	BBY7SOP-00002	EPA 6020B R2 m
Elements by CRC ICPMS (dissolved)	11	N/A	2017/12/04	BBY7SOP-00002	EPA 6020B R2 m
Elements by CRC ICPMS (dissolved)	4	N/A	2017/12/05	BBY7SOP-00002	EPA 6020B R2 m
Ammonia-N (Preserved)	15	N/A	2017/12/01	BBY6SOP-00009	EPA 350.1 m
Nitrate + Nitrite (N)	15	N/A	2017/11/30	BBY6SOP-00010	SM 22 4500-NO ₃ - I m
Nitrite (N) by CFA	15	N/A	2017/11/30	BBY6SOP-00010	SM 22 4500-NO ₃ - I m
Nitrogen - Nitrate (as N)	15	N/A	2017/12/01	BBY WI-00033	Auto Calc
Filter and HNO ₃ Preserve for Metals	15	N/A	2017/12/01	BBY7 WI-00004	BCMOE Reqs 08/14
pH Water (1)	14	2017/11/30	2017/12/01	BBY6SOP-00026	SM 22 4500-H+ B m
pH Water (1)	1	2017/12/01	2017/12/02	BBY6SOP-00026	SM 22 4500-H+ B m
Sulphate by Automated Colourimetry	12	N/A	2017/12/01	BBY6SOP-00017	SM 22 4500-SO ₄ 2- E m
Sulphate by Automated Colourimetry	3	N/A	2017/12/04	BBY6SOP-00017	SM 22 4500-SO ₄ 2- E 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.

Your P.O. #: 73506861
Your Project #: 56484-02
Site Location: HORNBY ISLAND, BC
Your C.O.C. #: 525068-02-01, 525068-05-01

Attention: Aïresse MacPhee

GHD Limited
10271 Shellbridge Way
Suite 165
Richmond, BC
Canada V6X 2W8

Report Date: 2017/12/06
Report #: R2487281
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B7A6372

Received: 2017/11/29, 10:45

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) 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/PHA Standard Method holding time.

Encryption Key

Dan Woolger
Project Manager
06 Dec 2017 11:14:43

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

cosign

=====

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 #: B7A6372
Report Date: 2017/12/06

GHD Limited
Client Project #: 56484-02
Site Location: HORNBY ISLAND, BC
Your P.O. #: 73506861
Sampler Initials: CR

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		SO9107		SO9108		
Sampling Date		2017/11/28 09:30		2017/11/28 08:40		
COC Number		525068-02-01		525068-02-01		
	UNITS	WG-56484-281117-CR-06	QC Batch	WG-56484-281117-CR-07	RDL	QC Batch
ANIONS						
Nitrite (N)	mg/L	<0.0050	8849008	<0.0050	0.0050	8849008
Calculated Parameters						
Nitrate (N)	mg/L	0.060	8847380	0.420	0.020	8847380
Misc. Inorganics						
Fluoride (F)	mg/L	0.024	8849220	<0.020	0.020	8849220
Alkalinity (Total as CaCO ₃)	mg/L	132	8848284	50.6	1.0	8848284
Alkalinity (PP as CaCO ₃)	mg/L	<1.0	8848284	<1.0	1.0	8848284
Bicarbonate (HCO ₃)	mg/L	161	8848284	61.7	1.0	8848284
Carbonate (CO ₃)	mg/L	<1.0	8848284	<1.0	1.0	8848284
Hydroxide (OH)	mg/L	<1.0	8848284	<1.0	1.0	8848284
Anions						
Dissolved Sulphate (SO ₄)	mg/L	3.7	8853049	2.5	1.0	8850987
Dissolved Chloride (Cl)	mg/L	5.5	8850970	100	1.0	8850986
Nutrients						
Total Ammonia (N)	mg/L	0.027	8849725	<0.020	0.020	8849725
Nitrate plus Nitrite (N)	mg/L	0.060	8849006	0.420	0.020	8849006
Physical Properties						
Conductivity	uS/cm	273	8848283	451	2.0	8848283
pH	pH	8.14	8848278	7.96	N/A	8848278
RDL = Reportable Detection Limit						
N/A = Not Applicable						

Maxxam Job #: B7A6372
Report Date: 2017/12/06

GHD Limited
Client Project #: 56484-02
Site Location: HORNBY ISLAND, BC
Your P.O. #: 73506861
Sampler Initials: CR

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		SO9109		SO9110		
Sampling Date		2017/11/28 08:45		2017/11/28 09:40		
COC Number		525068-02-01		525068-02-01		
	UNITS	WG-56484-281117-CR-08	QC Batch	WG-56484-281117-CR-09	RDL	QC Batch
ANIONS						
Nitrite (N)	mg/L	<0.0050	8849008	<0.0050	0.0050	8849008
Calculated Parameters						
Nitrate (N)	mg/L	0.405	8847380	0.080	0.020	8847380
Misc. Inorganics						
Fluoride (F)	mg/L	<0.020	8849220	<0.020	0.020	8849220
Alkalinity (Total as CaCO ₃)	mg/L	46.2	8848284	50.5	1.0	8848284
Alkalinity (PP as CaCO ₃)	mg/L	<1.0	8848284	<1.0	1.0	8848284
Bicarbonate (HCO ₃)	mg/L	56.4	8848284	61.6	1.0	8848284
Carbonate (CO ₃)	mg/L	<1.0	8848284	<1.0	1.0	8848284
Hydroxide (OH)	mg/L	<1.0	8848284	<1.0	1.0	8848284
Anions						
Dissolved Sulphate (SO ₄)	mg/L	2.7	8850983	1.3	1.0	8850983
Dissolved Chloride (Cl)	mg/L	100	8850970	4.7	1.0	8850970
Nutrients						
Total Ammonia (N)	mg/L	<0.020	8849725	0.030	0.020	8849717
Nitrate plus Nitrite (N)	mg/L	0.405	8849006	0.080	0.020	8849006
Physical Properties						
Conductivity	uS/cm	452	8848283	117	2.0	8848283
pH	pH	7.90	8848278	8.02	N/A	8848278
RDL = Reportable Detection Limit						
N/A = Not Applicable						

Maxxam Job #: B7A6372
Report Date: 2017/12/06

GHD Limited
Client Project #: 56484-02
Site Location: HORNBY ISLAND, BC
Your P.O. #: 73506861
Sampler Initials: CR

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		SO9111	SO9111		SO9112		
Sampling Date		2017/11/28 11:30	2017/11/28 11:30		2017/11/28 12:50		
COC Number		525068-02-01	525068-02-01		525068-02-01		
	UNITS	WG-56484-281117-CR-10	WG-56484-281117-CR-10 Lab-Dup	QC Batch	WG-56484-281117-CR-11	RDL	QC Batch

ANIONS							
Nitrite (N)	mg/L	<0.0050	<0.0050	8849008	<0.0050	0.0050	8849008
Calculated Parameters							
Nitrate (N)	mg/L	0.071	N/A	8847380	0.203	0.020	8847380
Misc. Inorganics							
Fluoride (F)	mg/L	<0.020	N/A	8849220	0.025	0.020	8849220
Alkalinity (Total as CaCO ₃)	mg/L	46.6	N/A	8848284	109	1.0	8848284
Alkalinity (PP as CaCO ₃)	mg/L	<1.0	N/A	8848284	<1.0	1.0	8848284
Bicarbonate (HCO ₃)	mg/L	56.8	N/A	8848284	133	1.0	8848284
Carbonate (CO ₃)	mg/L	<1.0	N/A	8848284	<1.0	1.0	8848284
Hydroxide (OH)	mg/L	<1.0	N/A	8848284	<1.0	1.0	8848284
Anions							
Dissolved Sulphate (SO ₄)	mg/L	1.9	N/A	8850983	2.1	1.0	8850987
Dissolved Chloride (Cl)	mg/L	1.2	N/A	8850970	5.5	1.0	8850986
Nutrients							
Total Ammonia (N)	mg/L	<0.020	N/A	8849725	0.026	0.020	8849717
Nitrate plus Nitrite (N)	mg/L	0.071	0.070	8849006	0.203	0.020	8849006
Physical Properties							
Conductivity	uS/cm	98.2	N/A	8848283	225	2.0	8848283
pH	pH	7.99	N/A	8848278	8.23	N/A	8848278
RDL = Reportable Detection Limit Lab-Dup = Laboratory Initiated Duplicate N/A = Not Applicable							

Maxxam Job #: B7A6372
Report Date: 2017/12/06

GHD Limited
Client Project #: 56484-02
Site Location: HORNBY ISLAND, BC
Your P.O. #: 73506861
Sampler Initials: CR

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		SO9112		SO9113	SO9113		
Sampling Date		2017/11/28 12:50		2017/11/28 13:30	2017/11/28 13:30		
COC Number		525068-02-01		525068-02-01	525068-02-01		
	UNITS	WG-56484-281117-CR-11 Lab-Dup	QC Batch	WG-56484-281117-CR-12	WG-56484-281117-CR-12 Lab-Dup	RDL	QC Batch
ANIONS							
Nitrite (N)	mg/L	N/A	8849008	<0.0050	N/A	0.0050	8849008
Calculated Parameters							
Nitrate (N)	mg/L	N/A	8847380	0.416	N/A	0.020	8847380
Misc. Inorganics							
Fluoride (F)	mg/L	N/A	8849220	<0.020	N/A	0.020	8849220
Alkalinity (Total as CaCO ₃)	mg/L	N/A	8848284	267	269	1.0	8848284
Alkalinity (PP as CaCO ₃)	mg/L	N/A	8848284	<1.0	<1.0	1.0	8848284
Bicarbonate (HCO ₃)	mg/L	N/A	8848284	326	329	1.0	8848284
Carbonate (CO ₃)	mg/L	N/A	8848284	<1.0	<1.0	1.0	8848284
Hydroxide (OH)	mg/L	N/A	8848284	<1.0	<1.0	1.0	8848284
Anions							
Dissolved Sulphate (SO ₄)	mg/L	1.8	8850987	5.2	N/A	1.0	8850987
Dissolved Chloride (Cl)	mg/L	5.4	8850986	6.9	N/A	1.0	8850986
Nutrients							
Total Ammonia (N)	mg/L	N/A	8849717	<0.020	N/A	0.020	8849725
Nitrate plus Nitrite (N)	mg/L	N/A	8849006	0.416	N/A	0.020	8849006
Physical Properties							
Conductivity	uS/cm	N/A	8848283	512	511	2.0	8848283
pH	pH	N/A	8848278	8.19	8.22	N/A	8848278
RDL = Reportable Detection Limit Lab-Dup = Laboratory Initiated Duplicate N/A = Not Applicable							

Maxxam Job #: B7A6372
Report Date: 2017/12/06

GHD Limited
Client Project #: 56484-02
Site Location: HORNBY ISLAND, BC
Your P.O. #: 73506861
Sampler Initials: CR

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		SO9114			SO9115		
Sampling Date		2017/11/28 14:00			2017/11/28 14:50		
COC Number		525068-02-01			525068-02-01		
	UNITS	WG-56484-281117-CR-13	RDL	QC Batch	WG-56484-281117-CR-14	RDL	QC Batch
ANIONS							
Nitrite (N)	mg/L	<0.0050	0.0050	8849015	<0.0050	0.0050	8849008
Calculated Parameters							
Nitrate (N)	mg/L	0.047	0.020	8847380	2.25	0.10	8847380
Misc. Inorganics							
Fluoride (F)	mg/L	0.022	0.020	8849221	<0.020	0.020	8849221
Alkalinity (Total as CaCO ₃)	mg/L	41.3	1.0	8849715	308	1.0	8848284
Alkalinity (PP as CaCO ₃)	mg/L	<1.0	1.0	8849715	<1.0	1.0	8848284
Bicarbonate (HCO ₃)	mg/L	50.3	1.0	8849715	376	1.0	8848284
Carbonate (CO ₃)	mg/L	<1.0	1.0	8849715	<1.0	1.0	8848284
Hydroxide (OH)	mg/L	<1.0	1.0	8849715	<1.0	1.0	8848284
Anions							
Dissolved Sulphate (SO ₄)	mg/L	3.4	1.0	8850987	1.5	1.0	8850987
Dissolved Chloride (Cl)	mg/L	<1.0	1.0	8850986	4.0	1.0	8850986
Nutrients							
Total Ammonia (N)	mg/L	<0.020	0.020	8849725	0.048	0.020	8849725
Nitrate plus Nitrite (N)	mg/L	0.047	0.020	8849012	2.25 (1)	0.10	8849006
Physical Properties							
Conductivity	uS/cm	85.5	2.0	8849712	582	2.0	8848283
pH	pH	7.64	N/A	8849711	8.22	N/A	8848278
RDL = Reportable Detection Limit							
N/A = Not Applicable							
(1) Detection limits raised due to dilution to bring analyte within the calibrated range.							

Maxxam Job #: B7A6372
Report Date: 2017/12/06

GHD Limited
Client Project #: 56484-02
Site Location: HORNBY ISLAND, BC
Your P.O. #: 73506861
Sampler Initials: CR

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		SO9115	SO9116		SO9118		
Sampling Date		2017/11/28 14:50	2017/11/28 14:55		2017/11/28 14:30		
COC Number		525068-02-01	525068-02-01		525068-05-01		
	UNITS	WG-56484-281117-CR-14 Lab-Dup	WG-56484-281117-CR-15	RDL	WG-56484-281117-CR-16	RDL	QC Batch
ANIONS							
Nitrite (N)	mg/L	N/A	<0.0050	0.0050	0.0146	0.0050	8849008
Calculated Parameters							
Nitrate (N)	mg/L	N/A	2.29	0.10	1.98	0.020	8847380
Misc. Inorganics							
Fluoride (F)	mg/L	<0.020	<0.020	0.020	<0.020	0.020	8849221
Alkalinity (Total as CaCO ₃)	mg/L	N/A	313	1.0	420	1.0	8848284
Alkalinity (PP as CaCO ₃)	mg/L	N/A	<1.0	1.0	<1.0	1.0	8848284
Bicarbonate (HCO ₃)	mg/L	N/A	382	1.0	512	1.0	8848284
Carbonate (CO ₃)	mg/L	N/A	<1.0	1.0	<1.0	1.0	8848284
Hydroxide (OH)	mg/L	N/A	<1.0	1.0	<1.0	1.0	8848284
Anions							
Dissolved Sulphate (SO ₄)	mg/L	N/A	1.5	1.0	13.2	1.0	8850987
Dissolved Chloride (Cl)	mg/L	N/A	4.0	1.0	40	1.0	8850986
Nutrients							
Total Ammonia (N)	mg/L	N/A	<0.020	0.020	0.064	0.020	8849725
Nitrate plus Nitrite (N)	mg/L	N/A	2.29 (1)	0.10	1.99	0.020	8849006
Physical Properties							
Conductivity	uS/cm	N/A	574	2.0	901	2.0	8848283
pH	pH	N/A	8.21	N/A	8.09	N/A	8848278
RDL = Reportable Detection Limit Lab-Dup = Laboratory Initiated Duplicate N/A = Not Applicable (1) Detection limits raised due to dilution to bring analyte within the calibrated range.							

Maxxam Job #: B7A6372
Report Date: 2017/12/06

GHD Limited
Client Project #: 56484-02
Site Location: HORNBY ISLAND, BC
Your P.O. #: 73506861
Sampler Initials: CR

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		SO9119	SO9119		
Sampling Date		2017/11/28 15:40	2017/11/28 15:40		
COC Number		525068-05-01	525068-05-01		
	UNITS	WG-56484-281117-CR-17	WG-56484-281117-CR-17 Lab-Dup	RDL	QC Batch
ANIONS					
Nitrite (N)	mg/L	0.0053	N/A	0.0050	8849008
Calculated Parameters					
Nitrate (N)	mg/L	0.654	N/A	0.020	8847380
Misc. Inorganics					
Fluoride (F)	mg/L	0.020	N/A	0.020	8849220
Alkalinity (Total as CaCO ₃)	mg/L	98.9	N/A	1.0	8848284
Alkalinity (PP as CaCO ₃)	mg/L	<1.0	N/A	1.0	8848284
Bicarbonate (HCO ₃)	mg/L	121	N/A	1.0	8848284
Carbonate (CO ₃)	mg/L	<1.0	N/A	1.0	8848284
Hydroxide (OH)	mg/L	<1.0	N/A	1.0	8848284
Anions					
Dissolved Sulphate (SO ₄)	mg/L	6.0 (1)	6.3	1.0	8853049
Dissolved Chloride (Cl)	mg/L	4.7 (1)	4.7	1.0	8853047
Nutrients					
Total Ammonia (N)	mg/L	<0.020	<0.020	0.020	8849725
Nitrate plus Nitrite (N)	mg/L	0.659	N/A	0.020	8849006
Physical Properties					
Conductivity	uS/cm	218	N/A	2.0	8848283
pH	pH	8.18	N/A	N/A	8848278
RDL = Reportable Detection Limit Lab-Dup = Laboratory Initiated Duplicate N/A = Not Applicable (1) Matrix spike exceeds acceptance limits due to matrix interference. Re-analysis yields similar results.					

Maxxam Job #: B7A6372
Report Date: 2017/12/06

GHD Limited
Client Project #: 56484-02
Site Location: HORNBY ISLAND, BC
Your P.O. #: 73506861
Sampler Initials: CR

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		SO9120			SO9121		
Sampling Date		2017/11/28 16:10			2017/11/28 16:30		
COC Number		525068-05-01			525068-05-01		
	UNITS	WG-56484-281117-CR-18	RDL	QC Batch	WG-56484-281117-CR-19	RDL	QC Batch
ANIONS							
Nitrite (N)	mg/L	<0.0050	0.0050	8849008	0.0061	0.0050	8849008
Calculated Parameters							
Nitrate (N)	mg/L	<0.020	0.020	8847380	<0.020	0.020	8847380
Misc. Inorganics							
Fluoride (F)	mg/L	0.022	0.020	8849220	<0.020	0.020	8849220
Alkalinity (Total as CaCO ₃)	mg/L	360	1.0	8848284	248	1.0	8848284
Alkalinity (PP as CaCO ₃)	mg/L	<1.0	1.0	8848284	<1.0	1.0	8848284
Bicarbonate (HCO ₃)	mg/L	439	1.0	8848284	302	1.0	8848284
Carbonate (CO ₃)	mg/L	<1.0	1.0	8848284	<1.0	1.0	8848284
Hydroxide (OH)	mg/L	<1.0	1.0	8848284	<1.0	1.0	8848284
Anions							
Dissolved Sulphate (SO ₄)	mg/L	<1.0	1.0	8850987	<1.0	1.0	8853049
Dissolved Chloride (Cl)	mg/L	49	1.0	8850986	35	1.0	8850970
Nutrients							
Total Ammonia (N)	mg/L	18 (1)	0.20	8849725	2.9 (1)	0.040	8849725
Nitrate plus Nitrite (N)	mg/L	<0.020	0.020	8849006	<0.020	0.020	8849006
Physical Properties							
Conductivity	uS/cm	841	2.0	8848283	566	2.0	8848283
pH	pH	7.87	N/A	8848278	7.85	N/A	8848278
RDL = Reportable Detection Limit							
N/A = Not Applicable							
(1) Detection limits raised due to dilution to bring analyte within the calibrated range.							

Maxxam Job #: B7A6372
Report Date: 2017/12/06

GHD Limited
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Site Location: HORNBY ISLAND, BC
Your P.O. #: 73506861
Sampler Initials: CR

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		SO9122		
Sampling Date		2017/11/28 17:00		
COC Number		525068-05-01		
	UNITS	WG-56484-281117-CR-20	RDL	QC Batch
ANIONS				
Nitrite (N)	mg/L	<0.0050	0.0050	8849008
Calculated Parameters				
Nitrate (N)	mg/L	<0.020	0.020	8847380
Misc. Inorganics				
Fluoride (F)	mg/L	<0.020	0.020	8849221
Alkalinity (Total as CaCO ₃)	mg/L	129	1.0	8848284
Alkalinity (PP as CaCO ₃)	mg/L	<1.0	1.0	8848284
Bicarbonate (HCO ₃)	mg/L	157	1.0	8848284
Carbonate (CO ₃)	mg/L	<1.0	1.0	8848284
Hydroxide (OH)	mg/L	<1.0	1.0	8848284
Anions				
Dissolved Sulphate (SO ₄)	mg/L	2.1	1.0	8850987
Dissolved Chloride (Cl)	mg/L	6.9	1.0	8850986
Nutrients				
Total Ammonia (N)	mg/L	11 (1)	0.20	8849725
Nitrate plus Nitrite (N)	mg/L	<0.020	0.020	8849006
Physical Properties				
Conductivity	uS/cm	281	2.0	8848283
pH	pH	8.09	N/A	8848278
RDL = Reportable Detection Limit N/A = Not Applicable (1) Detection limits raised due to dilution to bring analyte within the calibrated range.				

Maxxam Job #: B7A6372
Report Date: 2017/12/06

GHD Limited
Client Project #: 56484-02
Site Location: HORNBY ISLAND, BC
Your P.O. #: 73506861
Sampler Initials: CR

CSR DISSOLVED METALS IN WATER WITH CV HG (WATER)

Maxxam ID		SO9107	SO9107	SO9108		
Sampling Date		2017/11/28 09:30	2017/11/28 09:30	2017/11/28 08:40		
COC Number		525068-02-01	525068-02-01	525068-02-01		
	UNITS	WG-56484-281117-CR-06	WG-56484-281117-CR-06 Lab-Dup	WG-56484-281117-CR-07	RDL	QC Batch

Calculated Parameters						
Filter and HNO3 Preservation	N/A	FIELD	N/A	FIELD	N/A	ONSITE
Misc. Inorganics						
Dissolved Hardness (CaCO3)	mg/L	129	N/A	180	0.50	8847273
Elements						
Dissolved Mercury (Hg)	ug/L	<0.010	N/A	<0.010	0.010	8852210
Dissolved Metals by ICPMS						
Dissolved Aluminum (Al)	ug/L	4.1	3.8	<3.0	3.0	8848936
Dissolved Antimony (Sb)	ug/L	<0.50	<0.50	<0.50	0.50	8848936
Dissolved Arsenic (As)	ug/L	0.11	0.11	0.12	0.10	8848936
Dissolved Barium (Ba)	ug/L	1.3	1.3	1.8	1.0	8848936
Dissolved Beryllium (Be)	ug/L	<0.10	<0.10	<0.10	0.10	8848936
Dissolved Bismuth (Bi)	ug/L	<1.0	<1.0	<1.0	1.0	8848936
Dissolved Boron (B)	ug/L	<50	<50	<50	50	8848936
Dissolved Cadmium (Cd)	ug/L	0.023	0.023	<0.010	0.010	8848936
Dissolved Chromium (Cr)	ug/L	1.2	1.2	<1.0	1.0	8848936
Dissolved Cobalt (Co)	ug/L	<0.20	<0.20	<0.20	0.20	8848936
Dissolved Copper (Cu)	ug/L	0.61	0.57	0.21	0.20	8848936
Dissolved Iron (Fe)	ug/L	<5.0	<5.0	<5.0	5.0	8848936
Dissolved Lead (Pb)	ug/L	<0.20	<0.20	<0.20	0.20	8848936
Dissolved Lithium (Li)	ug/L	<2.0	<2.0	<2.0	2.0	8848936
Dissolved Manganese (Mn)	ug/L	1.9	1.9	<1.0	1.0	8848936
Dissolved Molybdenum (Mo)	ug/L	<1.0	<1.0	<1.0	1.0	8848936
Dissolved Nickel (Ni)	ug/L	<1.0	<1.0	<1.0	1.0	8848936
Dissolved Phosphorus (P)	ug/L	33	30	14	10	8848936
Dissolved Selenium (Se)	ug/L	0.16	0.16	0.17	0.10	8848936
Dissolved Silicon (Si)	ug/L	4580	4740	4680	100	8848936
Dissolved Silver (Ag)	ug/L	<0.020	<0.020	<0.020	0.020	8848936
Dissolved Strontium (Sr)	ug/L	100	97.7	103	1.0	8848936
Dissolved Thallium (Tl)	ug/L	<0.010	<0.010	<0.010	0.010	8848936
RDL = Reportable Detection Limit						
Lab-Dup = Laboratory Initiated Duplicate						
N/A = Not Applicable						

Maxxam Job #: B7A6372
Report Date: 2017/12/06

GHD Limited
Client Project #: 56484-02
Site Location: HORNBY ISLAND, BC
Your P.O. #: 73506861
Sampler Initials: CR

CSR DISSOLVED METALS IN WATER WITH CV HG (WATER)

Maxxam ID		SO9107	SO9107	SO9108		
Sampling Date		2017/11/28 09:30	2017/11/28 09:30	2017/11/28 08:40		
COC Number		525068-02-01	525068-02-01	525068-02-01		
	UNITS	WG-56484-281117-CR-06	WG-56484-281117-CR-06 Lab-Dup	WG-56484-281117-CR-07	RDL	QC Batch
Dissolved Tin (Sn)	ug/L	<5.0	<5.0	<5.0	5.0	8848936
Dissolved Titanium (Ti)	ug/L	<5.0	<5.0	<5.0	5.0	8848936
Dissolved Uranium (U)	ug/L	0.21	0.21	<0.10	0.10	8848936
Dissolved Vanadium (V)	ug/L	<5.0	<5.0	<5.0	5.0	8848936
Dissolved Zinc (Zn)	ug/L	<5.0	<5.0	<5.0	5.0	8848936
Dissolved Zirconium (Zr)	ug/L	<0.10	<0.10	<0.10	0.10	8848936
Dissolved Calcium (Ca)	mg/L	39.7	N/A	57.1	0.050	8847274
Dissolved Magnesium (Mg)	mg/L	7.18	N/A	9.16	0.050	8847274
Dissolved Potassium (K)	mg/L	0.478	N/A	0.497	0.050	8847274
Dissolved Sodium (Na)	mg/L	3.90	N/A	2.91	0.050	8847274
Dissolved Sulphur (S)	mg/L	<3.0	N/A	<3.0	3.0	8847274
Dissolved Sulphur (S)	ug/L	<3000	<3000	<3000	3000	8848936
RDL = Reportable Detection Limit Lab-Dup = Laboratory Initiated Duplicate N/A = Not Applicable						

Maxxam Job #: B7A6372
Report Date: 2017/12/06

GHD Limited
Client Project #: 56484-02
Site Location: HORNBY ISLAND, BC
Your P.O. #: 73506861
Sampler Initials: CR

CSR DISSOLVED METALS IN WATER WITH CV HG (WATER)

Maxxam ID		SO9109	SO9110	SO9111		
Sampling Date		2017/11/28 08:45	2017/11/28 09:40	2017/11/28 11:30		
COC Number		525068-02-01	525068-02-01	525068-02-01		
	UNITS	WG-56484-281117-CR-08	WG-56484-281117-CR-09	WG-56484-281117-CR-10	RDL	QC Batch
Calculated Parameters						
Filter and HNO3 Preservation	N/A	FIELD	FIELD	FIELD	N/A	ONSITE
Misc. Inorganics						
Dissolved Hardness (CaCO3)	mg/L	181	51.6	43.7	0.50	8847273
Elements						
Dissolved Mercury (Hg)	ug/L	<0.010	<0.010	<0.010	0.010	8852210
Dissolved Metals by ICPMS						
Dissolved Aluminum (Al)	ug/L	<3.0	5.4	7.3	3.0	8848936
Dissolved Antimony (Sb)	ug/L	<0.50	<0.50	<0.50	0.50	8848936
Dissolved Arsenic (As)	ug/L	0.11	1.61	0.58	0.10	8848936
Dissolved Barium (Ba)	ug/L	1.8	1.6	<1.0	1.0	8848936
Dissolved Beryllium (Be)	ug/L	<0.10	<0.10	<0.10	0.10	8848936
Dissolved Bismuth (Bi)	ug/L	<1.0	<1.0	<1.0	1.0	8848936
Dissolved Boron (B)	ug/L	<50	<50	<50	50	8848936
Dissolved Cadmium (Cd)	ug/L	<0.010	<0.010	<0.010	0.010	8848936
Dissolved Chromium (Cr)	ug/L	<1.0	<1.0	<1.0	1.0	8848936
Dissolved Cobalt (Co)	ug/L	<0.20	<0.20	<0.20	0.20	8848936
Dissolved Copper (Cu)	ug/L	0.21	<0.20	0.23	0.20	8848936
Dissolved Iron (Fe)	ug/L	<5.0	<5.0	<5.0	5.0	8848936
Dissolved Lead (Pb)	ug/L	<0.20	<0.20	<0.20	0.20	8848936
Dissolved Lithium (Li)	ug/L	<2.0	<2.0	<2.0	2.0	8848936
Dissolved Manganese (Mn)	ug/L	<1.0	<1.0	<1.0	1.0	8848936
Dissolved Molybdenum (Mo)	ug/L	<1.0	<1.0	<1.0	1.0	8848936
Dissolved Nickel (Ni)	ug/L	<1.0	<1.0	<1.0	1.0	8848936
Dissolved Phosphorus (P)	ug/L	15	39	13	10	8848936
Dissolved Selenium (Se)	ug/L	0.17	0.18	<0.10	0.10	8848936
Dissolved Silicon (Si)	ug/L	4680	5430	4440	100	8848936
Dissolved Silver (Ag)	ug/L	<0.020	<0.020	<0.020	0.020	8848936
Dissolved Strontium (Sr)	ug/L	101	28.5	22.5	1.0	8848936
Dissolved Thallium (Tl)	ug/L	<0.010	<0.010	<0.010	0.010	8848936
Dissolved Tin (Sn)	ug/L	<5.0	<5.0	<5.0	5.0	8848936
RDL = Reportable Detection Limit						
N/A = Not Applicable						

Maxxam Job #: B7A6372
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GHD Limited
Client Project #: 56484-02
Site Location: HORNBY ISLAND, BC
Your P.O. #: 73506861
Sampler Initials: CR

CSR DISSOLVED METALS IN WATER WITH CV HG (WATER)

Maxxam ID		SO9109	SO9110	SO9111		
Sampling Date		2017/11/28 08:45	2017/11/28 09:40	2017/11/28 11:30		
COC Number		525068-02-01	525068-02-01	525068-02-01		
	UNITS	WG-56484-281117-CR-08	WG-56484-281117-CR-09	WG-56484-281117-CR-10	RDL	QC Batch
Dissolved Titanium (Ti)	ug/L	<5.0	<5.0	<5.0	5.0	8848936
Dissolved Uranium (U)	ug/L	<0.10	0.23	<0.10	0.10	8848936
Dissolved Vanadium (V)	ug/L	<5.0	15.4	<5.0	5.0	8848936
Dissolved Zinc (Zn)	ug/L	<5.0	<5.0	<5.0	5.0	8848936
Dissolved Zirconium (Zr)	ug/L	<0.10	<0.10	<0.10	0.10	8848936
Dissolved Calcium (Ca)	mg/L	57.7	15.7	14.8	0.050	8847274
Dissolved Magnesium (Mg)	mg/L	8.99	2.99	1.65	0.050	8847274
Dissolved Potassium (K)	mg/L	0.510	1.13	0.404	0.050	8847274
Dissolved Sodium (Na)	mg/L	2.92	3.05	2.54	0.050	8847274
Dissolved Sulphur (S)	mg/L	<3.0	<3.0	<3.0	3.0	8847274
Dissolved Sulphur (S)	ug/L	<3000	<3000	<3000	3000	8848936
RDL = Reportable Detection Limit						

Maxxam Job #: B7A6372
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GHD Limited
Client Project #: 56484-02
Site Location: HORNBY ISLAND, BC
Your P.O. #: 73506861
Sampler Initials: CR

CSR DISSOLVED METALS IN WATER WITH CV HG (WATER)

Maxxam ID		SO9112	SO9113	SO9114		
Sampling Date		2017/11/28 12:50	2017/11/28 13:30	2017/11/28 14:00		
COC Number		525068-02-01	525068-02-01	525068-02-01		
	UNITS	WG-56484-281117-CR-11	WG-56484-281117-CR-12	WG-56484-281117-CR-13	RDL	QC Batch
Calculated Parameters						
Filter and HNO3 Preservation	N/A	FIELD	FIELD	FIELD	N/A	ONSITE
Misc. Inorganics						
Dissolved Hardness (CaCO3)	mg/L	116	281	39.8	0.50	8847273
Elements						
Dissolved Mercury (Hg)	ug/L	<0.010	<0.010	<0.010	0.010	8852210
Dissolved Metals by ICPMS						
Dissolved Aluminum (Al)	ug/L	5.2	<3.0	11.0	3.0	8848936
Dissolved Antimony (Sb)	ug/L	<0.50	<0.50	<0.50	0.50	8848936
Dissolved Arsenic (As)	ug/L	0.16	<0.10	0.61	0.10	8848936
Dissolved Barium (Ba)	ug/L	5.6	9.7	<1.0	1.0	8848936
Dissolved Beryllium (Be)	ug/L	<0.10	<0.10	<0.10	0.10	8848936
Dissolved Bismuth (Bi)	ug/L	<1.0	<1.0	<1.0	1.0	8848936
Dissolved Boron (B)	ug/L	<50	<50	<50	50	8848936
Dissolved Cadmium (Cd)	ug/L	<0.010	<0.010	<0.010	0.010	8848936
Dissolved Chromium (Cr)	ug/L	2.4	<1.0	<1.0	1.0	8848936
Dissolved Cobalt (Co)	ug/L	<0.20	<0.20	<0.20	0.20	8848936
Dissolved Copper (Cu)	ug/L	<0.20	<0.20	1.69	0.20	8848936
Dissolved Iron (Fe)	ug/L	<5.0	<5.0	43.4	5.0	8848936
Dissolved Lead (Pb)	ug/L	<0.20	<0.20	<0.20	0.20	8848936
Dissolved Lithium (Li)	ug/L	<2.0	<2.0	<2.0	2.0	8848936
Dissolved Manganese (Mn)	ug/L	<1.0	<1.0	<1.0	1.0	8848936
Dissolved Molybdenum (Mo)	ug/L	<1.0	<1.0	<1.0	1.0	8848936
Dissolved Nickel (Ni)	ug/L	<1.0	<1.0	<1.0	1.0	8848936
Dissolved Phosphorus (P)	ug/L	<10	<10	13	10	8848936
Dissolved Selenium (Se)	ug/L	0.17	0.18	0.12	0.10	8848936
Dissolved Silicon (Si)	ug/L	8300	7930	4920	100	8848936
Dissolved Silver (Ag)	ug/L	<0.020	<0.020	<0.020	0.020	8848936
Dissolved Strontium (Sr)	ug/L	64.8	189	20.4	1.0	8848936
Dissolved Thallium (Tl)	ug/L	<0.010	<0.010	<0.010	0.010	8848936
Dissolved Tin (Sn)	ug/L	<5.0	<5.0	<5.0	5.0	8848936
RDL = Reportable Detection Limit						
N/A = Not Applicable						

Maxxam Job #: B7A6372
Report Date: 2017/12/06

GHD Limited
Client Project #: 56484-02
Site Location: HORNBY ISLAND, BC
Your P.O. #: 73506861
Sampler Initials: CR

CSR DISSOLVED METALS IN WATER WITH CV HG (WATER)

Maxxam ID		SO9112	SO9113	SO9114		
Sampling Date		2017/11/28 12:50	2017/11/28 13:30	2017/11/28 14:00		
COC Number		525068-02-01	525068-02-01	525068-02-01		
	UNITS	WG-56484-281117-CR-11	WG-56484-281117-CR-12	WG-56484-281117-CR-13	RDL	QC Batch
Dissolved Titanium (Ti)	ug/L	<5.0	<5.0	<5.0	5.0	8848936
Dissolved Uranium (U)	ug/L	0.17	0.17	<0.10	0.10	8848936
Dissolved Vanadium (V)	ug/L	<5.0	<5.0	<5.0	5.0	8848936
Dissolved Zinc (Zn)	ug/L	9.1	<5.0	14.7	5.0	8848936
Dissolved Zirconium (Zr)	ug/L	<0.10	<0.10	<0.10	0.10	8848936
Dissolved Calcium (Ca)	mg/L	31.2	94.3	13.1	0.050	8847274
Dissolved Magnesium (Mg)	mg/L	9.25	11.0	1.72	0.050	8847274
Dissolved Potassium (K)	mg/L	0.499	0.936	0.256	0.050	8847274
Dissolved Sodium (Na)	mg/L	3.79	3.92	1.26	0.050	8847274
Dissolved Sulphur (S)	mg/L	<3.0	<3.0	<3.0	3.0	8847274
Dissolved Sulphur (S)	ug/L	<3000	<3000	<3000	3000	8848936
RDL = Reportable Detection Limit						

Maxxam Job #: B7A6372
Report Date: 2017/12/06

GHD Limited
Client Project #: 56484-02
Site Location: HORNBY ISLAND, BC
Your P.O. #: 73506861
Sampler Initials: CR

CSR DISSOLVED METALS IN WATER WITH CV HG (WATER)

Maxxam ID		SO9115	SO9116	SO9118		
Sampling Date		2017/11/28 14:50	2017/11/28 14:55	2017/11/28 14:30		
COC Number		525068-02-01	525068-02-01	525068-05-01		
	UNITS	WG-56484-281117-CR-14	WG-56484-281117-CR-15	WG-56484-281117-CR-16	RDL	QC Batch
Calculated Parameters						
Filter and HNO3 Preservation	N/A	FIELD	FIELD	FIELD	N/A	ONSITE
Misc. Inorganics						
Dissolved Hardness (CaCO3)	mg/L	305	304	438	0.50	8847273
Elements						
Dissolved Mercury (Hg)	ug/L	<0.010	<0.010	<0.010	0.010	8852210
Dissolved Metals by ICPMS						
Dissolved Aluminum (Al)	ug/L	<3.0	<3.0	<3.0	3.0	8848936
Dissolved Antimony (Sb)	ug/L	<0.50	<0.50	<0.50	0.50	8848936
Dissolved Arsenic (As)	ug/L	<0.10	0.11	0.15	0.10	8848936
Dissolved Barium (Ba)	ug/L	7.6	7.7	17.3	1.0	8848936
Dissolved Beryllium (Be)	ug/L	<0.10	<0.10	<0.10	0.10	8848936
Dissolved Bismuth (Bi)	ug/L	<1.0	<1.0	<1.0	1.0	8848936
Dissolved Boron (B)	ug/L	57	61	275	50	8848936
Dissolved Cadmium (Cd)	ug/L	0.010	0.010	0.038	0.010	8848936
Dissolved Chromium (Cr)	ug/L	1.2	1.2	<1.0	1.0	8848936
Dissolved Cobalt (Co)	ug/L	<0.20	<0.20	0.38	0.20	8848936
Dissolved Copper (Cu)	ug/L	<0.20	<0.20	3.39	0.20	8848936
Dissolved Iron (Fe)	ug/L	<5.0	<5.0	<5.0	5.0	8848936
Dissolved Lead (Pb)	ug/L	<0.20	<0.20	<0.20	0.20	8848936
Dissolved Lithium (Li)	ug/L	<2.0	<2.0	<2.0	2.0	8848936
Dissolved Manganese (Mn)	ug/L	<1.0	<1.0	81.4	1.0	8848936
Dissolved Molybdenum (Mo)	ug/L	<1.0	<1.0	<1.0	1.0	8848936
Dissolved Nickel (Ni)	ug/L	<1.0	<1.0	1.9	1.0	8848936
Dissolved Phosphorus (P)	ug/L	<10	<10	11	10	8848936
Dissolved Selenium (Se)	ug/L	<0.10	<0.10	<0.10	0.10	8848936
Dissolved Silicon (Si)	ug/L	11400	11300	12800	100	8848936
Dissolved Silver (Ag)	ug/L	<0.020	<0.020	<0.020	0.020	8848936
Dissolved Strontium (Sr)	ug/L	208	210	345	1.0	8848936
Dissolved Thallium (Tl)	ug/L	<0.010	<0.010	<0.010	0.010	8848936
Dissolved Tin (Sn)	ug/L	<5.0	<5.0	<5.0	5.0	8848936
RDL = Reportable Detection Limit						
N/A = Not Applicable						

Maxxam Job #: B7A6372
Report Date: 2017/12/06

GHD Limited
Client Project #: 56484-02
Site Location: HORNBY ISLAND, BC
Your P.O. #: 73506861
Sampler Initials: CR

CSR DISSOLVED METALS IN WATER WITH CV HG (WATER)

Maxxam ID		SO9115	SO9116	SO9118		
Sampling Date		2017/11/28 14:50	2017/11/28 14:55	2017/11/28 14:30		
COC Number		525068-02-01	525068-02-01	525068-05-01		
	UNITS	WG-56484-281117-CR-14	WG-56484-281117-CR-15	WG-56484-281117-CR-16	RDL	QC Batch
Dissolved Titanium (Ti)	ug/L	<5.0	<5.0	<5.0	5.0	8848936
Dissolved Uranium (U)	ug/L	0.25	0.24	0.78	0.10	8848936
Dissolved Vanadium (V)	ug/L	<5.0	<5.0	<5.0	5.0	8848936
Dissolved Zinc (Zn)	ug/L	<5.0	<5.0	<5.0	5.0	8848936
Dissolved Zirconium (Zr)	ug/L	<0.10	<0.10	<0.10	0.10	8848936
Dissolved Calcium (Ca)	mg/L	92.2	91.0	129	0.050	8847274
Dissolved Magnesium (Mg)	mg/L	18.1	18.6	28.4	0.050	8847274
Dissolved Potassium (K)	mg/L	1.44	1.43	2.22	0.050	8847274
Dissolved Sodium (Na)	mg/L	7.09	7.43	21.4	0.050	8847274
Dissolved Sulphur (S)	mg/L	<3.0	<3.0	5.4	3.0	8847274
Dissolved Sulphur (S)	ug/L	<3000	<3000	5400	3000	8848936
RDL = Reportable Detection Limit						

Maxxam Job #: B7A6372
Report Date: 2017/12/06

GHD Limited
Client Project #: 56484-02
Site Location: HORNBY ISLAND, BC
Your P.O. #: 73506861
Sampler Initials: CR

CSR DISSOLVED METALS IN WATER WITH CV HG (WATER)

Maxxam ID		SO9119	SO9120	SO9121		
Sampling Date		2017/11/28 15:40	2017/11/28 16:10	2017/11/28 16:30		
COC Number		525068-05-01	525068-05-01	525068-05-01		
	UNITS	WG-56484-281117-CR-17	WG-56484-281117-CR-18	WG-56484-281117-CR-19	RDL	QC Batch
Calculated Parameters						
Filter and HNO3 Preservation	N/A	FIELD	FIELD	FIELD	N/A	ONSITE
Misc. Inorganics						
Dissolved Hardness (CaCO3)	mg/L	101	253	221	0.50	8847273
Elements						
Dissolved Mercury (Hg)	ug/L	<0.010	<0.010	<0.010	0.010	8852210
Dissolved Metals by ICPMS						
Dissolved Aluminum (Al)	ug/L	<3.0	<3.0	5.2	3.0	8848936
Dissolved Antimony (Sb)	ug/L	<0.50	<0.50	<0.50	0.50	8848936
Dissolved Arsenic (As)	ug/L	0.26	4.29	0.37	0.10	8848936
Dissolved Barium (Ba)	ug/L	2.8	33.1	13.4	1.0	8848936
Dissolved Beryllium (Be)	ug/L	<0.10	<0.10	<0.10	0.10	8848936
Dissolved Bismuth (Bi)	ug/L	<1.0	<1.0	<1.0	1.0	8848936
Dissolved Boron (B)	ug/L	117	463	173	50	8848936
Dissolved Cadmium (Cd)	ug/L	<0.010	<0.010	<0.010	0.010	8848936
Dissolved Chromium (Cr)	ug/L	1.5	<1.0	<1.0	1.0	8848936
Dissolved Cobalt (Co)	ug/L	<0.20	1.26	0.25	0.20	8848936
Dissolved Copper (Cu)	ug/L	<0.20	0.35	0.23	0.20	8848936
Dissolved Iron (Fe)	ug/L	<5.0	2620	3660	5.0	8848936
Dissolved Lead (Pb)	ug/L	<0.20	<0.20	<0.20	0.20	8848936
Dissolved Lithium (Li)	ug/L	<2.0	<2.0	<2.0	2.0	8848936
Dissolved Manganese (Mn)	ug/L	<1.0	2590	2410	1.0	8848936
Dissolved Molybdenum (Mo)	ug/L	<1.0	<1.0	<1.0	1.0	8848936
Dissolved Nickel (Ni)	ug/L	<1.0	3.1	1.3	1.0	8848936
Dissolved Phosphorus (P)	ug/L	22	18	27	10	8848936
Dissolved Selenium (Se)	ug/L	<0.10	<0.10	<0.10	0.10	8848936
Dissolved Silicon (Si)	ug/L	6750	14300	7720	100	8848936
Dissolved Silver (Ag)	ug/L	<0.020	<0.020	<0.020	0.020	8848936
Dissolved Strontium (Sr)	ug/L	66.2	311	211	1.0	8848936
Dissolved Thallium (Tl)	ug/L	<0.010	<0.010	<0.010	0.010	8848936
Dissolved Tin (Sn)	ug/L	<5.0	<5.0	<5.0	5.0	8848936
RDL = Reportable Detection Limit						
N/A = Not Applicable						

Maxxam Job #: B7A6372
Report Date: 2017/12/06

GHD Limited
Client Project #: 56484-02
Site Location: HORNBY ISLAND, BC
Your P.O. #: 73506861
Sampler Initials: CR

CSR DISSOLVED METALS IN WATER WITH CV HG (WATER)

Maxxam ID		SO9119	SO9120	SO9121		
Sampling Date		2017/11/28 15:40	2017/11/28 16:10	2017/11/28 16:30		
COC Number		525068-05-01	525068-05-01	525068-05-01		
	UNITS	WG-56484-281117-CR-17	WG-56484-281117-CR-18	WG-56484-281117-CR-19	RDL	QC Batch
Dissolved Titanium (Ti)	ug/L	<5.0	<5.0	<5.0	5.0	8848936
Dissolved Uranium (U)	ug/L	0.19	0.38	<0.10	0.10	8848936
Dissolved Vanadium (V)	ug/L	6.0	<5.0	<5.0	5.0	8848936
Dissolved Zinc (Zn)	ug/L	<5.0	<5.0	<5.0	5.0	8848936
Dissolved Zirconium (Zr)	ug/L	<0.10	<0.10	<0.10	0.10	8848936
Dissolved Calcium (Ca)	mg/L	29.2	78.9	74.7	0.050	8847274
Dissolved Magnesium (Mg)	mg/L	6.77	13.7	8.36	0.050	8847274
Dissolved Potassium (K)	mg/L	0.579	9.22	3.37	0.050	8847274
Dissolved Sodium (Na)	mg/L	4.82	42.2	21.8	0.050	8847274
Dissolved Sulphur (S)	mg/L	<3.0	<3.0	<3.0	3.0	8847274
Dissolved Sulphur (S)	ug/L	<3000	<3000	<3000	3000	8848936
RDL = Reportable Detection Limit						

Maxxam Job #: B7A6372
Report Date: 2017/12/06

GHD Limited
Client Project #: 56484-02
Site Location: HORNBY ISLAND, BC
Your P.O. #: 73506861
Sampler Initials: CR

CSR DISSOLVED METALS IN WATER WITH CV HG (WATER)

Maxxam ID		SO9122		
Sampling Date		2017/11/28 17:00		
COC Number		525068-05-01		
	UNITS	WG-56484-281117-CR-20	RDL	QC Batch
Calculated Parameters				
Filter and HNO3 Preservation	N/A	FIELD	N/A	ONSITE
Misc. Inorganics				
Dissolved Hardness (CaCO3)	mg/L	56.3	0.50	8847273
Elements				
Dissolved Mercury (Hg)	ug/L	<0.010	0.010	8852210
Dissolved Metals by ICPMS				
Dissolved Aluminum (Al)	ug/L	5.5	3.0	8848936
Dissolved Antimony (Sb)	ug/L	<0.50	0.50	8848936
Dissolved Arsenic (As)	ug/L	2.79	0.10	8848936
Dissolved Barium (Ba)	ug/L	7.3	1.0	8848936
Dissolved Beryllium (Be)	ug/L	<0.10	0.10	8848936
Dissolved Bismuth (Bi)	ug/L	<1.0	1.0	8848936
Dissolved Boron (B)	ug/L	187	50	8848936
Dissolved Cadmium (Cd)	ug/L	0.014	0.010	8848936
Dissolved Chromium (Cr)	ug/L	<1.0	1.0	8848936
Dissolved Cobalt (Co)	ug/L	<0.20	0.20	8848936
Dissolved Copper (Cu)	ug/L	0.31	0.20	8848936
Dissolved Iron (Fe)	ug/L	268	5.0	8848936
Dissolved Lead (Pb)	ug/L	<0.20	0.20	8848936
Dissolved Lithium (Li)	ug/L	<2.0	2.0	8848936
Dissolved Manganese (Mn)	ug/L	623	1.0	8848936
Dissolved Molybdenum (Mo)	ug/L	<1.0	1.0	8848936
Dissolved Nickel (Ni)	ug/L	<1.0	1.0	8848936
Dissolved Phosphorus (P)	ug/L	38	10	8848936
Dissolved Selenium (Se)	ug/L	<0.10	0.10	8848936
Dissolved Silicon (Si)	ug/L	10200	100	8848936
Dissolved Silver (Ag)	ug/L	<0.020	0.020	8848936
Dissolved Strontium (Sr)	ug/L	90.5	1.0	8848936
Dissolved Thallium (Tl)	ug/L	<0.010	0.010	8848936
Dissolved Tin (Sn)	ug/L	<5.0	5.0	8848936
RDL = Reportable Detection Limit				
N/A = Not Applicable				

Maxxam Job #: B7A6372
Report Date: 2017/12/06

GHD Limited
Client Project #: 56484-02
Site Location: HORNBY ISLAND, BC
Your P.O. #: 73506861
Sampler Initials: CR

CSR DISSOLVED METALS IN WATER WITH CV HG (WATER)

Maxxam ID		SO9122		
Sampling Date		2017/11/28 17:00		
COC Number		525068-05-01		
	UNITS	WG-56484-281117-CR-20	RDL	QC Batch
Dissolved Titanium (Ti)	ug/L	<5.0	5.0	8848936
Dissolved Uranium (U)	ug/L	<0.10	0.10	8848936
Dissolved Vanadium (V)	ug/L	<5.0	5.0	8848936
Dissolved Zinc (Zn)	ug/L	<5.0	5.0	8848936
Dissolved Zirconium (Zr)	ug/L	<0.10	0.10	8848936
Dissolved Calcium (Ca)	mg/L	19.5	0.050	8847274
Dissolved Magnesium (Mg)	mg/L	1.86	0.050	8847274
Dissolved Potassium (K)	mg/L	3.88	0.050	8847274
Dissolved Sodium (Na)	mg/L	17.9	0.050	8847274
Dissolved Sulphur (S)	mg/L	<3.0	3.0	8847274
Dissolved Sulphur (S)	ug/L	<3000	3000	8848936
RDL = Reportable Detection Limit				

Maxxam Job #: B7A6372
Report Date: 2017/12/06

GHD Limited
Client Project #: 56484-02
Site Location: HORNBY ISLAND, BC
Your P.O. #: 73506861
Sampler Initials: CR

GENERAL COMMENTS

Results relate only to the items tested.

Maxxam Job #: B7A6372
Report Date: 2017/12/06

QUALITY ASSURANCE REPORT

GHD Limited
Client Project #: 56484-02
Site Location: HORNBY ISLAND, BC
Your P.O. #: 73506861
Sampler Initials: CR

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
8848278	pH	2017/12/01			101	97 - 103			0.37 (1)	20
8848283	Conductivity	2017/12/02			101	80 - 120	<2.0	uS/cm	0.20 (1)	20
8848284	Alkalinity (PP as CaCO ₃)	2017/12/01					<1.0	mg/L	NC (1)	20
8848284	Alkalinity (Total as CaCO ₃)	2017/12/01	NC (2)	80 - 120	97	80 - 120	<1.0	mg/L	0.95 (1)	20
8848284	Bicarbonate (HCO ₃)	2017/12/01					<1.0	mg/L	0.95 (1)	20
8848284	Carbonate (CO ₃)	2017/12/01					<1.0	mg/L	NC (1)	20
8848284	Hydroxide (OH)	2017/12/01					<1.0	mg/L	NC (1)	20
8848936	Dissolved Aluminum (Al)	2017/12/04	113 (3)	80 - 120	115	80 - 120	<3.0	ug/L	9.3 (4)	20
8848936	Dissolved Antimony (Sb)	2017/12/04	107 (3)	80 - 120	101	80 - 120	<0.50	ug/L	NC (4)	20
8848936	Dissolved Arsenic (As)	2017/12/04	105 (3)	80 - 120	101	80 - 120	<0.10	ug/L	0.92 (4)	20
8848936	Dissolved Barium (Ba)	2017/12/04	104 (3)	80 - 120	103	80 - 120	<1.0	ug/L	1.5 (4)	20
8848936	Dissolved Beryllium (Be)	2017/12/04	106 (3)	80 - 120	101	80 - 120	<0.10	ug/L	NC (4)	20
8848936	Dissolved Bismuth (Bi)	2017/12/04	100 (3)	80 - 120	102	80 - 120	<1.0	ug/L	NC (4)	20
8848936	Dissolved Boron (B)	2017/12/04	97 (3)	80 - 120	99	80 - 120	<50	ug/L	NC (4)	20
8848936	Dissolved Cadmium (Cd)	2017/12/04	106 (3)	80 - 120	102	80 - 120	<0.010	ug/L	0 (4)	20
8848936	Dissolved Chromium (Cr)	2017/12/04	99 (3)	80 - 120	102	80 - 120	<1.0	ug/L	3.8 (4)	20
8848936	Dissolved Cobalt (Co)	2017/12/04	99 (3)	80 - 120	103	80 - 120	<0.20	ug/L	NC (4)	20
8848936	Dissolved Copper (Cu)	2017/12/04	96 (3)	80 - 120	100	80 - 120	<0.20	ug/L	6.0 (4)	20
8848936	Dissolved Iron (Fe)	2017/12/04	97 (3)	80 - 120	108	80 - 120	<5.0	ug/L	NC (4)	20
8848936	Dissolved Lead (Pb)	2017/12/04	100 (3)	80 - 120	101	80 - 120	<0.20	ug/L	NC (4)	20
8848936	Dissolved Lithium (Li)	2017/12/04	99 (3)	80 - 120	98	80 - 120	<2.0	ug/L	NC (4)	20
8848936	Dissolved Manganese (Mn)	2017/12/04	99 (3)	80 - 120	104	80 - 120	<1.0	ug/L	0.89 (4)	20
8848936	Dissolved Molybdenum (Mo)	2017/12/04	111 (3)	80 - 120	103	80 - 120	<1.0	ug/L	NC (4)	20
8848936	Dissolved Nickel (Ni)	2017/12/04	97 (3)	80 - 120	103	80 - 120	<1.0	ug/L	NC (4)	20
8848936	Dissolved Phosphorus (P)	2017/12/04					<10	ug/L	7.4 (4)	20
8848936	Dissolved Selenium (Se)	2017/12/04	105 (3)	80 - 120	105	80 - 120	<0.10	ug/L	3.8 (4)	20
8848936	Dissolved Silicon (Si)	2017/12/04					<100	ug/L	3.5 (4)	20
8848936	Dissolved Silver (Ag)	2017/12/04	115 (3)	80 - 120	114	80 - 120	<0.020	ug/L	NC (4)	20
8848936	Dissolved Strontium (Sr)	2017/12/04	NC (3)	80 - 120	99	80 - 120	<1.0	ug/L	2.3 (4)	20
8848936	Dissolved Sulphur (S)	2017/12/04					<3000	ug/L	NC (4)	20

Maxxam Job #: B7A6372
Report Date: 2017/12/06

QUALITY ASSURANCE REPORT(CONT'D)

GHD Limited
Client Project #: 56484-02
Site Location: HORNBY ISLAND, BC
Your P.O. #: 73506861
Sampler Initials: CR

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
8848936	Dissolved Thallium (Tl)	2017/12/04	99 (3)	80 - 120	104	80 - 120	<0.010	ug/L	NC (4)	20
8848936	Dissolved Tin (Sn)	2017/12/04	108 (3)	80 - 120	100	80 - 120	<5.0	ug/L	NC (4)	20
8848936	Dissolved Titanium (Ti)	2017/12/04	101 (3)	80 - 120	98	80 - 120	<5.0	ug/L	NC (4)	20
8848936	Dissolved Uranium (U)	2017/12/04	102 (3)	80 - 120	101	80 - 120	<0.10	ug/L	4.3 (4)	20
8848936	Dissolved Vanadium (V)	2017/12/04	100 (3)	80 - 120	101	80 - 120	<5.0	ug/L	NC (4)	20
8848936	Dissolved Zinc (Zn)	2017/12/04	99 (3)	80 - 120	100	80 - 120	<5.0	ug/L	NC (4)	20
8848936	Dissolved Zirconium (Zr)	2017/12/04	109 (3)	80 - 120	98	80 - 120	<0.10	ug/L	NC (4)	20
8849006	Nitrate plus Nitrite (N)	2017/11/30	101 (5)	80 - 120	98	80 - 120	<0.020	mg/L	0.99 (6)	25
8849008	Nitrite (N)	2017/11/30	98 (5)	80 - 120	99	80 - 120	<0.0050	mg/L	NC (6)	20
8849012	Nitrate plus Nitrite (N)	2017/11/30			105	80 - 120	<0.020	mg/L		
8849015	Nitrite (N)	2017/11/30			103	80 - 120	<0.0050	mg/L		
8849220	Fluoride (F)	2017/12/01	98	80 - 120	100	80 - 120	<0.020	mg/L	NC (7)	20
8849221	Fluoride (F)	2017/12/01	98 (8)	80 - 120	100	80 - 120	<0.020	mg/L	NC (9)	20
8849711	pH	2017/12/02			102	97 - 103			0 (7)	20
8849712	Conductivity	2017/12/02			100	80 - 120	<2.0	uS/cm	0.51 (7)	20
8849715	Alkalinity (PP as CaCO ₃)	2017/12/02					<1.0	mg/L	0.61 (7)	20
8849715	Alkalinity (Total as CaCO ₃)	2017/12/02			100	80 - 120	<1.0	mg/L	1.3 (7)	20
8849715	Bicarbonate (HCO ₃)	2017/12/02					<1.0	mg/L	NC (7)	20
8849715	Carbonate (CO ₃)	2017/12/02					<1.0	mg/L	4.6 (7)	20
8849715	Hydroxide (OH)	2017/12/02					<1.0	mg/L	0.52 (7)	20
8849717	Total Ammonia (N)	2017/12/01	NC	80 - 120	110	80 - 120	<0.020	mg/L	1.6 (7)	20
8849725	Total Ammonia (N)	2017/12/01	102 (10)	80 - 120	100	80 - 120	<0.020	mg/L	NC (11)	20
8850970	Dissolved Chloride (Cl)	2017/12/01			99	80 - 120	<1.0	mg/L		
8850983	Dissolved Sulphate (SO ₄)	2017/12/01			93	80 - 120	<1.0	mg/L		
8850986	Dissolved Chloride (Cl)	2017/12/01	109 (12)	80 - 120	99	80 - 120	<1.0	mg/L	1.2 (13)	20
8850987	Dissolved Sulphate (SO ₄)	2017/12/01	114 (12)	80 - 120	94	80 - 120	<1.0	mg/L	16 (13)	20
8852210	Dissolved Mercury (Hg)	2017/12/05	99	80 - 120	91	80 - 120	<0.010	ug/L	NC (7)	20
8853047	Dissolved Chloride (Cl)	2017/12/04	125 (14,15)	80 - 120	105	80 - 120	<1.0	mg/L	0.21 (16)	20

Maxxam Job #: B7A6372
Report Date: 2017/12/06

QUALITY ASSURANCE REPORT(CONT'D)

GHD Limited
Client Project #: 56484-02
Site Location: HORNBY ISLAND, BC
Your P.O. #: 73506861
Sampler Initials: CR

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
8853049	Dissolved Sulphate (SO4)	2017/12/04	144 (14,15)	80 - 120	105	80 - 120	<1.0	mg/L	4.1 (16)	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 [SO9113-01] (2) Matrix Spike Parent ID [SO9113-01] (3) Matrix Spike Parent ID [SO9107-03] (4) Duplicate Parent ID [SO9107-03] (5) Matrix Spike Parent ID [SO9111-01] (6) Duplicate Parent ID [SO9111-01] (7) Duplicate Parent ID (8) Matrix Spike Parent ID [SO9122-01] (9) Duplicate Parent ID [SO9115-01] (10) Matrix Spike Parent ID [SO9119-05] (11) Duplicate Parent ID [SO9119-05] (12) Matrix Spike Parent ID [SO9112-01] (13) Duplicate Parent ID [SO9112-01] (14) Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria. (15) Matrix Spike Parent ID [SO9119-01] (16) Duplicate Parent ID [SO9119-01]										

Maxxam Job #: B7A6372
Report Date: 2017/12/06

GHD Limited
Client Project #: 56484-02
Site Location: HORNBY ISLAND, BC
Your P.O. #: 73506861
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

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 Analytics International Corporation o/a Maxxam Analytics
4606 Canada Way, Burnaby, British Columbia Canada V5G 1K5 Tel: (604) 734 7276 Toll-free 800-563-6206 Fax: (604) 731 2385 www.maxxam.ca

INVOICE TO:		Report Information		Project Information	
Company Name	#163 GHD Limited	Company Name	#28639 GHD Limited	Quotation #	B70472
Contact Name	Airesse MacPhee	Contact Name	Michaela Dyck	P.O. #	73506851
Address	651 COLBY DRIVE WATERLOO ON N2V 1C2	Address	10271 Shellbridge Way Suite 165 Richmond BC V6X 2W8	Project #	56484-02
Phone	(519) 884-0510 x	Phone	(604) 214-0510 x234	Project Name	
Email	airesse.macphee@ghd.com, NationalEDDSupport@ma	Email	Michaela.dyck@ghd.com, airesse.macphee@ghd.com	Site #	



B7A6372_COC

Page 1 of 2

Bottle Order #:

525068

Project Manager

VJ Oco

Regulatory Criteria:	Special Instructions	ANALYSIS REQUESTED (PLEASE BE SPECIFIC)
☐ CSR ☐ CCME ☐ BC Water Quality ☐ Other		Metals Field Filled ? (Y/N) ANIONS (Cl, F, SO4, NO2, NO3) Alkalinity, pH (specified) Ammonia-N Conductivity Dissolved Metals (including Hg, Phosphorus, Sulfur and Hardness) Low Level Dissolved Metals (w/ Hg, Phos, Sulfur and Hardness) Low Level Total Metals (w/ Hg, Phos, Sulfur and Hardness)

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									
Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Metals Field Filled ? (Y/N)	ANIONS (Cl, F, SO4, NO2, NO3)	Alkalinity, pH (specified)	Ammonia-N	Conductivity
WG-56484-28117-CR-06	Nov 28 2017	9:30	W	Y	X	X	X	X	X
	-07	8:40							
	-08	8:45							
	-09	9:40							
	-10	11:30							
	-11	12:50							
	-12	13:30							
	-13	14:00							
	-14	14:50							
	-15	14:55							

RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# Jars used and not submitted	Temp Sensitive	Temperature (°C) on Receipt	Lab Use Only
P. RAGAN	17/11/29	11:06	Michaela Dyck	17/11/29	10:45	NA	☐	4, 3, 4	NA
	17/11/29	15:00		17/11/30	08:40			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.

[illegible]

Maxxam Analytics International Corporation o/a Maxxam Analytics
4908 Canada Way, Burnaby, British Columbia Canada V5G 1K3 Tel: (604) 734 7276 Toll-free: 800-563-6266 Fax: (604) 731 2386 www.maxxam.ca

Chain Of Custody Record Page 1 of 2

INVOICE TO: Company Name: #163 GHD Limited Contact Name: Alesse MacPhee Address: 651 COLBY DRIVE WATERLOO ON N2V 1C2 Phone: (519) 884-0510 x Email: alesse.macphee@ghd.com; NationalEODSupport@ma		Report Information Company Name: #28639 GHD Limited Contact Name: Michaela Dyck Address: 10271 Shellbridge Way Suite 165 Richmond BC V6X 2W8 Phone: (604) 214-0510 x234 Email: Michaela.dyck@ghd.com; alesse.macphee@ghd.com		Project Information Quotation #: B70472 P.O. #: 73506861 Project #: 56484-02 Project Name: Sampled By: C. RAGAN, T. PICKER		Laboratory Use Only Maxxam Job #: 525068 Chain Of Custody Record Project Manager VJ Doc								
Regulatory Code: ☐ CS#2 ☐ CC#1E ☐ BC Water Quality ☐ Other		Special Instructions		ANALYSIS REQUESTED (PLEASE BE SPECIFIC) Metals Field Filtered? (Y/N): ANIONS (Cl, F, SO4, NO2, NO3) Alkalinity, pH (Speciated) Ammonia-N Conductivity Dissolved Metals (Including Hg, Phosphorus, Sulfur and Hardness) Low Level Dissolved Metals (w/ Hg, Phos, Sulfur and Hardness) Low Level Total Metals (w/ Hg, Phos, Sulfur and Hardness)		Turnaround Time (TAT) Required: Please provide alternate notes 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 Dissolved Phosphorus are > 5 days - contact your Project Manager for details. Job Specific Rush TAT (if applies to entire subcollection): 1 DAY ☐ 2 Day ☐ 3 Day ☐ Date Required: ☐ Rush Confirmation Number: (call lab for #) # of Bottles: 5 Comments:								
SAMPLES MUST BE KEPT COOL (< 15°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)	ANIONS (Cl, F, SO4, NO2, NO3)	Alkalinity, pH (Speciated)	Ammonia-N	Conductivity	Dissolved Metals (Including Hg, Phosphorus, Sulfur and Hardness)	Low Level Dissolved Metals (w/ Hg, Phos, Sulfur and Hardness)	Low Level Total Metals (w/ Hg, Phos, Sulfur and Hardness)	# of Bottles	Comments
1	WG-56484-281117-08-06	Nov 28 2017	9:30	W	Y	X	X	X	X	X			5	
2		-07	8:40											
3		-08	8:45											
4		-09	9:40											
5		-10	11:30											
6		-11	12:50											
7		-12	13:30											
8		-13	14:00											
9		-14	14:50											
10		-15	14:55											
RECEIVED BY: (Signature) C. RAGAN Date: 17/11/29 11:05 Time: 15:00		RECEIVED BY: (Signature) Michaela Dyck Date: 17/11/29 10:45 Time: 10:45		# Jars used and not submitted: 0 Temperature (°C) on Receipt: 4, 3, 4 Custody Seal intact on Cooler? ☐ Yes ☐ No White Maxxam Yellow Client										

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.

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Chain Of Custody Record Page 2 of 2

Maxxam Analytics International Corporation
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

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

Report Information
Company Name: #28639 GHD Limited
Contact Name: Michaela Dyck
Address: 10271 Shellbridge Way Suite 165
Richmond BC V6X 2W8
Phone: (604) 214-0510 x234 Fax: (604) 214-0510 x234
Email: Michaela.dyck@ghd.com; alesse.macphee@ghd.com

Project Information
Quotation #: B70472
P.O. #: 73506861
Project #: 56484-02
Project Name: C. RAGAN T. DICKENS
Site #: C. RAGAN T. DICKENS
Sampled By: C. RAGAN T. DICKENS

Laboratory Use Only
Maxxam Job #: 525068
Chain Of Custody Record: 525068-05-01
Project Manager: VJ Doe
Turnaround Time (TAT) Required: Regular (Standard) TAT

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

SPECIAL INSTRUCTIONS

ANALYSIS REQUESTED (PLEASE BE SPECIFIC)

Metals Field Filled ? (Y/N)	ANIONS (CL, F, SO4, NO2, NO3)	Alkalinity, pH (Speciated)	Ammonia-N	Conductivity	Dissolved Metals (including Hg, Phosphorus, Sulfur and Hardness)	Low Level Dissolved Metals (w/ Hg, Phos, Sulfur and Hardness)	Low Level Total Metals (w/ Hg, Phos, Sulfur and Hardness)
Y	X	X	X	X	X		

Job Specific Rush TAT (if applies to entire submission)
1 DAY ☐ 2 Day ☐ 3 Day ☐ Date Required: ☐
Rush Confirmation Number: 5 (call lab for #)
Comments:

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
1	WG-5484-281117-CR-16	Nov 28 2017	14:30	W	Y
2		-17		15:40	
3		-18		16:10	
4		-19		16:30	
5		-20		17:00	
6					
7					
8					
9					
10					

RELINQUISHED BY: (Signature/Print)
C. RAGAN T. DICKENS
Date: 17/11/29 Time: 11:00

RECEIVED BY: (Signature/Print)
Michelle van Schijndel
Date: 17/11/29 Time: 10:45

Lab Use Only
Time Sensitive: ☐ Temperature (°C) on Receipt: 4.3, 4
Custody Seal Intact on Cooler? ☐ Yes ☐ No
White: Maxxam Yellow: Client

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.
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Maxxam Analytics International Corporation c/o Maxxam Analytics

Appendix G

Validation Memoranda



Memorandum

January 29, 2018

To: Michaela Dyck, Cassandra Ragan

Ref. No.: 056484-02
Campbell River

From: Airesse MacPhee/al/62

Tel: 604-248-3661

CC:

Subject: Data Quality Assessment and Validation

Laboratory: Maxxam Analytics International Corporation

Date(s) Sampled: November 26-28, 2017

Lab Job No.: B7A5894, B7A6363, B7A6372

Sampled By: Cassandra Ragan

Media Sampled: Groundwater, Surface 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
B7A5894	11/26/2017	WG-56484-261117-CR-01	pH	7.80	J	S.U.
B7A5894	11/26/2017	WG-56484-261117-CR-03	pH	8.10	J	S.U.
B7A5894	11/26/2017	WG-56484-261117-CR-04	pH	8.32	J	S.U.
B7A5894	11/27/2017	WG-56484-271117-CR-05	pH	7.95	J	S.U.
B7A6363	11/28/2017	WS-56484-281117-CR-01	pH	7.01	J	S.U.
B7A6363	11/28/2011	WS-56484-281117-CR-02	pH	7.03	J	S.U.
B7A6363	11/28/2017	WS-56484-281117-CR-03	pH	6.86	J	S.U.
B7A6372	11/28/2017	WG-56484-281117-CR-06	pH	8.14	J	S.U.
B7A6372	11/28/2017	WG-56484-281117-CR-07	pH	7.96	J	S.U.
B7A6372	11/28/2017	WG-56484-281117-CR-08	pH	7.90	J	S.U.



Lab Report #	Sample Date (mm/dd/yyyy)	Sample ID	Analyte	Result	Qualifier	Units
B7A6372	11/28/2017	WG-56484-281117-CR-09	pH	8.02	J	s.u.
B7A6372	11/28/2017	WG-56484-281117-CR-10	pH	7.99	J	s.u.
B7A6372	11/28/2017	WG-56484-281117-CR-11	pH	8.23	J	s.u.
B7A6372	11/28/2017	WG-56484-281117-CR-12	pH	8.19	J	s.u.
B7A6372	11/28/2017	WG-56484-281117-CR-13	pH	7.64	J	s.u.
B7A6372	11/28/2017	WG-56484-281117-CR-14	pH	8.22	J	s.u.
B7A6372	11/28/2017	WG-56484-281117-CR-15	pH	8.21	J	s.u.
B7A6372	11/28/2017	WG-56484-281117-CR-16	pH	8.09	J	s.u.
B7A6372	11/28/2017	WG-56484-281117-CR-17	pH	8.18	J	s.u.
B7A6372	11/28/2017	WG-56484-281117-CR-18	pH	7.87	J	s.u.
B7A6372	11/28/2017	WG-56484-281117-CR-19	pH	7.85	J	s.u.
B7A6372	11/28/2017	WG-56484-281117-CR-20	pH	8.09	J	s.u.

The following results are qualified based on dissolved results that are significantly higher than the total results:

Lab Report #	Sample Date (mm/dd/yyyy)	Sample ID	Analyte	Result	Qualifier	Units
B7A6363	11/28/2017	WS-56484-281117-CR-01	Titanium	2.0	UJ	µg/L
B7A6363	11/28/2017	WS-56484-281117-CR-01	Titanium (dissolved)	0.61	J	µg/L

The following results are qualified based on matrix spike recovery outlier:

Lab Report #	Sample Date (mm/dd/yyyy)	Sample ID	Analyte	Result	Qualifier	Units
B7A6372	11/28/2017	WG-56484-281117-CR-17	Chloride (dissolved)	4.7	J	mg/L
B7A6372	11/28/2017	WG-56484-281117-CR-06	Sulfate (dissolved)	3.7	J	mg/L
B7A6372	11/28/2017	WG-56484-281117-CR-17	Sulfate (dissolved)	6.0	J	mg/L

The following results are qualified based on field blank detections:

Lab Report #	Sample Date (mm/dd/yyyy)	Sample ID	Analyte	Result	Qualifier	Units
B7A5894	11/26/2017	WG-56484-261117-CR-01	Barium (dissolved)	3.2	U	µg/L
B7A5894	11/26/2017	WG-56484-261117-CR-03	Barium (dissolved)	1.8	U	µg/L
B7A5894	11/26/2017	WG-56484-261117-CR-04	Barium (dissolved)	10.0	U	µg/L
B7A5894	11/26/2017	WG-56484-261117-CR-01	Calcium (dissolved)	14.7	U	mg/L
B7A5894	11/26/2017	WG-56484-261117-CR-03	Calcium (dissolved)	31.7	U	mg/L
B7A5894	11/26/2017	WG-56484-261117-CR-04	Calcium (dissolved)	66.4	U	mg/L
B7A5894	11/27/2017	WG-56484-271117-CR-05	Calcium (dissolved)	18.6	U	mg/L
B7A5894	11/26/2017	WG-56484-261117-CR-01	Magnesium (dissolved)	1.94	U	mg/L
B7A5894	11/26/2017	WG-56484-261117-CR-03	Magnesium (dissolved)	4.36	U	mg/L



Lab Report #	Sample Date (mm/dd/yyyy)	Sample ID	Analyte	Result	Qualifier	Units
B7A5894	11/26/2017	WG-56484-261117-CR-04	Magnesium (dissolved)	9.14	U	mg/L
B7A5894	11/27/2017	WG-56484-271117-CR-05	Magnesium (dissolved)	1.77	U	mg/L
B7A5894	11/26/2017	WG-56484-261117-CR-01	Potassium (dissolved)	0.227	U	mg/L
B7A5894	11/26/2017	WG-56484-261117-CR-03	Potassium (dissolved)	0.754	U	mg/L
B7A5894	11/27/2017	WG-56484-271117-CR-05	Potassium (dissolved)	0.323	U	mg/L
B7A5894	11/26/2017	WG-56484-261117-CR-01	Silicon (dissolved)	4780	U	µg/L
B7A5894	11/26/2017	WG-56484-261117-CR-03	Silicon (dissolved)	6290	U	µg/L
B7A5894	11/26/2017	WG-56484-261117-CR-04	Silicon (dissolved)	5940	U	µg/L
B7A5894	11/27/2017	WG-56484-271117-CR-05	Silicon (dissolved)	4150	U	µg/L
B7A5894	11/26/2017	WG-56484-261117-CR-01	Sodium (dissolved)	1.42	U	mg/L
B7A5894	11/26/2017	WG-56484-261117-CR-03	Sodium (dissolved)	1.87	U	mg/L
B7A5894	11/26/2017	WG-56484-261117-CR-04	Sodium (dissolved)	2.25	U	mg/L
B7A5894	11/27/2017	WG-56484-271117-CR-05	Sodium (dissolved)	1.36	U	mg/L
B7A5894	11/26/2017	WG-56484-261117-CR-01	Strontium (dissolved)	21.6	U	µg/L
B7A5894	11/26/2017	WG-56484-261117-CR-03	Strontium (dissolved)	50.0	U	µg/L
B7A5894	11/26/2017	WG-56484-261117-CR-04	Strontium (dissolved)	84.0	U	µg/L
B7A5894	11/27/2017	WG-56484-271117-CR-05	Strontium (dissolved)	29.0	U	µg/L

The following results are qualified due to field duplicate variability:

Lab Report #	Sample Date (mm/dd/yyyy)	Sample ID	Analyte	Result	Qualifier	Units
B7A6372	11/28/2017	WG-56484-281117-CR-14	Ammonia-N	0.048	J	mg/L
B7A6372	11/28/2017	WG-56484-281117-CR-15	Ammonia-N	0.020	UJ	mg/L

Notes:

J - Estimated concentration

UJ - Non-detect with an Estimated Report Limit

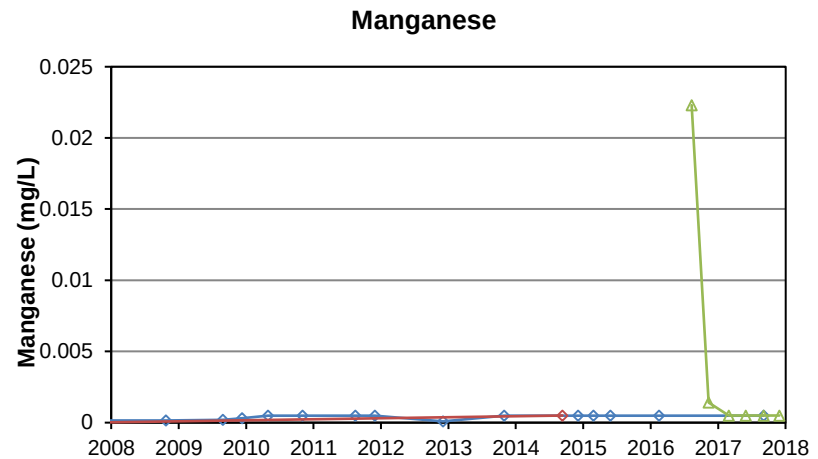
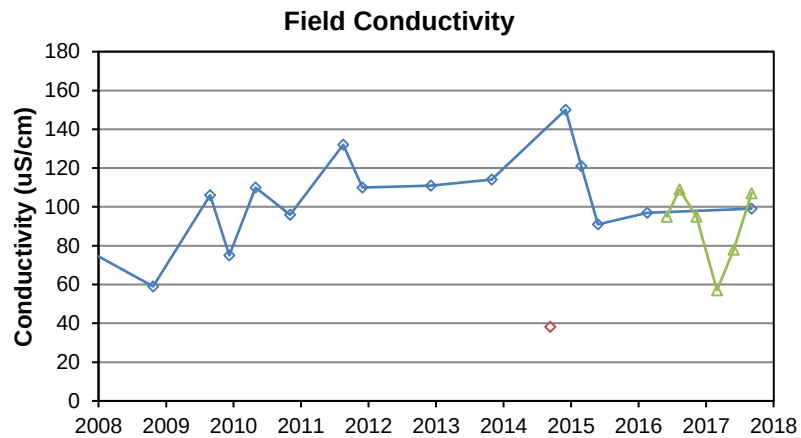
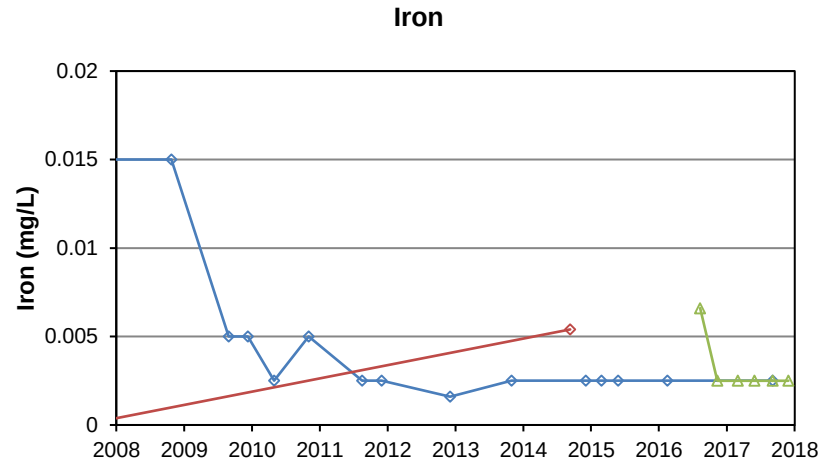
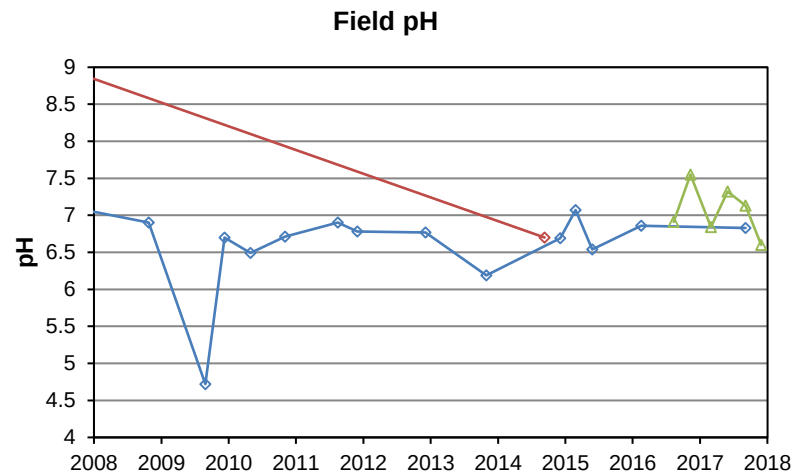
U - Not Detected

N - Nitrogen

s.u. - Standard pH Units

Appendix H

Historical Data



Legend

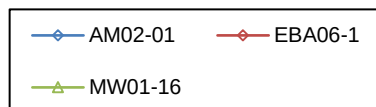


figure H-1
 BACKGROUND WELLS HISTORICAL GROUNDWATER DATA
 (Field and Lab pH, Iron, and Manganese)
 2017 OPERATIONS AND MONITORING REPORT
 CAMPBELL RIVER WASTE MANAGEMENT CENTRE
 Comox Strathcona Waste Management

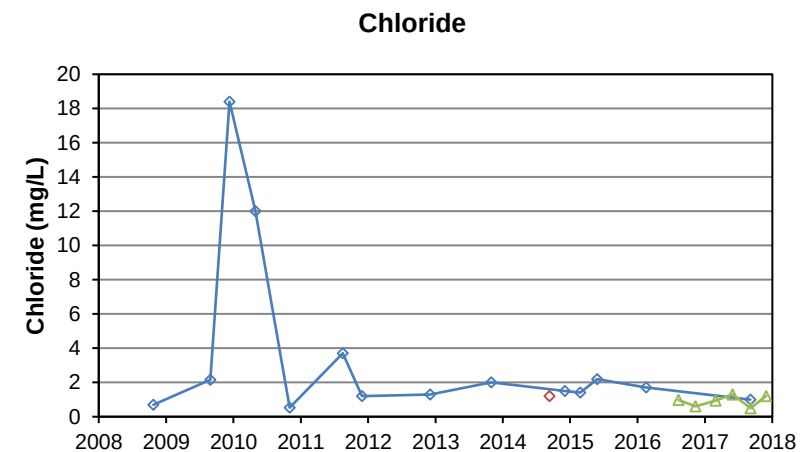
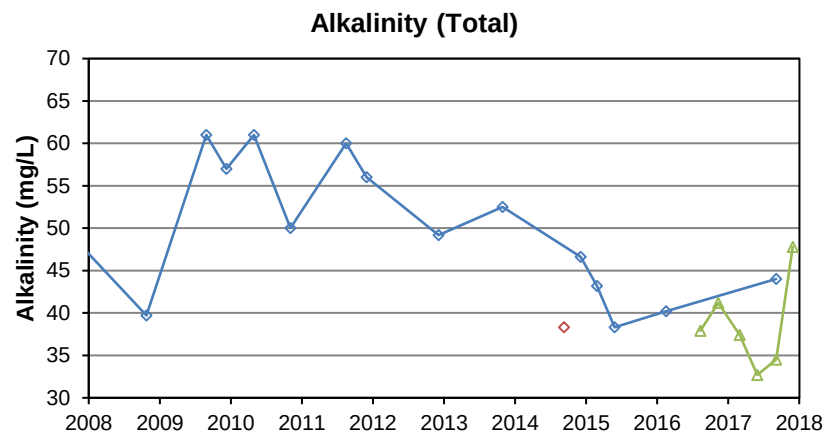
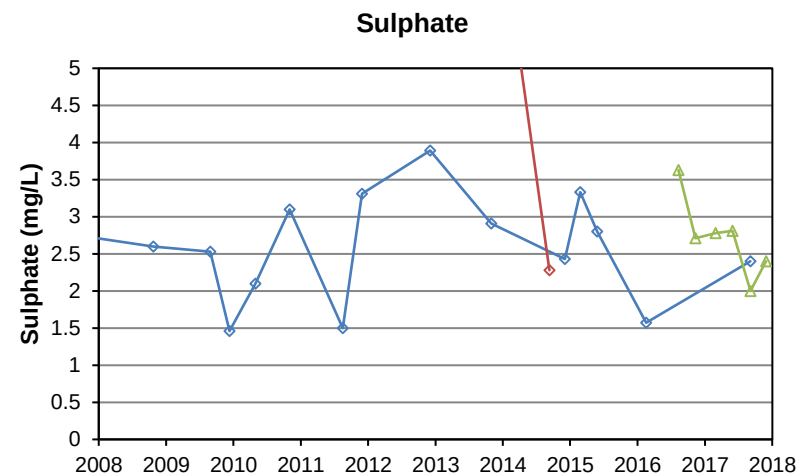
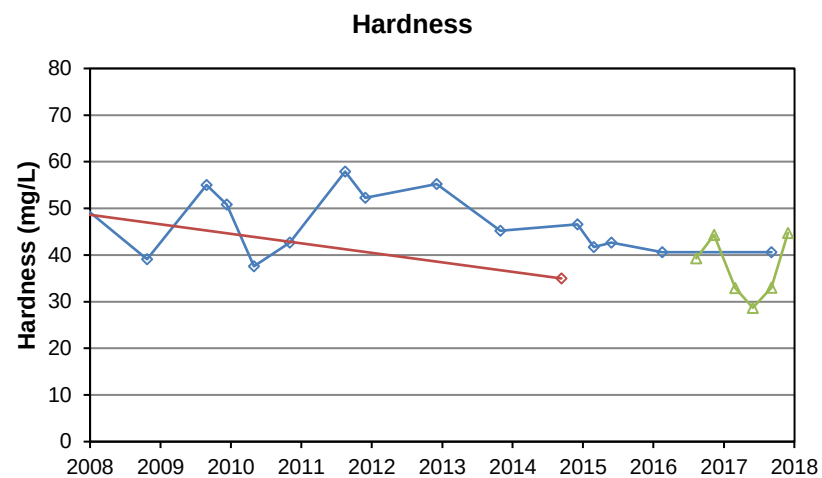
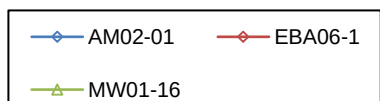
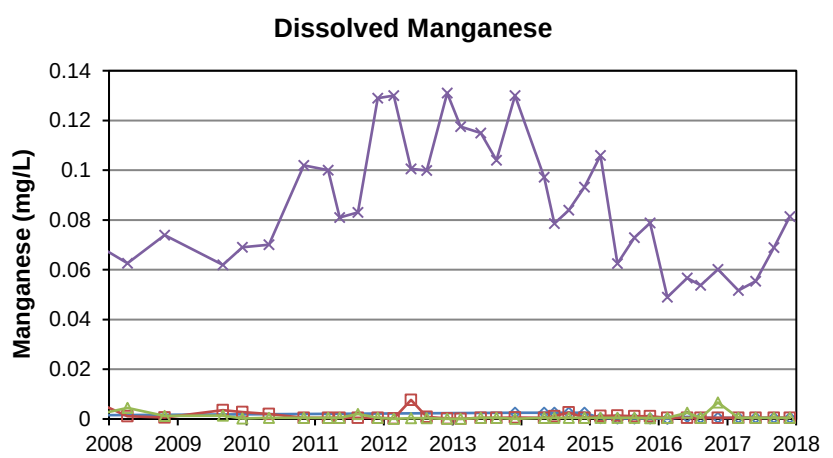
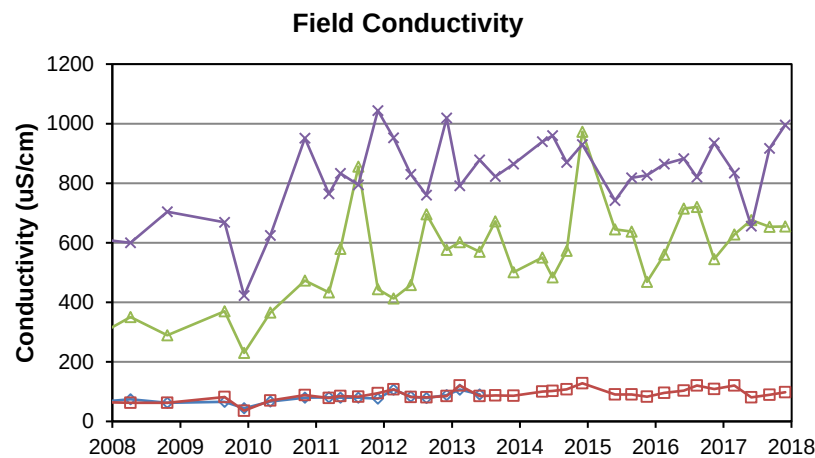
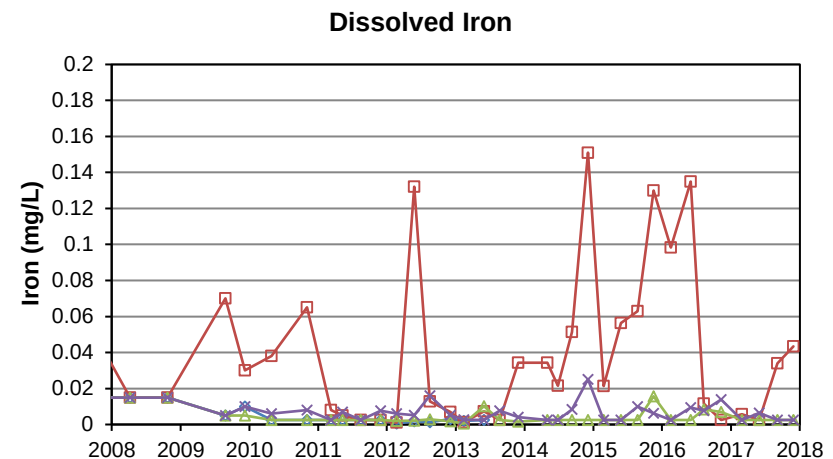
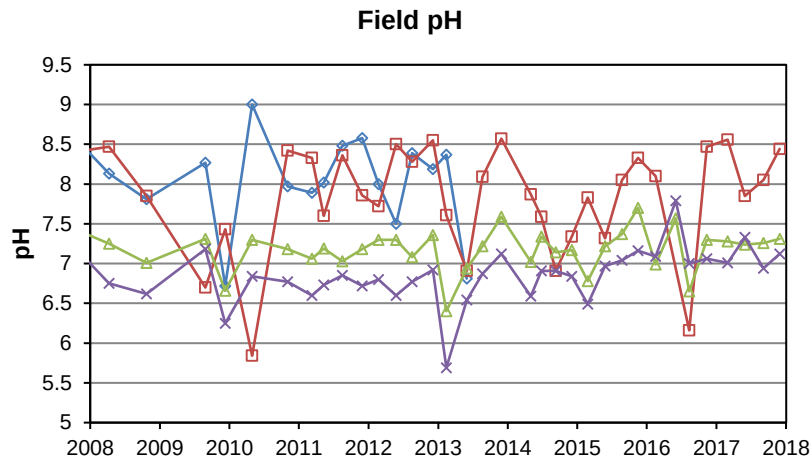


figure H-2

BACKGROUND WELLS HISTORICAL GROUNDWATER DATA
(Hardness, Sulphate, Alkalinity)
2017 OPERATIONS AND MONITORING REPORT
CAMPBELL RIVER WASTE MANAGEMENT CENTRE
Comox Strathcona Waste Management

Legend





Legend

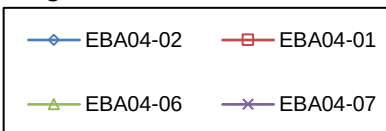
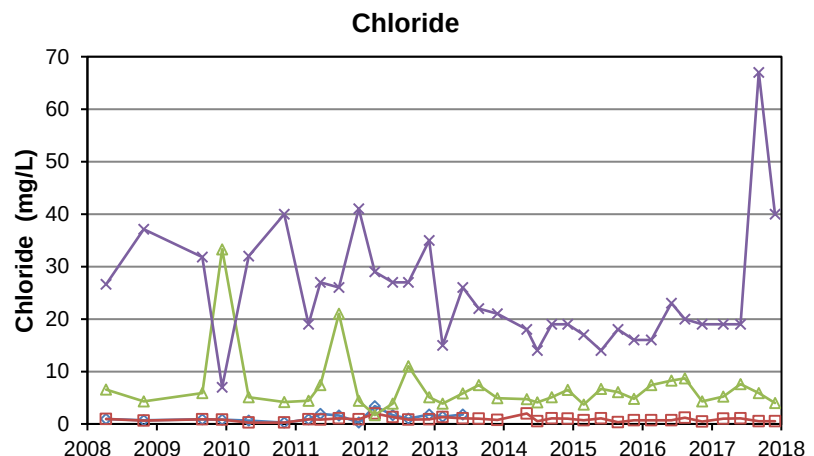
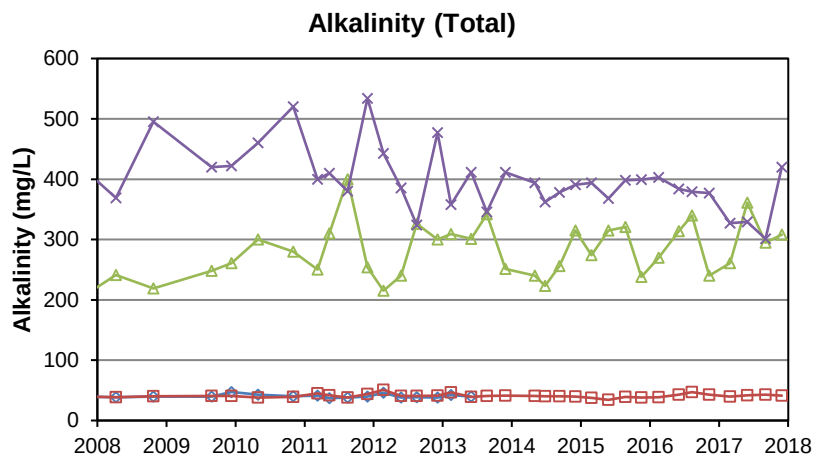
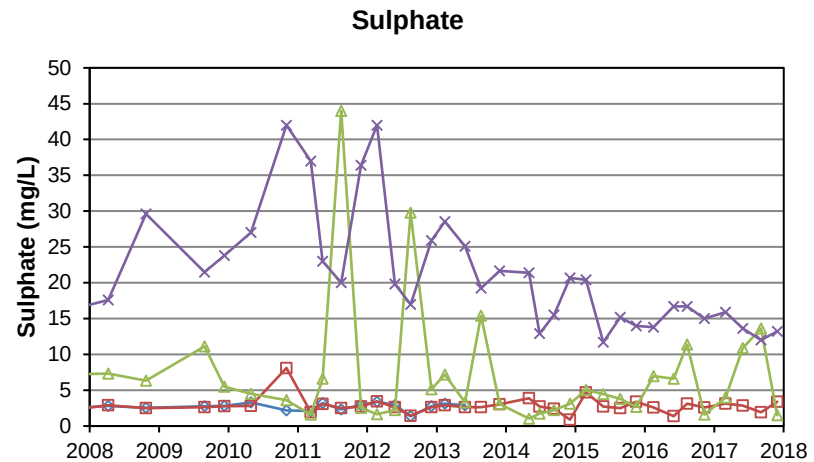
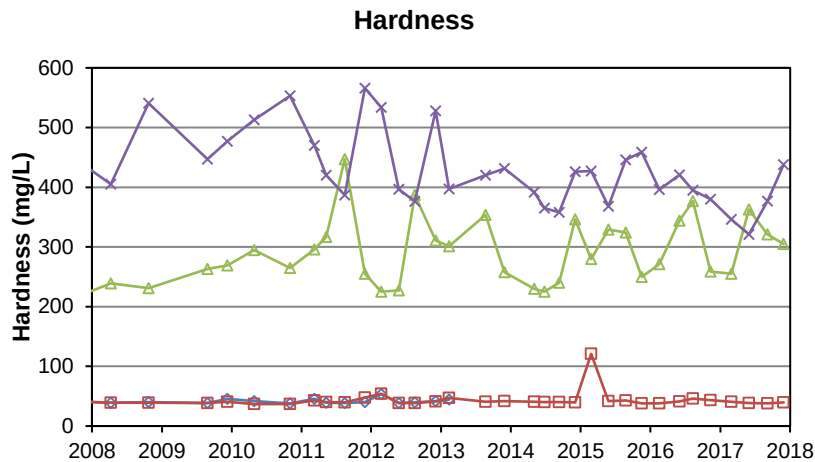


figure H-3

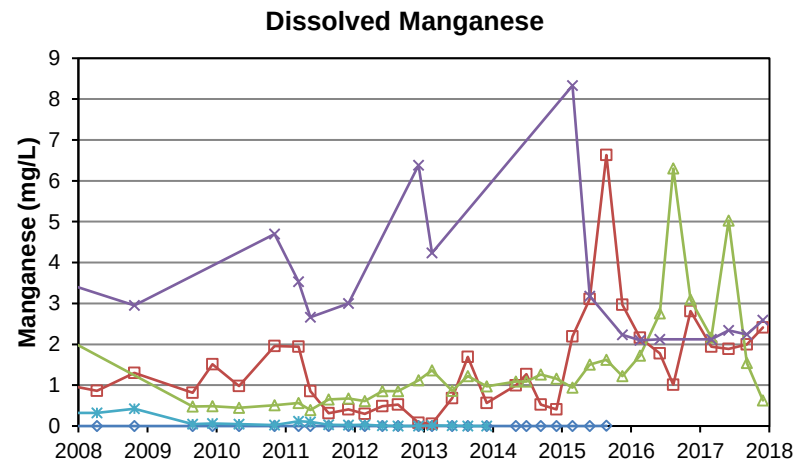
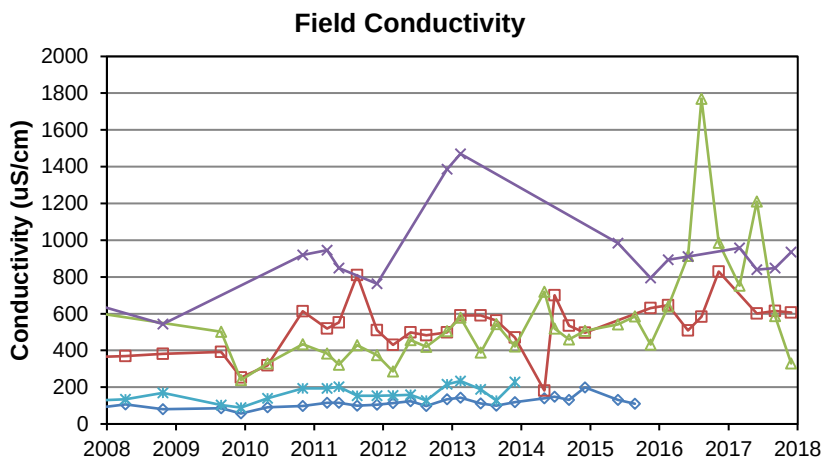
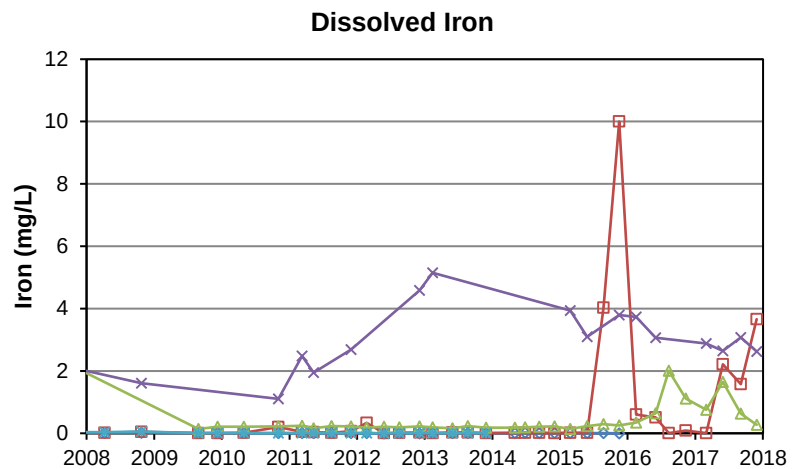
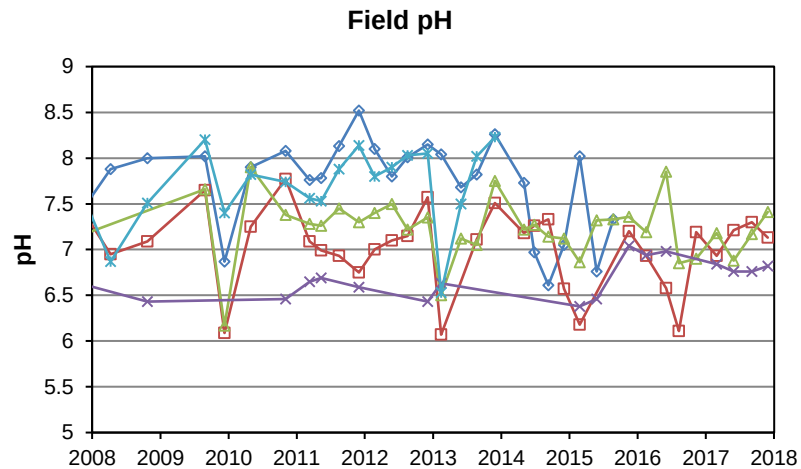
LANDFILL WELLS HISTORICAL GROUNDWATER DATA
(Field and Lab pH, Iron, and Manganese)
2017 OPERATIONS AND MONITORING REPORT
CAMPBELL RIVER WASTE MANAGEMENT CENTRE
Comox Strathcona Waste Management



Legend



figure H-4
 LANDFILL WELLS HISTORICAL GROUNDWATER DATA
 (Hardness, Sulphate, Alkalinity)
 2017 OPERATIONS AND MONITORING REPORT
 CAMPBELL RIVER WASTE MANAGEMENT CENTRE
 Comox Strathcona Waste Management

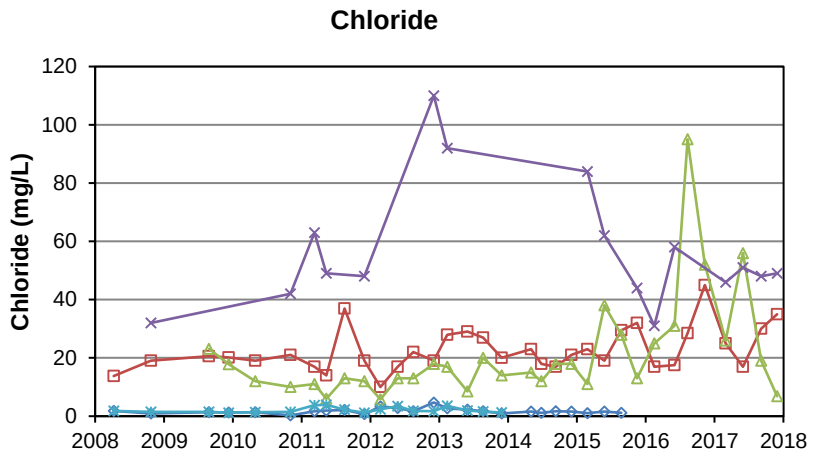
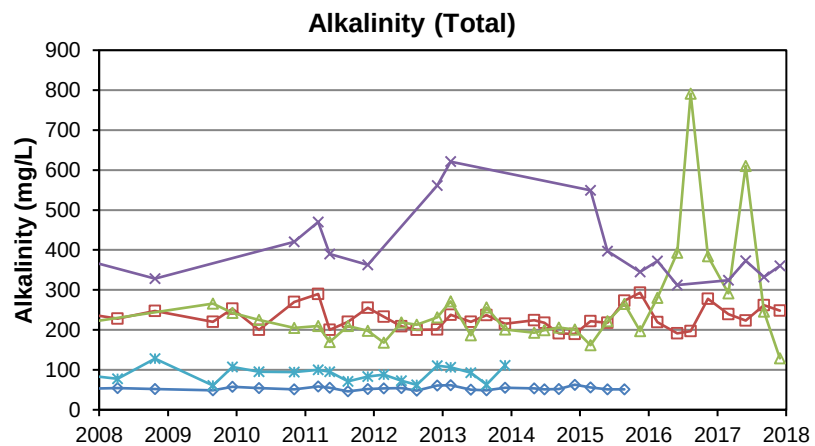
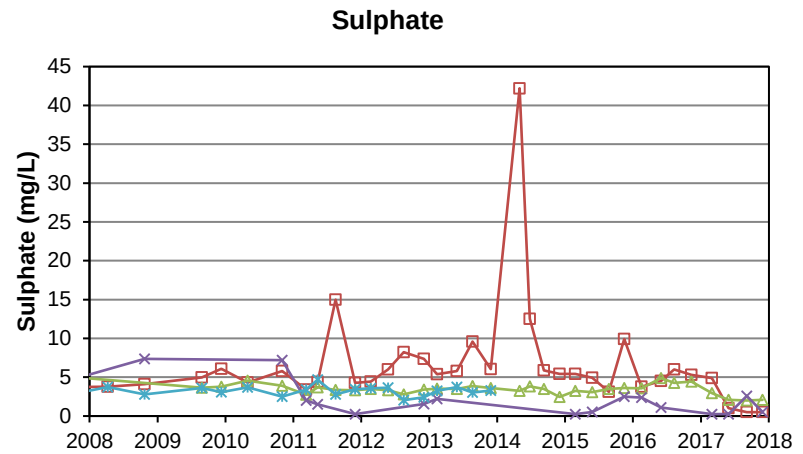
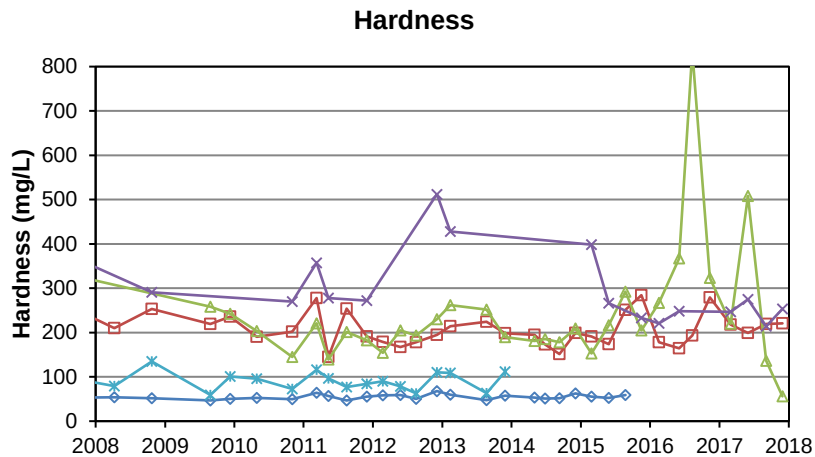


Legend



LANDFILL WELLS HISTORICAL GROUNDWATER DATA
(Field and Lab pH, Iron, and Manganese)
2017 OPERATIONS AND MONITORING REPORT
CAMPBELL RIVER WASTE MANAGEMENT CENTRE
Comox Strathcona Waste Management

figure H-5



Legend



LANDFILL WELLS HISTORICAL GROUNDWATER DATA
(Hardness, Sulphate, Alkalinity)
2017 OPERATIONS AND MONITORING REPORT
CAMPBELL RIVER WASTE MANAGEMENT CENTRE
Comox Strathcona Waste Management

figure H-6

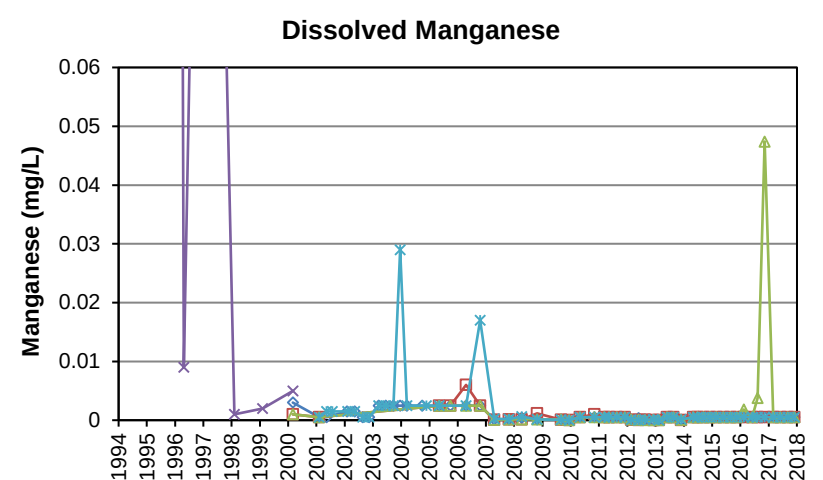
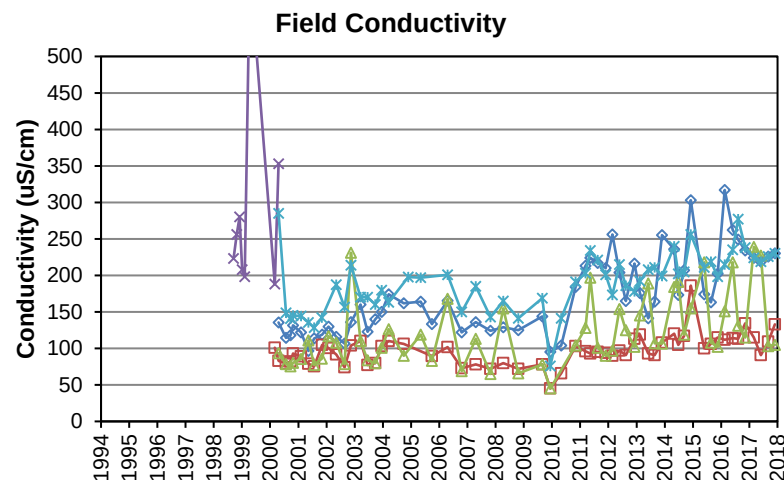
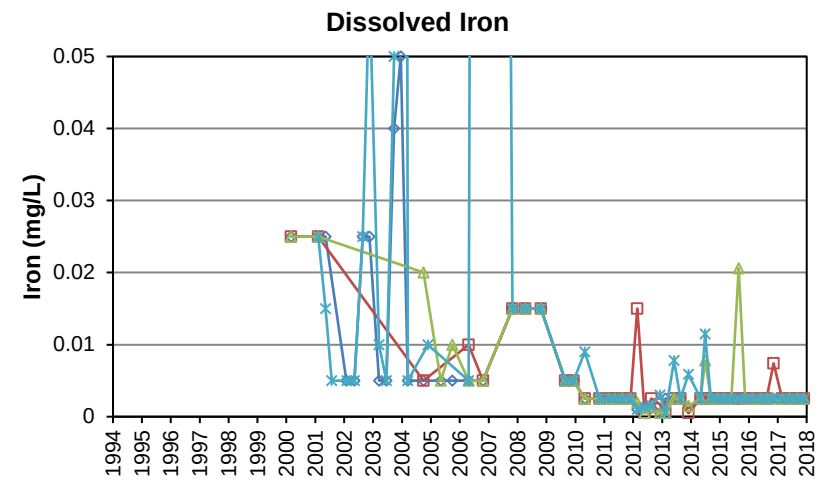
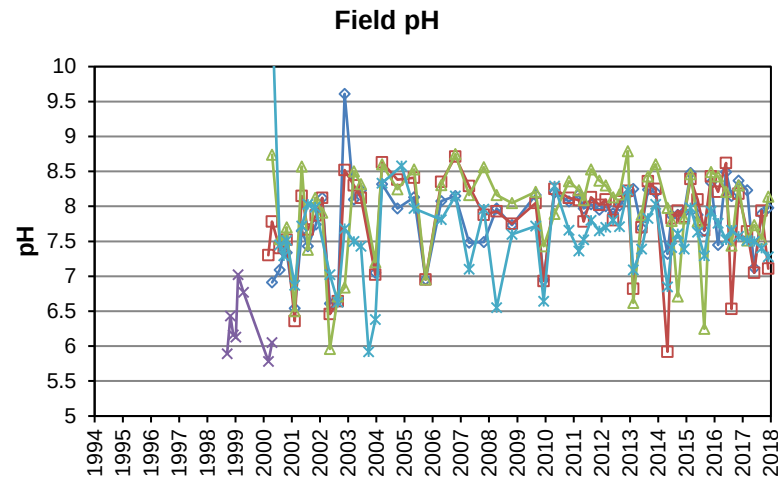
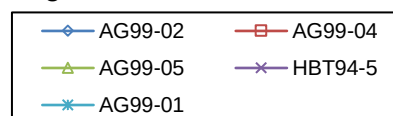


figure H-7

**SOUTHEAST DOWNGRAIDENT WELLS HISTORICAL GROUNDWATER DATA
(Field and Lab pH, Iron, and Manganese)**

2017 OPERATIONS AND MONITORING REPORT
CAMPBELL RIVER WASTE MANAGEMENT CENTRE
Comox Strathcona Waste Management

Legend



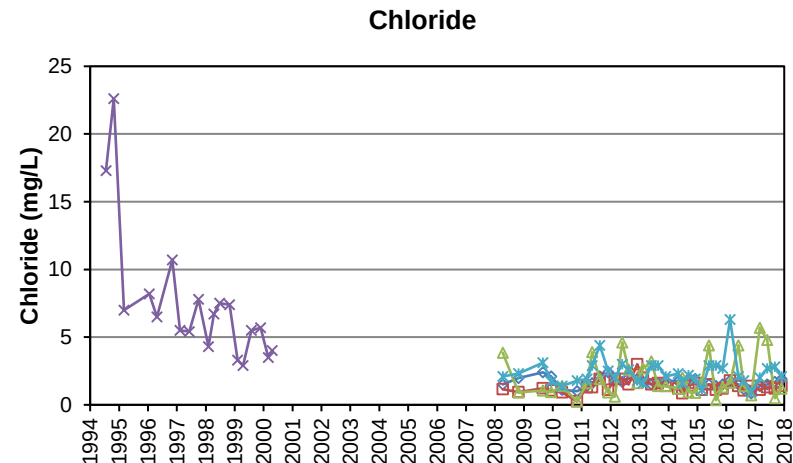
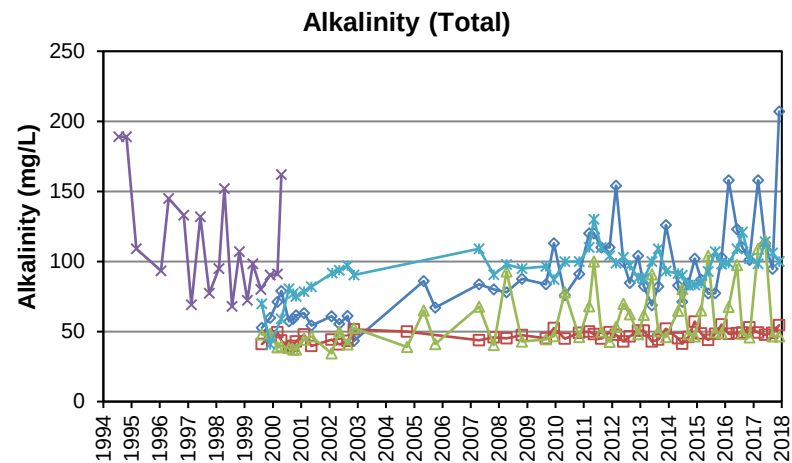
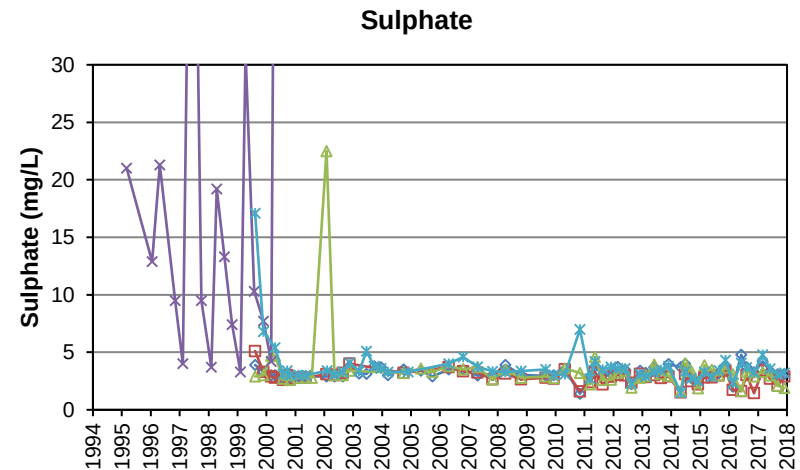
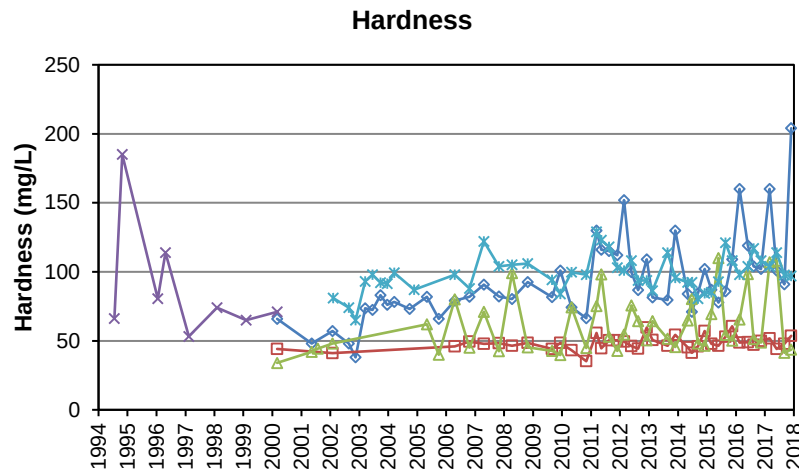
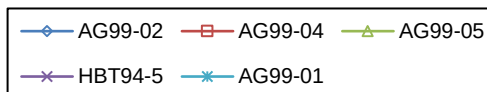


figure H-8

SOUTHEAST DOWNGRADE WELLS HISTORICAL GROUNDWATER DATA (Hardness, Sulphate, Alkalinity)

2017 OPERATIONS AND MONITORING REPORT
CAMPBELL RIVER WASTE MANAGEMENT CENTRE
Comox Strathcona Waste Management

Legend



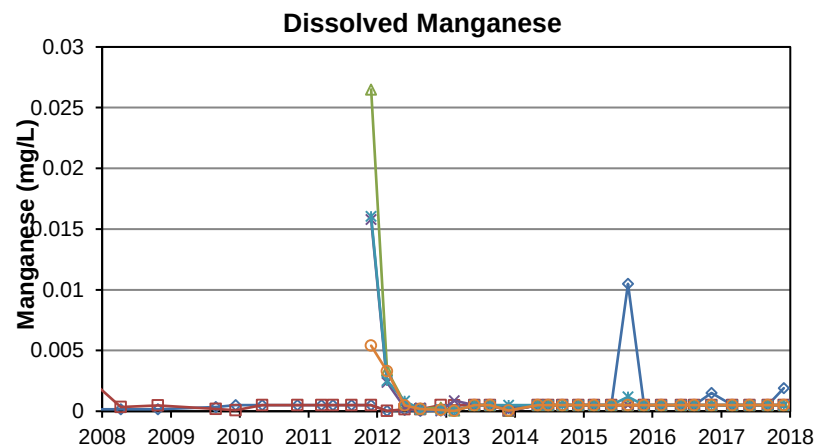
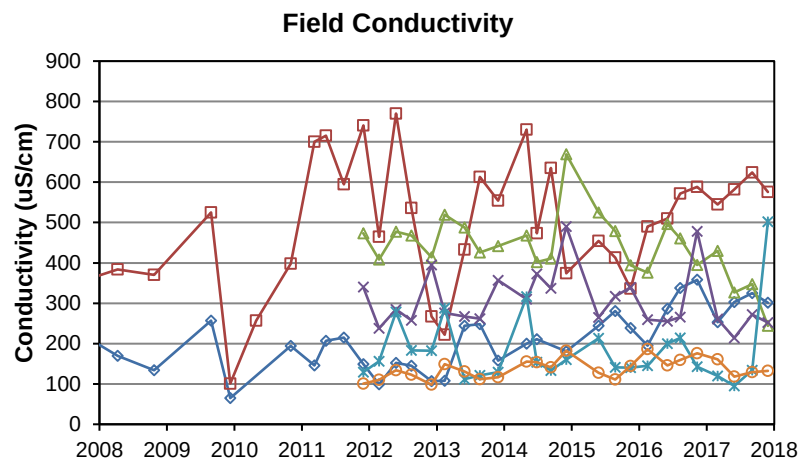
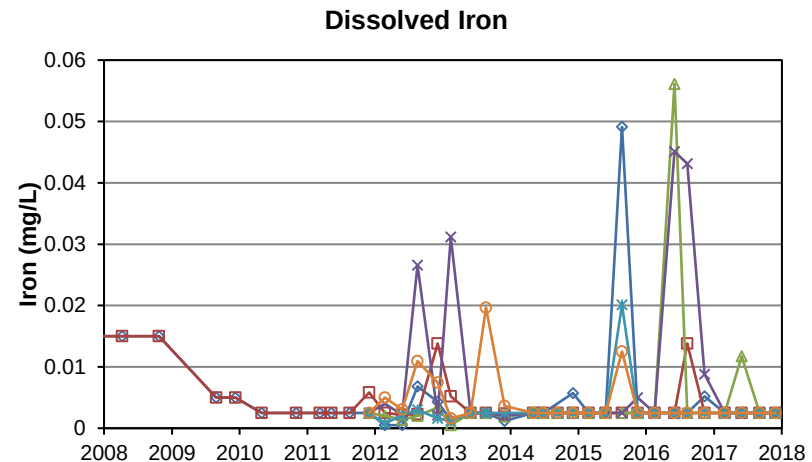
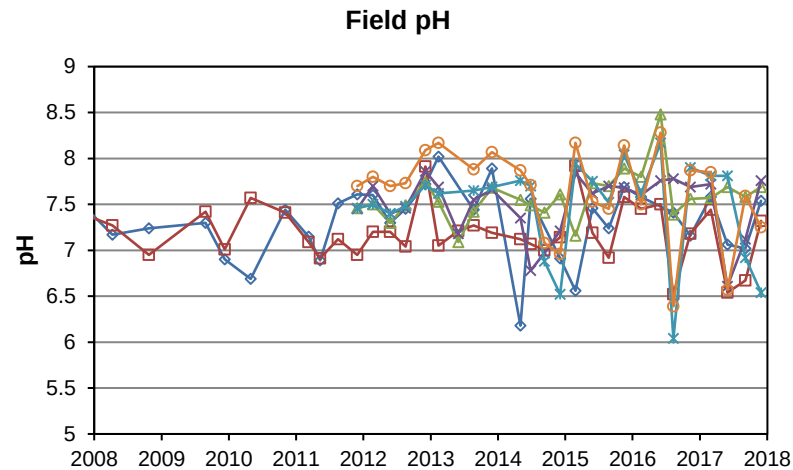
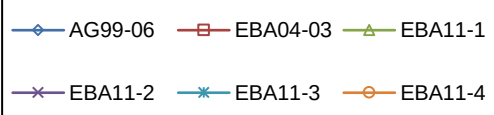


figure H-9

NORTHEAST DOWNGRADIENT WELLS HISTORICAL GROUNDWATER DATA
(Field and Lab pH, Iron, and Manganese)

2017 OPERATIONS AND MONITORING REPORT
CAMPBELL RIVER WASTE MANAGEMENT CENTRE
Comox Strathcona Waste Management

Legend



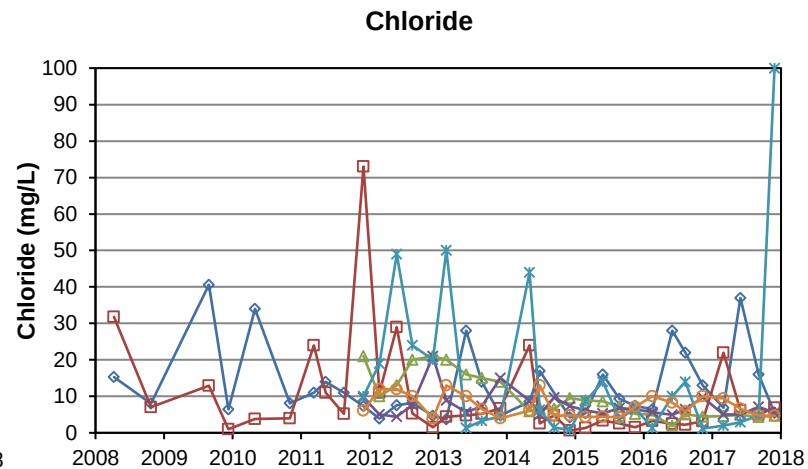
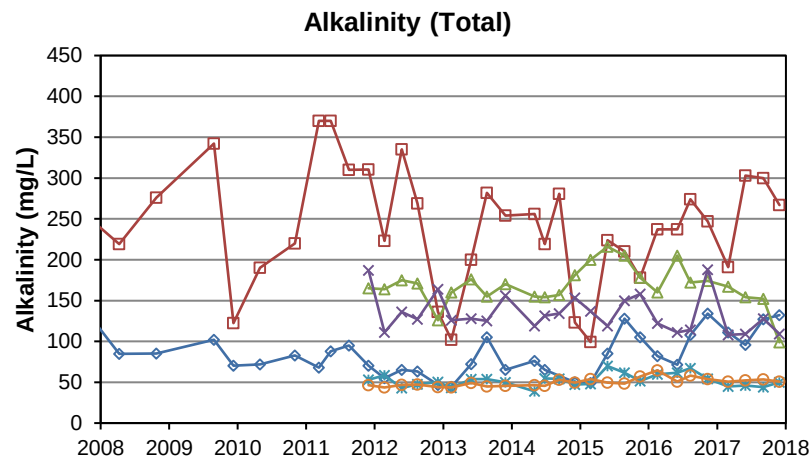
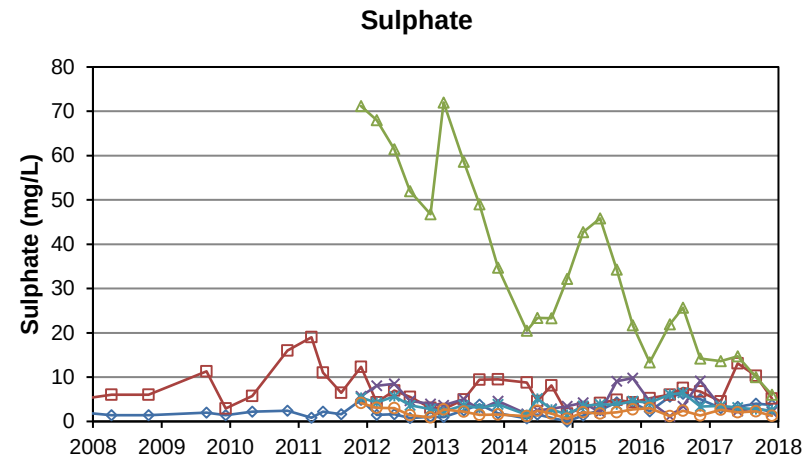
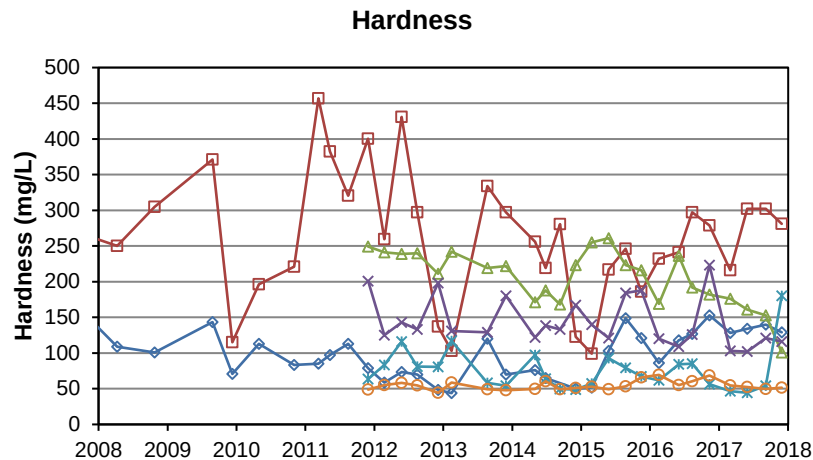


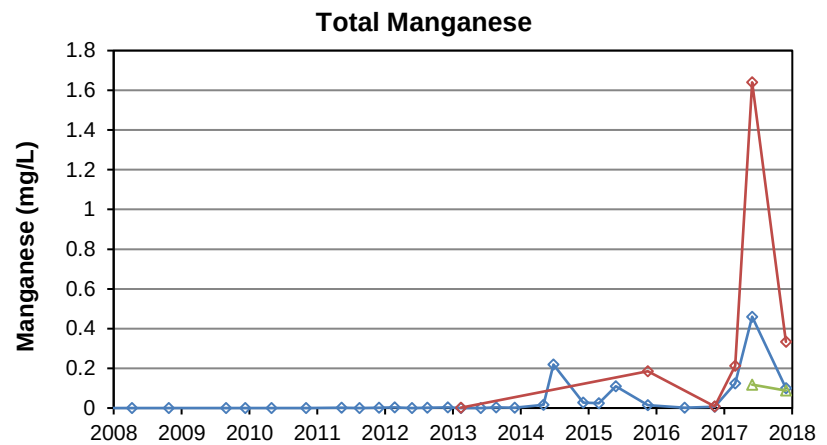
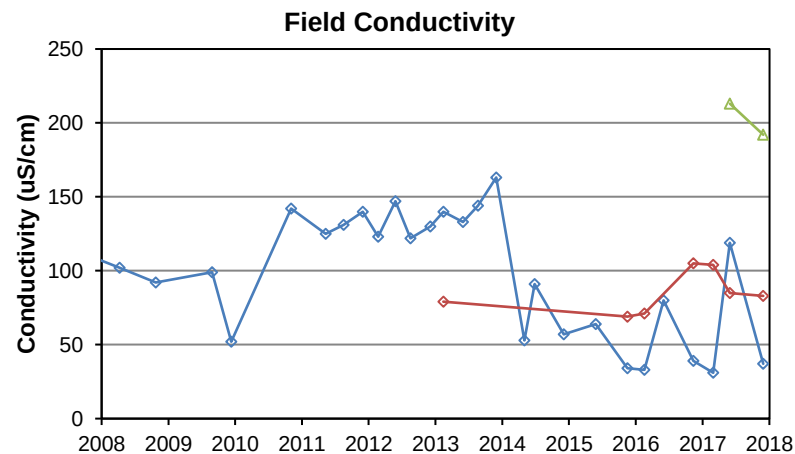
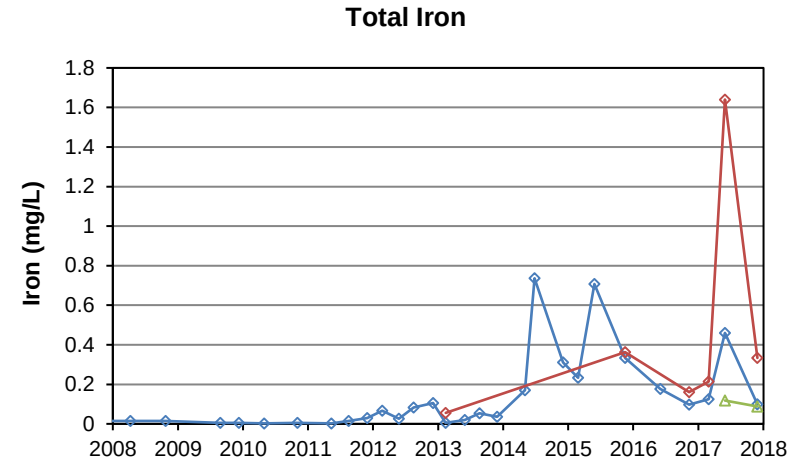
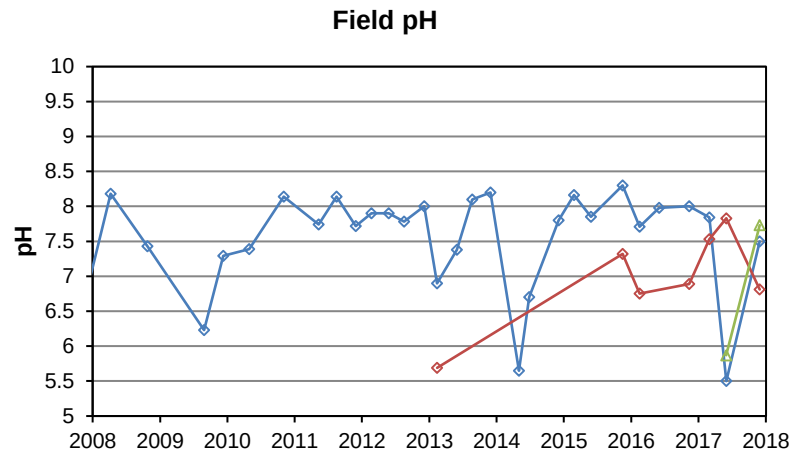
figure H-10

NORTHEAST DOWNGRADIENT WELLS HISTORICAL GROUNDWATER DATA (Hardness, Sulphate, Alkalinity)

2017 OPERATIONS AND MONITORING REPORT
CAMPBELL RIVER WASTE MANAGEMENT CENTRE
Comox Strathcona Waste Management

Legend





Legend

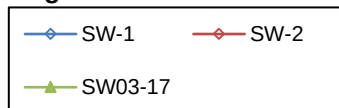
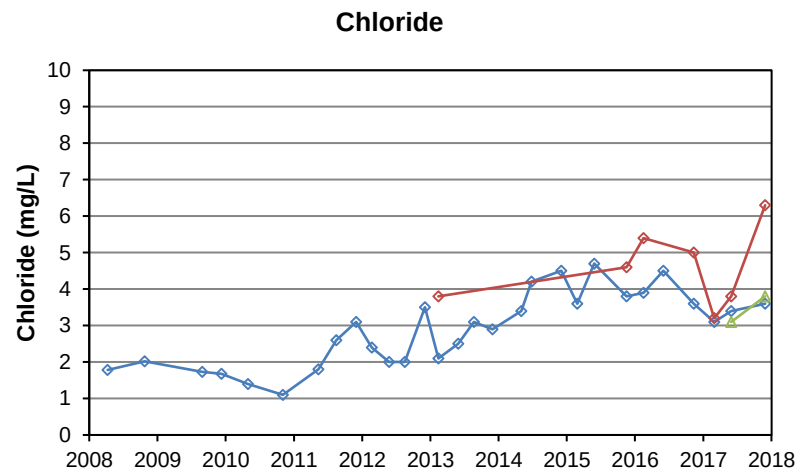
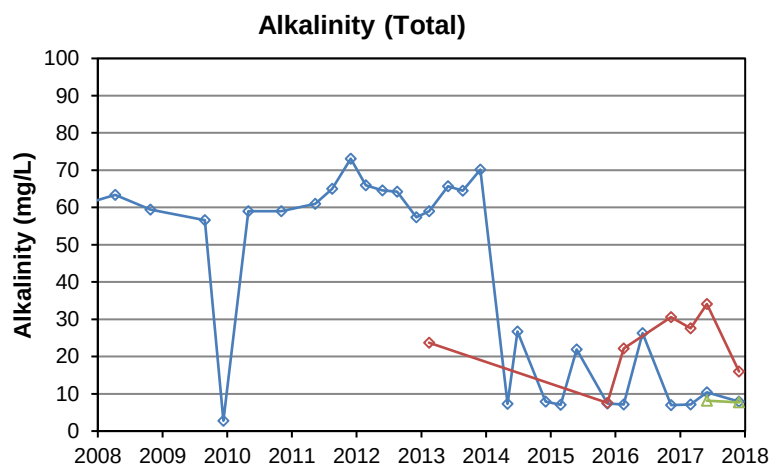
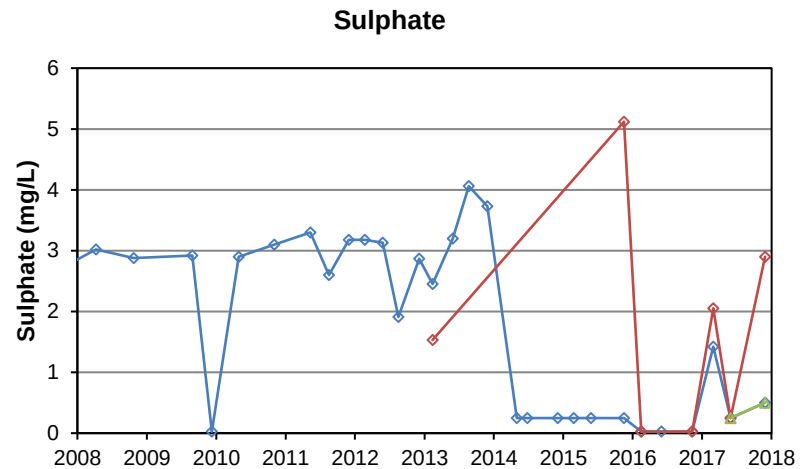
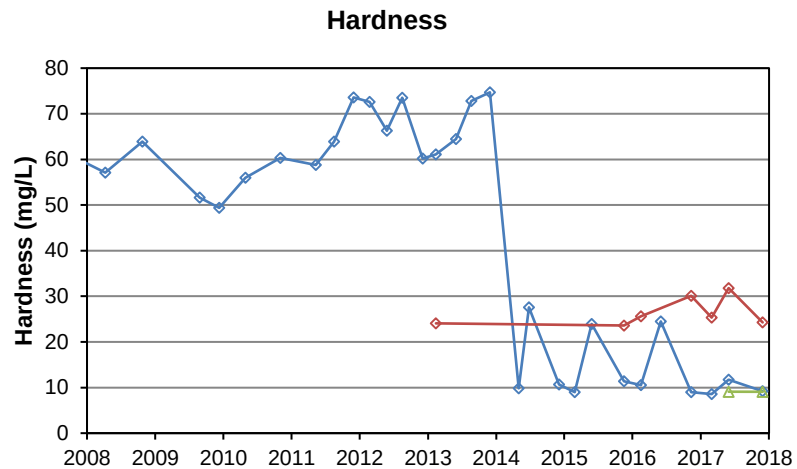


figure H-11

HISTORICAL SURFACE WATER DATA
(Field and Lab pH, Iron, and Manganese)
2017 OPERATIONS AND MONITORING REPORT
CAMPBELL RIVER WASTE MANAGEMENT CENTRE
Comox Strathcona Waste Management





Legend

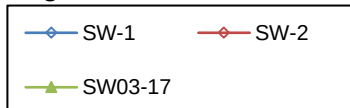


figure H-12

HISTORICAL SURFACE WATER DATA
(Hardness, Sulphate, Alkalinity)
2017 OPERATIONS AND MONITORING REPORT
CAMPBELL RIVER WASTE MANAGEMENT CENTRE
Comox Strathcona Waste Management



Appendix I

Historical Data HBT94-5

APPENDIX F: HISTORICAL WATER QUALITY DATABASE, CAMPBELL RIVER WASTE MANAGEMENT CENTRE

Parameter	Units	BC.AWQG.AL	BC.AWQG.DW	CDWG	HBT94-5 19-Jul-94	HBT94-5 26-Oct-94	HBT94-5 2-Mar-95	HBT94-5 22-Jun-95	HBT94-5 20-Jul-95	HBT94-5 16-Jan-96	HBT94-5 28-Feb-96	HBT94-5 23-Apr-96	HBT94-5 5-Nov-96	HBT94-5 9-Jan-97	HBT94-5 10-Feb-97	HBT94-5 6-Mar-97	HBT94-5 7-May-97	HBT94-5 5-Jun-97	HBT94-5 31-Jul-97	HBT94-5 2-Oct-97	HBT94-5 8-Dec-97	HBT94-5 12-Jan-98	HBT94-5 3-Feb-98
Physical Tests																							
pH (Field)	pH Unit	6.5 - 9	6.5 - 8.5	6.5 - 8.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
pH (Lab)	pH Unit	6.5 - 9	6.5 - 8.5	6.5 - 8.5	7.27	6.58	6.93	6.71	6.78	6.78	6.75	7.21	6.51	6.65	6.71	7	6.34 abc	6.42 abc	6.47 abc	6.95	6.84	6.47 abc	6.76
Specific Conductance (Field)	µS/cm	no guideline	no guideline	no guideline	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Specific Conductance (Lab)	µS/cm	no guideline	no guideline	no guideline	438	484	270	373	451	225	254	340	230	236	156	203	326	400	271	206	293	175	193
Temperature (Field)	deg C	19	15	15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dissolved Oxygen (Field)	mg/L	5	no guideline	no guideline	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hardness: Total (as CaCO ₃) (Lab)	mg/L	no guideline	no guideline	no guideline	66.1	185	-	-	-	80.4	-	114	-	-	53.2	-	-	-	-	-	-	-	74
Dissolved Solids: Total	mg/L	no guideline	no guideline	no guideline	249	282	167	188	226	156	127	218	194	118	105	102	180	259	147	160	188	114	183
Anions and Nutrients																							
Ammonia (as N)	mg/L	-	no guideline	no guideline	0.032	0.014	-	-	-	<0.005	-	<0.005	-	-	<0.005	-	-	-	-	-	-	-	-
Nitrogen: Nitrite (as N) (Lab)	mg/L	-	1	3.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nitrogen: Nitrate (as N) (Lab)	mg/L	-	1	3.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chloride (Lab)	mg/L	32.8	10	10	17.3	22.6	7	-	-	8.2	-	6.5	10.7	-	5.5	-	-	5.4	-	7.8	-	-	4.3
Fluoride: Dissolved	mg/L	600	250	250	-	-	21	-	-	12.9	-	21.3	9.5	-	-	-	-	-	-	-	-	-	-
Sulphate (Lab)	mg/L	1.5	1.5	-	-	-	-	-	-	1.5	-	21.3	9.5	-	4	-	-	67	-	9.5	-	-	3.7
Alkalinity (as CaCO ₃) (Lab)	mg/L	100	500	500	189	189	109	-	-	93.2	-	145	133	-	69	-	-	132	-	77.3	-	-	94.8
Bicarbonate (as CaCO ₃)	mg/L	no guideline	no guideline	no guideline	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Carbonate (as CaCO ₃)	mg/L	no guideline	no guideline	no guideline	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hydroxide	mg/L	no guideline	no guideline	no guideline	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dissolved Metals																							
Aluminum: Dissolved	mg/L	-	no guideline	no guideline	<0.20	<0.20	-	-	-	<0.20	-	<0.20	-	-	<0.005	-	-	-	-	-	-	-	0.012
Antimony: Dissolved	mg/L	-	0.2	0.1	<0.20	<0.20	-	-	-	<0.20	-	<0.20	-	-	<0.20	-	-	-	-	-	-	-	<0.001
Arsenic: Dissolved	mg/L	0.02	no guideline	0.006	0.0009	0.0001	-	-	-	<0.0001	-	<0.0001	-	-	0.0001	-	-	-	-	-	-	-	<0.001
Barium: Dissolved	mg/L	0.005	no guideline	0.01	0.013	0.019	-	-	-	0.011	-	<0.01	-	-	<0.01	-	-	-	-	-	-	-	0.004
Beryllium: Dissolved	mg/L	-	no guideline	1	<0.005	<0.005	-	-	-	<0.005	-	<0.005	-	-	<0.005	-	-	-	-	-	-	-	<0.001
Bismuth: Dissolved	mg/L	0.0053	0.004	no guideline	<0.10	<0.10	-	-	-	<0.10	-	<0.10	-	-	<0.10	-	-	-	-	-	-	-	-
Boron: Dissolved	mg/L	no guideline	no guideline	no guideline	<0.10	0.11	-	-	-	<0.10	-	<0.10	-	-	<0.1	-	-	-	-	-	-	-	<0.05
Cadmium: Dissolved	mg/L	1.2	5	5	<0.0002	<0.0002	-	-	-	0.0024 a	-	0.0017 a	-	-	0.0015 a	-	-	-	-	-	-	-	0.0024 a
Calcium: Dissolved	mg/L	-	no guideline	0.005	21.8	56.2	27.9	-	-	25.5	-	37.2	-	-	16.1	-	-	-	-	-	-	-	22.5
Chromium: Dissolved	mg/L	no guideline	no guideline	no guideline	<0.015	<0.015	-	-	-	<0.015	-	<0.01	-	-	<0.01	-	-	-	-	-	-	-	<0.001
Cobalt: Dissolved	mg/L	0.001	no guideline	0.05	<0.015	<0.015	-	-	-	<0.015	-	<0.01	-	-	<0.02	-	-	-	-	-	-	-	<0.001
Copper: Dissolved	mg/L	0.11	no guideline	no guideline	<0.010	<0.010	-	-	-	<0.010	-	<0.01	-	-	0.003	-	-	-	-	-	-	-	0.002
Iron: Dissolved (Lab)	mg/L	-	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lead: Dissolved	mg/L	0.35	no guideline	0.3	<0.001	<0.001	-	-	-	<0.001	-	<0.001	-	-	<0.001	-	-	-	-	-	-	-	<0.001
Lithium: Dissolved	mg/L	-	0.05	0.01	<0.015	<0.015	-	-	-	<0.015	-	<0.01	-	-	<0.02	-	-	-	-	-	-	-	-
Magnesium: Dissolved	mg/L	0.87	no guideline	no guideline	2.85	10.9	4.75	-	-	4.09	-	5	6.24	-	3.18	-	-	-	-	-	-	-	3.62
Manganese: Dissolved	mg/L	no guideline	no guideline	no guideline	0.121 bc	0.189 bc	-	-	-	0.4 bc	-	0.009	-	-	0.215 bc	-	-	-	-	-	-	-	0.001
Mercury: Dissolved	mg/L	-	no guideline	0.05	-	-	-	-	-	-	-	-	-	-	<0.00005	-	-	-	-	-	-	<0.00005	
Molybdenum: Dissolved	mg/L	no guideline	0.001	0.001	<0.030	<0.030	-	-	-	<0.030	-	<0.030	-	-	<0.03	-	-	-	-	-	-	-	<0.001
Nickel: Dissolved	mg/L	2	0.25	no guideline	<0.020	0.114	-	-	-	<0.020	-	<0.020	-	-	<0.02	-	-	-	-	-	-	-	<0.001
Phosphorus: Dissolved	mg/L	-	no guideline	no guideline	<0.30	<0.30	-	-	-	<0.30	-	<0.30	-	-	-	-	-	-	-	-	-	-	0.04
Potassium: Dissolved	mg/L	no guideline	no guideline	no guideline	1.86	<2.0	2.6	-	-	<2.0	-	2	-	-	-	-	-	-	-	-	-	-	0.82
Selenium: Dissolved	mg/L	373	no guideline	no guideline	<0.0005	<0.0005	-	-	-	<0.0005	-	<0.0005	-	-	<0.0005	-	-	-	-	-	-	-	<0.002
Silicon: Dissolved	mg/L	0.002	0.01	0.01	7.33	11	-	-	-	11.1	-	9.3	-	-	-	-	-	-	-	-	-	-	20.9
Silver: Dissolved	mg/L	no guideline	no guideline	no guideline	<0.015	<0.015	-	-	-	<0.015	-	<0.01	-	-	<0.0001	-	-	-	-	-	-	-	<0.0001
Sodium: Dissolved	mg/L	-	no guideline	no guideline	66.4	26.4	23.5	-	-	17.8	-	20	17	-	12	-	-	-	-	-	-	-	11.3
Strontium: Dissolved	mg/L	no guideline	no guideline	no guideline	0.137	0.203	-	-	-	0.082	-	0.165	-	-	-	-	-	-	-	-	-	-	0.073
Sulphur: Dissolved	mg/L	no guideline	no guideline	no guideline	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tellurium: Dissolved	mg/L	no guideline	no guideline	no guideline	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.001
Thallium: Dissolved	mg/L	no guideline	no guideline	no guideline	<0.10	<0.10	-	-	-	<0.10	-	<0.10	-	-	-	-	-	-	-	-	-	-	<0.0001
Thorium: Dissolved	mg/L	0.0003	0.002	no guideline	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0005
Tin: Dissolved	mg/L	no guideline	no guideline	no guideline	<0.30	<0.30	-	-	-	<0.30	-	<0.3	-	-	-	-	-	-	-	-	-	-	<0.001
Titanium: Dissolved	mg/L	no guideline	no guideline	no guideline	<0.010	<0.010	-	-	-	<0.010	-	<0.010	-	-	-	-	-	-	-	-	-	-	<0.001
Tungsten: Dissolved	mg/L	2	no guideline	no guideline	<0.10	<0.10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Uranium: Dissolved	mg/L	no guideline	no guideline	no guideline	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0005
Vanadium: Dissolved	mg/L	0.3	no guideline	0.02	<0.030	<0.030	-	-	-	<0.030	-	<0.030	-	-	<0.03	-	-	-	-	-	-	-	<0.001
Zinc: Dissolved	mg/L	0.006	no guideline	no guideline	<0.005	0.133 a	-	-	-	0.299 a	-	0.027	-	-	0.005	-	-	-	-	-	-	-	0.012
Zirconium: Dissolved	mg/L	-	5	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.001

Notes:

BC.AWQG.AL - BC Approved & Working Water Quality Guidelines for protection of aquatic life.

BC.AWQG.DW - BC Approved & Working Water Quality Guidelines for protection of drinking water.

CDWG - Canadian Drinking Water Quality Guidelines.

a - Parameter exceeds and/or is not within the acceptable criteria ranges of the aquatic life guidelines (BC.AWQG.AL).

b - Parameter exceeds and/or is not within the acceptable criteria ranges of the British Columbia drinking water guidelines (BC.AWQG.DW).

c - Parameter exceeds and/or is not within the acceptable criteria ranges of the Canadian drinking water guidelines (CDWG).

c - Parameter exceeds and/or is not within the acceptable criteria ranges of the Canadian drinking water guidelines (CDWG).

APPENDIX F: HISTORICAL WATER QUALITY DATABASE, CAMPBELL RIVER WASTE MANAGEMENT CENTRE

Parameter	Units	BC.AWQG.AL	BC.AWQG.DW	CDWG	19-Jul-94	26-Oct-94	2-Mar-95	22-Jun-95	20-Jul-95	16-Jan-96	28-Feb-96	23-Apr-96	5-Nov-96	9-Jan-97	10-Feb-97	6-Mar-97	7-May-97	5-Jun-97	31-Jul-97	2-Oct-97	8-Dec-97	12-Jan-98	3-Feb-98
Total Metals																							
Aluminum: Total	mg/L	*	0.2	0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Antimony: Total	mg/L	0.02	no guideline	0.006	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Arsenic: Total	mg/L	0.005	0.025	0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Barium: Total	mg/L	5	no guideline	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Beryllium: Total	mg/L	0.0053	0.004	no guideline	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bismuth: Total	mg/L	no guideline	5	no guideline	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boron: Total	mg/L	1.2	no guideline	0.005	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cadmium: Total	mg/L	*	no guideline	0.005	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Calcium: Total	mg/L	no guideline	no guideline	no guideline	-	-	-	-	-	-	-	-	-	-	-	-	-	54.3	-	26.8	-	-	-
Chromium: Total	mg/L	0.001	no guideline	0.05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cobalt: Total	mg/L	0.11	no guideline	no guideline	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Copper: Total	mg/L	0.5	no guideline	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Iron: Total (Lab)	mg/L	0.35	no guideline	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lead: Total	mg/L	*	0.05	0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lithium: Total	mg/L	0.87	no guideline	no guideline	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Magnesium: Total	mg/L	no guideline	no guideline	no guideline	-	-	-	-	-	-	-	-	-	-	-	-	-	10.4	-	3.64	-	-	-
Manganese: Total (Lab)	mg/L	*	no guideline	0.05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mercury: Total	mg/L	no guideline	0.001	0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Molybdenum: Total	mg/L	2	0.25	no guideline	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nickel: Total	mg/L	*	no guideline	no guideline	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phosphorus: Total	mg/L	no guideline	no guideline	no guideline	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Potassium: Total	mg/L	373	no guideline	0.05	-	-	-	-	-	-	-	-	-	-	-	-	-	1.11	-	1.53	-	-	-
Selenium: Total	mg/L	0.002	0.01	0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Silicon: Total	mg/L	no guideline	no guideline	no guideline	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Silver: Total	mg/L	no guideline	no guideline	no guideline	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sodium: Total	mg/L	no guideline	no guideline	200	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Strontium: Total	mg/L	no guideline	no guideline	no guideline	-	-	-	-	-	-	-	-	-	-	-	-	-	7.54	-	11.1	-	-	-
Sulphur: Total	mg/L	no guideline	no guideline	no guideline	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tellurium: Total	mg/L	no guideline	no guideline	no guideline	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thallium: Total	mg/L	0.0003	0.002	no guideline	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thorium: Total	mg/L	no guideline	no guideline	no guideline	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tin: Total	mg/L	no guideline	no guideline	no guideline	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Titanium: Total	mg/L	2	no guideline	no guideline	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tungsten: Total	mg/L	no guideline	no guideline	no guideline	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Uranium: Total	mg/L	0.3	no guideline	0.02	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium: Total	mg/L	0.006	no guideline	no guideline	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zinc: Total	mg/L	*	5	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zirconium: Total	mg/L	no guideline	no guideline	no guideline	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Organic Parameters																							
Chemical Oxygen Demand	mg/L	no guideline	no guideline	no guideline	188	31	-	-	-	20	-	41	-	-	24	-	-	-	-	-	-	-	-
Organic Carbon: Dissolved	mg/L	no guideline	no guideline	no guideline	7.8	1.89	-	-	-	1.4	-	4.6	-	-	1.9	-	-	-	-	-	-	-	-
Organic Carbon: Total	mg/L	no guideline	no guideline	no guideline	16.5	2.2	-	-	-	1.5	-	4.6	-	-	2.2	-	-	-	-	-	-	-	-
Bacteria																							
Coliforms: Fecal	MPN/100 ml	no guideline	0	no guideline	3000 b	0	<1.1	-	-	<1	-	8 b	1 b	-	<2	-	-	<2	-	21 b	-	-	<2
Coliforms: Total	MPN/100 ml	no guideline	0	0	8000 bc	0	>23 bc	-	-	20 bc	-	23 bc	112 bc	-	1600 bc	-	-	1600 bc	-	32 bc	-	-	350 bc
Escherichia Coli	MPN/100 ml	no guideline	0	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Parameters Measured Using Field Test Kits - 2003 to 2005 only (Discontinued due to data quality issues)																							
Hardness: Total (as CaCO ₃) (Field)	mg/L	no guideline	500	no guideline	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Alkalinity (as CaCO ₃) (Field)	mg/L	no guideline	no guideline	no guideline	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nitrogen: Nitrite (as N) (Field)	mg/L	-	1	3.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nitrogen: Nitrate (as N) (Field)	mg/L	32.8	10	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chloride (Field)	mg/L	600	250	250	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphate (Field)	mg/L	100	500	500	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Carbon Dioxide	mg/L	no guideline	no guideline	no guideline	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Iron: Dissolved (Field)	mg/L	0.35	no guideline	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Iron: Total (Field)	mg/L	1	no guideline	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Manganese: Total (Field)	mg/L	*	no guideline	0.005	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Notes:

BC AWQG AL - BC Approved & Working Water Quality Guidelines for protection of aquatic life.

BC AWQG DW - BC Approved & Working Water Quality Guidelines for protection of drinking water.

CDWG - Canadian Drinking Water Quality Guidelines.

a - Parameter exceeds and/or is not within the acceptable criteria ranges of the aquatic life guidelines (BC.AWQG.AL).

a - Parameter exceeds and/or is not within the acceptable criteria ranges of the aquatic life guidelines (BC.AWQG.AL).

c - Parameter exceeds and/or is not within the acceptable criteria ranges of the Canadian drinking water guidelines (CDWG).

* - See notes at beginning of Appendix F.

APPENDIX F: HISTORICAL WATER QUALITY DATABASE, CAMPBELL RIVER WASTE MANAGEMENT CENTRE

Parameter	Units	BC.AWQG.AL	BC.AWQG.DW	CDWG	HB T94-5 5-Mar-98	HB T94-5 13-Apr-98	HB T94-5 20-May-98	HB T94-5 25-Jun-98	HB T94-5 21-Jul-98	HB T94-5 14-Sep-98	HB T94-5 26-Oct-98	HB T94-5 2-Dec-98	HB T94-5 5-Jan-99	HB T94-5 5-Feb-99	HB T94-5 14-Apr-99	HB T94-5 29-Jul-99	HB T94-5 25-Nov-99	HB T94-5 1-Mar-00	HB T94-5 19-Apr-00
Physical Tests																			
pH (Field)	pH Unit	6.5 - 9	6.5 - 8.5	6.5 - 8.5	-	-	-	-	-	5.89 abc	6.43 abc	6.16 abc	6.13 abc	7.02	6.77	-	-	5.78 abc	6.05 abc
pH (Lab)	pH Unit	6.5 - 9	6.5 - 8.5	6.5 - 8.5	6.68	6.84	6.49 abc	6.69	6.77	6.97	6.97	6.97	6.97	6.67	6.74	6.55	6.66	6.76	6.62
Specific Conductance (Field)	µS/cm	no guideline	no guideline	no guideline	-	-	-	-	-	223	256	280	208	198	621.5	-	-	188.1	353
Specific Conductance (Lab)	µS/cm	no guideline	no guideline	no guideline	256	373	276	179	203	-	253	-	-	153	261	186	198	181	326
Temperature (Field)	deg C	19	15	15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dissolved Oxygen (Field)	mg/L	5	no guideline	no guideline	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hardness: Total (as CaCO ₃) (Lab)	mg/L	no guideline	no guideline	no guideline	-	-	-	-	-	-	-	-	-	65	-	-	-	71	-
Dissolved Solids: Total	mg/L	no guideline	no guideline	no guideline	162	292	195	130	125	-	153	-	-	90	165	119	136	119	274
Anions and Nutrients																			
Ammonia (as N)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	0.04	-	-	-	0.04	-
Nitrogen: Nitrite (as N) (Lab)	mg/L	*	no guideline	no guideline	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nitrogen: Nitrate (as N) (Lab)	mg/L	*	1	3.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chloride (Lab)	mg/L	32.8	10	10	-	6.7	-	-	7.5	-	7.4	-	-	3.3	2.9	5.5	5.7	3.5	4
Fluoride: Dissolved	mg/L	600	250	250	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphate (Lab)	mg/L	*	1.5	1.5	-	19.2	-	-	13.3	-	7.4	-	-	3.3	31.1	10.3	7.7	4.2	61.8
Alkalinity (as CaCO ₃) (Lab)	mg/L	100	500	500	-	152	-	-	67.9	-	107	-	-	72.4	98.4	80.1	90.3	91	162
Bicarbonate (as CaCO ₃)	mg/L	no guideline	no guideline	no guideline	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Carbonate (as CaCO ₃)	mg/L	no guideline	no guideline	no guideline	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hydroxide	mg/L	no guideline	no guideline	no guideline	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dissolved Metals																			
Aluminum: Dissolved	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	0.006	-	-	-	0.01	-
Antimony: Dissolved	mg/L	*	0.2	0.1	-	-	-	-	-	-	-	-	-	<0.001	-	-	-	<0.001	-
Arsenic: Dissolved	mg/L	0.02	no guideline	0.006	-	-	-	-	-	-	-	-	-	<0.001	-	-	-	<0.001	-
Barium: Dissolved	mg/L	0.005	0.025	0.01	-	-	-	-	-	-	-	-	-	0.003	-	-	-	0.003	-
Beryllium: Dissolved	mg/L	5	no guideline	1	-	-	-	-	-	-	-	-	-	<0.001	-	-	-	<0.001	-
Bismuth: Dissolved	mg/L	0.0053	0.004	no guideline	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boron: Dissolved	mg/L	no guideline	no guideline	no guideline	-	-	-	-	-	-	-	-	-	<0.05	-	-	-	0.05	-
Cadmium: Dissolved	mg/L	1.2	5	5	-	-	-	-	-	-	-	-	-	0.0007 a	-	-	-	0.0009 a	-
Calcium: Dissolved	mg/L	*	no guideline	0.005	-	-	-	-	-	-	-	-	-	19.6	42	28.9	-	23.5	37.9
Chromium: Dissolved	mg/L	no guideline	no guideline	no guideline	-	-	-	-	-	-	-	-	-	<0.001	-	-	-	<0.001	-
Cobalt: Dissolved	mg/L	0.001	no guideline	0.05	-	-	-	-	-	-	-	-	-	<0.001	-	-	-	<0.001	-
Copper: Dissolved	mg/L	0.11	no guideline	no guideline	-	-	-	-	-	-	-	-	-	0.001	-	-	-	<0.001	-
Iron: Dissolved (Lab)	mg/L	0.5	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lead: Dissolved	mg/L	0.35	no guideline	0.3	-	-	-	-	-	-	-	-	-	<0.001	-	-	-	<0.001	-
Lithium: Dissolved	mg/L	*	0.05	0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Magnesium: Dissolved	mg/L	0.87	no guideline	no guideline	-	-	-	-	-	-	-	-	-	2.11	5.24	4.89	-	3.43	4.34
Manganese: Dissolved	mg/L	no guideline	no guideline	no guideline	-	-	-	-	-	-	-	-	-	0.002	-	-	-	0.005	-
Mercury: Dissolved	mg/L	no guideline	no guideline	0.05	-	-	-	-	-	-	-	-	-	<0.05	-	-	-	<0.02	-
Molybdenum: Dissolved	mg/L	no guideline	0.001	0.001	-	-	-	-	-	-	-	-	-	<0.001	-	-	-	<0.001	-
Nickel: Dissolved	mg/L	2	0.25	no guideline	-	-	-	-	-	-	-	-	-	0.002	-	-	-	<0.001	-
Phosphorus: Dissolved	mg/L	*	no guideline	no guideline	-	-	-	-	-	-	-	-	-	0.07	-	-	-	0.1	-
Potassium: Dissolved	mg/L	no guideline	no guideline	no guideline	-	-	-	-	-	-	-	-	-	0.58	1.1	0.83	-	0.31	0.88
Selenium: Dissolved	mg/L	373	no guideline	no guideline	-	-	-	-	-	-	-	-	-	<0.002	-	-	-	<0.002	-
Silicon: Dissolved	mg/L	0.002	0.01	0.01	-	-	-	-	-	-	-	-	-	13	-	-	-	20.1	-
Silver: Dissolved	mg/L	no guideline	no guideline	no guideline	-	-	-	-	-	-	-	-	-	<0.0001	-	-	-	<0.0001	-
Sodium: Dissolved	mg/L	*	no guideline	no guideline	-	-	-	-	-	-	-	-	-	4.24	8.2	7.4	-	6.99	7.6
Strontium: Dissolved	mg/L	no guideline	no guideline	200	-	-	-	-	-	-	-	-	-	0.055	-	-	-	0.06	-
Sulphur: Dissolved	mg/L	no guideline	no guideline	no guideline	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tellurium: Dissolved	mg/L	no guideline	no guideline	no guideline	-	-	-	-	-	-	-	-	-	<0.001	-	-	-	<0.001	-
Thallium: Dissolved	mg/L	no guideline	no guideline	no guideline	-	-	-	-	-	-	-	-	-	<0.0001	-	-	-	<0.0001	-
Thorium: Dissolved	mg/L	0.0003	0.002	no guideline	-	-	-	-	-	-	-	-	-	<0.0005	-	-	-	<0.0005	-
Tin: Dissolved	mg/L	no guideline	no guideline	no guideline	-	-	-	-	-	-	-	-	-	<0.001	-	-	-	<0.001	-
Titanium: Dissolved	mg/L	no guideline	no guideline	no guideline	-	-	-	-	-	-	-	-	-	<0.001	-	-	-	<0.001	-
Tungsten: Dissolved	mg/L	2	no guideline	no guideline	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Uranium: Dissolved	mg/L	no guideline	no guideline	no guideline	-	-	-	-	-	-	-	-	-	<0.0005	-	-	-	<0.0005	-
Vanadium: Dissolved	mg/L	0.3	no guideline	0.02	-	-	-	-	-	-	-	-	-	<0.001	-	-	-	0.001	-
Zinc: Dissolved	mg/L	0.006	no guideline	no guideline	-	-	-	-	-	-	-	-	-	0.027	-	-	-	0.009	-
Zirconium: Dissolved	mg/L	*	5	5	-	-	-	-	-	-	-	-	-	<0.001	-	-	-	<0.01	-

Notes:

BC.AWQG.AL - BC Approved & Working Water Quality Guidelines for protection of aquatic life.

BC.AWQG.DW - BC Approved & Working Water Quality Guidelines for protection of drinking water.

CDWG - Canadian Drinking Water Quality Guidelines.

a - Parameter exceeds and/or is not within the acceptable criteria ranges of the aquatic life guidelines (BC.AWQG.AL).

b - Parameter exceeds and/or is not within the acceptable criteria ranges of the British Columbia drinking water guidelines (BC.AWQG.DW).

c - Parameter exceeds and/or is not within the acceptable criteria ranges of the Canadian drinking water guidelines (CDWG).

* - See notes at beginning of Appendix F.

APPENDIX F: HISTORICAL WATER QUALITY DATABASE, CAMPBELL RIVER WASTE MANAGEMENT CENTRE

Parameter	Units	BC.AWQG.AL	BC.AWQG.DW	CDWG	HB T94-5 5-Mar-98	HB T94-5 13-Apr-98	HB T94-5 20-May-98	HB T94-5 25-Jun-98	HB T94-5 21-Jul-98	HB T94-5 14-Sep-98	HB T94-5 26-Oct-98	HB T94-5 2-Dec-98	HB T94-5 5-Jan-99	HB T94-5 5-Feb-99	HB T94-5 14-Apr-99	HB T94-5 29-Jul-99	HB T94-5 25-Nov-99	HB T94-5 1-Mar-00	HB T94-5 19-Apr-00
Total Metals																			
Aluminum: Total	mg/L	*	0.2	0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Antimony: Total	mg/L	0.02	no guideline	0.006	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Arsenic: Total	mg/L	0.005	0.025	0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Barium: Total	mg/L	5	no guideline	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Beryllium: Total	mg/L	0.0053	0.004	no guideline	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bismuth: Total	mg/L	no guideline	no guideline	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boron: Total	mg/L	1.2	5	no guideline	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cadmium: Total	mg/L	*	no guideline	0.005	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Calcium: Total	mg/L	no guideline	no guideline	no guideline	-	44.8	-	-	26.3	-	30	-	-	-	-	-	21.5	-	39.1
Chromium: Total	mg/L	0.001	no guideline	0.05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cobalt: Total	mg/L	0.11	no guideline	no guideline	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Copper: Total	mg/L	*	0.5	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Iron: Total (Lab)	mg/L	0.35	no guideline	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lead: Total	mg/L	*	0.05	0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lithium: Total	mg/L	0.87	no guideline	no guideline	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Magnesium: Total	mg/L	no guideline	no guideline	no guideline	-	8.22	-	-	4.49	-	4.62	-	-	-	-	-	3.42	-	4.52
Manganese: Total (Lab)	mg/L	*	no guideline	0.05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mercury: Total	mg/L	no guideline	0.001	0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Molybdenum: Total	mg/L	2	0.25	no guideline	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nickel: Total	mg/L	no guideline	no guideline	no guideline	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phosphorus: Total	mg/L	no guideline	no guideline	no guideline	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Potassium: Total	mg/L	373	no guideline	no guideline	-	1.34	-	-	0.91	-	1.25	-	-	-	-	-	0.78	-	1.11
Selenium: Total	mg/L	0.002	0.01	0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Silicon: Total	mg/L	no guideline	no guideline	no guideline	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Silver: Total	mg/L	no guideline	no guideline	no guideline	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sodium: Total	mg/L	no guideline	no guideline	200	-	13.8	-	-	7	-	15	-	-	-	-	-	12	-	7.8
Strontium: Total	mg/L	no guideline	no guideline	no guideline	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphur: Total	mg/L	no guideline	no guideline	no guideline	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tellurium: Total	mg/L	no guideline	no guideline	no guideline	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thallium: Total	mg/L	0.0003	0.002	no guideline	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thorium: Total	mg/L	no guideline	no guideline	no guideline	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tin: Total	mg/L	no guideline	no guideline	no guideline	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Titanium: Total	mg/L	2	no guideline	no guideline	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tungsten: Total	mg/L	no guideline	no guideline	no guideline	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Uranium: Total	mg/L	0.3	no guideline	0.02	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium: Total	mg/L	0.006	no guideline	no guideline	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zinc: Total	mg/L	*	5	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zirconium: Total	mg/L	no guideline	no guideline	no guideline	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Organic Parameters																			
Chemical Oxygen Demand	mg/L	no guideline	no guideline	no guideline	-	-	-	-	-	-	-	-	-	<25	-	-	-	<25	-
Organic Carbon: Dissolved	mg/L	no guideline	no guideline	no guideline	-	-	-	-	-	-	-	-	-	3.4	-	-	-	2.3	-
Organic Carbon: Total	mg/L	no guideline	no guideline	no guideline	-	-	-	-	-	-	-	-	-	4.5	-	-	-	1.6	-
Bacteria																			
Coliforms: Fecal	MPN/100 ml	no guideline	0	no guideline	-	<2	-	-	-	-	-	-	-	6 b	<2	4 b	5 b	2 b	<2
Coliforms: Total	MPN/100 ml	no guideline	0	0	-	170 bc	-	-	-	-	-	-	-	540 bc	920 bc	14000 bc	3500 bc	3500 bc	5 bc
Escherichia Coli	MPN/100 ml	no guideline	0	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Parameters Measured Using Field Test Kits - 2003 to 2005 only (Discontinued due to data quality issues)																			
Hardness: Total (as CaCO ₃) (Field)	mg/L	no guideline	500	no guideline	-	-	-	-	-	-	-	-	-	65	-	-	-	71	-
Alkalinity (as CaCO ₃) (Field)	mg/L	no guideline	no guideline	no guideline	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nitrogen: Nitrite (as N) (Field)	mg/L	*	1	3.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nitrogen: Nitrate (as N) (Field)	mg/L	32.8	10	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chloride (Field)	mg/L	600	250	250	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphate (Field)	mg/L	100	500	500	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Carbon Dioxide	mg/L	no guideline	no guideline	no guideline	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Iron: Dissolved (Field)	mg/L	0.35	no guideline	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Iron: Total (Field)	mg/L	1	no guideline	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Manganese: Total (Field)	mg/L	*	no guideline	0.005	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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