



2018 Operations and Monitoring Report

Campbell River Waste Management Centre
Campbell River, British Columbia

Comox Strathcona Waste
Management





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 2018 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 2018 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 2018 calendar year, approximately 25,998 tonnes of waste was landfilled at the Site, resulting in an updated per capita disposal rate estimate of 0.59 tonnes/year. Approximately 2,135 tonnes of clean fill was used as cover, and approximately 2,504 tonnes of waste was diverted from the landfill. At the end of the Reporting Period, approximately 127,633 m³ of airspace remains under the current design.

The 2017 Design, Operations, and Closure Plan (2017 DOCP) for the Site was submitted to the British Columbia Ministry of Environment and Climate Change Strategy (ENV) in March 2018. 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.

As recommended in the 2017 DOCP, two additional monitoring wells (MW02-18 and MW03-18) were installed at the Site in summer 2018.

Construction of the surface water management pond in Block J continued at the Site in 2018 including excavation activities

Environmental Monitoring

Groundwater was observed to flow towards the east across and downgradient of the Site based on water levels measured during the reporting period which is consistent with previous years. There is approximately a 36 metre (m) drop in groundwater elevations between background monitoring location MW01-16 and Site monitoring location HBT94-1.

Downward vertical gradients were observed at nested wells EBA04-6/EBA04-7 and MW03-18/AG99-05 in 2018. Vertical gradients at EBA04-6 and EBA04-7 have historically been consistently downward. MW03-18 was installed in summer 2018, therefore limited groundwater elevation data for this location has been collected to date.



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 ENV, 2018), BC Source Drinking Water Quality Guidelines (ENV, 2017), and BC Working Water Quality Guidelines: Aquatic Life, Wildlife & Agriculture (BC Ministry of Environment [MOE], 2017) (WQG) for drinking water (DW) and the protection of freshwater aquatic life (FWAL).

No landfill derived impacts were observed in groundwater quality at background monitoring well MW01-16. Groundwater quality at monitoring well MW01-16 is considered to be representative of background groundwater quality at the Site.

Leachate impacts continue to be observed in groundwater at monitoring wells located in the Landfill Area monitoring wells HBT94-1, HBT94-2 and HBT94-3. The horizontal extent of leachate impacts extends to monitoring well MW02-18 located approximately 120 m east of the limit of waste and Site property boundary. However, monitoring well MW02-18 is located adjacent to a historic dumping ground, therefore it is difficult to determine if groundwater quality is adversely affected by the dumping ground, the Site, or both. From review of Figure 5.3, it appears the ratio of major ions at MW03-18 is similar to HBT94-3. Manganese concentrations were close to or above applicable CSR standards during one or more monitoring event in 2018 at the aforementioned monitoring wells.

Deep downgradient groundwater quality southeast of the Site at AG99-01, AG99-02, AG99-04, and AG99-05 remains generally stable over time with minimal leachate impacts observed. Groundwater quality results from monitoring wells southeast and downgradient of the Site (AG99-01, AG99-02, AG99-04, and AG99-05) were below the applicable CSR standards for all parameters analyzed in 2018 with the exception of vanadium concentrations detected at AG99-02 during the September and November 2018 monitoring events.

Chloride concentrations in groundwater collected from EBA04-7 were notably higher than historical results during the September 2017 monitoring event and have remained at elevated levels since then. However, other leachate indicator parameter (e.g. hardness, alkalinity, or manganese) concentrations in groundwater at EBA04-7 are similar to historical results. Concentrations of chloride and other leachate indicator parameters in groundwater at deep nested monitoring well EBA04-6 were consistent with historical results. Analytical results for groundwater samples collected from these monitoring wells in 2018 were below the applicable CSR water quality standards.

The extent of potential leachate impact observed in groundwater at EBA04-7 does not appear to horizontally extend to MW03-18 based on the low concentrations of leachate indicators detected at MW03-18 in 2018. Analytical results from groundwater samples collected from MW03-18 were below applicable CSR water quality standards.

Shallow and deep downgradient groundwater quality northeast of the landfill footprint is generally stable with minimal leachate impacts observed at monitoring wells EBA11-1, EBA11-2, EBA11-4, EBA04-3, and AG99-06. Downgradient northeast groundwater quality analytical results were below the applicable CSR standards at EBA11-1, EBA11-2, EBA11-3, EBA11-4, EBA04-3, and AG99-06 in 2018.



Chloride concentrations in groundwater at monitoring well EBA11-3 increased significantly above historical ranges in November 2017 and remained elevated during 2018. The piper plot provided on Figure 5.3 displaying water quality trends of major ions indicates groundwater at EBA11-3 is influenced by another source. 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 surface water and groundwater. Further monitoring is required to determine the source of the increased chloride concentrations in groundwater at this monitoring location.

Leachate indicator parameter concentrations were low at both surface water sampling locations, SW-1 and SW03-17, indicating no leachate impacts are observed at these surface water monitoring locations.

Surface water parameter concentrations were greater than the applicable WQGs at SW-1 and/or SW03-17 during one or more 2018 monitoring events for dissolved oxygen, dissolved aluminum, total iron and total manganese. The source of elevated total metals that exceeded applicable WQGs is likely due to naturally occurring conditions and/or stagnant water conditions.

Recommendations

Based on the findings of the 2018 Annual Operations and Monitoring Report, the following recommendations are made:

Operations

- Develop an action plan to address the items requiring attention in response to ENV's March 21, 2019 inspection reports.
- Place intermediate cover over the areas of the landfill that have reached final contours as indicated in the 2017 DOCP.
- Continue construction of the surface water management pond and surface water ditching as outlined in the Surface Water Management Works (GHD, 2018).
- Continue landfilling in accordance with the phased filling plan as prescribed in the 2017 DOCP until final Landfill closure in 2023.

Monitoring Program

- Continue quarterly monitoring of groundwater and surface water quality for general chemistry, nutrients, and metals to identify trends in water quality at and in the vicinity of the Site.
- Install one (1) additional groundwater monitoring well immediately downgradient of the surface water management pond to monitor groundwater quality in the shallow portion of the overburden aquifer, as indicated in the 2017 DOCP.
- Once the construction of the surface water management pond is complete, commence quarterly surface water sampling and laboratory analysis at the pond.
- Use a dissolved oxygen specific field meter such as the Hanna® HI9142 to measure dissolved oxygen concentrations in surface water in the field.
- Repair the steel casing on AG99-06 so it can be locked securely.
- Repair the riser pipes of HBT94-1, HBT94-2, and HBT94-3.



- Decommission monitoring well EBA04-as it appears to be damaged beyond repair.
- Decommission monitoring well EBA04-3 as it is located within the constructed surface water management pond.



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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 2018 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 2018 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* (Protocol 21) provides the criteria for selecting the appropriate CSR standards for water quality.

Protocol 21 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 iMapBC, accessed February 12, 2019, the Site is located less than 500 m from two fresh surface water bodies: Mclvor Lake and an ephemeral tributary of Cold Creek. Mclvor 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 12, 2019, three 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 Protocol 21.

Surface water analytical results are also compared to the British Columbia Approved Water Quality Guidelines: Aquatic Life, Wildlife & Agriculture (ENV, 2018), BC Source Drinking Water Quality Guidelines (ENV, 2017), and BC Working Water Quality Guidelines: Aquatic Life, Wildlife & Agriculture (BC 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 M, 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 previous legal land description for Block M was “Block C, together with that part of Block A, and that part of Block K, all part of District Lot 85, Sayward District”. The aforementioned lands were all combined into Block M as per Land Lease V934579 dated January 8, 2019 from the Ministry of Forests, Lands and Natural Resource Operations.

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 October 24, 2018). 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 metres (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 Block M. 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. Beginning in 2018, a surface water management pond (SWM pond) has been under construction in Block J. 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 m deep. Bedrock is also not encountered at private water supply wells, which are approximately 60 m deep and located approximately 3 km to the northeast to the Site. Bedrock is encountered at a depth of approximately 1.8 metres below ground surface (m 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 McIvor Lake. The bedrock lithology was not indicated on the well log.

From review of bedrock geology maps of the area, it appears the Karmutsen formation is the bedrock unit in the vicinity of the Site. The Karmutsen formation is comprised of volcanic basalts and breccias.

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.

Figure 5.2 presents groundwater contours for the November 2018 monitoring event. Based on GHD field measurements, the water table in the vicinity of the landfill is encountered at depths ranging from 20 to 35 m BGS. Seasonal water table fluctuations ranging from 0.6 m to 3.6 m were observed in 2018. The lowest groundwater elevations were measured in August during the 2018 monitoring year.

Further details of the results of the 2018 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 McIvor Lake and Cold Creek. Based on the local topography and interpreted groundwater flow direction, McIvor 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 SW03-17 located approximately 1000 m east of the Site on a pond.)

Based on a search of the iMapBC (accessed February 12, 2019), there are nine water wells within a 500 m radius of the Site. Three (3) of the water wells are listed as water supply wells for Private Domestic use, four (4) are listed as water supply wells for Commercial/Industrial use, one (1) is listed as a water supply well for unknown use and one (1) is listed as a decommissioned monitoring well. The well licenses and a map indicating the locations of the water wells are included in Appendix C.



Well tag 84136 was included in the 2018 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 110853 is assigned to monitoring well GLL93-1, which was decommissioned in 2013. The well record for well tag 110853 is the well closure report for this monitoring well.

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, 93413, and 103257 appear to be located hydraulically upgradient from the Site; therefore it is unlikely that MSW leachate from the Site will 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 watershed, 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

Non-recyclable household waste and construction and demolition waste received at the transfer station is discharged to the Landfill. Clean wood waste and yard waste received at the transfer station is diverted to off-site facilities.



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.

3.2 Changes from Approved Reports, Plans, and Specifications

No changes from approved reports, plans, or specifications occurred in 2018.

As indicated in the 2017 Operations and Monitoring Report (GHD, 2018), the 2017 Design, Operations and Closure Plan was submitted to ENV in March 2018. At the time of preparing this report, the 2017 DOCP is under review by ENV.

3.3 Site Development

Normal operations and landfiling activities occurred in 2018. Some ditching and a maintenance road were constructed on the Landfill in 2018.

3.3.1 Closure Works Completed

No closure works were completed in 2018.

3.3.2 Surface Water Management Pond

In 2018, GHD completed the detailed design of the surface water management works for the Site (GHD, 2018). Construction of the surface water management pond in Block J continued in July 2018 and is expected to be completed in 2020.



3.3.3 Inspections

On December 4, 2018, ENV conducted an inspection at the Site. The results of the inspection were provided to the CVRD in multiple reports dated March 21, 2019. An action plan to address the items requiring attention as identified in the inspection reports will be developed in 2019.

3.4 Complaints

No complaints were received in 2018.

3.5 Emergencies or Non-Compliance Items

No emergencies or non-compliance items were reported in 2018.

3.6 Landfill Gas Collection

Landfill gas (LFG) was not collected in 2018 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 (GHD 2017) predicted that the Site will produce approximately 1,509 tonnes of methane in 2018 (GHD, 2017). As indicated in the 2017 DOCP, the detailed design of the LFG collection system is scheduled to occur in 2020 to 2021. Construction of the LFG collection system and flare compound for the Site is currently scheduled to commence in concurrence with the closure of the Landfill in 2022 to 2023.

3.7 Waste Tonnage

Table 3.1 presents tonnages of each type of waste received and discharged to the Landfill in 2018. Approximately 30,637 tonnes was received at the Site. Approximately 4,640 tonnes of waste was diverted from the Landfill resulting in a total of 25,998 tonnes landfilled at the Site in 2018.

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 25,998 tonnes and a population of 43,337 in the Campbell River watershed in 2018, the updated 2018 municipal solid waste per capita estimate is 0.59 tonnes.

3.8 Volume Survey

A ground survey was completed on October 24, 2018 at the Site. Based on the results of the survey, GHD estimates approximately 137,533 cubic metres of airspace remain to achieve the design contours as of the date of the survey.

By prorating the survey results above, GHD estimates 127,633 cubic metres (m³) of airspace remain to achieve the design contours as of December 31, 2018.



3.9 Remaining Capacity and Estimated Site Life

As stated in Section 3.8, GHD estimates 127,633 m³ of airspace remains at the Landfill as of December 31, 2018.

A 2018 airspace consumption rate could not be estimated with confidence as significant construction works were completed on-Site in 2018 and existing topographic contours were compared to a different final contour plan than previous years. The updated final contour plan used for comparison to the October 2018 topographic contours is included in the 2017 DOCP. Construction works that influenced the topographic contours in 2018 included the construction of an access road and regrading of the side slopes.

Waste tonnages of each type of waste received and discharged to the Landfill in 2018 is discussed in Section 3.7 of this Annual Report.

Based on waste tonnage information from 2017 and 2018, a similar tonnage of waste was received and discharged to the Landfill in 2017 and 2018. For this reason, it is assumed a similar volume of airspace was also consumed in 2017 and 2018. Based on the 2017 estimated airspace consumption rate of 56,600 m³ between December 31, 2016 and December 31, 2017 (GHD, 2018), an estimated 2.25 years of Site life remains; however it is noted that this estimate is based only on the 2017 filling rate. The Site will cease to accept waste from walking floor trailers in 2020, 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 River 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 footprint. As recommended by GHD, two additional monitoring wells were installed in July 2018. The locations of these monitoring wells is indicated on Figure 2.2.

In the 2017 DOCP, an expanded monitoring well network and phased installation schedule was provided. The next phase of monitoring well network expansion for the Site should occur in spring/summer 2019 and includes installation of one groundwater monitoring well.

3.12 Operational Plan for the Next 12 Months

The operational plan for 2019 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 2019.



The installation of one additional groundwater monitoring well to monitor groundwater quality in the shallow portion of the overburden aquifer immediately downgradient of the surface water management pond is scheduled to occur in spring/summer 2019. The proposed well location (MW04-19) is 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: March, April, 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 2018 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 2018 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 Annual 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, MW02-18, MW03-18
- Southeast downgradient deep: AG99-01, AG99-02, AG99-04, AG99-05

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 2018 monitoring events. These monitoring wells have been historically dry.
- AM02-01 was dry during all 2018 monitoring events. AM02-01 has historically been periodically dry.
- EBA04-4 was found to be damaged during the February, May, September, and November monitoring events in 2018, 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. EBA04-4 requires decommissioning.

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 2018 surface water monitoring program included sampling of two 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 March, April, September, and November monitoring events.
- 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 March, April, September, 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 2018. Results are tabulated and presented in Table 4.2. Groundwater elevation data collected between 2008 to 2018 is presented as a hydrograph on Figures 5.1a, 5.1b, 5.1c, and 5.1d.

Groundwater elevation data collected in 2018 was compared with historical Site data. Groundwater was encountered at elevations ranging from approximately 152 m AMSL at the upgradient wells to 110 m AMSL in the downgradient wells in the Site area. Mean groundwater elevation is approximately 115 m AMSL. The highest groundwater elevations are found in background well MW01-16, located approximately 400 m to the west of the Site property boundary. There is approximately a 36 m drop in groundwater elevations between background location MW01-16 and Site monitoring location HBT94-1. In general, groundwater elevation data collected in 2018 was slightly lower than historical monitoring years.

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 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 across and downgradient of the Site. The 2018 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 2018 monitoring event ranging from 0.01 to 0.02 (over a screen separation of 7.6 metres). A slight downward gradient has historically been observed at these monitoring locations.

Groundwater elevation data from nested wells MW03-18/AG99-05 show a slight downward gradient during the September and November 2018 monitoring events ranging from 0.003 to 0.006 (over a screen separation of 22.8 metres). MW03-18 was installed in summer 2018, therefore limited groundwater elevation data for this location has been collected to date.

5.3 Groundwater Quality Monitoring Results

Groundwater analytical data collected in 2018 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, MW02-18, MW03-18

Southeast deep wells: 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 monitoring well AM02-01 was dry during all 2018 monitoring events. The following table presents ranges of leachate indicator parameter concentrations observed in 2018 at 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
Background MW01-16	32.4 – 44.3	ND – 0.047	ND	ND – 2	74.5 – 93.3	33.3 – 43.2	ND	ND	6.85 – 7.84	2 – 3.3

ND – Parameter concentration below laboratory detection limit.
mg/L - milligrams per litre; µg/L - micrograms per litre; µS/cm - microSiemens per centimeter.
Cond.: Conductivity.
Conductivity – measured in the lab; pH – measured in the field.

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 2018 data presented in the above table, GHD observed the following:

- Groundwater quality at MW01-16 is generally characterized by low and stable concentrations of MSW leachate indicator parameters.
- AM02-01 continued to be dry in 2018 preventing collection of groundwater samples for field monitoring and laboratory analysis.
- VOC analytical results from MW01-16 were below the laboratory detection limits in 2018.

Background Area Groundwater Assessment

Monitoring well AM02-01 was dry during each monitoring event in 2018. From review of groundwater elevations at MW01-16, it appears groundwater elevations in this area were approximately 3 to 4 m lower than the previous year. Monitoring wells AM02-01 and MW01-16 are located adjacent to McIvor Lake, which is contiguous with Campbell Lake. Campbell Lake is dammed by the Ladore Dam, which controls the water level in Campbell Lake and McIvor Lake. As a result, groundwater elevations at AM02-01 and MW01-16 may be affected by water level adjustments at the Ladore Dam.

Analytical results for groundwater samples collected from MW01-16 were below applicable CSR standards for all parameters tested in 2018.

At this time, no landfill derived impacts are apparent at MW01-16 and groundwater quality at this monitoring well 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 overburden 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 2018 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	467	23	507	45	1,010	331	4,350	3,080	6.72	ND
HBT94-1	215 – 271	1.6 – 5.3	167 – 216	25 – 33	489 – 612	185 – 256	2,270 – 15,900	1,820 – 3,210	6.82 – 7.65	ND – 2.6
EBA04-7	305 – 422	ND – 0.043	173 – 252	42 – 110	786 – 998	385 – 458	ND – 8.2	69.7 – 136	6.9 – 7.2	12 – 12.7
Background (MW01-16)	32.4 – 44.3	ND – 0.047	ND	ND – 2	74.5 – 93.3	33.3 – 43.2	ND	ND	6.85 – 7.84	2 – 3.3

ND – Parameter concentration below laboratory detection limit.

mg/L - milligrams per litre; µg/L - micrograms per litre; µS/cm - microSiemens per centimeter.

Alk: alkalinity, NH₄: Ammonia, Bo: boron, Cl⁻: chloride, Fe: iron, Mn: manganese, SO₄: sulphate, Cond.: Conductivity.

Conductivity – measured in the lab; pH – measured in the field.

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 2018 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.
- 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 the exception of iron) 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. In 2017 and 2018, iron concentrations in groundwater at HBT94-1 have increased by an order of magnitude, however other leachate indicator concentrations continue to be similar to historical ranges.
- 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 and 2018, ammonia concentrations in groundwater samples from HBT94-3 were similar to historical ranges.
- 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 2018.
- Chloride concentrations in groundwater collected from EBA04-7 began to increase in September 2017 and this trend continued to be observed in 2018. Manganese concentrations in groundwater quality at EBA04-7 also slightly increased in 2018. Other leachate indicator parameter (e.g. hardness, alkalinity) concentrations in groundwater at EBA04-7 are similar to historical results. Further monitoring is required to determine if these increasing trends continue.
- VOC concentrations were below laboratory detection in groundwater quality at the shallow Landfill Area wells in 2018.

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 2018 except the following:

Ammonia

Ammonia concentrations were greater than the CSR FAW standard in groundwater samples collected from HBT94-3 for the first quarter 2018 monitoring event.

Ammonia concentrations in groundwater quality at HBT94-3 have periodically been greater than the applicable CSR standards. Ammonia concentrations at HBT94-3 continue to be within historical ranges.



Iron

Iron concentrations were greater than the CSR DW standard in groundwater samples collected from HBT94-1 during the first and third quarter 2018 monitoring events. As stated above, iron concentrations at this monitoring location have increased in 2018. Further monitoring is required to determine if this increasing trend continues.

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 2018.

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 2018 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 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 2018.
- 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 2018 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 - 49	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	120 – 184	2.1 – 13	96 – 111	6.2 – 25	283 – 448	61.5 – 155	220 – 1110	557 – 1010	7.39 – 7.5	1.6 – 3.3
EBA04-6	288 – 330	ND – 0.1	ND – 121	4.3 – 8.3	575 – 663	291 – 367	ND	ND	7.14 – 7.39	1.4 – 15.2
EBA04-1	38.2 – 42	ND – 0.067	ND	ND – 1.2	84.1 – 95.6	39.6 – 42.9	ND	ND	7.03 – 8.41	1.6 – 3
Background (MW01-16)	32.4 – 44.3	ND – 0.047	ND	ND – 2	74.5 – 93.3	33.3 – 43.2	ND	ND	6.85 – 7.84	2 – 3.3
ND – Parameter concentration below laboratory detection limit. mg/L - milligrams per litre; µg/L - micrograms per litre; µS/cm - microSiemens per centimeter. Alk: alkalinity, NH ₄ : Ammonia, Bo: boron, Cl ⁻ : chloride, Fe: iron, Mn: manganese, SO ₄ : sulphate, Cond.: Conductivity. Conductivity – measured in the lab; pH – measured in the field.										

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 2018 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.
- The leachate indicator parameter concentrations are generally one to two orders of magnitude less than 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 trend was observed to a lesser extend during the September 2018 monitoring event. These observations appear to be the result of seasonal water quality fluctuations.
- EBA04-6 continues to show 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 2018 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 and 2018 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 2018 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 in groundwater at the sampled deep overburden Landfill Area wells in 2018.

Landfill Area Deep Groundwater Assessment

Parameter concentrations were below applicable standards in deep Landfill Area wells for all parameters tested in 2018.

In 2017, manganese concentrations detected in groundwater quality at HBT94-2 were greater than the applicable CSR standard, but were less than the applicable standards in 2018. This may indicate groundwater quality at HBT94-2 may be improving, further monitoring is required to confirm this interpretation.

5.3.4 Downgradient Groundwater Quality

Groundwater quality in the area downgradient of the landfill footprint is monitored at 13 monitoring wells. To facilitate the discussion of groundwater quality downgradient of the Site in this Annual 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.

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 2018 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 NE 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	87.5 – 109	ND – 0.038	79 – 99	3.8 – 4.7	195 – 252	91.9 – 122	ND – 5.6	ND	7.64 – 7.89	4.7 – 10.6
EBA11-2	106 – 192	ND – 0.027	ND	4.3 – 14	220 – 419	109 – 210	ND – 6.4	ND	7.06 – 7.69	3 – 6.7
AG99-06	69 – 113	ND – 0.054	ND	3.2 – 7.8	148 – 242	67.5 – 122	ND – 6.2	ND	6.85 – 7.78	2.7 – 3.9
EBA11-4	46.7 – 51.1	ND – 0.058	ND	3.9 – 7.9	111 – 129	46.9 – 55.2	ND	ND	7.83 – 7.88	1.1 – 3
EBA11-3	46.2 – 60.8	ND – 0.042	ND	8.6 – 89	152 – 419	69.8 – 175	ND	ND	7.43 – 7.87	2.3 – 4.1
Background (MW01-16)	32.4 – 44.3	ND – 0.047	ND	ND – 2	74.5 – 93.3	33.3 – 43.2	ND	ND	6.85 – 7.84	2 – 3.3

ND – Parameter concentration below laboratory detection limit.

mg/L - milligrams per litre; µg/L - micrograms per litre; µS/cm - microSiemens per centimeter.

Alk: alkalinity, NH₄: Ammonia, Bo: boron, Cl⁻: chloride, Fe: iron, Mn: manganese, SO₄: sulphate, Cond.: Conductivity.

Conductivity – measured in the lab; pH – measured in the field.

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-7 and H-8).

Based on historical data presented in Figures H-9 and H-10, and the 2018 data presented in the above table, the following conclusions regarding groundwater quality at the Downgradient Area wells have been developed:

- EBA04-3 became inaccessible in mid-2018 due to the construction of the surface water management pond. EBA04-3 requires decommissioning.
- 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 and 2018 at these locations were similar to historical results. It appears 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 between 2016 and 2017, however other leachate indicator parameter concentrations remained stable in groundwater at AG99-06. Chloride concentrations in groundwater at AG99-06 appear to be stable since 2016 and 2017. Further monitoring is required to determine if chloride concentrations at AG99-06 continue to be stable.



- Chloride concentrations in groundwater at EBA11-3 were significantly higher than historical chloride ranges at this monitoring location during the November 2017 monitoring event. Elevated chloride concentrations in groundwater at EBA11-3 continued to be observed in 2018. However, concentrations of other leachate indicator parameters appear to be similar to historical results in groundwater quality at EBA11-3. A piper plot showing water quality trends of major ions in groundwater was generated using March 2018 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 quality and groundwater quality 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 and surface water. 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 at northeast shallow overburden wells in 2018.

Northeast Downgradient Shallow Groundwater Assessment

Parameter concentrations were below applicable CSR standards at the northeast shallow overburden groundwater wells for all parameters tested in 2018 with the exception of the following:

Antimony

Antimony concentrations in groundwater quality at AG99-06 were greater than the CSR DW standard during the first quarter 2018 monitoring event with a concentration of 7.1 ug/L. Antimony concentrations at AG99-06 were below the laboratory detection limit during the following three monitoring events. The first quarter 2018 antimony concentration may have been anomalous. Further monitoring is required to determine this interpretation.

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. GHD notes that due to the construction of the surface water management pond, EBA04-3 was inaccessible during the September and November 2018 monitoring events.

The following table presents ranges of leachate indicator parameter concentrations observed in 2018 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 NE Downgradient Area 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)
EBA04-3	317 – 358	ND	ND	28-29	678 – 782	359 – 435	ND	ND	7.01 – 7.07	8.5 – 10.9
Background (MW01-16)	32.4 – 44.3	ND – 0.047	ND	ND – 2	74.5 – 93.3	33.3 – 43.2	ND	ND	6.85 – 7.84	2 – 3.3

ND – Parameter concentration below laboratory detection limit.

mg/L - milligrams per litre; µg/L - micrograms per litre; µS/cm - microSiemens per centimeter.

Alk: alkalinity, NH₄: Ammonia, Bo: boron, Cl⁻: chloride, Fe: iron, Mn: manganese, SO₄: sulphate, Cond.: Conductivity. Conductivity – measured in the lab; pH – measured in the field.

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-7 and H-8).

Based on historical data presented in Figures H-7 and H-8, and 2018 data presented in the above table, the following conclusions regarding groundwater quality at EBA04-3 have been developed:

- Groundwater quality at EBA04-3 historically displayed generally stable, mild leachate impacts based on slightly elevated alkalinity, conductivity, and hardness levels compared to background groundwater conditions. Analytical results for alkalinity, conductivity, hardness, and chloride at EBA04-3 slightly increased in early 2018. As stated above, EBA04-3 could not be sampled during the third and fourth quarter 2018 monitoring events. A replacement monitoring well is required to determine if this increasing trend continues.

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 2018.

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, MW02-18, and MW03-18. Groundwater monitoring at HBT94-5 has not been possible since 2000 as the well has been dry during all monitoring events. As stated in Section 2.5, groundwater elevations in the vicinity of the Site have decreased by approximately 2 - 4 m 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. MW02-18 and MW03-18 were installed in July 2018 and were included in the September and November 2018 monitoring events.

Concentrations versus time graphs for selected leachate indicator parameters are presented in Figures H-9 and H-10 in Appendix H.

The following table presents concentration ranges of leachate indicator parameters in groundwater quality at MW02-18 and MW03-18. Leachate indicator parameter concentrations historically observed in groundwater quality at HBT94-5, between 1994 through 2000, are also included in the



table below. 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 SE 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 ⁽¹⁾	67.9-162	0.04	ND – 50	2.9-7.5	153-373	65-71	--	2-5	5.78-7.02	3.3-61.8
MW02-18	336 – 354	15 – 17	590 – 651	18 – 38	732 – 769	215 – 238	20.9 – 40.4	2,670 – 3,000	6.91 – 6.92	3.3 – 4.5
MW03-18	68.1 – 111	ND – 0.024	ND	2.3 – 5.2	144 – 237	61.3 – 110	ND	ND	6.96 – 8.23	1.5 – 2.8
Background (MW01-16)	32.4 – 44.3	ND – 0.047	ND	ND – 2	74.5 – 93.3	33.3 – 43.2	ND	ND	6.85 – 7.84	2 – 3.3

Notes:

(1) Includes all analytical data available from samples collected from HBT94-5 between March 1998 and April 2000

ND – Parameter concentration below laboratory detection limit.

mg/L - milligrams per litre; µg/L - micrograms per litre; µS/cm - microSiemens per centimeter.

Alk: alkalinity, NH₄: Ammonia, Bo: boron, Cl⁻: chloride, Fe: iron, Mn: manganese, SO₄: sulphate, Cond.: Conductivity.

Conductivity – measured in the lab; pH – measured in the field.

-- Parameter not analyzed.

From review of Table 5.7 as well as Figures H-9 and H-10 this following interpretations of shallow groundwater quality southeast of the Site have been developed:

- 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. From review of the borehole log for HBT94-5, approximately 10 m of waste is encountered at this well location, indicating the presence of a historic dumping ground. The well is screened approximately 10-12 m below the waste, however groundwater quality in the vicinity of this well is likely adversely impacted by this dumping area.
- Groundwater quality at MW02-18 shows elevated levels of ammonia, chloride, iron, and manganese relative to background groundwater conditions, indicating some leachate impact. Monitoring well MW02-18 is located adjacent to the historic dumping ground, therefore it is difficult to determine if groundwater quality is adversely affected by the dumping ground, the Site, or both. From review of Figure 5.3, it appears the ratio of major leachate ions at MW02-18, is similar to HBT94-3.
- Groundwater quality at MW03-18 is similar to background groundwater conditions. MW03-18 is nested with AG99-05, which also shows similar groundwater conditions. Leachate impact is not observed in groundwater at MW03-18 at this time. From review of Figure 5.3, MW03-18 shows a similar ratio of major ions to background location MW01-16 and its deep nested counterpart AG99-05.



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.

The following table presents ranges of leachate indicator parameter concentrations observed in 2018 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 SE 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)
AG99-01	87.1 – 98.9	ND – 0.077	ND	1.9 – 2.9	178 – 209	84.6 – 104	ND	ND	7.68 – 7.9	2.4 – 4
AG99-02	80.2 – 116	ND – 0.079	ND	1.3 – 1.8	166 – 230	83.2 – 114	ND	ND	7.28 – 8.37	2.3 – 3.7
AG99-04	44.9 – 62.3	ND – 0.066	ND	ND – 1.3	100 – 129	46.3 – 62.3	ND	ND	7.91 – 8.33	1.5 – 3.2
AG99-05	44 – 72.2	ND	ND	ND – 3.2	93.8 – 164	43.2 – 77.4	ND	ND	7.07 – 8.37	1.6 – 3.2
Background (MW01-16)	32.4 – 44.3	ND – 0.047	ND	ND – 2	74.5 – 93.3	33.3 – 43.2	ND	ND	6.85 – 7.84	2 – 3.3

ND – Parameter concentration below laboratory detection limit.
 mg/L - milligrams per litre; µg/L - micrograms per litre; µS/cm - microSiemens per centimeter.
 Alk: alkalinity, NH₄: Ammonia, Bo: boron, Cl⁻: chloride, Fe: iron, Mn: manganese, SO₄: sulphate, Cond.: Conductivity.
 Conductivity – measured in the lab; pH – measured in the field.

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-11 and H-12).

Based on historical data presented in Figures H-11 and H-12, and 2018 data presented in the above table, the following conclusions regarding groundwater quality at AG99-01, AG99-02, AG99-04, and AG99-05 have been developed:

- Groundwater quality at AG99-01 and 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 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 5.3.4.3, shallow groundwater quality southeast of the landfill appears to be impacted by



leachate at MW02-18, however it cannot be determined if the source is the Site or the historic dumping ground or both.

5.3.4.5 Southeast Downgradient Deep Groundwater Assessment

Groundwater analytical results for southeast deep groundwater wells were below the applicable CSR standards in 2018, with the exception of the following:

Vanadium

Vanadium concentrations in groundwater at AG99-02 were greater than the CSR DW standard during the September and November 2018 monitoring events. Vanadium concentrations in 2018 at AG99-02 remain stable compared to historical results and leachate indicator concentrations at AG99-02 continue to be similar to background groundwater conditions. GHD notes that prior to the implementation of the Stage 11 Amendment to the CSR standards in 2017, no vanadium DW standard existed.

5.4 Surface Water Quality Monitoring Results

Site surface water quality is monitored at two 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
- SW03-17 an unnamed pond located upstream of SW-1

As previously discussed, there is no direct surface water discharge from the Site to the ephemeral tributaries east of the Site. The depth of groundwater in the vicinity of the tributaries is unknown 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 nested wells MW03-18 and AG99-05, which are located approximately 900 m west of SW-1. Groundwater levels at AG99-05 ranged from 19.5 to 21.9 m below top of riser (BTOR) in 2018. Groundwater levels at MW03-18 ranged from 19.7 to 21.9 m BTOR in 2018. However, as previously stated, the depth to groundwater adjacent to the Cold Creek tributaries has not been investigated.

The following table presents the 2018 surface water analytical results for leachate indicator parameters indicated in Section 5.3.1 of this Annual Report. These parameters are selected to best indicate potential MSW leachate impacts in surface water downgradient of 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 – 16.3	ND – 0.074	ND	3.6 – 5.5	30.4 – 88.6	8.08 – 31.4	64.2 – 145	5.95 – 23.9	7.09 – 7.7	ND – 12.4
SW03-17 (Pond upstream of SW-1)	5.8 – 8.8	ND – 0.068	ND	3.4 – 3.6	30.6 – 31.6	7.36 – 8.48	29.5 – 62.5	4.6 – 7.02	6.5 – 7.66	ND

ND – Parameter concentration below laboratory detection limit.
 mg/L - milligrams per litre; µg/L - micrograms per litre; µS/cm - microSiemens per centimeter.
 Alk: alkalinity, NH₄: Ammonia, Bo: boron, Cl⁻: chloride, Fe: iron, Mn: manganese, SO₄: sulphate, Cond.: Conductivity.
 Conductivity – measured in the lab; pH – measured in the field.

Detailed surface water analytical results are presented in Table 5.12. Historical surface water quality data and graphs (Figures H-13 and H-14) of the selected parameters are presented in Appendix H.

Based on historical data presented in Figures H-13 and H-14, and 2018 data presented in the above table GHD has concluded the following:

- At SW-1 and SW03-17, the presence of leachate was not suspected, based on low level of leachate indicator parameters including alkalinity, ammonia, chloride, and conductivity levels.
- 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 and SW03-17 in 2018. 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 were 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:

Dissolved Oxygen

Field dissolved oxygen measurements did not meet the most stringent short term or long term FAW WQG for dissolved oxygen (>9 mg/L and >11 mg/L, respectively) during 2018 as follows:

- SW-1: May, November
- SW03-17: May, September, November

The dissolved oxygen FAW WQG varies depending on the current life stages of fish and other aquatic life inhabiting the surface water body. The species of aquatic life and associated life cycles in the Cold Creek tributary and unnamed pond are unknown and therefore the most stringent FAW WQG (specific to buried embryo and alevin life stages) was applied for comparison purposes only. Based on the quarterly sampling frequency conducted at SW-1 and SW03-17, the short term FAW guideline for dissolved oxygen is most applicable. The short term dissolved oxygen guideline for



FAW in surface waters hosting all aquatic life stages other than buried embryo and alevin is >5 mg/L, which measurements at SW-1 and SW03-17 met during all 2018 monitoring events with the exception of SW03-17 in November 2018.

GHD uses a Horiba® multi-parameter water quality meter to collect field water quality measurements. Based on GHD's experience, the dissolved oxygen values measured by the Horiba® multi-parameter meter are suspected to be biased low and it is recommended a dissolved oxygen specific field meter such as the Hanna® HI9142 be used for future monitoring events.

Aluminum

The FWAL WQG for aluminum is based on the dissolved phase of the metal to most effectively represent bioavailable aluminum concentrations. Aluminum concentrations in surface water samples collected in 2018 were greater than the long term WQG (50 ug/L) but below the more applicable short term WQG (100 ug/L) at SW-1 during the first, second, and third quarter monitoring events.

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.

Iron

The total iron concentration in the surface water sample collected from SW-1 during the September 2018 monitoring event was greater than the DW WQG for the first time ever. It is noted that the stream SW-1 is located on was stagnant at the time of sampling, therefore iron concentrations in this surface water body may have been affected by its stagnant condition.

GHD understands that surface water in the vicinity of SW-1 is not diverted for drinking water purposes at this time. The DW WQG for iron is an aesthetic objective and has been prepared to protect primarily from objectionable taste and staining of plumbing and laundry (Health Canada, 1978).

Manganese

The total manganese concentration was greater than the DW WQG in the surface water sample collected from SW-1 during the September 2018 sampling event for the first time ever. It is noted that the stream SW-1 is located on was stagnant at the time of sampling, therefore manganese concentrations in this surface water body may have been affected by its stagnant condition.

GHD understands that surface water in the vicinity of SW-1 is not diverted for drinking water purposes at this time. 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).



6. Summary

The following summarizes the findings of the Annual Report:

Operations

- Approximately 25,998 tonnes of waste was landfilled at the Site in 2018.
- The updated municipal solid waste disposal per capita estimate for 2018 is 0.59 tonnes/year.
- Approximately 127,633 m³ of airspace remains as of December 31, 2018, resulting in 2.25 years of site life remaining based on the 2017 filling rate. The Site will cease to accept waste from walking floor trailers in 2020, thus reducing the volume of waste landfilled each year until final Landfill closure in 2023.
- Construction of the surface water management pond continued in 2018 and will continue in 2019.
- Two new monitoring wells, MW02-18 and MW03-18, were installed in July 2018.

Monitoring Program

- Groundwater monitoring was conducted at 22 groundwater monitoring locations in 2018.
- 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 2018. This is consistent with historical results. A slight downward vertical gradient was observed at nested wells MW03-18/AG99-05 during the third and fourth quarter 2018 monitoring events.
- No landfill derived impacts were observed in groundwater quality at background monitoring well MW01-16. Groundwater quality at monitoring well MW01-16 is considered to be representative of background groundwater quality at the Site.
- Leachate impacts continue to be observed in groundwater at monitoring wells located at the edge of the landfill footprint HBT94-1, HBT94-2 and HBT94-3. The horizontal extent of leachate impacts extends to monitoring well MW02-18 located approximately 120 m east of the limit of waste and Site property boundary. However, monitoring well MW02-18 is located adjacent to a historic dumping ground, therefore it is difficult to determine if groundwater quality is adversely affected by the dumping ground, the Site, or both. From review of Figure 5.3, it appears the ratio of major ions for MW03-18 is similar to HBT94-3. Manganese concentrations were close to or above applicable CSR standards during one or more monitoring event in 2018 at the aforementioned monitoring wells.
- Shallow downgradient groundwater quality southeast of the Site at monitoring well HBT94-5 has historically shown evidence of mild leachate impact; however this monitoring location has been dry since 2000. Monitoring well HBT94-5 is located within a historic dumping ground and therefore groundwater quality in the vicinity of this well is likely adversely impacted by the historical dumping area and potentially the Site as well.
- Deep downgradient groundwater quality southeast of the Site at AG99-01, AG99-02, AG99-04, and AG99-05 remains generally stable over time with minimal leachate impacts observed.



Groundwater quality results from monitoring wells southeast and downgradient of the Site (AG99-01, AG99-02, AG99-04, and AG99-05) were below the applicable CSR standards for all parameters analyzed in 2018 with the exception of vanadium concentrations detected at AG99-02 during the September and November 2018 monitoring events.

- Chloride concentrations in groundwater collected from EBA04-7 were notably higher than historical results during the September 2017 monitoring event and have remained at elevated levels since then. However, other leachate indicator parameter (e.g. hardness, alkalinity, or manganese) concentrations in groundwater at EBA04-7 are similar to historical results. Concentrations of chloride and other leachate indicator parameters in groundwater at deep nested monitoring well EBA04-6 were consistent with historical results. Analytical results for groundwater samples collected from these monitoring wells in 2018 were below the applicable CSR water quality standards.
- The extent of potential leachate impact observed in groundwater at EBA04-7 does not appear to horizontally extend to MW03-18 based on the low concentrations of leachate indicators detected at MW03-18 in 2018. Analytical results from groundwater samples collected from MW03-18 were below applicable CSR water quality standards.
- Shallow and deep downgradient groundwater quality northeast of the landfill footprint is generally stable with minimal leachate impacts observed at monitoring wells EBA11-1, EBA11-2, EBA11-4, EBA04-3, and AG99-06. Downgradient northeast groundwater quality analytical results were below the applicable CSR standards at EBA11-1, EBA11-2, EBA11-3, EBA11-4, EBA04-3, and AG99-06 in 2018.
- Chloride concentrations in groundwater at monitoring well EBA11-3 increased significantly above historical ranges in November 2017 and remained elevated during 2018. The piper plot provided on Figure 5.3 displaying water quality trends of major ions indicates groundwater at EBA11-3 is influenced by another source. 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 surface water and groundwater. Further monitoring is required to determine the source of the increased chloride concentrations in groundwater at this monitoring location.
- Leachate indicator parameter concentrations were low at both surface water sampling locations, SW-1 and SW03-17, indicating no leachate impacts are observed in surface water near the Site.
- Surface water parameter concentrations were greater than the applicable WQGs at SW-1 and/or SW03-17 during one or more 2018 monitoring events for dissolved oxygen, dissolved aluminum, total iron and total manganese. The source of elevated total metals that exceeded applicable WQGs is likely due to naturally occurring conditions and/or stagnant water conditions.



7. Recommendations

Based on the findings of the 2018 Annual Operations and Monitoring Report, GHD provides the following recommendations:

Operations

- Develop an action plan to address the items requiring attention in response to ENV's March 21, 2019 inspection reports.
- Place intermediate cover over the areas of the landfill that have reached final contours as indicated in the 2017 DOCP.
- Continue construction of the surface water management pond and surface water ditching as outlined in the Surface Water Management Works (GHD, 2018).
- Continue landfilling in accordance with the phased filling plan as prescribed in the 2017 DOCP until final Landfill closure in 2023.

Monitoring Program

- Continue quarterly monitoring of groundwater and surface water quality for general chemistry, nutrients, and metals to identify trends in water quality at and in the vicinity of the Site.
- Install one (1) additional groundwater monitoring well immediately downgradient of the surface water management pond to monitor groundwater quality in the shallow portion of the overburden aquifer, as indicated in the 2017 DOCP.
- Once the construction of the surface water management pond is complete, commence quarterly surface water sampling and laboratory analysis at the pond.
- Repair the steel casing on AG99-06 so it can be locked securely.
- Repair the riser pipes of HBT94-1, HBT94-2, and HBT94-3.
- Decommission monitoring well EBA04-as it appears to be damaged beyond repair.
- Decommission monitoring well EBA04-3 as it is located within the constructed surface water management pond.
- Use a dissolved oxygen specific field meter such as the Hanna© HI9142 to measure dissolved oxygen concentrations in surface water in the field.



All of which is Respectfully Submitted,

GHD

A handwritten signature in black ink, appearing to read "Michaela Dyck".

On behalf of:
Michaela Dyck, G.I.T.

A handwritten signature in black ink, appearing to read "K. Lindsay".

Kathryn Lindsay, M.Sc.

A handwritten signature in blue ink, appearing to read "Gregory D. Ferraro".

Gregory D. Ferraro, P.Eng.

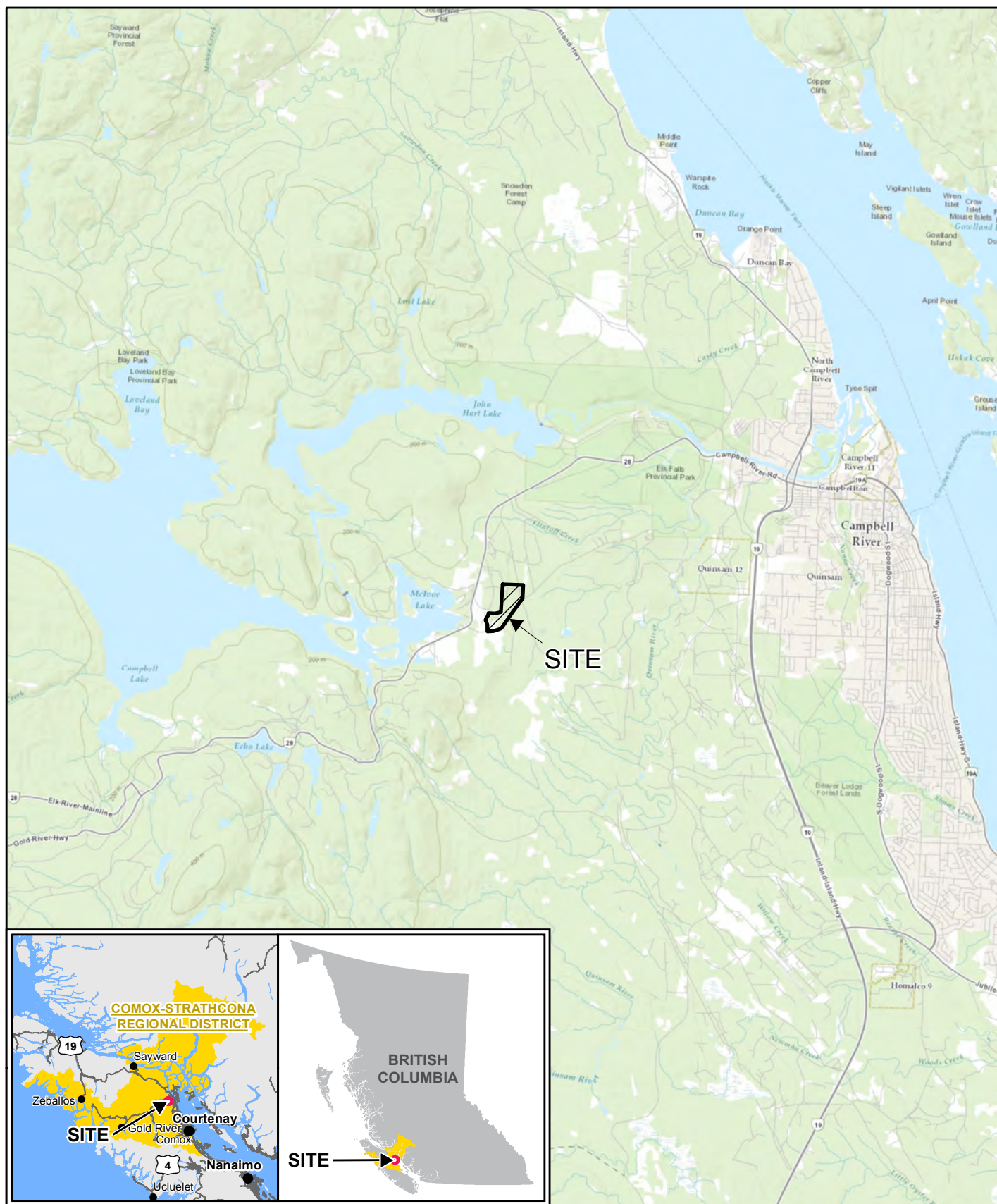


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Source: ESRI Topographic Basemap, Accessed 2019

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Meters
Coordinate System:
NAD 1983 UTM Zone 10N

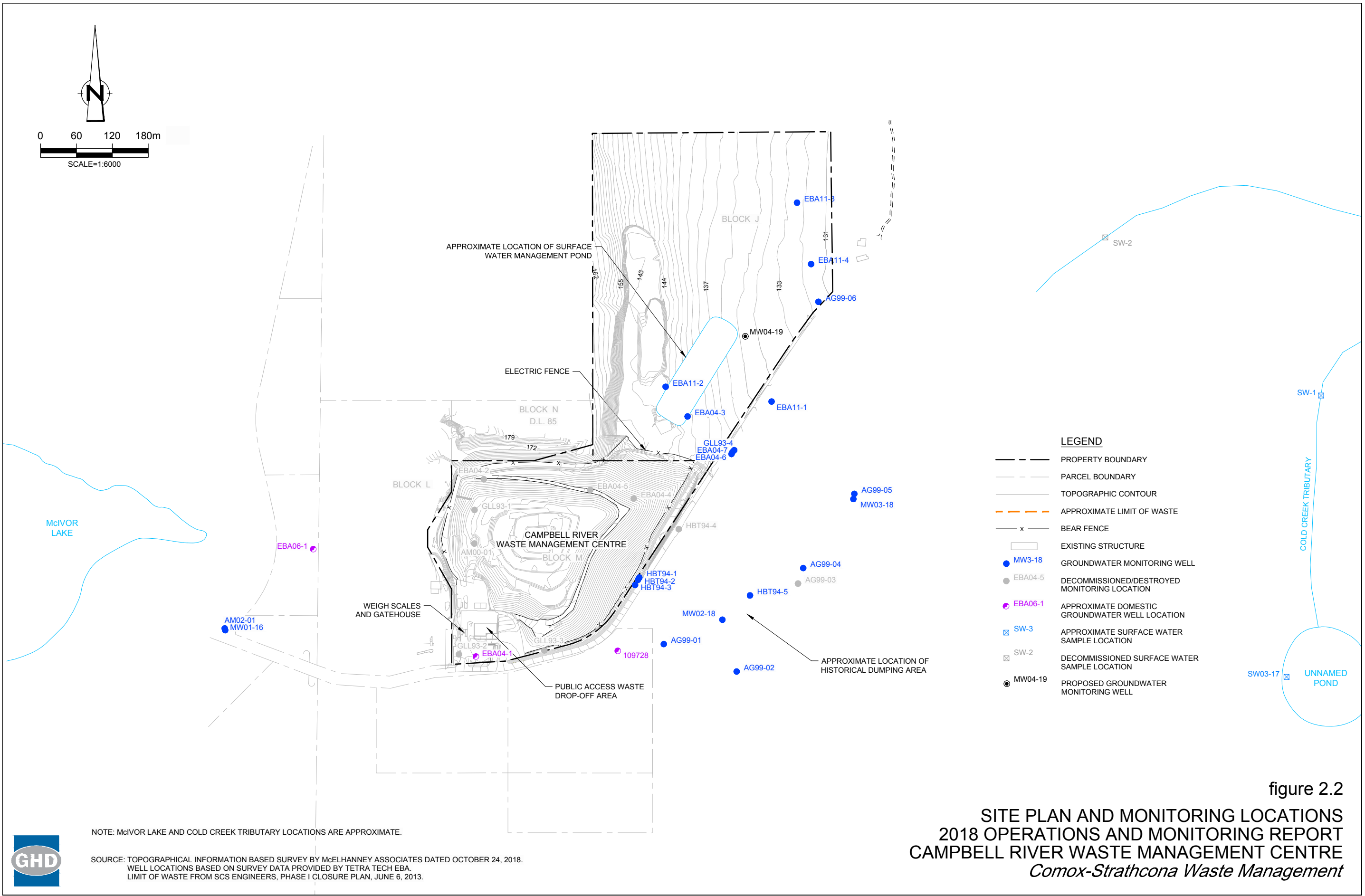


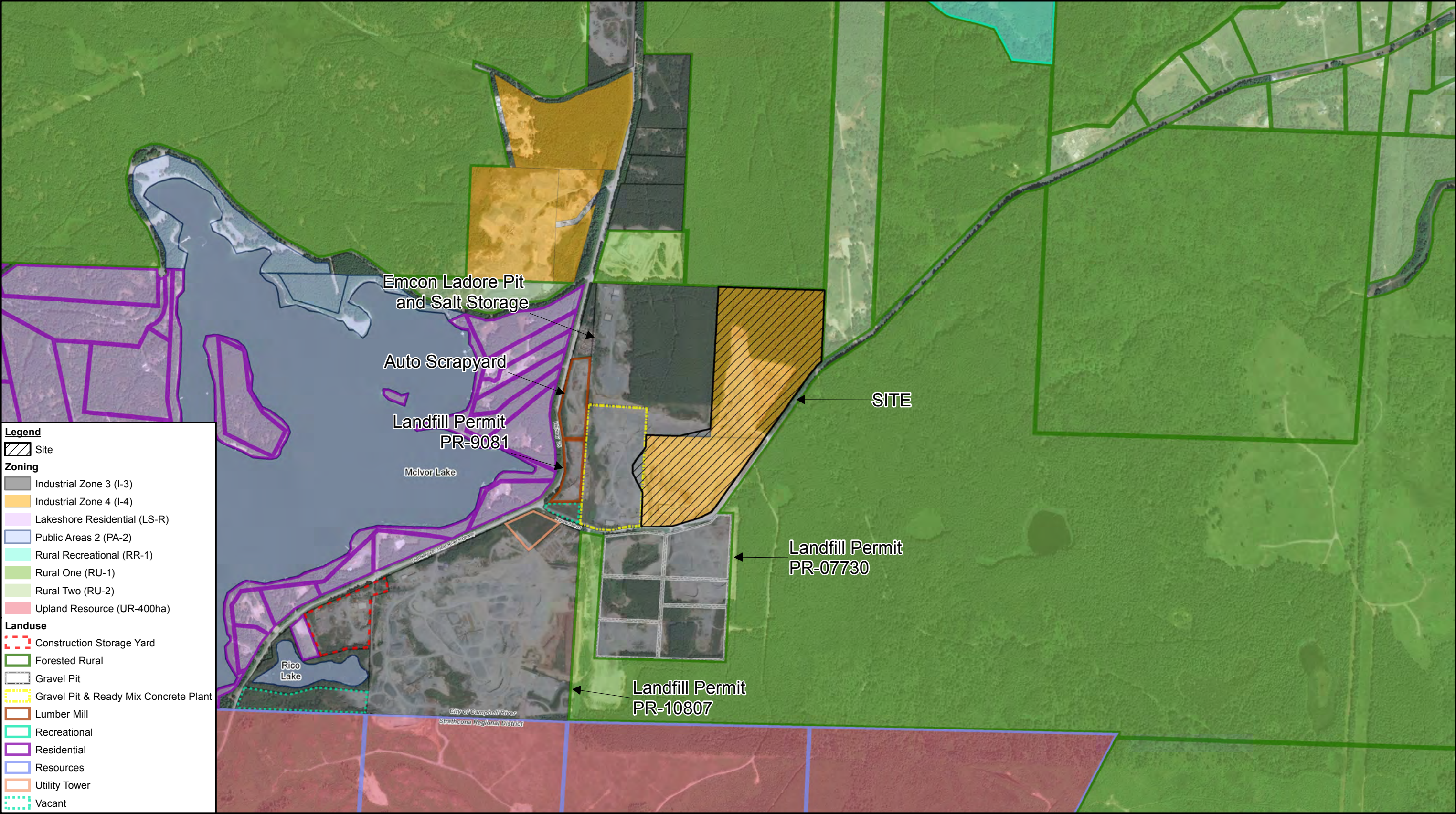
COMOX-STRATHCONA WASTE MANAGEMENT
CAMPBELL RIVER WASTE MANAGEMENT CENTRE
2018 OPERATIONS AND MONITORING REPORT

056484-02
Mar 18, 2019

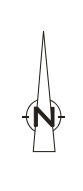
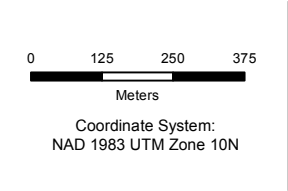
SITE LOCATION

FIGURE 2.1





Sources: CanVec Edition 1.1 © Department of Natural Resources Canada, all rights reserved; National Road Network 2.0 GeoBase; Property Parcels - City of Campbell River; Microsoft product screen shot(s) reprinted with permission from Microsoft Corporation.

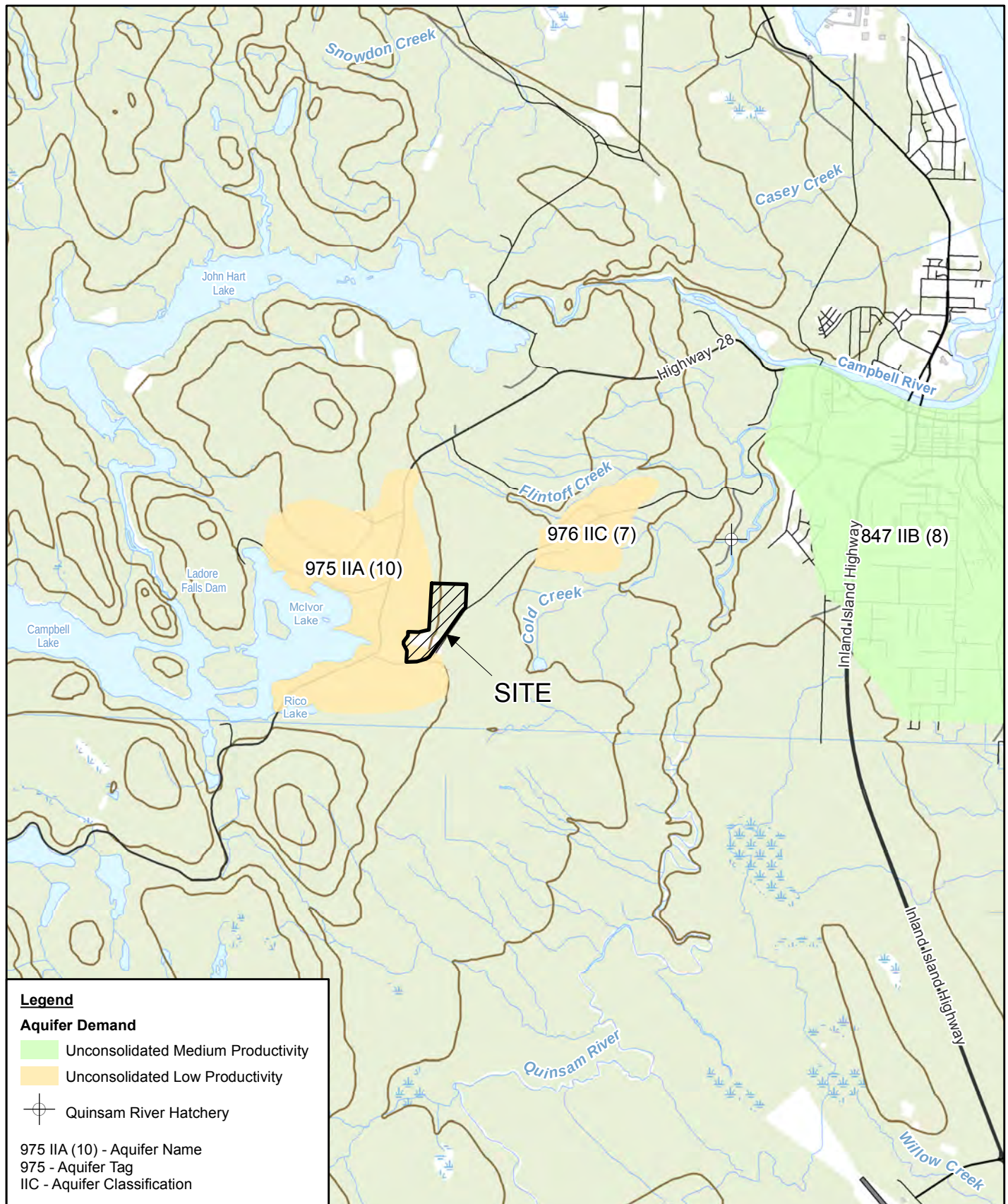


COMOX-STRATHCONA WASTE MANAGEMENT
CAMPBELL RIVER WASTE MANAGEMENT CENTRE
2018 OPERATIONS AND MONITORING REPORT

SITE AREA ZONING AND LAND USE

056484-02
Jan 18, 2019

FIGURE 2.3



Source: CanVec Edition 1.1 © Department of Natural Resources Canada. All rights reserved. National Road Network 2.0 GeoBase. DataBC 2018

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

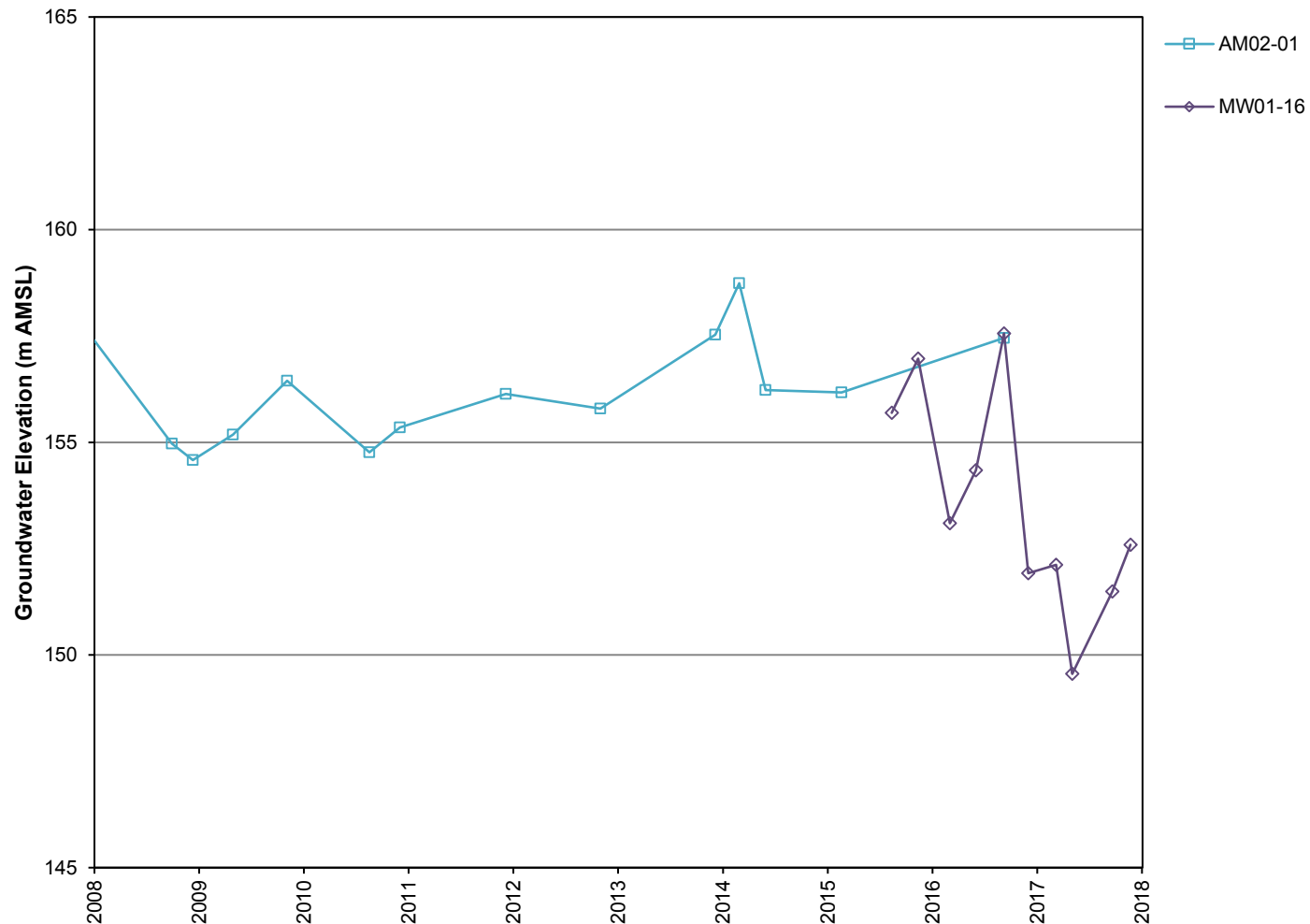


COMOX-STRATHCONA WASTE MANAGEMENT
 CAMPBELL RIVER WASTE MANAGEMENT CENTRE
 2018 OPERATIONS AND MONITORING REPORT

056484-02
 Jan 18, 2019

DRAINAGE MAP

FIGURE 2.4



Note: AM02-01 dry during all 2018 monitoring events

figure 5.1a

HYDROGRAPH 2008 - 2018 - BACKGROUND WELLS
 2018 OPERATIONS AND MONITORING REPORT
 CAMPBELL RIVER WASTE MANAGEMENT CENTRE
Comox Strathcona Waste Management



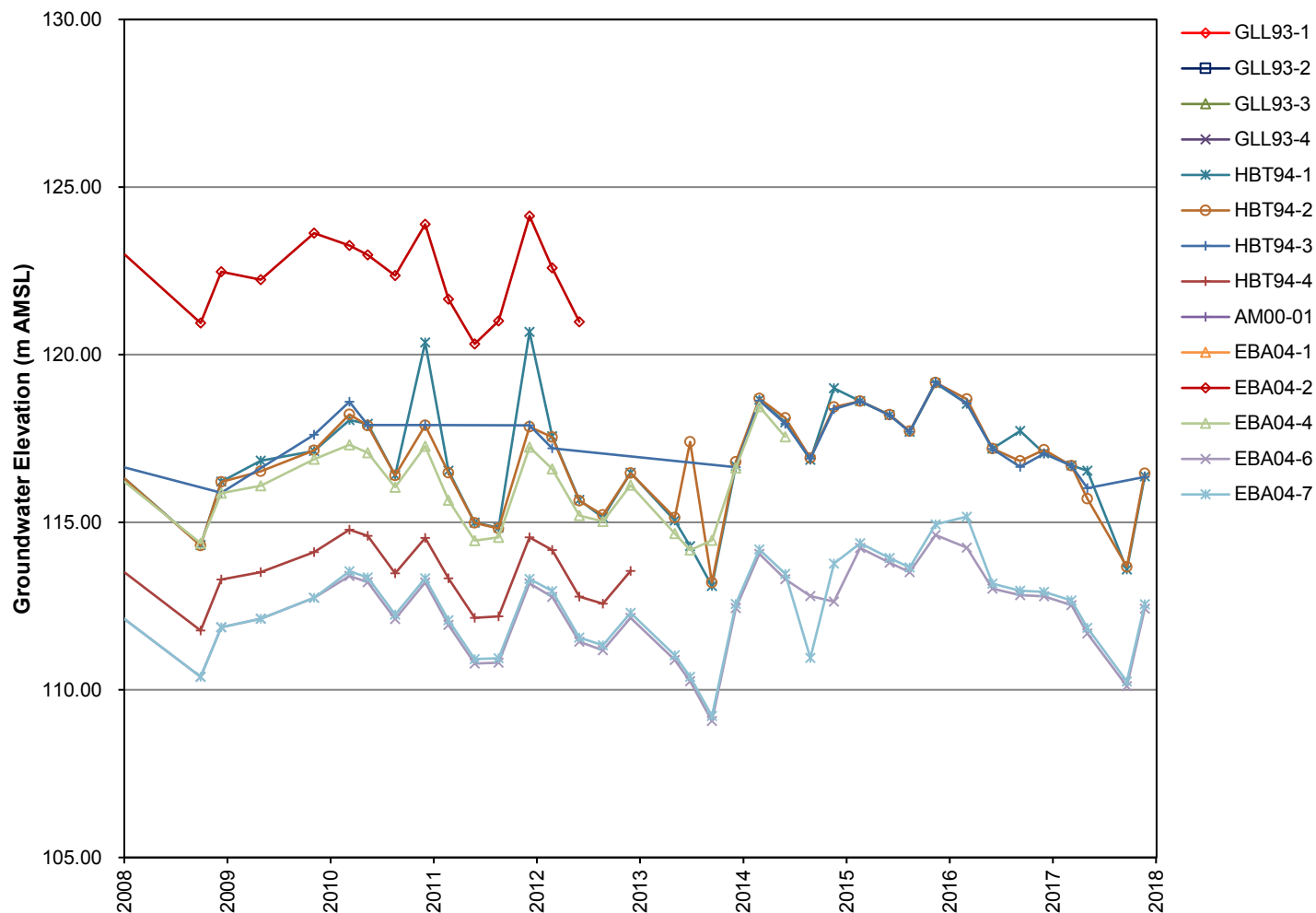


figure 5.1b

HYDROGRAPH 2008 - 2018 - LANDFILL WELLS 2018
 OPERATIONS AND MONITORING REPORT
 CAMPBELL RIVER WASTE MANAGEMENT CENTRE
Comox Strathcona Waste Management



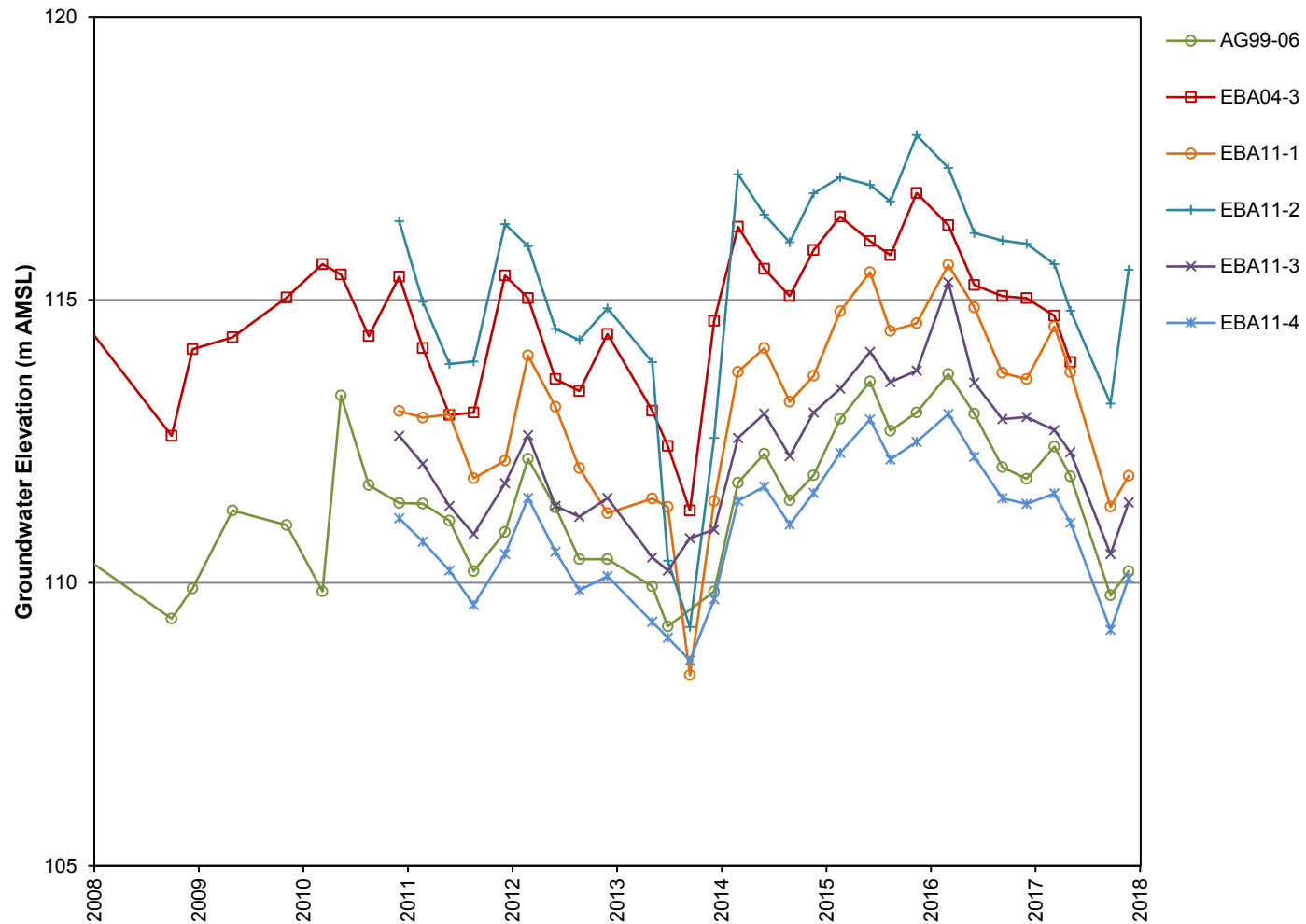


figure 5.1c

HYDROGRAPH 2008 - 2018 - NORTHEAST WELLS
 2018 OPERATIONS AND MONITORING REPORT
 CAMPBELL RIVER WASTE MANAGEMENT CENTRE
Comox Strathcona Waste Management



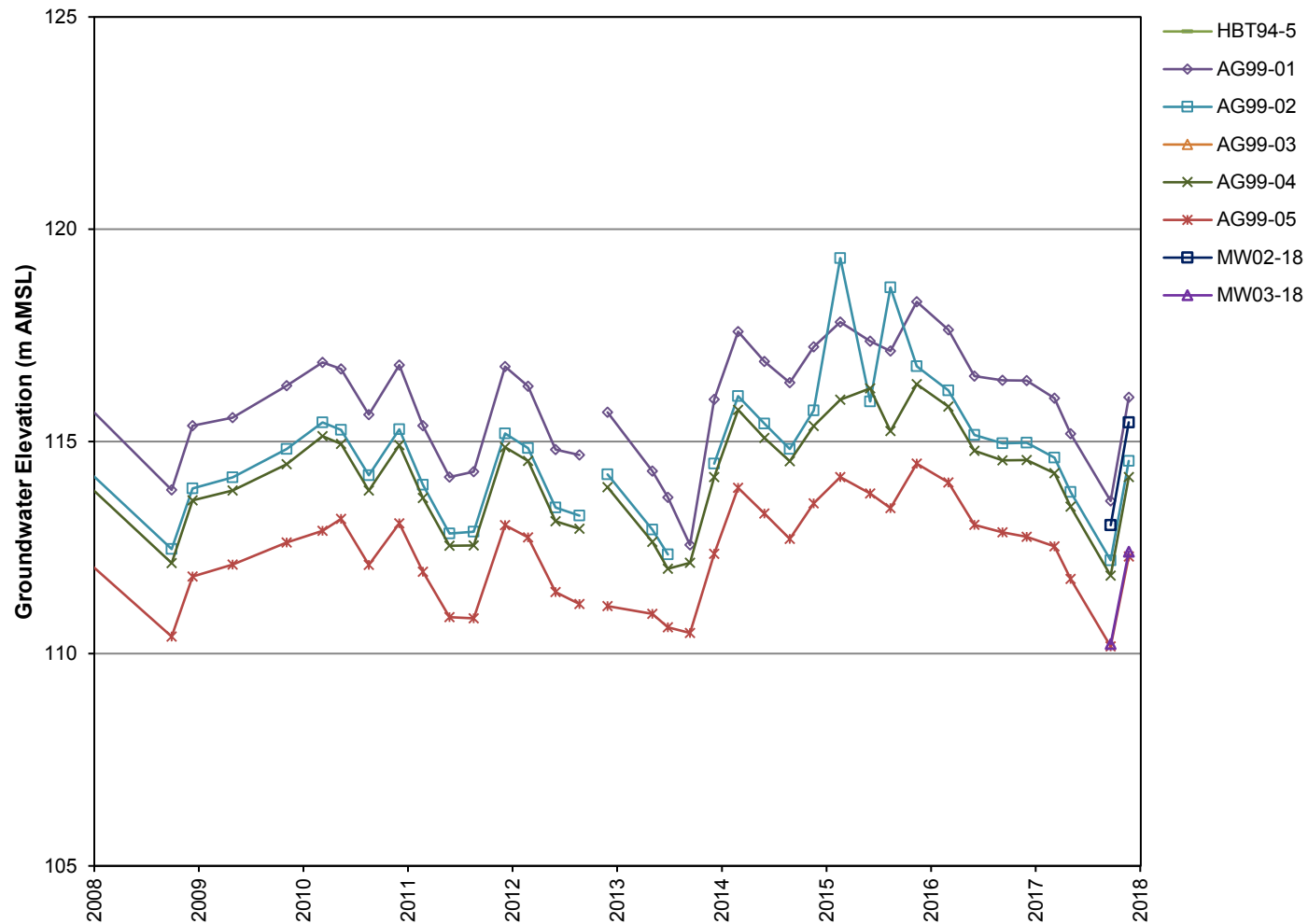
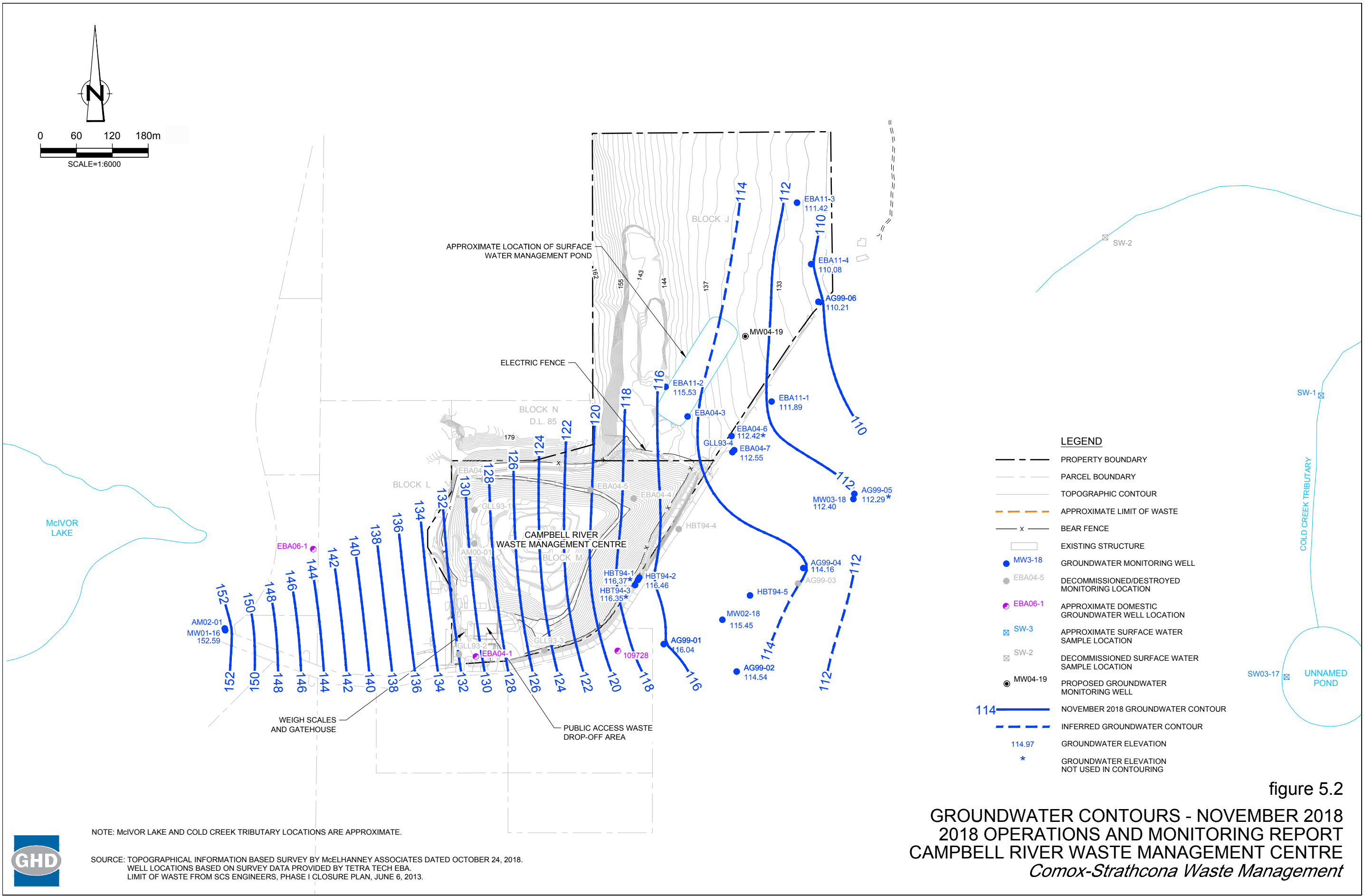
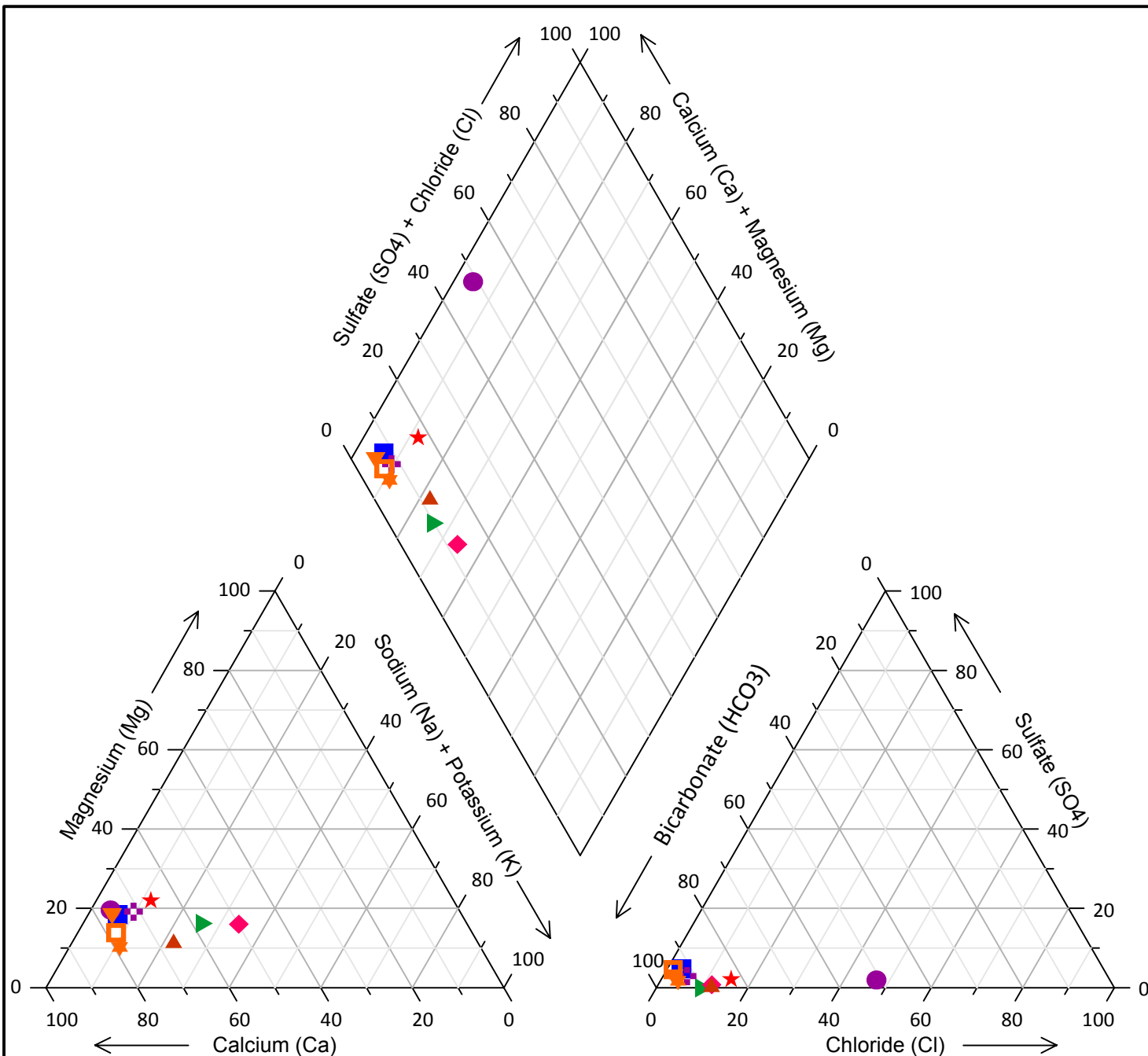


figure 5.1d

HYDROGRAPH 2008 - 2018 - SOUTHEAST WELLS
 2018 OPERATIONS AND MONITORING REPORT
 CAMPBELL RIVER WASTE MANAGEMENT CENTRE
Comox Strathcona Waste Management







LEGEND

■ MW01-16	Background	★ MW03-18
★ EBA04-7	At NE Landfill toe	◆ MW02-18
▶ HBT94-3	On eastern Landfill boundary	▲ HBT94-1
● EBA11-3	In Block J north	
✦ AG99-06	In Block J south	
▼ AG99-01	SE of Landfill	
◻ AG99-05	SE of Landfill	

NOTE:
HBT94-3 WAS SAMPLED
MARCH 6, 2018



2018 OPERATIONS AND MONITORING REPORT
CAMPBELL RIVER WASTE MANAGEMENT CENTER
Comox Strathcona Waste Management

NOVEMBER 2018 GROUNDWATER DATA -
PIPER PLOT

056484
April 04, 2019

FIGURE 5.3

Table 3.1

**Waste Tonnage and Diversion
2018 Operations and Monitoring Report
Campbell River Waste Management Centre
Comox Strathcona Waste Management**

	Units	2018
WASTE DISCHARGED TO LANDFILL ⁽¹⁾		
Waste from CRWMC wasteshed		
Construction Waste	tonnes	1,747
ICI & Household	tonnes	19,130
Municipal Waste by Contract	tonnes	4,359
Volunteer Clean Up	tonnes	16
Asbestos	tonnes	743
Streetside cleanup/illegal dumping	tonnes	3
Total Waste Discharged to Landfill		25,998
RECYLED/DIVERTED MATERIAL ⁽¹⁾		
Battery Sales	tonnes	25
Clean Wood Waste	tonnes	392
Cut Grass & Raked Leaves	tonnes	149
Drywall/Gypsum waste	tonnes	586
Refrigerators/CFCs	tonnes	84
Scrap Metal Sales	tonnes	677
Weigh only (tires etc)	tonnes	222
Yard Waste	tonnes	360
Commercial Cardboard/Recycling	tonnes	9
Total Recycled/Diverted Material		2,504
Clean fill used as cover		2,135
Total Material Delivered		30,637

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
2018 Operations and Monitoring Report
Campbell River Waste Management Centre
Comox Strathcona Waste Management**

Year	Estimated Population⁽¹⁾⁽²⁾
2018	43,337
2019	43,641
2020	43,946
2021	44,254
2022	44,564
2023	44,876

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
2018 Operations and Monitoring Report
Campbell River Waste Management Centre
Comox Strathcona Waste Management

Monitoring Location	February	May	September	November
Groundwater				
MW01-16	√	√	√	√
MW02-18 ⁽¹⁾	-	-	√	√
MW03-18 ⁽¹⁾	-	-	√	√
AG99-01	√	√	√	√
AG99-02	√	√	√	√
AG99-04	√	√	√	√
AG99-05	√	√	√	√
AG99-06	√	√	√	√
AM02-01	Dry	Dry	Dry	Dry
EBA04-1	√	√	√	√
EBA04-3 ⁽²⁾	√	√	-	-
EBA04-4 ⁽³⁾	-	-	-	-
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
Surface Water				
SW-1	√	√	√	√
SW03-17	√	√	√	√

Notes

√ - Sample collected and submitted for laboratory analysis

- Not included in sampling event

(1) Monitoring wells MW02-18 and MW03-18 were installed on July 25 and 24, 2018, respectively.

(2) Monitoring well EBA04-3 was inaccessible during the Sept and Nov monitoring events due to construction of the surface water pond.

(3) Monitoring well EBA04-4 is damaged and requires decommissioning

Table 4.2

Well Completion Details and Hydraulic Monitoring
2018 Operations and Monitoring Report
Campbell River Waste Management Centre
Comox Strathcona Waste Management

Location	Total	Top of	Screened Interval				Screen Length	2018 Water Levels								Screened Unit		Screened Lithology
	Depth	Riser						5-Mar-18		30-Apr-18		17-Sep-18		19-Nov-18				
	(m BTOR)	(m AMSL) ⁽¹⁾	(m BTOR)	(m AMSL)	(m)	(m AMSL)		(m BTOR)	(m AMSL)	(m BTOR)	(m AMSL)	(m BTOR)	(m AMSL)	(m BTOR)	(m AMSL)			
MW01-16 ⁽²⁾	43.17	186.69	38.60	41.64	145.10	148.15	3.1	152.12	34.57	149.56	37.14	151.50	35.19	152.59	34.10	Shallow overburden	Sand and gravel	
MW02-18	32.66	138.79	31.14	32.66	107.65	106.13	1.5	-	-	-	-	113.03	25.76	115.45	23.34	Shallow overburden	Sand	
MW03-18	27.21	132.10	25.68	27.21	106.42	104.89	1.5	-	-	-	-	110.23	21.87	112.40	19.70	Shallow overburden	Sand and gravel	
AG99-01	48.50	144.19	46.50	48.50	97.69	95.69	2.0	116.02	28.18	115.18	29.01	113.60	30.59	116.04	28.15	Deep overburden	Gravel	
AG99-02	51.51	139.85	49.00	51.00	90.85	88.85	2.0	114.62	25.24	113.81	26.05	112.20	27.65	114.54	25.31	Deep overburden	Gravel, some sand and cobbles	
AG99-04	45.42	136.44	38.00	45.00	98.44	91.44	7.0	114.25	22.20	113.46	22.98	111.84	24.60	114.16	22.28	Deep overburden	Gravel, some sand and cobbles	
AG99-05	50.90	132.09	44.00	50.00	88.09	82.09	6.0	112.53	19.56	111.76	20.34	110.17	21.92	112.29	19.80	Deep overburden	Sand, trace silt	
AG99-06	45.11	133.03	22.00	25.00	111.03	108.03	3.0	112.41	20.62	111.88	21.15	109.78	23.25	110.21	22.82	Shallow overburden	Sand, trace silt	
AM02-01	33.20	186.59	19.00	34.00	167.59	152.59	15.0	Dry	-	Dry	-	Dry	-	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 ⁽³⁾	41.20	142.20	38.10	41.20	104.10	101.00	3.1	114.72	27.48	113.90	28.30	Inaccessible	-	Inaccessible	-	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	112.53	23.82	111.68	24.66	110.11	26.23	112.42	23.92	Deep overburden	Sand and gravel	
EBA04-7	32.00	136.40	30.50	32.00	105.90	104.40	1.5	112.67	23.73	111.85	24.55	110.25	26.15	112.55	23.85	Shallow overburden	Sand and gravel	
EBA11-1	28.96	134.77	25.60	28.70	109.17	106.07	3.1	114.53	20.24	113.72	21.06	111.35	23.42	111.89	22.88	Shallow overburden	Sand, trace/some silt	
EBA11-2	35.00	141.55	32.00	35.00	109.55	106.55	3.0	115.63	25.92	114.81	26.74	113.17	28.39	115.53	26.02	Shallow overburden	Sand, gravelly, trace silt	
EBA11-3	30.18	134.19	27.10	30.18	107.09	104.01	3.1	112.70	21.49	112.31	21.89	110.51	23.68	111.42	22.77	Shallow overburden	Sand, trace gravel	
EBA11-4	29.57	133.13	25.90	29.00	107.23	104.13	3.1	111.58	21.55	111.06	22.08	109.17	23.96	110.08	23.06	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	3.0	116.70	25.21	116.54	25.36	113.59	28.32	116.37	25.53	Shallow overburden	Sand, trace silt and gravel	
HBT94-2	44.00	141.98	41.00	43.00	100.98	98.98	2.0	116.69	25.29	115.70	26.28	113.67	28.31	116.46	25.52	Deep overburden	Sand, some silt	
HBT94-3	27.00	142.32	25.00	27.00	117.32	115.32	2.0	116.69	25.63	116.02	26.30	Dry	-	116.35	25.97	Shallow overburden	Gravel	
HBT94-5	32.00	138.29	20.00	22.00	118.29	116.29	2.0	Dry	-	Dry	-	Dry	-	Dry	-	Shallow overburden	Sand, silty	

Notes

- (1)Well details for monitoring wells installed prior to 2016 sourced from Hydrogeologic Assessment and Closure Plan, Piteau Associates Engineering Ltd., April 1998
- (2)Monitoring well MW01-16 surveyed by McElhanney on Marxch 2017
- (3)Monitoring well EBA04-3 was inaccessible in Q3 and Q4 2018 due to construction of the surface water pond.
- m BTORmetres below top of riser
- m AMSLmetres above mean sea level
- not applicable/not available

Table 5.10

Groundwater Analytical Results - General Chemistry, Nutrients, Metals
2018 Operations and Monitoring Report
Campbell River Waste Management Centre
Campbell River, British Columbia

Sample Location:		MW02-18	MW03-18	MW03-18	MW03-18	MW03-18
Sample ID:		WG-56484-191118-NT-06	WG-56484-170918-MND-02	WG-56484-170918-MND-03	WG-56484-201118-NT-10	WG-56484-201118-NT-11
Sample Date:		11/19/2018	9/17/2018	9/17/2018 Duplicate	11/20/2018	11/20/2018 Duplicate
Parameters	Units					
Field Parameters						
Dissolved Oxygen, Field	mg/L	-	-	-	-	-
ORP, Field	millivolts	72	250	250	205	205
pH, Field	s.u.	6.92	6.96	6.96	8.23	8.23
Specific Conductance, Field	uS/cm	766	160	160	242	242
Temperature, Field	Deg C	10.84	11.83	11.83	11.11	11.11
Total Dissolved Solids, Field	g/L	0.49	0.104	0.104	0.157	0.157
Turbidity, Field	NTU	3.9	3.1	3.1	0.4	0.4
General Chemistry						
Alkalinity as CaCO3 Ph=8.3	mg/L	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Alkalinity, Bicarbonate (as CaCO3)	mg/L	410	83.0	84.8	136	134
Alkalinity, Carbonate (as CaCO3)	mg/L	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Alkalinity, Hydroxide (as CaCO3)	mg/L	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Alkalinity, Total (as CaCO3)	mg/L	336	68.1	69.5	111	110
Chloride (Dissolved)	mg/L	38	2.3	2.3	5.1	5.2
Fluoride	mg/L	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)
Hardness (Dissolved)	mg/L	215	65.4	61.3	110	110
pH, Lab	s.u.	7.45 J	7.89 J	7.93 J	8.01 J	7.99 J
Specific Conductance, Lab	uS/cm	769	144	147	237	235
Sulphate (Dissolved)	mg/L	3.3	1.5	2.0	2.8	2.7
Total dissolved solids (TDS)	mg/L	366	78	80	108	120
Nutrients						
Ammonia-N	mg/L	15	ND (0.020)	ND (0.020)	0.024	ND (0.020)
Nitrate (as N)	mg/L	ND (0.10)	0.15	0.15	0.27	0.26
Nitrite (as N)	mg/L	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)
Nitrite/Nitrate	mg/L	ND (0.10)	0.15	0.15	0.27	0.26
Dissolved Metals						
Aluminum	ug/L	ND (3.0)	10.6	9.3	6.3	5.6
Antimony	ug/L	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)
Arsenic	ug/L	0.24	0.53	0.55	0.45	0.45
Barium	ug/L	36.9	2.7	2.7	3.3	3.3
Beryllium	ug/L	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)
Boron	ug/L	651	ND (50)	ND (50)	ND (50)	ND (50)
Cadmium	ug/L	0.119	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)
Calcium	ug/L	65000	23200	21500	38600	38800
Chromium Total	ug/L	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Cobalt	ug/L	1.77	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)
Copper	ug/L	18.6	0.27	0.23	0.94	0.90
Iron	ug/L	40.4	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)
Lead	ug/L	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)
Lithium	ug/L	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)
Magnesium	ug/L	12700	1830	1830	3300	3310
Manganese	ug/L	2670*	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Mercury	ug/L	ND (0.0020)	ND (0.0020)	ND (0.0020)	ND (0.0020)	ND (0.0020)
Molybdenum	ug/L	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Nickel	ug/L	3.7	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Phosphorus	ug/L	16	ND (10)	12	11	ND (10)
Potassium	ug/L	11400	605	611	751	756
Selenium	ug/L	ND (0.10)	0.17	0.16	0.13	0.13
Silicon	ug/L	13500	4230	4260	4310	4370
Silver	ug/L	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)
Sodium	ug/L	43800	3300	3280	3730	3780
Strontium	ug/L	348	39.5	40.0	67.0	66.6
Sulphur	ug/L	ND (3000)	ND (3000)	ND (3000)	ND (3000)	ND (3000)
Thallium	ug/L	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)
Tin	ug/L	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)
Titanium	ug/L	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)
Uranium	ug/L	0.42	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)
Vanadium	ug/L	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)
Zinc	ug/L	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)
Zirconium	ug/L	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)

Table 5.11

Groundwater Analytical Results - Petroleum Products, VOCs
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Campbell River Waste Management Centre
Campbell River, British Columbia

Sample Location:				AG99-06	AG99-06	EBA04-7	EBA04-7	EBA04-7	EBA11-1	EBA11-1	EBA11-3	EBA11-3	EBA11-3	EBA11-4
Sample ID:				WG-56484-060318-MD-12	WG-56484-180918-MND-18	WG-56484-060318-MD-14	WG-56484-060318-MD-15	WG-56484-180918-MND-20	WG-56484-060318-MD-16	WG-56484-170918-MND-07	WG-56484-060318-MD-09	WG-56484-060318-MD-10	WG-56484-180918-MND-16	WG-56484-060318-MD-11
Sample Date:				3/6/2018	9/18/2018	3/6/2018	3/6/2018 Duplicate	9/18/2018	3/6/2018	9/17/2018	3/6/2018	3/6/2018 Duplicate	9/18/2018	3/6/2018
Parameters	Units	CSR DW a	CSR FAW b											
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)
Total Petroleum Hydrocarbons VH (C6-C10)	mg/L	15	15	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)
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)
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)
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)
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)
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)
1,2,3-Trichlorobenzene	ug/L	3	80	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	5.5	240	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)
1,2-Dichlorobenzene	ug/L	200	7	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	5	1000	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)
1,3,5-Trimethylbenzene	ug/L	40	--	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)
1,3-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)
1,4-Dichlorobenzene	ug/L	5	260	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	5	400	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)	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)
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)
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)
Carbon tetrachloride	ug/L	2	130	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	80	13	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)
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)
Chloroform (Trichloromethane)	ug/L	100	20	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)
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)
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)
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)
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)
Ethylbenzene	ug/L	140	2000	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	2	15	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)
Isopropyl benzene	ug/L	400	--	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)
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)
Methyl Tert Butyl Ether	ug/L	95	34000	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	--	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)
Styrene	ug/L	800	720	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	30	1100	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	60	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)
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)
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)
Trichloroethene	ug/L	5	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)
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)
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)
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)
Xylene (total)	ug/L	90	300	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

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Sample Location:		EBA11-4	HBT94-2	HBT94-2	MW01-16	MW01-16	MW02-18	MW02-18
Sample ID:		WG-56484-180918-MND-17	WG-56484-060318-MD-17	WG-56484-170918-MND-09	WG-56484-050318-MD-01	WG-56484-170918-MND-08	WG-56484-180918-MND-12	WG-56484-180918-MND-13
Sample Date:		9/18/2018	3/6/2018	9/17/2018	3/5/2018	9/17/2018	9/18/2018	9/18/2018
Parameters	Units							Duplicate
Petroleum Products								
Total Petroleum Hydrocarbons VPH (C6-C10)LessBTEX	mg/L	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)
Volatile Organic Compounds								
1,1,1,2-Tetrachloroethane	ug/L	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	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	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	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	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	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	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	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	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	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	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	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)
1,3,5-Trimethylbenzene	ug/L	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)
1,3-Dichlorobenzene	ug/L	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	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)
Benzene	ug/L	ND (0.40)	ND (0.40)	ND (0.40)	ND (0.40)	ND (0.40)	ND (0.40)	ND (0.40)
Bromobenzene	ug/L	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)
Bromodichloromethane	ug/L	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Bromoform	ug/L	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	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	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)
Chlorobenzene	ug/L	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)
Chloroethane	ug/L	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	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)
cis-1,2-Dichloroethene	ug/L	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)
Dibromochloromethane	ug/L	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Dichlorodifluoromethane (CFC-12)	ug/L	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)
Ethylbenzene	ug/L	ND (0.40)	ND (0.40)	ND (0.40)	ND (0.40)	ND (0.40)	ND (0.40)	ND (0.40)
Hexachlorobutadiene	ug/L	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)
Isopropyl benzene	ug/L	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)
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)
Methyl Tert Butyl Ether	ug/L	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	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)
Styrene	ug/L	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)
Tetrachloroethene	ug/L	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)
Toluene	ug/L	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	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)
Trichloroethene	ug/L	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	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	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	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	ND (0.40)	ND (0.40)	ND (0.40)	ND (0.40)	ND (0.40)	ND (0.40)	ND (0.40)

Table 5.12

**Surface Water Analytical Results
2018 Operations and Monitoring Report
Campbell River Waste Management Centre
Campbell River, British Columbia**

Sample Location:			SW-1	SW-1	SW-1	SW-1	SW-1	SW03-17	SW03-17	SW03-17	SW03-17	
Sample ID:	BC WQG	BC WQG	WS-56484-060318-NT-01	WS-56484-060318-NT-02	WS-56484-010518-NT-01	WS-56484-170918-MND-01	WS-56484-201118-NT-01	WS-56484-060318-NT-03	WS-56484-010518-NT-02	WS-56484-170918-MND-02	WS-56484-201118-NT-02	
Sample Date:	DW	FWAL	3/6/2018	3/6/2018	5/1/2018	9/17/2018	11/20/2018	3/6/2018	5/1/2018	9/17/2018	11/20/2018	
		(Most stringent guideline available -- LTA unless otherwise specified)		Duplicate								
Parameters	Units	c	d									
Field Parameters												
Dissolved Oxygen, Field	mg/L	--	>11	12.38	12.38	5.29 ^d	11.78	7.93 ^d	13.41	5.67 ^d	6.25 ^d	4.8 ^d
ORP, Field	millivolts	--	--	239	239	209	219	229	244	211	214	243
pH, Field	s.u.	--	6.5-9.0	7.25	7.25	7.70	7.21	7.09	7.15	7.66	7.35	6.5
Specific Conductance, Field	uS/cm	--	--	36	36	37	98	34	34	31	37	32
Temperature, Field (stream)	Deg C	15 (*)	19 (12 spring/fall) STM	4.37	4.37	9.69	11.99	6.96				
Temperature, Field (lake/impoundment)	Deg C	15 (*)	+1 (c)						3.52	13.20	15.80	6.87
Total Dissolved Solids, Field	g/L	--	--	0.024	0.024	0.024	0.064	0.022	0.023	0.020	0.024	0.021
Turbidity, Field	NTU	(c)	+2 (c)	1.1	1.1	0	2.2	0	0.9	1.9	13.8	0
General Chemistry												
Alkalinity as CaCO3 Ph=8.3	mg/L	--	--	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Alkalinity, Bicarbonate (as CaCO3)	mg/L	--	--	9.2	9.1	10.0	19.9	8.5	7.5	7.1	10.2	10.7
Alkalinity, Carbonate (as CaCO3)	mg/L	--	--	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Alkalinity, Hydroxide (as CaCO3)	mg/L	--	--	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Alkalinity, Total (as CaCO3)	mg/L	--	[e] w	7.5	7.5	8.2	16.3	7.0	6.2	5.8	8.3	8.8
Chloride (Dissolved)	mg/L	--	--	3.8	3.7	3.6	5.5	3.9	3.5	3.4	3.5	3.6
Fluoride	mg/L	1.5	[b] STM	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)
Hardness	mg/L	--	--	8.68	8.42	9.58	31.0	9.02	7.40	7.86	8.52	8.56
Hardness (Dissolved)	mg/L	--	--	8.64	8.08	9.97	31.4	8.88	7.36	7.97	8.48	8.21
pH, Lab	s.u.	--	6.5-9.0	6.98 J	6.95 J	6.97 J	7.05 J	6.82 J	6.88 J	6.88 J	6.88 J	7.06 J
Specific Conductance, Lab	uS/cm	--	--	33.0	30.4	34.1	88.6	31.0	30.6	31.6	31.2	30.6
Sulphate (Dissolved)	mg/L	--	--	ND (1.0)	ND (1.0)	ND (1.0)	12.4	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Total dissolved solids (TDS)	mg/L	--	--	16	12	64	68	18	14	20	20	28
Nutrients												
Ammonia-N	mg/L	--	[d]	ND (0.020)	ND (0.020)	0.074	0.044	ND (0.020)	ND (0.020)	0.068	ND (0.020)	0.032
Nitrate (as N)	mg/L	10	3.0	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)
Nitrite (as N)	mg/L	1	[c]	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)
Nitrite/Nitrate	mg/L	--	--	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)
Dissolved Metals												
Aluminum	ug/L	--	[a]	51.4 ^d	46.4	60.6 ^d	78.7 ^d	42.2	46.2	43.6	16.2	30.6
Antimony	ug/L	--	--	0.021	0.021	0.035	0.066	0.021	ND (0.020)	0.030	ND (0.020)	0.023
Arsenic	ug/L	--	--	0.084	0.083	0.118	0.155	0.116	0.073	0.092	0.101	0.108
Barium	ug/L	--	--	1.32	1.19	1.62	3.92	1.49	1.24	1.31	1.30	1.44
Beryllium	ug/L	--	--	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)
Bismuth	ug/L	--	--	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)
Boron	ug/L	--	--	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)
Cadmium	ug/L	--	[b]*	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)
Calcium	ug/L	--	--	1930	1800	2400	7520	2110	1710	1900	2020	2000
Chromium Total	ug/L	--	--	0.11	0.10	0.34	0.27	0.10	ND (0.10)	0.26	ND (0.10)	ND (0.10)
Cobalt	ug/L	--	--	0.0321	0.0312	0.0778	0.0645	0.0257	0.0273	0.0273	0.0194	0.0282
Copper	ug/L	--	--	0.234	0.224	0.291	0.774	0.250	0.214	0.212	0.208	0.191
Iron	ug/L	--	350 STM	68.0	64.2	145	87.1	80.6	55.3	60.9	29.5	62.5
Lead	ug/L	--	--	0.0231	0.0225	0.0686	0.124	0.0346	0.0176	0.0237	0.0098	0.0236
Lithium	ug/L	--	--	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)
Magnesium	ug/L	--	--	927	871	969	3070	878	748	782	834	782
Manganese	ug/L	--	--	6.19	5.95	23.9	23.2	5.98	5.00	4.60	6.36	7.02
Mercury	ug/L	--	--	ND (0.0020)	ND (0.0020)	ND (0.0020)	0.0032	ND (0.0020)	ND (0.0020)	ND (0.0020)	ND (0.0020)	ND (0.0020)
Molybdenum	ug/L	--	--	ND (0.050)	ND (0.050)	ND (0.050)	ND (0.050)	ND (0.050)	ND (0.050)	ND (0.050)	ND (0.050)	ND (0.050)
Nickel	ug/L	--	--	0.095	0.090	0.133	0.200	0.094	0.079	0.107	0.083	0.094

Table 5.12

Surface Water Analytical Results
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Campbell River, British Columbia

Sample Location:			SW-1	SW-1	SW-1	SW-1	SW-1	SW03-17	SW03-17	SW03-17	SW03-17	
Sample ID:	BC WQG	BC WQG	WS-56484-060318-NT-01	WS-56484-060318-NT-02	WS-56484-010518-NT-01	WS-56484-170918-MND-01	WS-56484-201118-NT-01	WS-56484-060318-NT-03	WS-56484-010518-NT-02	WS-56484-170918-MND-02	WS-56484-201118-NT-02	
Sample Date:	DW	FWAL	3/6/2018	3/6/2018	5/1/2018	9/17/2018	11/20/2018	3/6/2018	5/1/2018	9/17/2018	11/20/2018	
			(Most stringent guideline available -- LTA unless otherwise specified)									
			Duplicate									
Parameters	Units	c	d									
Phosphorus	ug/L	--	--	2.5	4.4	8.3 J	26.1	5.5	2.6	4.8	2.6	6.0
Potassium	ug/L	--	--	128	116	141	1100	143	103	125	128	128
Selenium	ug/L	--	--	ND (0.040)	ND (0.040)	ND (0.040)	0.070	ND (0.040)	0.041	ND (0.040)	ND (0.040)	ND (0.040)
Silicon	ug/L	--	--	2900	2610	3220	6400	2010	2600	2810	1880	1930
Silver	ug/L	--	--	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)
Sodium	ug/L	--	--	2590	2410	2590	3940	2560	2200	2440	2560	2350
Strontium	ug/L	--	--	8.49	8.08	10.3	29.7	9.01	6.93	8.56	9.51	8.33
Sulphur	ug/L	--	--	ND (3000)	ND (3000)	ND (3000)	4200	ND (3000)	ND (3000)	ND (3000)	ND (3000)	ND (3000)
Thallium	ug/L	--	--	ND (0.0020)	ND (0.0020)	ND (0.0020)	0.0025	ND (0.0020)	ND (0.0020)	ND (0.0020)	ND (0.0020)	ND (0.0020)
Tin	ug/L	--	--	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)
Titanium	ug/L	--	--	0.71	0.70	1.52	2.76	1.69 J	ND (0.50)	ND (0.50)	ND (0.50)	1.52
Uranium	ug/L	--	--	ND (0.0020)	ND (0.0020)	ND (0.0020)	0.0024	ND (0.0020)	ND (0.0020)	ND (0.0020)	ND (0.0020)	ND (0.0020)
Vanadium	ug/L	--	--	0.30	0.29	0.48	2.41	0.37	ND (0.20)	ND (0.20)	ND (0.20)	0.21
Zinc	ug/L	--	--	0.75	0.79	0.85	1.06	0.85	0.54	0.62	0.52	0.69
Zirconium	ug/L	--	--	ND (0.10)	ND (0.10)	ND (0.10)	0.13	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)
Total Metals												
Aluminum	ug/L	9500	--	58.4	60.2	63.7	1110	46.4	44.8	43.8	23.1	36.2
Antimony	ug/L	--	--	0.021	0.021	0.022	0.080	0.025	ND (0.020)	0.023	0.028	0.022
Arsenic	ug/L	10	5 Interim STM	0.084	0.093	0.115	0.250	0.102	0.075	0.083	0.101	0.103
Barium	ug/L	--	1000 w	1.36	1.37	1.56	6.64	1.48	1.21	1.27	1.41	1.43
Beryllium	ug/L	--	0.13 w	ND (0.010)	ND (0.010)	ND (0.010)	0.015	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)	ND (0.0050)	ND (0.0050)	ND (0.0050)
Boron	ug/L	5000	1200	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)
Cadmium	ug/L	5	--	ND (0.0050)	ND (0.0050)	0.0050	0.0199	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)
Calcium	ug/L	--	--	2000	1900	2290	7240	2140	1640	1870	1960	2040
Chromium Total	ug/L	--	--	0.11	0.11	0.42	1.07	0.11	ND (0.10)	0.24	ND (0.10)	ND (0.10)
Cobalt	ug/L	--	4	0.0517	0.0448	0.0823	0.521	0.0385	0.0354	0.0341	0.0235	0.0321
Copper	ug/L	1000 (*)	[b]*	0.240	0.230	0.277	1.79	0.260	0.240	0.225	0.274	0.207
Iron	ug/L	300 (*)	1000 STM	117 J	94.6 J	160	756*	90.5	82.8	67.9	36.0	78.7
Lead	ug/L	10	[b]*	0.0790 J	0.0591 J	0.0896	0.531	0.0500	0.0643	0.0447	0.0263	0.0337
Lithium	ug/L	--	--	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)
Magnesium	ug/L	--	--	893	894	941	3140	894	800	777	879	841
Manganese	ug/L	50 (*)	[b]*	11.0	9.76	24.6	59.8*	6.75	7.11	5.29	6.60	8.13
Mercury	ug/L	1	[f]	ND (0.0020)	ND (0.0020)	ND (0.0020)	ND (0.0020)	ND (0.0020)	ND (0.0020)	ND (0.0020)	ND (0.0020)	ND (0.0020)
Molybdenum	ug/L	250	1000	ND (0.050)	ND (0.050)	0.162	0.053	ND (0.050)	ND (0.050)	ND (0.050)	ND (0.050)	ND (0.050)
Nickel	ug/L	--	[b] w	0.101	0.116	0.156	0.659	0.118	0.099	0.112	0.085	0.095
Phosphorus (lakes)	ug/L	10 (*)	5 to 15*	--	--	--	--	--	6.2	9.8	5.9	6.3
Phosphorus (streams)	ug/L	10 (*)	--	6.5	7.5	5.7 J	82.9	8.7	--	--	--	--
Potassium	ug/L	--	--	120	120	138	1090	149	114	130	136	137
Selenium	ug/L	10	2*	0.040	ND (0.040)	ND (0.040)	0.082	ND (0.040)	ND (0.040)	ND (0.040)	ND (0.040)	ND (0.040)
Silicon	ug/L	--	--	2880	2950	3010	6700	2200	2430	2620	1860	2100
Silver	ug/L	--	[b]	ND (0.0050)	ND (0.0050)	ND (0.0050)	0.0077	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)
Sodium	ug/L	--	--	2470	2440	2540	3950	2520	2320	2430	2670	2520
Strontium	ug/L	--	--	8.24	8.35	9.45	29.2	9.23	7.16	8.03	9.30	8.53
Sulphur	ug/L	--	--	ND (3000)	ND (3000)	ND (3000)	4100	ND (3000)	ND (3000)	ND (3000)	ND (3000)	ND (3000)
Thallium	ug/L	--	0.8 w	ND (0.0020)	ND (0.0020)	ND (0.0020)	0.0029	ND (0.0020)	ND (0.0020)	ND (0.0020)	ND (0.0020)	ND (0.0020)
Tin	ug/L	--	--	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)
Titanium	ug/L	--	--	2.16 J	1.45 J	1.85	108	0.97 J	0.92	ND (0.50)	ND (0.50)	1.10
Uranium	ug/L	--	8.5 w	ND (0.0020)	ND (0.0020)	ND (0.0020)	0.0104	ND (0.0020)	ND (0.0020)	ND (0.0020)	ND (0.0020)	ND (0.0020)
Vanadium	ug/L	--	--	0.43	0.36	0.47	5.56	0.31	0.29	ND (0.20)	ND (0.20)	ND (0.20)
Zinc	ug/L	5000 (*)	[b]*	0.70	0.61	0.91	2.80	0.76	0.63	0.75	0.78	0.78
Zirconium	ug/L	--	--	ND (0.10)	ND (0.10)	ND (0.10)	0.42	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)

Table 5.13

Analytical Result Notes
2018 Operations and Monitoring Report
Campbell River Waste Management Centre
Campbell River, British Columbia

Notes:

ENV	British Columbia Ministry of Environment and Climate Change Strategy
CSR	ENV British Columbia Contaminated Sites Regulation (CSR) Schedule 3.2 Generic Numerical Water Standards (June, 2018)
WQG	ENV British Columbia Approved (March 2018), Working (June 2017) and Source Drinking (December 2017) Water Quality Guidelines (WQG)
	Most stringent guideline is presented unless otherwise indicated.
FAW	Guideline/standard for the protection of freshwater aquatic life
DW	Guideline/standard for the protection of drinking water
LTA	Long term average WQG FAW (generally most stringent guideline). WQGs presented are LTA unless otherwise specified.
a	CSR DW
b	CSR FAW
c	WQG DW
d	WQG FAW
w	Working WQG. Provides benchmarks for those substances that have not yet been fully assessed and endorsed by the ENV.
Interim	Interim WQG developed when insufficient data available to meet the minimum requirement of a full guideline.
(*)	Aesthetic objective. Parameters may impair the taste, smell or colour of water or interfere with the supply of good quality water. Parameters do not cause adverse health effects.
ND	Not detected at the associated reporting limit.
J	Estimated concentration.
R	Rejected result
[a]	Limit varies with pH.
[b]	Limit varies with Hardness.
[c]	Limit varies with Chloride (mg/L).
[f]	Limit varies with Methyl Mercury.
[h]	Standard varies with pH, temperature and substance isomer.
[i]	Standard varies with pH, temperature and substance isomer. Consult a director for further advice.
	Exceeds indicated standard or guideline
(c)	Background dependant. Comparison to background not complete or background location has not been established.

Dissolved Oxygen, field	WQG specific to buried embryo/alevin life stages of aquatic life (most conservative).
Turbidity, field	WQG applies to water during clear flows or clear water
Cadmium, dissolved	WQG LTA applies to water hardnesses between 3.4 and 285 mg/L CaCO ₃ .
Copper, total	WQG LTA applies to water hardnesses between 50 and 250 mg/L CaCO ₃ .
Lead, total	WQG LTA and STM apply to water hardnesses between 8 and 360 mg/L CaCO ₃ .
Zinc, total	WQG LTA applies to water hardnesses between 90 and 330 mg/L CaCO ₃ .

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


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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.



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- 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

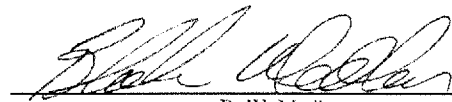
3.2. Annual Operating and Monitoring Report

- 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

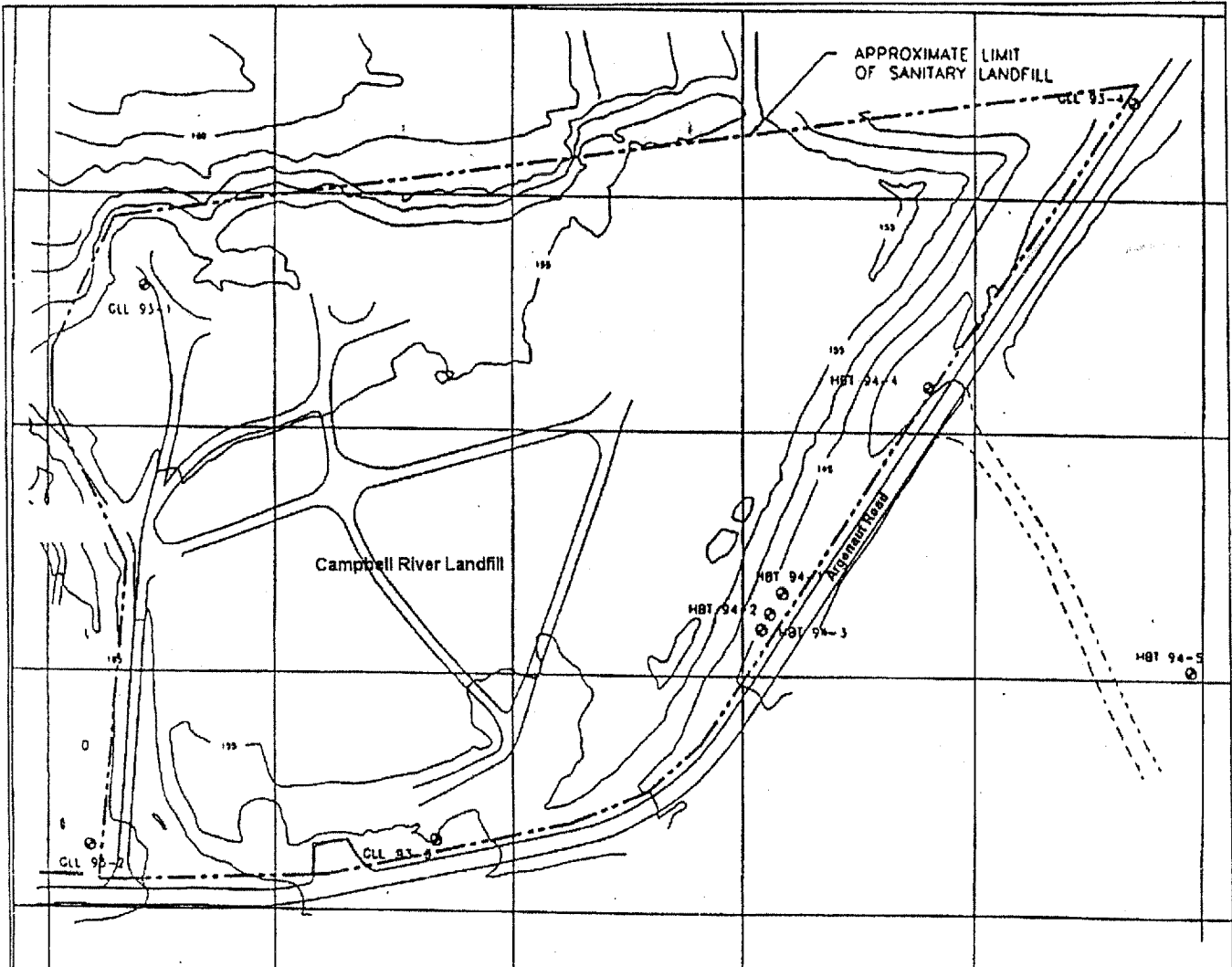
4.1. Closure and Post-Closure Fund

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.

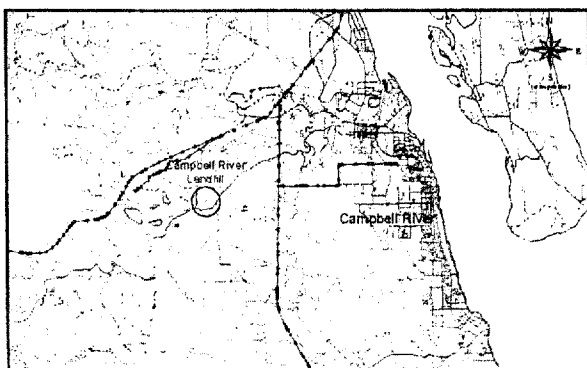


B. W. Medlar
Assistant Regional Waste Manager

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

GRAPHICS, SYMBOLS AND ABBREVIATIONS ON LOGS

SAMPLE TYPES and TESTS

SS	Split Spoon Sample	
SN	Non-Standard Split Spoon Sample	
ST	Shelby Tube Sample : (unconfined compression or unconsolidated undrained test)	- ◆
DS	Denison Type Sample	
PS	Piston Type Sample	
CS	Continuous Sample	
GS	Grab Sample	
WS	Wash Sample	
BQ	BQ Core Sample	
HQ	HQ Core Sample	
NQ	NQ Core Sample	
DT	Dynamic Penetration Test	
VT	Field Vane Test (undisturbed)	- +
VT	Field Vane Test (remoulded)	- ⊕

PENETRATION RESISTANCES

Standard Penetration Resistance(N Value)

The number of blows by a 63.6 kg (140 lb) hammer dropped 760 mm (30 in.) required to drive a 50 mm (2 in.) split spoon sampler for a distance of 300 mm (12 in.).

ABBREVIATIONS

DTPL: Drier Than Plastic Limit
 APL: About Plastic Limit
 WTPL: Wetter Than Plastic Limit
 K: Hydraulic Conductivity (m/s)
 C_u : Undrained Shear Strength (kPa)
 % REC : Percentage of Sample Recovered
 % RQD : Indirect Measure of the Number of Fractures and Soundness of Rock Mass
 ≈ Approximate Water Table

GRAIN SIZE CLASSIFICATION %

trace, "eg. trace sand"	1 - 10
some, "eg. some sand"	10 - 20
adjective, "eg. sandy"	20 - 35
and, "eg. and sand"	35 - 50
noun, "eg. sand"	>50

Note: Classification Divisions Based on Modified M.I.T. Grain Size Scale

SOIL DESCRIPTIONS

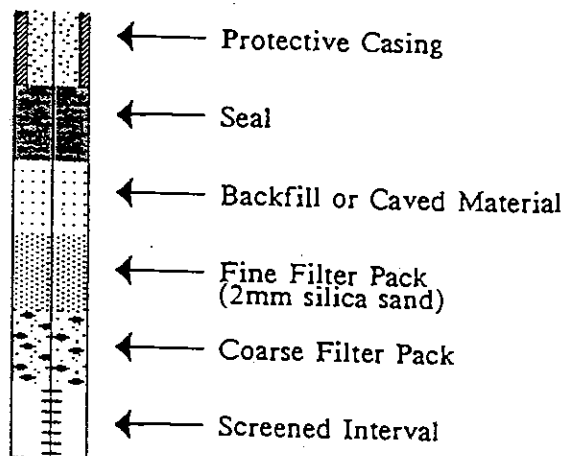
Cohesionless Soils

Relative Density	N Value
Very loose	0 to 4
Loose	4 to 10
Compact	10 to 30
Dense	30 to 50
Very Dense	over 50

Cohesive Soils

Consistency	C_u (kPa)	N Value
Very soft	0 to 12	0 to 2
Soft	12 to 25	2 to 4
Firm	25 to 50	4 to 8
Stiff	50 to 100	8 to 15
Very Stiff	100 to 200	15 to 30
Hard	over 200	over 30

MONITOR DETAILS



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

SAND AND GRAVEL																			
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																			
15																			
16																			
17		SAND AND GRAVEL Medium brown fine to medium sand, some fine to medium subrounded gravel, moist, compact.			GS														
18																			
19																			
		- Medium brown fine to medium sand and fine to coarse gravel with cobbles from 16.5 m to 17.1 m.			GS														

BOREHOLE LOG

PROJECT: 92-746

BOREHOLE: 1 2 of 2

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

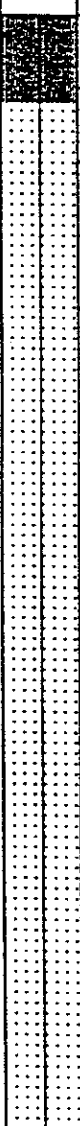
DATE: 11 January 1993

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	N VALUE				WATER CONTENT (%)				
											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 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

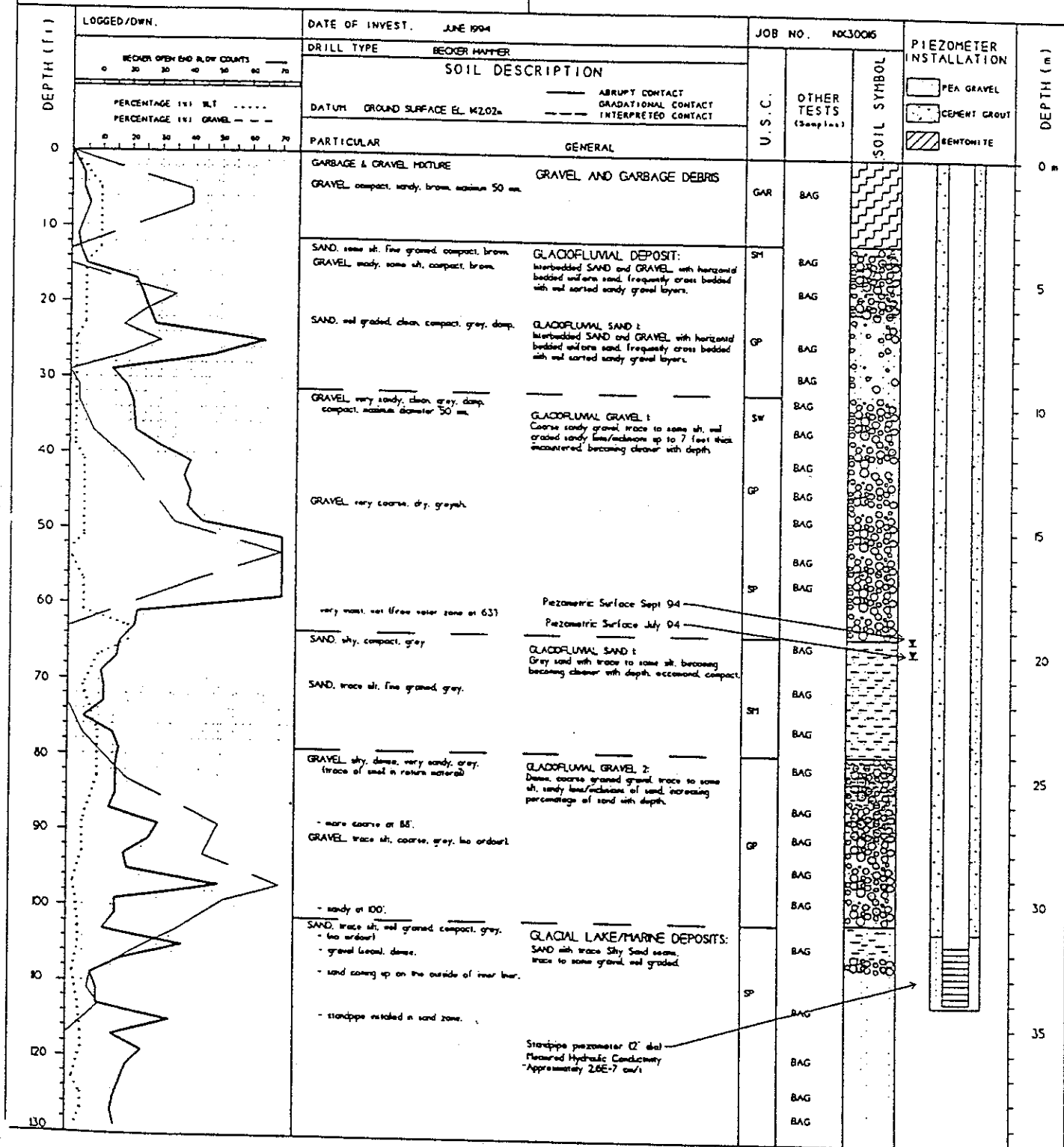
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Earth & Environmental

LOG OF BOREHOLE NO. HBT 94-1

DISTRICT OF CAMPBELL RIVER LANDFILL, ARGONAUT ROAD
1994 HYDROGEOLOGIC INVESTIGATIONS

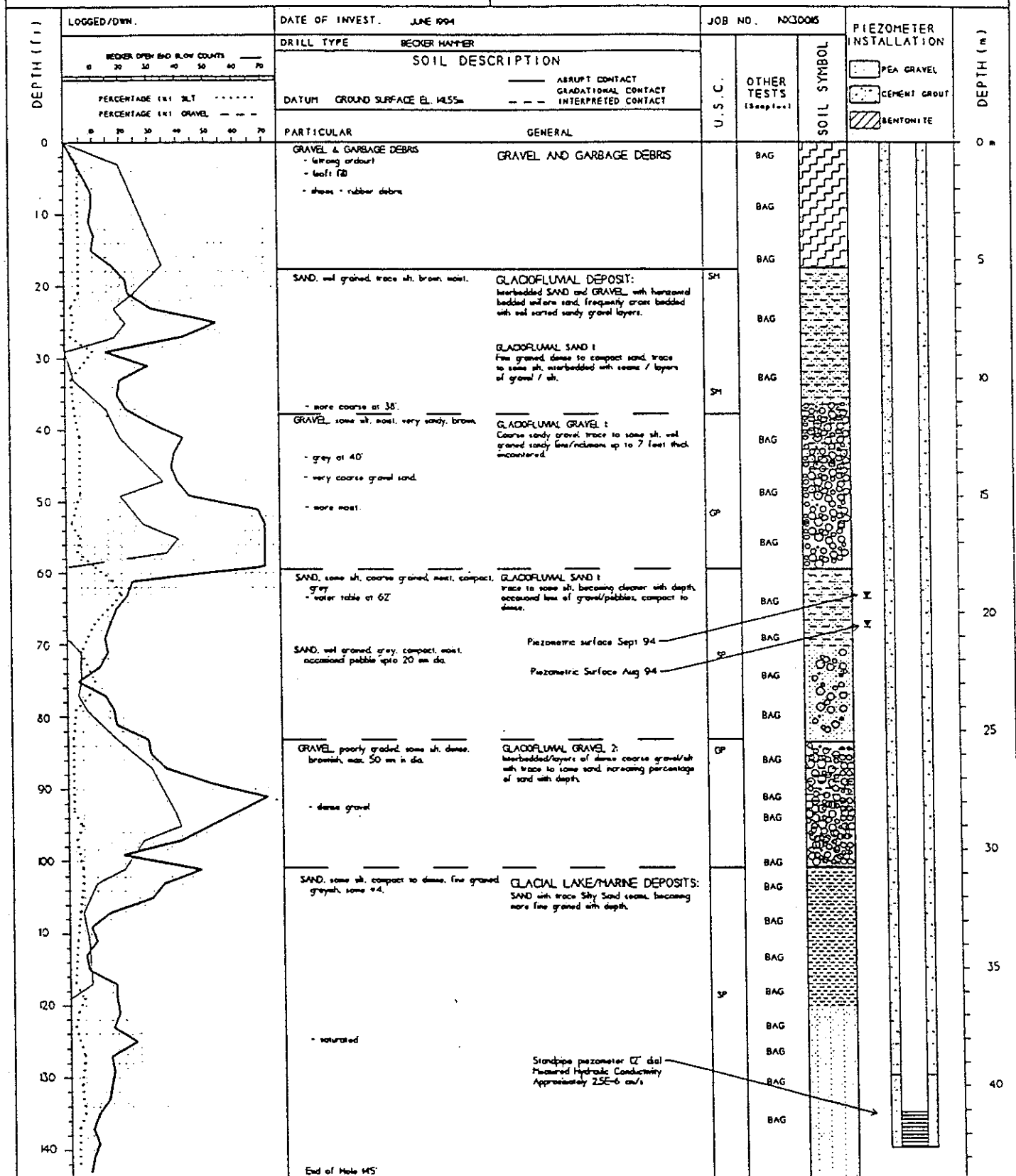




AGRA
Earth & Environmental

LOG OF BOREHOLE NO. HET 94-2

DISTRICT OF CAMPBELL RIVER LANDFILL, ARGONAUT ROAD
1994 HYDROGEOLOGIC INVESTIGATIONS

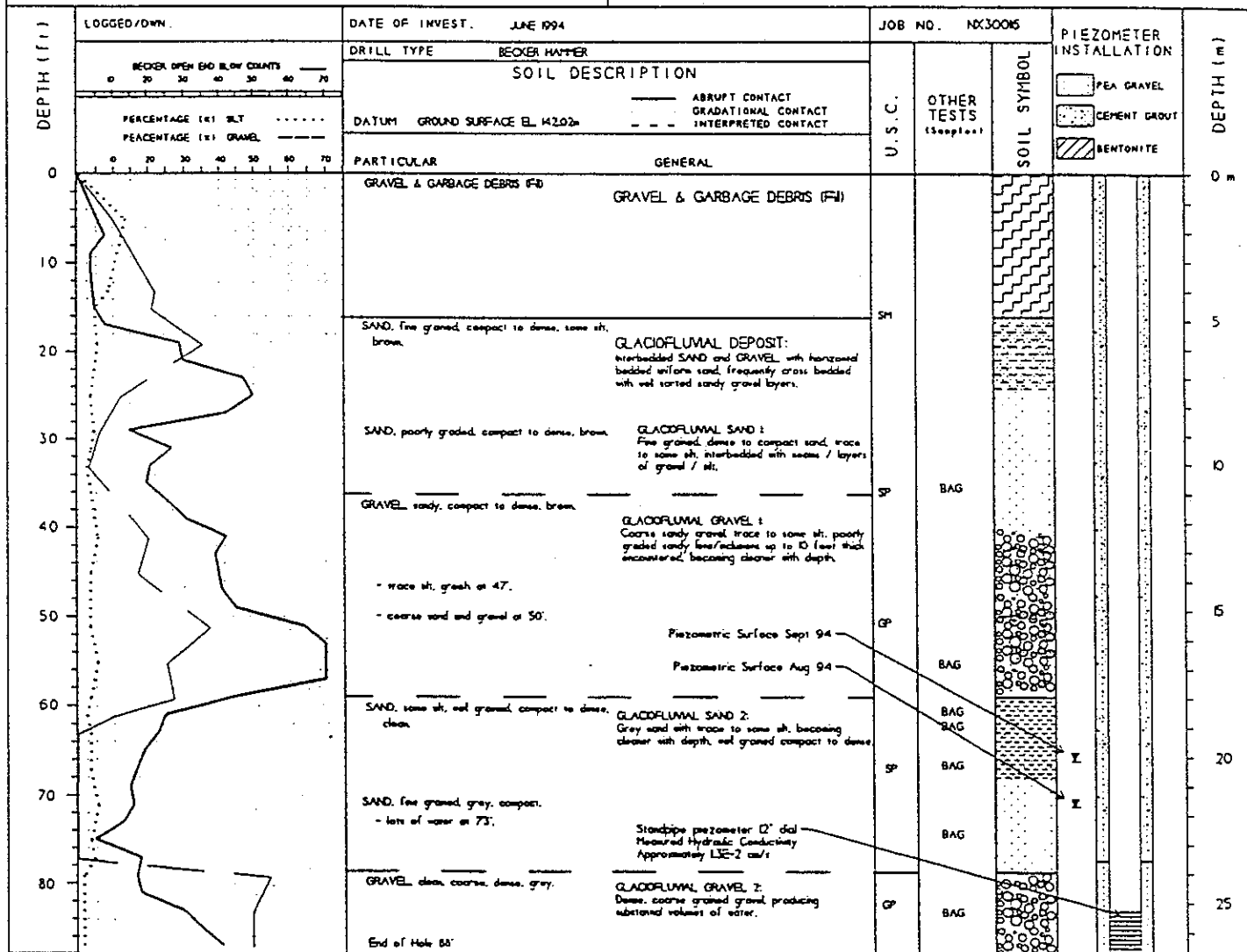




AGRA
Earth & Environmental

LOG OF BOREHOLE NO. HBT 94-3

DISTRICT OF CAMPBELL RIVER LANDFILL, ARGONAUT ROAD
1994 HYDROGEOLOGIC INVESTIGATIONS

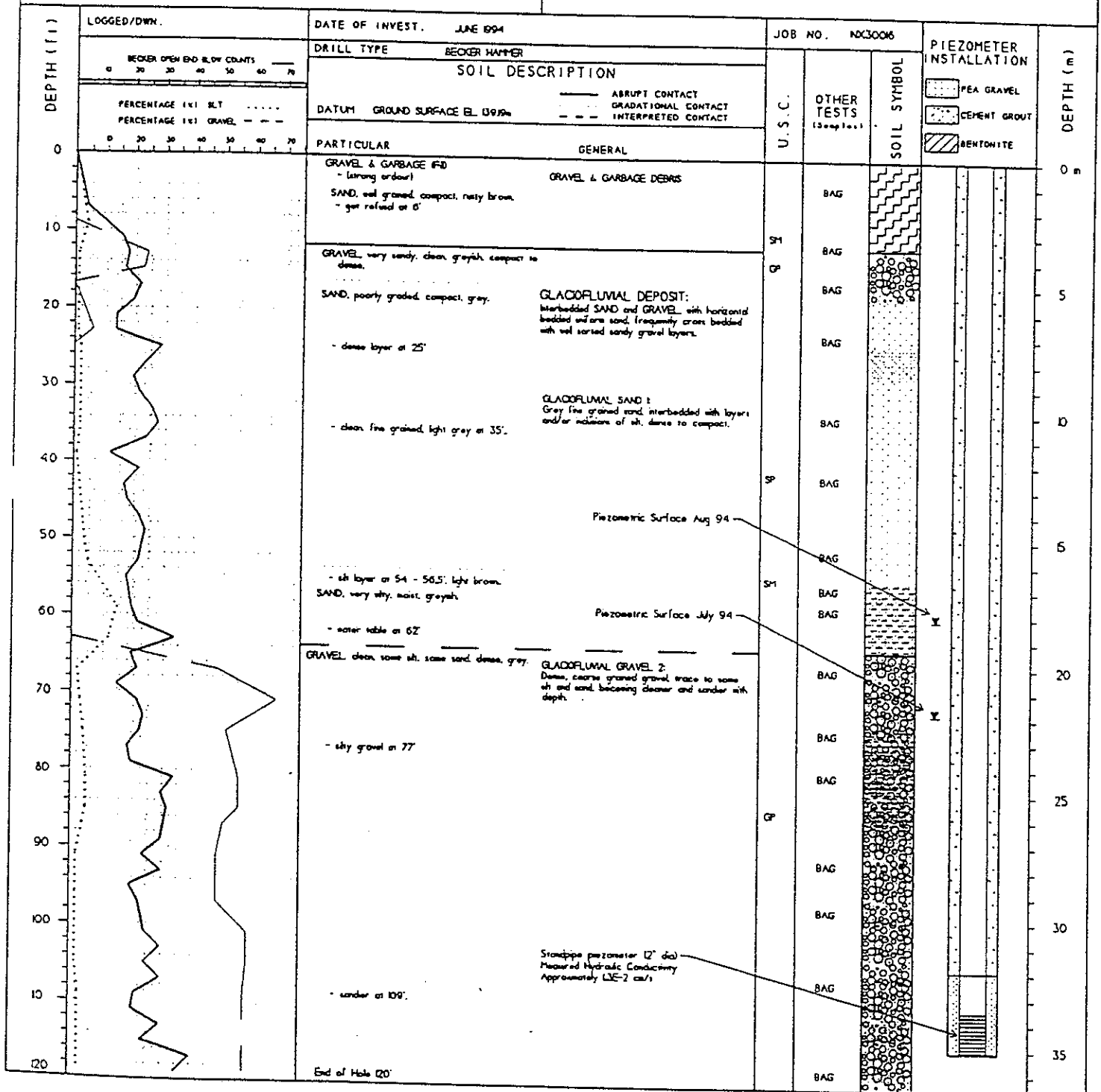




AGRA
Earth & Environmental

LOG OF BOREHOLE NO. HBT 94-4

DISTRICT OF CAMPBELL RIVER LANDFILL, ARGONAUT ROAD
1994 HYDROGEOLOGIC INVESTIGATIONS

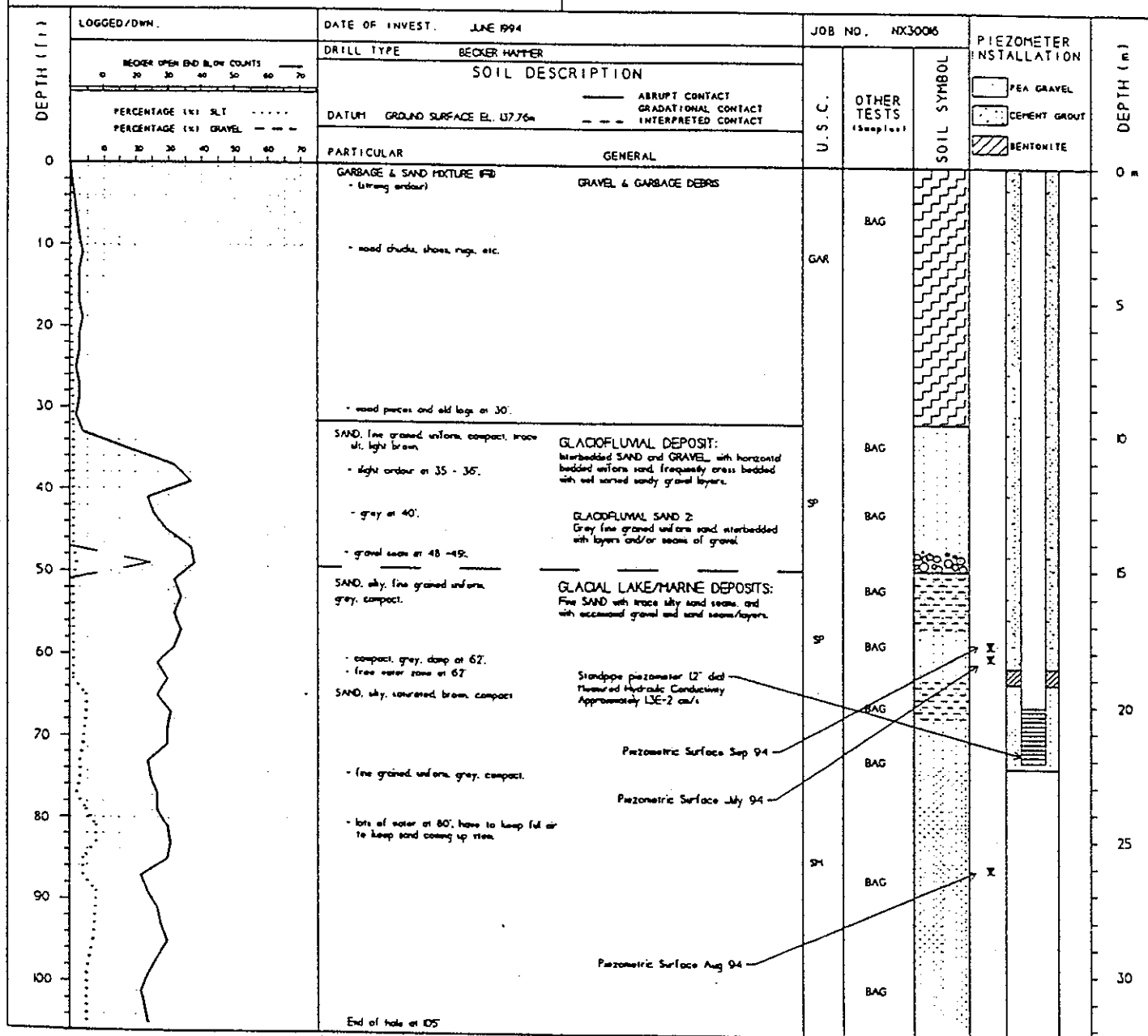




AGRA
Earth & Environmental

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			% Sand			% Gravel			SLOTTED PIEZOMETER	Depth(ft)
							20	40	80	20	40	80	20	40	80		
							20	40	80	20	40	80	20	40	80		
0.0			SAND - medium grained, poorly sorted, moderately oxidized, trace gravel/cobbles up to 100 mm diameter.													0.0	
1.0	OL															5.0	
2.0																10.0	
3.0			SAND AND GRAVEL - trace silt, poorly graded, damp.		01											15.0	
4.0	SP/GP															20.0	
5.0																25.0	
6.0	SP		SAND - some gravel, trace silt, poorly graded, damp.		02											30.0	
7.0																35.0	
8.0																40.0	
9.0			GRAVEL AND SAND - trace silt, poorly graded, damp.		03											45.0	
10.0	SP/GP															50.0	
11.0																55.0	
12.0			SAND - trace silt, fine grained, damp.													60.0	
13.0																65.0	
14.0	SP				04											70.0	
15.0																75.0	
16.0																80.0	
17.0																85.0	
18.0			SILT - some clay, some fine sand, laminated.		05											90.0	
19.0	ML															95.0	
20.0																	
21.0			SAND - trace silt, fine grained, wet.		06												
22.0																	
23.0						Cuttings are wet below 23.2 m.											
24.0					07												
25.0																	
26.0	SP																
27.0																	
28.0			SAND - some gravel, trace silt.		08												
29.0																	
30.0																	

AGRA Earth & Environmental Nanaimo, B.C.		LOGGED BY: JW	COMPLETION DEPTH: 48.5 m
		REVIEWED BY: JR	COMPLETE: 17/06/99
		Page 1 of	

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-STRAATHCONA		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 Nanaimo, B.C.		LOGGED BY: JW	COMPLETION DEPTH: 51.51 m
		REVIEWED BY: JR	COMPLETE: 18/06/99

06/21/23 04:31 PM (BORHOLE)
Page 1 of 2

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			

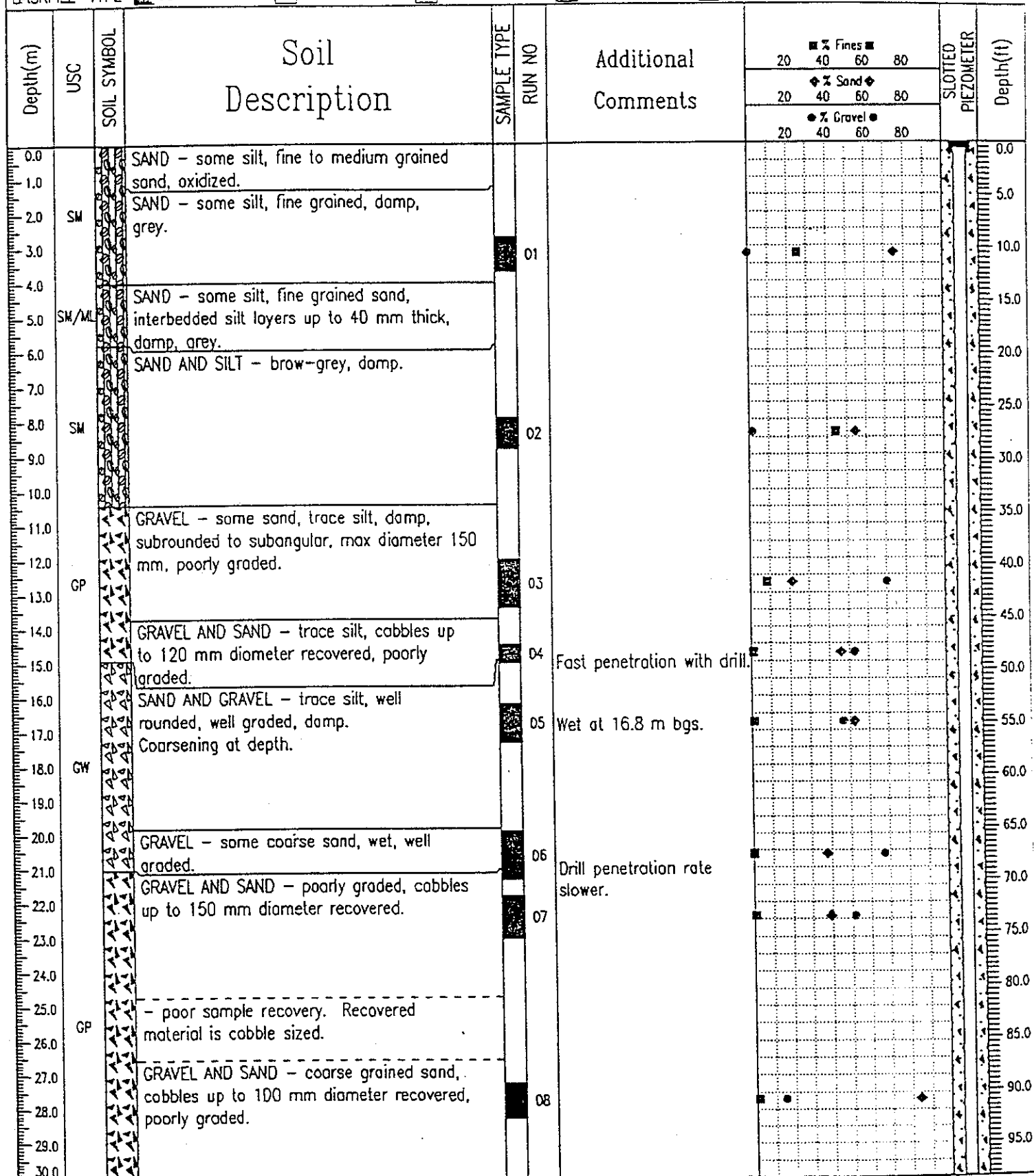
Depth(m)	USC	SOIL SYMBOL	Soil Description	SAMPLE TYPE	RUN NO	Additional Comments	■ % Fines ■ ◆ % Sand ◆ ● % Gravel ●				SLOTTED PIEZOMETER	Depth(ft)
							20	40	60	80		
							20	40	60	80		
							20	40	60	80		
30.0	SM		SAND - little silt, poorly graded, wet.		09							100.0
31.0									105.0			
32.0									110.0			
33.0	SP		SAND - trace silt, fine grained, wet.		10	Rapid drill penetration.						115.0
34.0									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									170.0			
45.0	GW		GRAVEL - some sand, some cobbles, clean.		12							175.0
46.0									180.0			
47.0									185.0			
48.0									190.0			
49.0									195.0			
50.0												
51.0												
52.0			End of Hole at 51.5 m. Well installed.								195.0	
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: 51.51 m
		REVIEWED BY: JR	COMPLETE: 18/06/99

06/03/23 04:01PM (BORG001)
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					

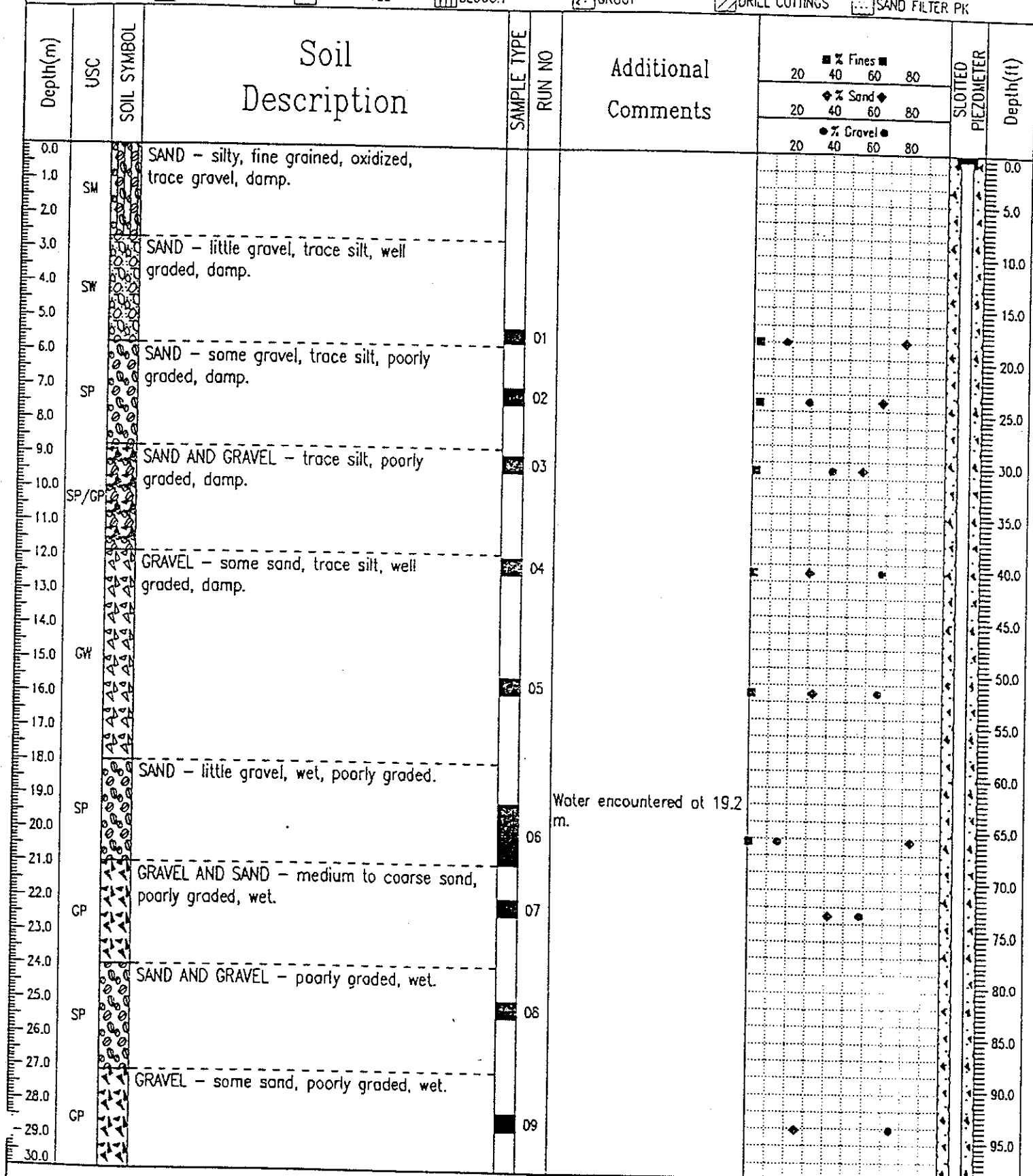
Depth(m)	USC	SOIL SYMBOL	Soil Description	SAMPLE TYPE	RUN NO	Additional Comments	Grain Size Analysis (%)				SLOTTED PIEZOMETER	Depth(ft)
							Fines	Sand	Gravel			
							20	40	60	80		
							20	40	60	80		
30.0	GP	AG	- well graded.		09							100.0
31.0		AG										105.0
32.0		AG										110.0
33.0		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

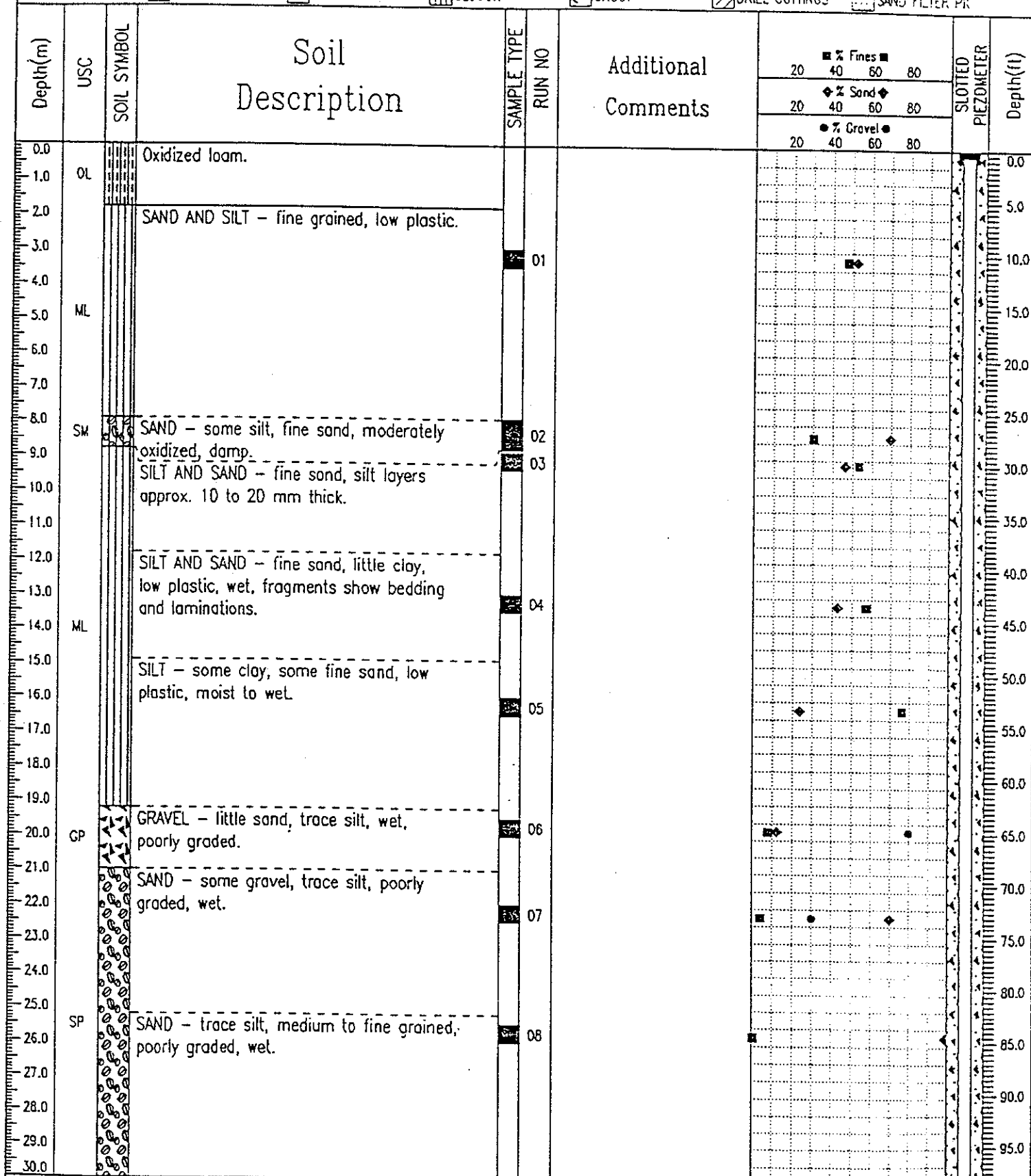
REGIONAL DISTRICT OF COMOX-STRAATHCONA		Drilling Contractor: BECK Drilling		BOREHOLE NO: AG99-04	
ADDITIONAL MONITORING WELL INSTALLATION		Method: Becker Hammer		PROJECT NO: NX2013604	
ELEVATION:					
SAMPLE TYPE ☒ GRAB (SOIL) ☐ GRAB (WATER)					
BACKFILL TYPE ☒ BENTONITE ☐ PEA GRAVEL ☐ SLOUGH ☐ GROUT ☒ DRILL CUTTINGS ☐ SAND FILTER PK					

Depth(m)	USC	SOIL SYMBOL	Soil Description	SAMPLE TYPE	RUN NO	Additional Comments	Grain Size Analysis (%)				SLOTTED PIEZOMETER	Depth(ft)
							20	40	60	80		
30.0												100.0
31.0												105.0
32.0												110.0
33.0	GP											115.0
34.0												120.0
35.0												125.0
36.0												130.0
37.0			GRAVEL - little sand, well graded, wet.									135.0
38.0	GW											140.0
39.0												145.0
40.0			GRAVEL - some sand, poorly graded, wet.									150.0
41.0												155.0
42.0	GP											160.0
43.0			GRAVEL - some cobbles, trace sand, poorly graded.									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		LOGGED BY: JW	COMPLETION DEPTH: 45.42 m
Nanaimo, B.C.		REVIEWED BY: JR	COMPLETE: 17/06/99

REGIONAL DISTRICT OF COMOX-STRAATHCONA	Drilling Contractor: BECK Drilling	BOREHOLE NO: AC99-05
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: 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: AG99-06					
ADDITIONAL MONITORING WELL INSTALLATION		Method: Becker Hammer		PROJECT NO: HX2013004					
				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)
0.0			SAND - medium grained.						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			- grades to fine sand.						70.0
15.0									75.0
16.0									80.0
17.0									85.0
18.0			SAND - some gravel, little silt, moist, medium grained sand.						90.0
19.0			SAND - little silt, fine grained sand.	01					95.0
20.0									
21.0									
22.0									
23.0									
24.0									
25.0									
26.0			SILT - sandy, fine grained, wet.						
27.0				02					
28.0									
29.0									
30.0									

AGRA Earth & Environmental
Nanaimo, B.C.

LOGGED BY: JW
REVIEWED BY: JR

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

Page 1 of 2

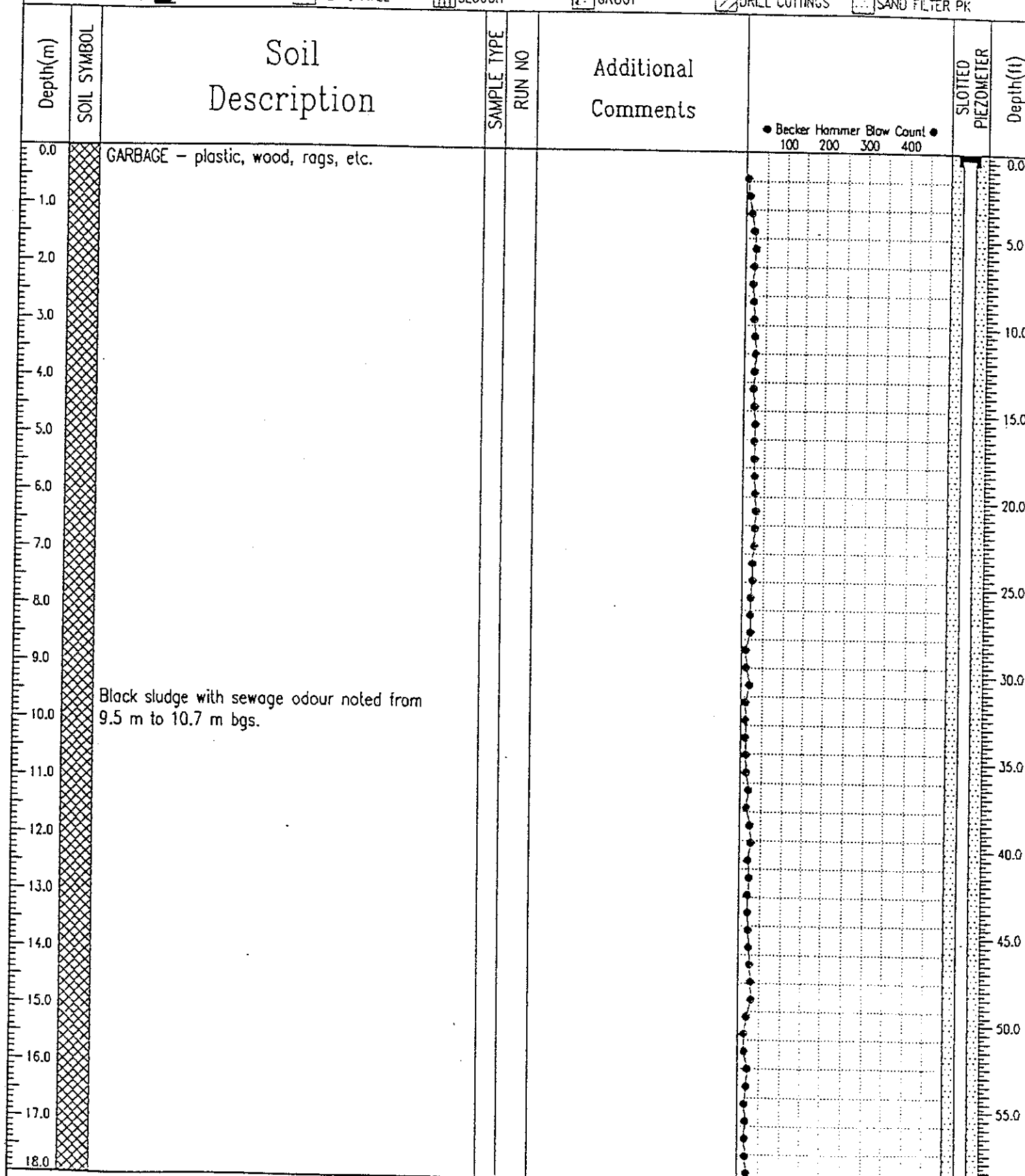
REGIONAL DISTRICT OF COMOX-STRAATHCONA		Drilling Contractor: BECK Drilling		BOREHOLE NO: AG99-06	
ADDITIONAL MONITORING WELL INSTALLATION		Method: Becker Hammer		PROJECT NO: NX2013604	
SAMPLE TYPE		☒ GRAB (SOIL) ☐ GRAB (WATER)		ELEVATION:	
BACKFILL TYPE		☒ BENTONITE ☐ PEA GRAVEL ☐ SLOUGH ☐ GROUT ☐ DRILL CUTTINGS ☐ SAND FILTER PK			

Depth(m)	USC	SOIL SYMBOL	Soil Description	SAMPLE TYPE	RUN NO	Additional Comments	20 40 60 80			SLOTTED PIEZOMETER	Depth(ft)
							■ % Fines ■				
							◆ % Sand ◆				
							● % Gravel ●				
30.0			- interbedded fine SAND and SILT layers, very wet.		03						100.0
31.0					04						105.0
32.0			SILT - some sand, some clay, low plastic, soft.								110.0
33.0					05						115.0
34.0			SILT - some fine sand, some clay, wet.								120.0
35.0											125.0
36.0											130.0
37.0											135.0
38.0											140.0
39.0			SILT AND SAND - fine sand, wet, occasional silt lense approx. 0.3 m thick slows drill penetration rate.								145.0
40.0											150.0
41.0											155.0
42.0			- low recovery, silty fine SANDS.								160.0
43.0											165.0
44.0											170.0
45.0			End of Hole at 45.1 m.								175.0
46.0			Hole sloughed in to 39.3 m, attempt to redrill, rods blocked.								180.0
47.0			Grout from 39.3 m to 25 m.								185.0
48.0			Install well.								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: 45.11 m
		REVIEWED BY: JR	COMPLETE: 18/06/99

Page 2 of 2

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	● Becker Hammer Blow Count ● 100 200 300 400	SLOTTED PIEZOMETER	Depth(ft)
18.0		Wood debris. GRAVEL – some sand, very dense, greyish.			Dust appearing in cyclone.			60.0
19.0								65.0
20.0								70.0
21.0								75.0
22.0								80.0
23.0								85.0
24.0								90.0
25.0								95.0
26.0								100.0
27.0								105.0
28.0		-becoming damp at 29.3 m. SAND – clean, very dense, moist, grey. GRAVEL – sandy, clean, very dense, moist.						110.0
29.0								115.0
30.0								
31.0								
32.0								
33.0								
34.0								
35.0								
36.0								
AMEC Earth & Environmental Limited LOGGED BY: BH COMPLETION DEPTH: 48.463 m Nanaimo, B.C. REVIEWED BY: CM COMPLETE: 21/09/00								

REGIONAL DISTRICT OF COMOX-STRAATHCOM

Contractor: BECK Drilling

BOREHOLE NO: AM00-01

ADDITIONAL MONITORING WELL INSTALLATION

Method: Becker Hammer, Hollow Stem

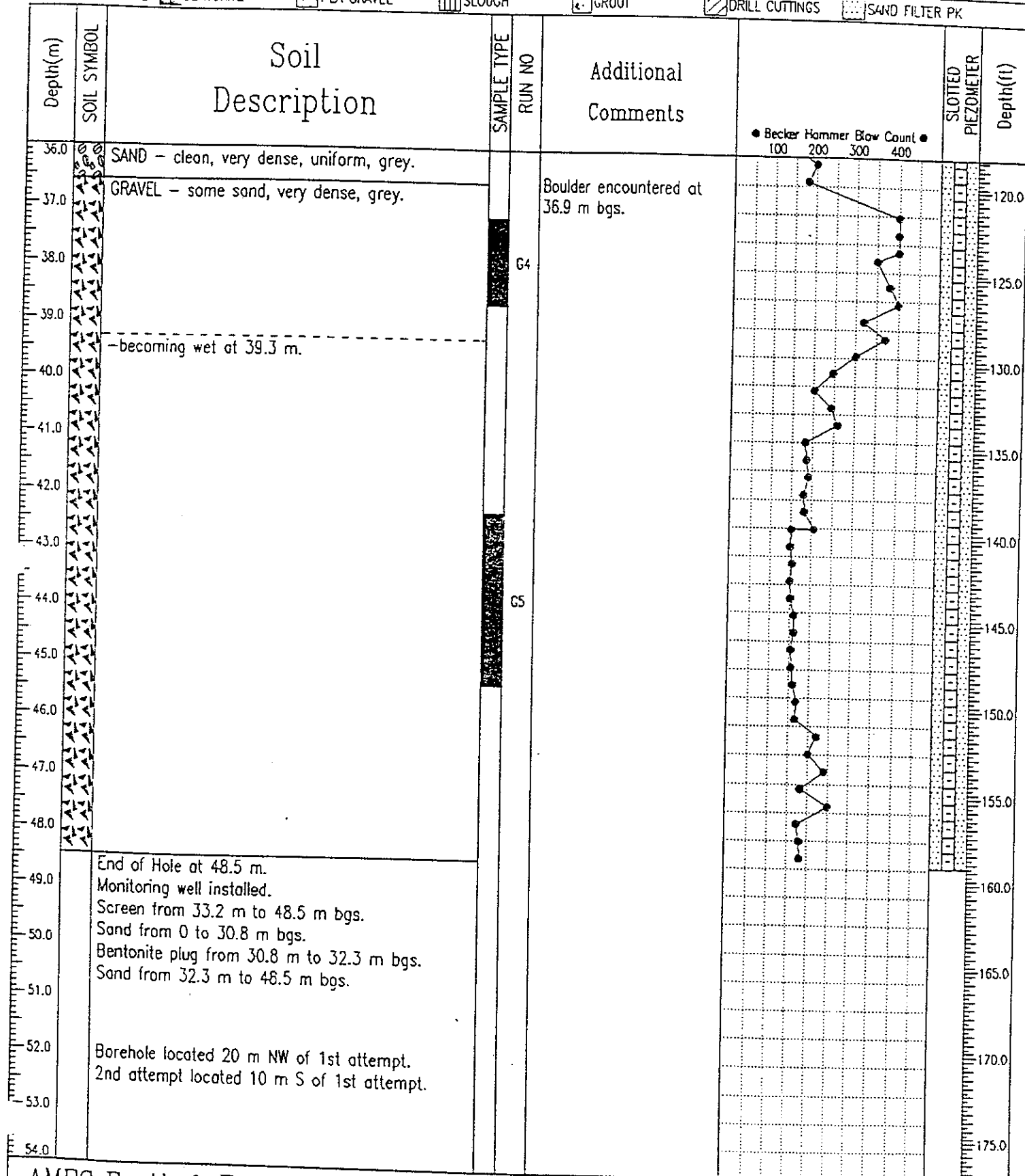
PROJECT NO: W2025502-600

SAMPLE TYPE

☐ GRAB (SOIL)☐ GRAB (WATER)☒ ISPT

ELEVATION:

BACKFILL TYPE

☒ BENTONITE☐ PEA GRAVEL☐ SLOUGH☐ GROUT☒ DRILL CUTTINGS☐ SAND FILTER PK

AMEC Earth & Environmental Limited
Nanaimo, B.C.

LOGGED BY: BH

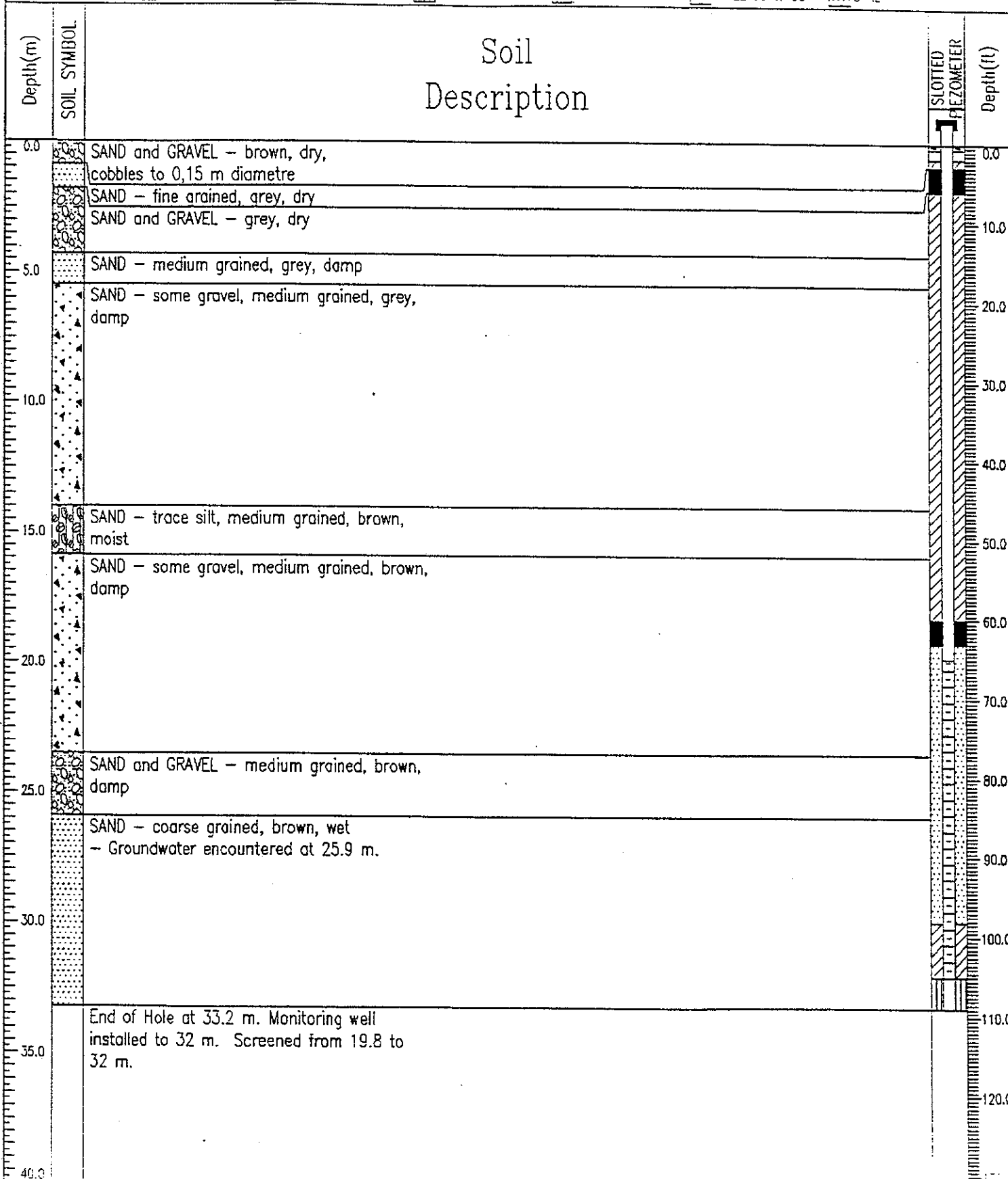
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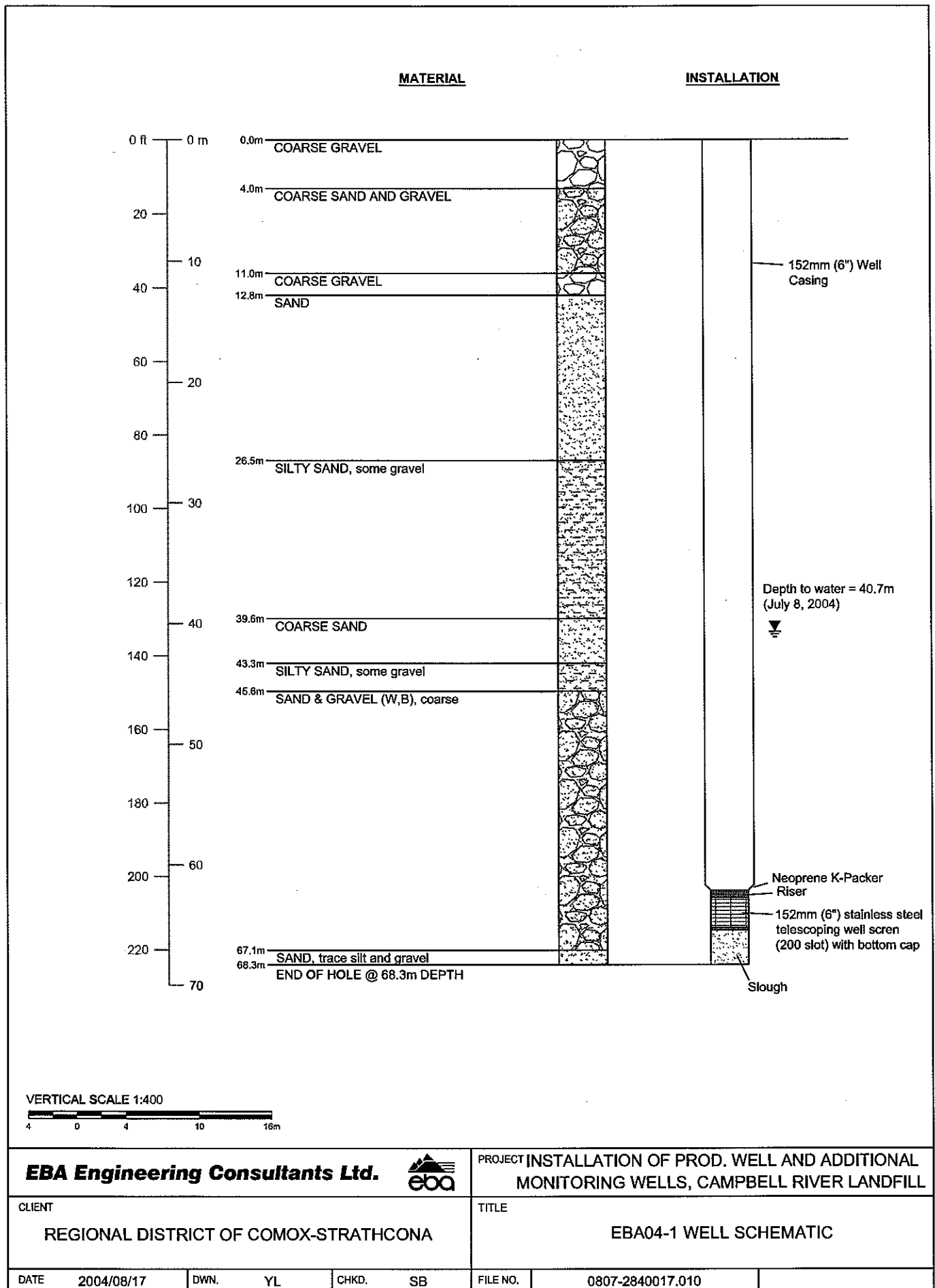
COMPLETION DEPTH: 48.463 m

COMPLETE: 21/09/00

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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	





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		SAND & GRAVEL		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 @ 65.5m BELOW SURFACE NOTE: SOILS LOGGED BY DRILLWELL 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: 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					
33.0		SAND AND GRAVEL	35.0		
34.0					
35.0					

EBA Engineering Consultants Ltd.	LOGGED BY: MC	COMPLETION DEPTH: 41.2 m
	REVIEWED BY: SB	COMPLETE: 07/07/04
		Page 1 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)
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	Page 2 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)
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	END OF HOLE @ 53.3 m BELOW SURFACE NOTE: SOILS LOGGED BY EBA STAFF.				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	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					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					
27.0					
28.0	☒ SILT & GRAVEL, moist				
29.0	☒ SAND & GRAVEL, poorly graded, compact, moist				
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					
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		END OF HOLE @ 67.1 m BELOW SURFACE NOTE: SOILS LOGGED BY EBA STAFF.			
69.0					
70.0					
EBA Engineering Consultants Ltd.			LOGGED BY: MC REVIEWED BY: SB	COMPLETION DEPTH: 67.1 m COMPLETE: 07/07/04	

Monitoring Wells Campbell River Landfill		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					
6.0		COARSE GRAVEL			10.0
7.0					
8.0					
9.0					
10.0		SAND & FINER GRAVEL	15.0		
11.0					
12.0					
13.0					
14.0					
15.0					
15.0		SILTY SAND	20.0		
16.0					
17.0					
18.0					
16.0		SAND	25.0		
17.0					
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	COMPLETION DEPTH: 39.6 m
	REVIEWED BY: SB	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			
		END OF HOLE @ 32.0 m BELOW SURFACE NOTE: SOILS LOGGED BY DRILLWELL STAFF.	

EBA Engineering Consultants Ltd.

04/12/16 12:10PM (SHELLY)

LOGGED BY: MC	COMPLETION DEPTH: 32 m
REVIEWED BY: SB	COMPLETE: 17/07/04
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 - EBA11-01	
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
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							190
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							1105
							1110
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							1125
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							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
☐ CORE					
☐ SAND					

Depth (m)	SOIL DESCRIPTION	SAMPLE TYPE	USC	SOIL SYMBOL	NOTES & COMMENTS	EBA11-02	Depth (ft)
0	SAND (FILL), some gravel, fine to coarse grained, loose, brown		FILL				0
	SAND, trace to some gravel, fine to medium grained, loose, damp, grey and brown						5
							10
							15
							20
							25
							30
10							35
							40
							45
							50
							55
							60
20	SAND, fine to medium grained, loose, moist, brown		SW				65
							70
							75
							80
							85
							90
							95
							100
30	SAND, silty, very fine grained, saturated, grey - Saturated at 26.5 m		SM				105
							110
							115
							120
							125
							130
							135
							140
							145
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							155
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							895

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 SHELBY TUBE CORE					
BACKFILL TYPE BENTONITE PEA GRAVEL SLOUGH GROUT DRILL CUTTINGS SAND					

Depth (m)	SOIL DESCRIPTION	SAMPLE TYPE	USC	SOIL SYMBOL	NOTES & COMMENTS	EBA11-03	Depth (ft)
0	ORGANICS (FOREST FLOOR), silt, trace sand, soft, moist, dark brown		TOPSOIL				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
							10
							15
							20
							25
							30
							35
							40
							45
							50
							55
							60
							65
20	SAND, trace gravel, fine to medium grained, compact		SW				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
	SAND, very fine grained, some silt, saturated, grey		SM				100
30	End of hole at 29.6 m						105
							110
							115
							120
							125
							130
							135
							140
							145
							150
							155
							160
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							340
							345
							350

 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

HOLE DESIGNATION: MW01-16

PROJECT NUMBER: 056484

DATE COMPLETED: 21 June 2016

CLIENT: Comox Valley Regional District

DRILLING METHOD: Rotasonic (153 mm)

LOCATION: Campbell River, BC

FIELD PERSONNEL: S. Foster

DRILLING CONTRACTOR: Mud Bay Drilling

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

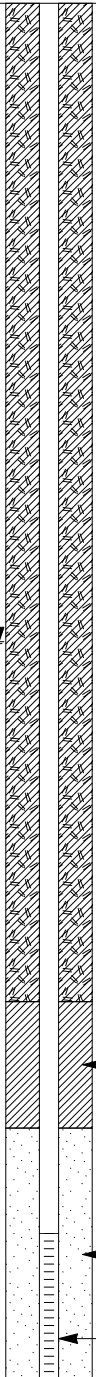


STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

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				RS-11		100		
29	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 - 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	156.99		RS-12		100		
30								
31				RS-13		100		
32								
33								
34				RS-14		100		
35								
36								
37				RS-15		100		
38								
39								

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

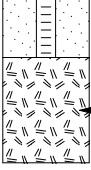


STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

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: Rotosonic (153 mm)
FIELD PERSONNEL: S. Foster

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	BOREHOLE	SAMPLE				
				NUMBER	INTERVAL	REC (%)	N' VALUE	
41				RS-16		100		
42								
43	END OF BOREHOLE @ 42.37m BGS	143.58	 CAVE IN					
44	Monitoring well completed in saturated conditions.		WELL DETAILS Screened interval: 145.10 to 148.15m 40.84 to 37.80m BGS Length: -3.05m Diameter: 51mm Slot Size: 20 Material: SCH. 40 PVC Seal: 149.67 to 151.50m 36.27 to 34.44m BGS Material: BENTONITE GRAVEL Sand Pack: 145.10 to 149.67m 40.84 to 36.27m BGS Material: TARGET FILTER SAND 10/20 ----- Seal: 151.50 to 185.94m 34.44 to 0.00m BGS Material: BENTONITE CHIP AND DRILL CUTTINGS					
45	Initial static water level elevated above normal due to addition of water during drilling.							
46	Borehole backfilled with bentonite gravel, and a mixture of soil cuttings and bentonite chip.							
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



STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

Page 1 of 2

PROJECT NAME: CVRD

HOLE DESIGNATION: MW02-18

PROJECT NUMBER: 056484-02

DATE COMPLETED: 25 July 2018

CLIENT: Comox Valley Regional District

DRILLING METHOD: Air Rotary

LOCATION: Campbell River, British Columbia

FIELD PERSONNEL: M. Dyck/N. Turl

DRILLING CONTRACTOR: Drillwell

DRILLER: Scott Burrows

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH m BGS	MONITORING WELL	SAMPLE				
				NUMBER	INTERVAL	REC (%)	N' VALUE	
	TOP OF CASING TOP OF RISER GROUND SURFACE	TBD TBD TBD						
1	SP - SAND, trace gravel, medium grained sand, fine gravel, poorly graded, subangular gravel, brown/grey		CONCRETE					
2	SP - SAND, medium grain, poorly graded, grey/brown	1.52						
3	SP - SAND, trace silt, fine grained sand, poorly graded, grey/brown	3.05						
4			BENTONITE CHIP					
5								
6								
7								
8	SW - SAND with gravel, fine to medium grain sand, well graded, subangular gravel, grey/brown	7.62						
9								
10								
11	GW - GRAVEL with sand, fine gravel, medium grain sand, subangular gravel, well graded, grey/brown	10.67						
12	SW - SAND, trace gravel, fine to medium grain sand, fine gravel, well graded, subangular gravel, grey/brown	12.19						
13								
14	GW - GRAVEL with sand, medium to coarse grain sand, fine gravel, well graded, subangular gravel, grey/brown	13.72						
15			BENTONITE CHIP					
16	SP - SAND, trace gravel, medium grain sand, fine gravel, poorly graded, subangular gravel, grey/brown	15.24						
17	- Some gravel content at 16.76m BGS							
18								
19	SP - SAND, fine grain sand, poorly graded, brown	18.29						
		19.81						

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 056484-BH LOGS.GPJ GHD Corp 30/7/18



STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

Page 2 of 2

PROJECT NAME: CVRD

PROJECT NUMBER: 056484-02

CLIENT: Comox Valley Regional District

LOCATION: Campbell River, British Columbia

DRILLING CONTRACTOR: Drillwell

HOLE DESIGNATION: MW02-18

DATE COMPLETED: 25 July 2018

DRILLING METHOD: Air Rotary

FIELD PERSONNEL: M. Dyck/N. Turl

DRILLER: Scott Burrows

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH m BGS	MONITORING WELL	SAMPLE				
				NUMBER	INTERVAL	REC (%)	N' VALUE	
21	SW - SAND with gravel, fine to medium grain sand, well graded, subangular gravel, grey/brown							
22								
23	- No gravel at 22.86m BGS							
24								
25								
26								
27								
28								
29	SP - SAND, medium to coarse grain sand, poorly graded, grey/brown	28.96						
30								
31								
32								
33	END OF BOREHOLE @ 32.61m BGS	32.61						
34								
35								
36								
37								
38								
39								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 056484-BH LOGS.GPJ GHD_Corp 30/7/18

WELL DETAILS

Screened interval:

30.18 to 31.70m BGS

Length: 1.52m

Diameter: 51mm

Material: PVC Schedule 40

Seal:

0.30 to 29.87m BGS

Material: Bentonite chips + 1 bag of bentonite pellets at ~ 22.86 m bgs.

Sand Pack:

29.87 to 32.61m BGS

Material: 10-20 Sand

10-20 SAND



STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

Page 1 of 2

PROJECT NAME: CVRD

PROJECT NUMBER: 056484-02

CLIENT: Comox Valley Regional District

LOCATION: Campbell River, British Columbia

DRILLING CONTRACTOR: Drillwell

HOLE DESIGNATION: MW03-18

DATE COMPLETED: 24 July 2018

DRILLING METHOD: Air Rotary

FIELD PERSONNEL: M. Dyck/N. Turl

DRILLER: Scott Burrows

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH m BGS	MONITORING WELL	SAMPLE				
				NUMBER	INTERVAL	REC (%)	N' VALUE	
	TOP OF CASING TOP OF RISER GROUND SURFACE	TBD TBD TBD						
1	CL - SILTY CLAY with gravel, few sand, fine grained sand, fine gravel, sub-angular gravel, poorly graded, brown		CONCRETE					
2								
3								
4								
5			BENTONITE CHIPS					
6								
7								
8								
9		9.14						
10	SP - SAND, trace gravel, fine to medium grained sand, fine gravel, subangular gravel, poorly graded, well sorted, brown							
11	CL - SILTY CLAY, trace sand, trace fine gravel, fine grained sand, poorly graded, brown	10.67						
12		12.19						
13	SC - SAND with clay, fine grained sand, poorly graded, low plasticity, brown		BENTONITE CHIPS + 1 BAG OF BENTONITE PELLETS AT ~22.86 M BGS					
14	SC - CLAYEY SAND, fine grained sand, poorly graded, brown	13.72						
15		15.24						
16	CL - CLAY with sand, fine grained sand, poorly graded, brown							
17								
18								
19		19.81						

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE



STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

Page 2 of 2

PROJECT NAME: CVRD

PROJECT NUMBER: 056484-02

CLIENT: Comox Valley Regional District

LOCATION: Campbell River, British Columbia

DRILLING CONTRACTOR: Drillwell

HOLE DESIGNATION: MW03-18

DATE COMPLETED: 24 July 2018

DRILLING METHOD: Air Rotary

FIELD PERSONNEL: M. Dyck/N. Turl

DRILLER: Scott Burrows

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH m BGS	MONITORING WELL	SAMPLE				
				NUMBER	INTERVAL	REC (%)	N' VALUE	
21	GW - GRAVEL with sand, medium to coarse grain sand, fine subangular gravel, well graded, grey							
22	SW - SAND, trace gravel, medium to coarse grained sand, fine to medium gravel, subangular gravel, brown/grey	21.34						
23	SW/GW - SAND and GRAVEL, medium to coarse grained sand, fine to medium gravel, subangular gravel, brown/grey	22.86						
24								
25	- Dominated by gravel, sand primarily coarse. Gravel with sand. at 24.38m BGS							
26	- Dominated by sand, trace gravel. at 25.91m BGS							
27	END OF BOREHOLE @ 26.52m BGS	26.52						
28								
29								
30								
31								
32								
33								
34								
35								
36								
37								
38								
39								

WELL DETAILS

Screened interval:

24.99 to 26.52m BGS

Length: 1.53m

Diameter: 51mm

Material: PVC Schedule 40

Seal:

0.30 to 24.69m BGS

Material: Bentonite chips + 1 bag of bentonite pellets at ~ 22.86 m bgs.

Sand Pack:

24.53 to 26.52m BGS

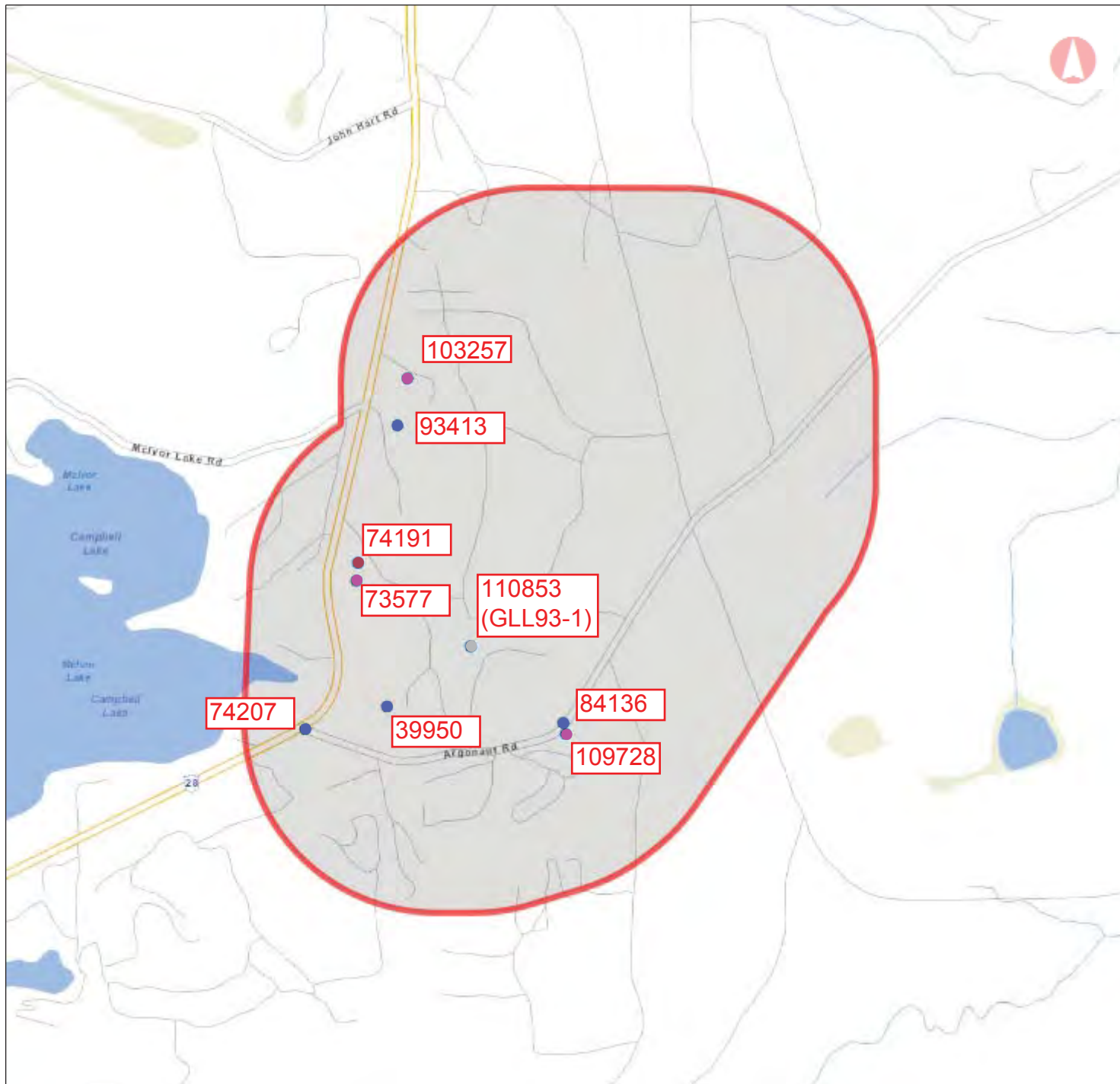
Material: 10-20 Sand

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 056484-BH LOGS.GPJ GHD_Corp 30/7/18

Appendix C

Well Licenses and Surface Water Points of Diversion



Campbell River

Legend

- Private Domestic Use Well
- Non-domestic/Commercial Use Well
- Decommissioned Well
- Other Use Well

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





☒ 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

 UTM Northing:

5542131

 m Latitude (see note 3):

50° 00' 27.32"

(see note 2) and UTM Easting:

331298

 m or 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	Water-bearing Estimated Flow (USgpm)	Observations (e.g. fractured, weathered, well sorted, silty wash), closure details
					(use recommended terms on reverse. List in order of decreasing amount, if applicable)		
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:



☒ 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: 73577
Existing Well Tag Number: _____
☐ Confirmation/alternative specs. attached
☐ Original well construction report attached

Red lettering indicates minimum mandatory informationSee reverse for notes & definitions of abbreviations.

Owner Name: FR FRANZEN CONSTUCTI

Mailing address: ""TownProvPostal Code

Well location: StreetTown

or

Legal description: Lot 7Plan 31913D.L. BlockSec.Twp.Rg.Land District SAYWARD

or

PID: 1125745andDescription of well location (attach sketch, if nec.): 4 MILES N OF C R ON GOLD R RD

NAD 83:Zone: 10UTM Northing: 5542462mLatitude (see note 3): 50° 00' 37.96"

(see note 2)andUTM Easting: 331232mLongitude: 125° 21' 19.86"

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

Orientation of well: ☐ vertical☐ horizontalGround 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	117				BLUE GRAVEL		
117	132				BLUE WATER BEARING SAND		
142	149				WATER BEARING SAND & GRAVEL		
138	142				WHITE WATER BEARING SAND		
132	138				BLUE WATER BEARING 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: 0.0 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☐ 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: ftTo: ftThickness: in

Type and size of material:

Final well completion data:

Total depth drilled: ftFinished well depth: 149 ft bgl

Final stick up: inDepth to bedrock: ft bgl

SWL: 120 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: 1981/03/09Completed:

Comment: STEEL CASING, CONTINUOUS,

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



☒ 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



☒ 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

mLongitude:

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

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
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



☐

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: LotPlanD.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☐ Gas

Colour/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):

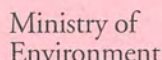
Started: 2005/12/15Completed: 2005/12/15

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 Copy

Sheet 1 of 2

☐ Well Alteration Report☐ Original well construction report attached

See reverse for notes & definitions of abbreviations.

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

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

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

Water-bearing Estimated Flow (USgpm)	Observations (e.g., fractured, weathered, well sorted, silty wash), closure details

[illegible]

From ft (bgl)	To ft (bgl)	Dia in	Casing Material / Open Hole	Wall Thickness in	Drive Shoe
0	231'2"	6	STEEL	.219	4cs

From: _____ ft (bgl) To: _____ ft (bgl) Perforated: From: _____ ft (bgl) To: _____ ft (bgl)

From ft (bgl)	To ft (bgl)	Dia in	Type (see note 18)	Slot Size
230' 2"		5	K. PACKER	
230' 2"	234' 7"	5	SCREEN	20 th
234' 7"	239	5	SCREEN	15 th

Type and size of material:

Notes:

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

Colour/odour: _____ Water sample collected: ☐

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*.

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 works, which may change over time.

white: Customer copy
canary: Driller copy
pink: Ministry copy

Sheet 1 of 1



☒ Well Construction Report

☐ Well Closure Report

☐ Well Alteration Report

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

Ministry Well ID Plate Number: 42401

Ministry Well Tag Number: 109728

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 EXCAVATING

Mailing address: 1741-14TH AVENUETown CAMPBELL RIVERProv BCPostal Code V9W4H7

Well location: Street 6700 ARGONAUT ROADTown CAMPBELL RIVER

Legal description: Lot 85PlanD.L. Block BSec.Twp.Rg.Land District SAYWARD

PID:andDescription of well location (attach sketch, if nec.): NOTHING RECORDED

NAD 83:Zone: 10UTM Northing: 5542041mLatitude (see note 3): 50° 00' 24.88"

(see note 2)UTM Easting: 331760mLongitude: 125° 20' 52.69"

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

Orientation of well: ☒ vertical☐ horizontalGround elevation: 520 ft (asl)Method (see note 4): GPS

Class of well (see note 5): Water supplySub-class of well: 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
0	8	Medium	brown		GRAVEL AND SILTY SANDY		
8	14	Medium	brown		GRAVEL		ZONE WOOD
14	72	Medium	brown		GRAVEL, SANDY		LOOSE
72	110	Medium	brown		SAND,SILTY.		SILT LAYERS AND GRAVEL LAYERS
110	144	Medium	brown		SAND		CLEAN, LOOSE
144	156	Medium	brown		GRAVEL		WB,COARSE CLEAN
156	209	Medium	brown		SAND MED FINE		WB,CLEAN
209	216	Medium	brown		SAND,SILTY		WB,FINE

Casing details

From ft (bgl)	To ft (bgl)	Dia in	Casing Material/Open Hole	Wall Thickness in	Drive Shoe
0	16	10	Steel Pulled Out		No
0	216	6	Steel	0.219	Yes

Screen details

From ft (bgl)	To ft (bgl)	Dia in	Type (see note 18)	Slot Size
197	199	5	K-Packer & Riser	
199	203.6	5	Screen	15
203.6	208	5	Screen	12

Production Casing Diameter: 6 in

Surface seal: Type: Bentonite clayDepth: 16 ft

Method of installation: ☒ Poured☐ PumpedThickness: 2 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: 3 hrs

Notes: BAILING AS WELL.

Well yield estimated by:

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

Rate: 50 USgpmDuration: 2 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): SCOTT BURROWS

Registration no. (see note 20): WD 04121407

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: 216 ftFinished well depth: 208 ft bgl

Final stick up: 20 inDepth to bedrock: ft bgl

SWL: 110 ft (btoc)Estimated well yield: 50.00 USgpm

Artesian flow: USgpm, or artesian pressure: ft

Type of well cap: WELDED LIDWell disinfected: ☒ yes☐ no

Where well ID plate is attached: ON WELL CASING

Well closure information:

Reason for closure:

Method of closure:

Sealant material:Backfill material:

Details of closure:

Date of work (YYYY/MM/DD):

Started: 2015/01/14Completed: 2015/01/15

Comment: EWELLS SUBMISSION

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



Groundwater Wells and Aquifers

Log in

Well Summary

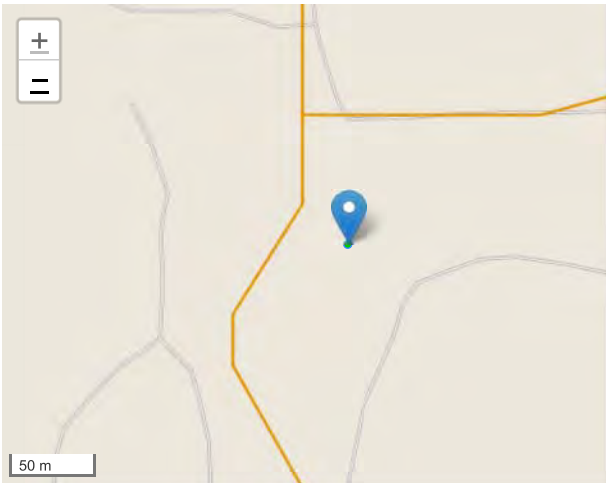
Well Tag Number: 110853	Well Status: CLOSURE	Observation Well Number:
Well Identification Plate Number:	Well Class: Monitoring	Observation Well Status:
Owner Name: COMOX VALLEY REGIONAL DISTRICT	Well Subclass: Permanent	Environmental Monitoring System (EMS) ID:
Licensed Status: UNLICENSED	Intended Water Use:	Aquifer Number: None
		Alternative specs submitted (if required): No

Location Information

Street Address: ARGONAUT ROAD
Town/City: CAMPBELL RIVER
Legal Description:

Lot	
Plan	
District Lot	
Block	
Section	
Township	
Range	
Land District	
Property Identification Description (PID)	

Description of Well Location: CLOSURE OF 2" MONITORING WELL
BCGS Mapsheet Number: 092K004112



[Leaflet](#) | Powered by [Esri](#) | Government of British Columbia, DataBC, GeoBC
Geographic Coordinates - North American Datum of 1983 (NAD 83)
Latitude: 50.008985
Longitude: -125.351395
UTM Northing: 5542279
UTM Easting: 331522
Zone: 10
Location Accuracy Code: (10 m accuracy)
Handheld GPS with accuracy of +/- 10 metres

Well Activity

Construction Date (YYYY-MM-DD)	Alteration Date (YYYY-MM-DD)	Decommission Date (YYYY-MM-DD)	Drilling Company
		2013-06-21	Drillwell Enterprises

Well Completion Data

Total Depth Drilled:	Static Water Level (BTOC):	Well Cap:
Finished Well Depth:	Estimated Well Yield:	Well Disinfected: No
Final Casing Stick Up:	Artesian Flow:	Drilling Methods: Air Rotary
Depth to Bedrock:	Artesian Pressure:	Orientation of Well: vertical
Ground Elevation:		
Elevation Determined By:		

Lithology

From (feet)	To (feet)	Lithology Raw Data	Description	Material Description	Relative Hardness	Colour	Water-Bearing Estimated Flow	Observations
								FILLED 2" WELL BORE WITH BENTONITE-CEMENT GROUT

Casing Details

No casing information available.

Surface Seal and Backfill Details

Surface Seal Material:	Backfill Material Above Surface Seal:
Surface Seal Installation Method:	Backfill Depth:
Surface Seal Thickness:	
Surface Seal Length:	

Screen Details

No screen assembly information available.	
Intake Method:	
Type:	
Material:	
Opening:	
Bottom:	

Well Development

Development Methods:	Development Total Duration:

Well Yield

Estimation Method:	Estimation Rate:	Estimation Duration:

Well Decommissioning

Reason for Decommission:	NOT REQUIRED - AREA TO BE FILLED	Decommission Sealant Material:	BENTONITE/CEMENT
Method of Decommission:	PUMPED	Decommission Backfill Material:	
Decommission Details:	TREMIE CEMENT/BENTONITE GROUT FROM BOTTOM TO TOP		

Comments

CLOSURE OF MONITORING WELL # GLL-93-1

Disclaimer

The information provided should not be used as a basis for making financial or any other commitments. The Government of British Columbia accepts no liability for the accuracy, availability, suitability, reliability, usability, completeness or timeliness of the data or graphical depictions rendered from the data.

Appendix D

Closure Fund Memorandum

Table 2: Landfill Liability - Campbell River Waste Management Centre

Data:	31-Dec-18
Landfill Cover Option	LLDPE
Landfill Closure Date (approximate)	2023
Post Closure Period (years)	30
Current (Dec 2018) Cumulative Waste Volume (m3)	2,572,367
Remaining airspace volume (m3)	127,633
Landfill Capacity at Closure (m3)	2,700,000
Closure Construction Costs (2014\$)(2019-2023 PB)	\$ 10,970,500
Annual post closure O&M (2014\$)	\$ 90,000
Annual post closure LFG O&M (2014\$)	\$ 100,000
Construction cost escalation rate	1.15%
Discount rate	3.36%
Inflation rate	1.67%

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
2018	0		\$ 208,000		\$ 208,000	\$ 208,000	Carry forward from 2018 to 2019 (\$2018)
2019	5	1	\$ 200,000	\$ -	\$ 211,796	\$ 204,911	Ph 2 design and construction/finish surface water
2020	6	2	\$ 525,000	\$ -	\$ 562,372	\$ 526,404	Ph 2 LFG and final cover design
2021	7	3	\$ 6,150,000	\$ -	\$ 6,663,728	\$ 6,034,757	Ph 2 LFG and final cover construction
2022	8	4	\$ 125,000	\$ -	\$ 137,003	\$ 120,038	Ph 3 closure design/surface water
2023	9	5	\$ 3,762,500	\$ -	\$ 4,171,321	\$ 3,535,990	Ph 3 LFG and final cover design
2024	10	6		\$ 190,000	\$ 224,301	\$ 183,957	Ph 3 LFG and final cover construction
2025	11	7		\$ 190,000	\$ 228,055	\$ 180,955	Annual O&M plus annual LFG O&M
2026	12	8		\$ 190,000	\$ 231,871	\$ 178,003	Annual O&M plus annual LFG O&M
2027	13	9		\$ 190,000	\$ 235,751	\$ 175,098	Annual O&M plus annual LFG O&M
2028	14	10		\$ 190,000	\$ 239,697	\$ 172,241	Annual O&M plus annual LFG O&M
2029	15	11		\$ 190,000	\$ 243,708	\$ 169,431	Annual O&M plus annual LFG O&M
2030	16	12		\$ 190,000	\$ 247,786	\$ 166,666	Annual O&M plus annual LFG O&M
2031	17	13		\$ 190,000	\$ 251,933	\$ 163,947	Annual O&M plus annual LFG O&M
2032	18	14		\$ 190,000	\$ 256,149	\$ 161,272	Annual O&M plus annual LFG O&M
2033	19	15		\$ 190,000	\$ 260,436	\$ 158,640	Annual O&M plus annual LFG O&M
2034	20	16		\$ 190,000	\$ 264,794	\$ 156,052	Annual O&M plus annual LFG O&M
2035	21	17		\$ 190,000	\$ 269,225	\$ 153,505	Annual O&M plus annual LFG O&M
2036	22	18		\$ 190,000	\$ 273,731	\$ 151,001	Annual O&M plus annual LFG O&M
2037	23	19		\$ 190,000	\$ 278,312	\$ 148,537	Annual O&M plus annual LFG O&M
2038	24	20		\$ 190,000	\$ 282,969	\$ 146,113	Annual O&M plus annual LFG O&M
2039	25	21		\$ 190,000	\$ 287,705	\$ 143,729	Annual O&M plus annual LFG O&M
2040	26	22		\$ 190,000	\$ 292,519	\$ 141,384	Annual O&M plus annual LFG O&M
2041	27	23		\$ 190,000	\$ 297,415	\$ 139,077	Annual O&M plus annual LFG O&M
2042	28	24		\$ 190,000	\$ 302,392	\$ 136,808	Annual O&M plus annual LFG O&M
2043	29	25		\$ 190,000	\$ 307,452	\$ 134,575	Annual O&M plus annual LFG O&M
2044	30	26		\$ 190,000	\$ 312,598	\$ 132,380	Annual O&M plus annual LFG O&M
2045	31	27		\$ 190,000	\$ 317,829	\$ 130,219	Annual O&M plus annual LFG O&M
2046	32	28		\$ 190,000	\$ 323,148	\$ 128,095	Annual O&M plus annual LFG O&M
2047	33	29		\$ 190,000	\$ 328,556	\$ 126,005	Annual O&M plus annual LFG O&M
2048	34	30		\$ 190,000	\$ 334,054	\$ 123,949	Annual O&M plus annual LFG O&M
2049	35	31		\$ 190,000	\$ 339,644	\$ 121,926	Annual O&M plus annual LFG O&M
2050	36	32		\$ 190,000	\$ 345,328	\$ 119,937	Annual O&M plus annual LFG O&M
2051	37	33		\$ 190,000	\$ 351,107	\$ 117,980	Annual O&M plus annual LFG O&M
2052	38	34		\$ 190,000	\$ 356,983	\$ 116,055	Annual O&M plus annual LFG O&M
2053	39	35		\$ 190,000	\$ 362,957	\$ 114,161	Annual O&M plus annual LFG O&M
TOTAL COST			\$ 10,970,500	\$ 5,700,000	\$ 20,602,627	\$ 15,021,795	
NPV of Estimated Closure and Post Closure Costs =						\$ 15,021,795	
Landfill Liability in Dec 2018 (\$) =						\$ 14,311,693	NPV x (Cumulative Capacity Used)/(Total Estimated Capacity)

Notes:

- (1) Total airspace remaining and waste in place calculated as of December 31, 2018 based on survey conducted November 11, 2017 and October 24, 2018 prorated to end of 2018.
- (2) Airspace consumed calculated based on revised final contours from 2017 Design, Operation and Closure Plan (GHD, 2018) and historical total volume estimates.
- (3) Construction costs in 2014\$ from 2019-2023 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 18-10-0135-01) (latest index Q3 2018).
- (7) Discount rate calculated based on Municipal Finance Authority 30 year borrowing rate as of Jan 11, 2019.
- (8) Inflation rate applied to operations and maintenance costs. Calculated based on 10 year average annual increase in British Columbia Consumer Price Index for all goods and services (CANSIM Table 18-10-0004-01) (latest index December 2018).

Appendix E

2018 Monitoring Specification

GHD LIMITED
ENVIRONMENTAL MONITORING PROGRAM SERVICES – 2018 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
Natasha Turl	Field Technicians
Thomas Elliott	
Cassie Ragan	
Airesse MacPhee	QA/QC Chemist
Laurie Linington	Database Manager

LABORATORIES USED: Maxxam Analytics, Burnaby, British Columbia

AUTHORIZATION:	MONITORING EVENT	SIGNATURE
	Feb, May, Aug, Nov	_____

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
7	Jan 2018	Removed well tag 109728 from monitoring program. Updated project staffing. Added TDS to the parameter list.	NT

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 - 2018 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 (21 locations)							
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

Table 1

**Water Quality Monitoring Program Summary
Environmental Monitoring Program Services - 2018 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 - 2018 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>		
Dissolved Oxygen, Field	√	√
Oxidation-Reduction Potential, Field	√	√
pH, Field	√	√
Specific Conductance, Field	√	√
Temperature, Field	√	√
Total Dissolved Solids, Field	√	√
Turbidity, Field	√	√
<u>General Chemistry</u>		
Alkalinity (speciated)	√	√
Chloride (Dissolved)	√	√
Fluoride	√	√
pH	√	√
Specific Conductance	√	√
Sulphate (Dissolved)	√	√
Total Dissolved Solids (TDS)	√	√
<u>Nutrients</u>		
Ammonia-N	√	√
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	√	√

Monitoring Parameter Schedules
Environmental Monitoring Program Services - 2018 Term
Campbell River Waste Management Centre
Comox Strathcona Waste Management

	<i>Groundwater</i>	<i>Surface Water</i>
Uranium	√	√
Vanadium	√	√
Zinc	√	√
Zirconium	√	√

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

Monitoring Parameter Schedules
Environmental Monitoring Program Services - 2018 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/Natasha Turl

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)	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-56484-050318-MD-01	MW01-16	3/5/2018	12:15	N	WG	grab		2	56	6.85	15.91	C	79	uS	19.9	ntu	9.48	mg/L	385	mV	-
WG-56484-050318-MD-02	EBA11-2	3/5/2018	12:45	N	WG	grab		2	80	7.06	9.16	C	242	uS	125	ntu	11.55	mg/L	229	mV	0.158
WG-56484-050318-MD-03	EBA04-3	3/5/2018	13:30	N	WG	grab		2	90	7.01	9.16	C	745	uS	0	ntu	11.56	mg/L	245	mV	0.477
WG-56484-050318-MD-04	EBA04-01	3/5/2018	14:30	N	WG	grab		2	-	8.06	7.85	C	95	uS	0.1	ntu	4.88	mg/L	204	mV	0.062
WG-56484-050318-MD-05	AG99-04	3/5/2018	15:15	N	WG	grab		2	144	7.91	10.45	C	109	uS	0	ntu	11.14	mg/L	211	mV	0.071
WG-56484-050318-MD-06	AG99-02	3/5/2018	16:30	N	WG	grab		2	150	7.97	9.54	C	249	uS	0.6	ntu	6.14	mg/L	221	mV	0.161
WG-56484-060318-MD-07	AG99-05	3/6/2018	10:30	N	WG	grab		2	180	7.07	9.41	C	145	uS	11.2	ntu	9.71	mg/L	242	mV	0.094
WG-56484-060318-MD-08	AG99-01	3/6/2018	12:30	N	WG	grab		2	120	7.68	10.05	C	226	uS	10.7	ntu	9.31	mg/L	238	mV	0.146
WG-56484-060318-MD-09	EBA11-3	3/6/2018	13:30	N	WG	grab		2	60	7.53	8.8	C	466	uS	9.6	ntu	5.92	mg/L	235	mV	0.303
WG-56484-060318-MD-10	EBA11-3	3/6/2018	13:35	FD	WGQ	grab	WG-56484-060318-MD-09	2	60	7.53	8.8	C	466	uS	9.6	ntu	5.92	mg/L	235	mV	0.303
WG-56484-060318-MD-11	EBA11-4	3/6/2018	14:00	N	WG	grab		3	48	7.85	8.84	C	148	uS	32.8	ntu	8.01	mg/L	222	mV	0.096
WG-56484-060318-MD-12	AG99-06	3/6/2018	14:30	N	WG	grab		3	30	7.7	7.06	C	229	uS	60.7	ntu	11.89	mg/L	232	mV	0.148
WG-56484-060318-MD-13	EBA04-6	3/6/2018	16:10	N	WG	grab		3	96	7.14	9.6	C	646	uS	0.9	ntu	5.79	mg/L	394	mV	-
WG-56484-060318-MD-14	EBA04-7	3/6/2018	16:20	N	WG	grab		3	80	7.05	8.97	C	888	uS	2	ntu	11.68	mg/L	248	mV	0.568
WG-56484-060318-MD-15	EBA04-7	3/6/2018	16:25	FD	WGQ	grab	WG-56484-060318-MD-14	3	80	7.05	8.97	C	888	uS	2	ntu	11.68	mg/L	248	mV	0.568
WG-56484-060318-MD-16	EBA11-1	3/6/2018	17:00	N	WG	grab		3	54	7.72	8.28	C	241	uS	6.5	ntu	11.6	mg/L	225	mV	0.156
WG-56484-060318-MD-17	HBT94-2	3/6/2018	17:20	N	WG	grab		3	102	7.47	10.76	C	337	uS	5.6	ntu	2.01	mg/L	212	mV	-
WG-56484-060318-MD-18	HBT94-3	3/6/2018	17:45	N	WG	grab		3	8	6.72	11.44	C	1130	uS	8	ntu	7.6	mg/L	-2.3	mV	0.725
WG-56484-060318-MD-19	HBT94-1	3/6/2018	18:00	N	WG	grab		3	16	7.46	10.04	C	699	uS	9.8	ntu	10.41	mg/L	-9	mV	0.448
WG-56484-060318-MD-20	Field Blank	3/6/2018	18:30	FB	WGQ	grab		3	-	-	-	C	-	uS	-	ntu	-	mg/L	-	mV	-
SURFACE WATER																					
WS-56484-060318-NT-01	SW-1	3/6/2018	9:20	N	WS	grab		1	-	7.25	4.37	C	36	uS	1.1	ntu	12.38	mg/L	239	mV	0.024
WS-56484-060318-NT-02	SW-1	3/6/2018	9:25	FD	WSQ	grab	WS-56484-060318-NT-01	1	-	7.25	4.37	C	36	uS	1.1	ntu	12.38	mg/L	239	mV	0.024
WS-56484-060318-NT-03	SW03-17	3/6/2018	9:40	N	WS	grab		1	-	7.15	3.52	C	34	uS	0.9	ntu	13.41	mg/L	244	mV	0.023

Footnotes

1. COC: C#546185-01-01
2. COC: C#546181-01-01
3. COC: C#546181-02-01
4. SW-2 was not sampled due to a bear den
5.

Key

Required Field

Populate When Appropriate

Field Data

Attention: Aïresse MacPhee

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

Your P.O. #: 73506861-1
Your Project #: 56484-02
Site#: Campbell River(Phase 02)-Quart
Site Location: SOLID WASTE ENGINEERING
Your C.O.C. #: 546185-01-01

Report Date: 2018/03/15

Report #: R2528810

Version: 3 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B817204

Received: 2018/03/07, 08:26

Sample Matrix: Water
Samples Received: 3

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity - Water	3	2018/03/09	2018/03/10	BBY6SOP-00026	SM 22 2320 B m
Chloride by Automated Colourimetry	2	N/A	2018/03/09	BBY6SOP-00011	SM 22 4500-Cl- E m
Chloride by Automated Colourimetry	1	N/A	2018/03/12	BBY6SOP-00011	SM 22 4500-Cl- E m
Conductance - water	3	2018/03/09	2018/03/10	BBY6SOP-00026	SM 22 2510 B m
Fluoride (higher level)	3	N/A	2018/03/13	BBY6SOP-00048	SM 22 4500-F C m
Hardness Total (calculated as CaCO ₃) (1)	3	N/A	2018/03/12	BBY WI-00033	Auto Calc
Hardness (calculated as CaCO ₃)	3	N/A	2018/03/12	BBY WI-00033	Auto Calc
Mercury (Dissolved) by CVAf	3	N/A	2018/03/08	BBY7SOP-00015	BCMOE BCLM Oct2013 m
Mercury (Total) by CVAf	3	2018/03/08	2018/03/08	BBY7SOP-00015	BCMOE BCLM Oct2013 m
Na, K, Ca, Mg, S by CRC ICPMS (diss.)	3	N/A	2018/03/12	BBY WI-00033	Auto Calc
Elements by ICPMS Low Level (dissolved)	3	N/A	2018/03/10	BBY7SOP-00002	EPA 6020b R2 m
Na, K, Ca, Mg, S by CRC ICPMS (total)	3	N/A	2018/03/12	BBY WI-00033	Auto Calc
Elements by ICPMS Low Level (total)	3	N/A	2018/03/11	BBY7SOP-00002	EPA 6020b R2 m
Ammonia-N (Preserved)	3	N/A	2018/03/13	BBY6SOP-00009	EPA 350.1 m
Nitrate + Nitrite (N) (highlevel)	3	N/A	2018/03/09	BBY6SOP-00010	SM 22 4500-NO ₃ - I m
Nitrite (N) by CFA (highlevel)	3	N/A	2018/03/09	BBY6SOP-00010	SM 22 4500-NO ₃ - I m
Nitrogen - Nitrate (as N)	3	N/A	2018/03/10	BBY WI-00033	Auto Calc
Filter and HNO ₃ Preserve for Metals	3	N/A	2018/03/11	BBY7 WI-00004	BCMOE Reqs 08/14
pH Water (2)	3	2018/03/09	2018/03/10	BBY6SOP-00026	SM 22 4500-H+ B m
Sulphate by Automated Colourimetry	3	N/A	2018/03/09	BBY6SOP-00017	SM 22 4500-SO ₄ 2- E m
Total Dissolved Solids (Filt. Residue)	3	2018/03/13	2018/03/14	BBY6SOP-00033	SM 22 2540 C m

Remarks:

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

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Maxxam's profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Maxxam in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected.

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

Attention: Aïresse MacPhee

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

Your P.O. #: 73506861-1
Your Project #: 56484-02
Site#: Campbell River(Phase 02)-Quart
Site Location: SOLID WASTE ENGINEERING
Your C.O.C. #: 546185-01-01

Report Date: 2018/03/15

Report #: R2528810

Version: 3 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B817204

Received: 2018/03/07, 08:26

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



Maxxam
15 Mar 2018 14:24:46

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 #: B817204
Report Date: 2018/03/15

GHD Limited
Client Project #: 56484-02
Site Location: SOLID WASTE ENGINEERING
Your P.O. #: 73506861-1
Sampler Initials: NT

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		TB4928	TB4928		TB4929		
Sampling Date		2018/03/06 09:20	2018/03/06 09:20		2018/03/06 09:25		
COC Number		546185-01-01	546185-01-01		546185-01-01		
	UNITS	WS-56484-060318-NT-01	WS-56484-060318-NT-01 Lab-Dup	QC Batch	WS-56484-060318-NT-02	RDL	QC Batch
ANIONS							
Nitrite (N)	mg/L	<0.10	<0.10	8930564	<0.10	0.10	8930566
Calculated Parameters							
Filter and HNO ₃ Preservation	N/A	FIELD	N/A	ONSITE	FIELD	N/A	ONSITE
Nitrate (N)	mg/L	<0.10	N/A	8928906	<0.10	0.10	8928906
Misc. Inorganics							
Fluoride (F)	mg/L	<0.10	<0.10	8933498	<0.10	0.10	8933501
Alkalinity (Total as CaCO ₃)	mg/L	7.5	N/A	8930817	7.5	1.0	8930823
Alkalinity (PP as CaCO ₃)	mg/L	<1.0	N/A	8930817	<1.0	1.0	8930823
Bicarbonate (HCO ₃)	mg/L	9.2	N/A	8930817	9.1	1.0	8930823
Carbonate (CO ₃)	mg/L	<1.0	N/A	8930817	<1.0	1.0	8930823
Hydroxide (OH)	mg/L	<1.0	N/A	8930817	<1.0	1.0	8930823
Anions							
Dissolved Sulphate (SO ₄)	mg/L	<1.0	N/A	8931800	<1.0	1.0	8931806
Dissolved Chloride (Cl)	mg/L	3.8	N/A	8931796	3.7	1.0	8931805
Nutrients							
Total Ammonia (N)	mg/L	<0.020	N/A	8933599	<0.020	0.020	8933601
Nitrate plus Nitrite (N)	mg/L	<0.10	<0.10	8930562	<0.10	0.10	8930565
Physical Properties							
Conductivity	uS/cm	33.0	N/A	8930816	30.4	2.0	8930822
pH	pH	6.98	N/A	8930815	6.95	N/A	8930821
Physical Properties							
Total Dissolved Solids	mg/L	16	N/A	8933107	12	10	8933107
RDL = Reportable Detection Limit Lab-Dup = Laboratory Initiated Duplicate N/A = Not Applicable							

Maxxam Job #: B817204
Report Date: 2018/03/15

GHD Limited
Client Project #: 56484-02
Site Location: SOLID WASTE ENGINEERING
Your P.O. #: 73506861-1
Sampler Initials: NT

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		TB4930		
Sampling Date		2018/03/06 09:40		
COC Number		546185-01-01		
	UNITS	WS-56484-060318-NT-03	RDL	QC Batch
ANIONS				
Nitrite (N)	mg/L	<0.10	0.10	8930564
Calculated Parameters				
Filter and HNO3 Preservation	N/A	FIELD	N/A	ONSITE
Nitrate (N)	mg/L	<0.10	0.10	8928906
Misc. Inorganics				
Fluoride (F)	mg/L	<0.10	0.10	8933498
Alkalinity (Total as CaCO3)	mg/L	6.2	1.0	8930817
Alkalinity (PP as CaCO3)	mg/L	<1.0	1.0	8930817
Bicarbonate (HCO3)	mg/L	7.5	1.0	8930817
Carbonate (CO3)	mg/L	<1.0	1.0	8930817
Hydroxide (OH)	mg/L	<1.0	1.0	8930817
Anions				
Dissolved Sulphate (SO4)	mg/L	<1.0	1.0	8931800
Dissolved Chloride (Cl)	mg/L	3.5	1.0	8932357
Nutrients				
Total Ammonia (N)	mg/L	<0.020	0.020	8933599
Nitrate plus Nitrite (N)	mg/L	<0.10	0.10	8930562
Physical Properties				
Conductivity	uS/cm	30.6	2.0	8930816
pH	pH	6.88	N/A	8930815
Physical Properties				
Total Dissolved Solids	mg/L	14	10	8933107
RDL = Reportable Detection Limit N/A = Not Applicable				

Maxxam Job #: B817204
Report Date: 2018/03/15

GHD Limited
Client Project #: 56484-02
Site Location: SOLID WASTE ENGINEERING
Your P.O. #: 73506861-1
Sampler Initials: NT

LOW LEVEL DISSOLVED METALS WITH CV HG (WATER)

Maxxam ID		TB4928	TB4929	TB4930		
Sampling Date		2018/03/06 09:20	2018/03/06 09:25	2018/03/06 09:40		
COC Number		546185-01-01	546185-01-01	546185-01-01		
	UNITS	WS-56484-060318-NT-01	WS-56484-060318-NT-02	WS-56484-060318-NT-03	RDL	QC Batch
Calculated Parameters						
Dissolved Hardness (CaCO ₃)	mg/L	8.64	8.08	7.36	0.50	8928849
Elements						
Dissolved Mercury (Hg)	ug/L	<0.0020	<0.0020	<0.0020	0.0020	8929243
Dissolved Metals by ICPMS						
Dissolved Aluminum (Al)	ug/L	51.4	46.4	46.2	0.50	8930456
Dissolved Antimony (Sb)	ug/L	0.021	0.021	<0.020	0.020	8930456
Dissolved Arsenic (As)	ug/L	0.084	0.083	0.073	0.020	8930456
Dissolved Barium (Ba)	ug/L	1.32	1.19	1.24	0.020	8930456
Dissolved Beryllium (Be)	ug/L	<0.010	<0.010	<0.010	0.010	8930456
Dissolved Bismuth (Bi)	ug/L	<0.0050	<0.0050	<0.0050	0.0050	8930456
Dissolved Boron (B)	ug/L	<10	<10	<10	10	8930456
Dissolved Cadmium (Cd)	ug/L	<0.0050	<0.0050	<0.0050	0.0050	8930456
Dissolved Chromium (Cr)	ug/L	0.11	0.10	<0.10	0.10	8930456
Dissolved Cobalt (Co)	ug/L	0.0321	0.0312	0.0273	0.0050	8930456
Dissolved Copper (Cu)	ug/L	0.234	0.224	0.214	0.050	8930456
Dissolved Iron (Fe)	ug/L	68.0	64.2	55.3	1.0	8930456
Dissolved Lead (Pb)	ug/L	0.0231	0.0225	0.0176	0.0050	8930456
Dissolved Lithium (Li)	ug/L	<0.50	<0.50	<0.50	0.50	8930456
Dissolved Manganese (Mn)	ug/L	6.19	5.95	5.00	0.050	8930456
Dissolved Molybdenum (Mo)	ug/L	<0.050	<0.050	<0.050	0.050	8930456
Dissolved Nickel (Ni)	ug/L	0.095	0.090	0.079	0.020	8930456
Dissolved Phosphorus (P)	ug/L	2.5	4.4	2.6	2.0	8930456
Dissolved Selenium (Se)	ug/L	<0.040	<0.040	0.041	0.040	8930456
Dissolved Silicon (Si)	ug/L	2900	2610	2600	50	8930456
Dissolved Silver (Ag)	ug/L	<0.0050	<0.0050	<0.0050	0.0050	8930456
Dissolved Strontium (Sr)	ug/L	8.49	8.08	6.93	0.050	8930456
Dissolved Thallium (Tl)	ug/L	<0.0020	<0.0020	<0.0020	0.0020	8930456
Dissolved Tin (Sn)	ug/L	<0.20	<0.20	<0.20	0.20	8930456
Dissolved Titanium (Ti)	ug/L	0.71	0.70	<0.50	0.50	8930456
Dissolved Uranium (U)	ug/L	<0.0020	<0.0020	<0.0020	0.0020	8930456
RDL = Reportable Detection Limit						

Maxxam Job #: B817204
Report Date: 2018/03/15

GHD Limited
Client Project #: 56484-02
Site Location: SOLID WASTE ENGINEERING
Your P.O. #: 73506861-1
Sampler Initials: NT

LOW LEVEL DISSOLVED METALS WITH CV HG (WATER)

Maxxam ID		TB4928	TB4929	TB4930		
Sampling Date		2018/03/06 09:20	2018/03/06 09:25	2018/03/06 09:40		
COC Number		546185-01-01	546185-01-01	546185-01-01		
	UNITS	WS-56484-060318-NT-01	WS-56484-060318-NT-02	WS-56484-060318-NT-03	RDL	QC Batch
Dissolved Vanadium (V)	ug/L	0.30	0.29	<0.20	0.20	8930456
Dissolved Zinc (Zn)	ug/L	0.75	0.79 (1)	0.54	0.10	8930456
Dissolved Zirconium (Zr)	ug/L	<0.10	<0.10	<0.10	0.10	8930456
Dissolved Calcium (Ca)	mg/L	1.93	1.80	1.71	0.050	8929026
Dissolved Magnesium (Mg)	mg/L	0.927	0.871	0.748	0.050	8929026
Dissolved Potassium (K)	mg/L	0.128	0.116	0.103	0.050	8929026
Dissolved Sodium (Na)	mg/L	2.59	2.41	2.20	0.050	8929026
Dissolved Sulphur (S)	mg/L	<3.0	<3.0	<3.0	3.0	8929026

RDL = Reportable Detection Limit

(1) Dissolved greater than total. Reanalysis yields similar results.

Maxxam Job #: B817204
Report Date: 2018/03/15

GHD Limited
Client Project #: 56484-02
Site Location: SOLID WASTE ENGINEERING
Your P.O. #: 73506861-1
Sampler Initials: NT

LOW LEVEL TOTAL METALS WITH CV HG (WATER)

Maxxam ID		TB4928	TB4929	TB4930		
Sampling Date		2018/03/06 09:20	2018/03/06 09:25	2018/03/06 09:40		
COC Number		546185-01-01	546185-01-01	546185-01-01		
	UNITS	WS-56484-060318-NT-01	WS-56484-060318-NT-02	WS-56484-060318-NT-03	RDL	QC Batch
Calculated Parameters						
Total Hardness (CaCO ₃)	mg/L	8.68	8.42	7.40	0.50	8928645
Elements						
Total Mercury (Hg)	ug/L	<0.0020	<0.0020	<0.0020	0.0020	8929207
Total Metals by ICPMS						
Total Aluminum (Al)	ug/L	58.4	60.2	44.8	0.50	8930461
Total Antimony (Sb)	ug/L	0.021	0.021	<0.020	0.020	8930461
Total Arsenic (As)	ug/L	0.084	0.093	0.075	0.020	8930461
Total Barium (Ba)	ug/L	1.36	1.37	1.21	0.020	8930461
Total Beryllium (Be)	ug/L	<0.010	<0.010	<0.010	0.010	8930461
Total Bismuth (Bi)	ug/L	<0.0050	<0.0050	<0.0050	0.0050	8930461
Total Boron (B)	ug/L	<10	<10	<10	10	8930461
Total Cadmium (Cd)	ug/L	<0.0050	<0.0050	<0.0050	0.0050	8930461
Total Chromium (Cr)	ug/L	0.11	0.11	<0.10	0.10	8930461
Total Cobalt (Co)	ug/L	0.0517	0.0448	0.0354	0.0050	8930461
Total Copper (Cu)	ug/L	0.240	0.230	0.240	0.050	8930461
Total Iron (Fe)	ug/L	117	94.6	82.8	1.0	8930461
Total Lead (Pb)	ug/L	0.0790	0.0591	0.0643	0.0050	8930461
Total Lithium (Li)	ug/L	<0.50	<0.50	<0.50	0.50	8930461
Total Manganese (Mn)	ug/L	11.0	9.76	7.11	0.050	8930461
Total Molybdenum (Mo)	ug/L	<0.050	<0.050	<0.050	0.050	8930461
Total Nickel (Ni)	ug/L	0.101	0.116	0.099	0.020	8930461
Total Phosphorus (P)	ug/L	6.5	7.5	6.2	2.0	8930461
Total Selenium (Se)	ug/L	0.040	<0.040	<0.040	0.040	8930461
Total Silicon (Si)	ug/L	2880	2950	2430	50	8930461
Total Silver (Ag)	ug/L	<0.0050	<0.0050	<0.0050	0.0050	8930461
Total Strontium (Sr)	ug/L	8.24	8.35	7.16	0.050	8930461
Total Thallium (Tl)	ug/L	<0.0020	<0.0020	<0.0020	0.0020	8930461
Total Tin (Sn)	ug/L	<0.20	<0.20	<0.20	0.20	8930461
Total Titanium (Ti)	ug/L	2.16	1.45	0.92	0.50	8930461
Total Uranium (U)	ug/L	<0.0020	<0.0020	<0.0020	0.0020	8930461
RDL = Reportable Detection Limit						

Maxxam Job #: B817204
Report Date: 2018/03/15

GHD Limited
Client Project #: 56484-02
Site Location: SOLID WASTE ENGINEERING
Your P.O. #: 73506861-1
Sampler Initials: NT

LOW LEVEL TOTAL METALS WITH CV HG (WATER)

Maxxam ID		TB4928	TB4929	TB4930		
Sampling Date		2018/03/06 09:20	2018/03/06 09:25	2018/03/06 09:40		
COC Number		546185-01-01	546185-01-01	546185-01-01		
	UNITS	WS-56484-060318-NT-01	WS-56484-060318-NT-02	WS-56484-060318-NT-03	RDL	QC Batch
Total Vanadium (V)	ug/L	0.43	0.36	0.29	0.20	8930461
Total Zinc (Zn)	ug/L	0.70	0.61	0.63	0.10	8930461
Total Zirconium (Zr)	ug/L	<0.10	<0.10	<0.10	0.10	8930461
Total Calcium (Ca)	mg/L	2.00	1.90	1.64	0.050	8929027
Total Magnesium (Mg)	mg/L	0.893	0.894	0.800	0.050	8929027
Total Potassium (K)	mg/L	0.120	0.120	0.114	0.050	8929027
Total Sodium (Na)	mg/L	2.47	2.44	2.32	0.050	8929027
Total Sulphur (S)	mg/L	<3.0	<3.0	<3.0	3.0	8929027
RDL = Reportable Detection Limit						

Maxxam Job #: B817204
Report Date: 2018/03/15

GHD Limited
Client Project #: 56484-02
Site Location: SOLID WASTE ENGINEERING
Your P.O. #: 73506861-1
Sampler Initials: NT

GENERAL COMMENTS

Results relate only to the items tested.

Maxxam Job #: B817204
Report Date: 2018/03/15

QUALITY ASSURANCE REPORT

GHD Limited
Client Project #: 56484-02
Site Location: SOLID WASTE ENGINEERING
Your P.O. #: 73506861-1
Sampler Initials: NT

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
8929207	Total Mercury (Hg)	2018/03/08	94	80 - 120	99	80 - 120	<0.0020	ug/L	NC (1)	20
8929243	Dissolved Mercury (Hg)	2018/03/08	96	80 - 120	97	80 - 120	<0.0020	ug/L	NC (1)	20
8930456	Dissolved Aluminum (Al)	2018/03/10	94	80 - 120	110	80 - 120	<0.50	ug/L	NC (1)	20
8930456	Dissolved Antimony (Sb)	2018/03/10	100	80 - 120	99	80 - 120	<0.020	ug/L	NC (1)	20
8930456	Dissolved Arsenic (As)	2018/03/10	99	80 - 120	101	80 - 120	<0.020	ug/L	NC (1)	20
8930456	Dissolved Barium (Ba)	2018/03/10	97	80 - 120	100	80 - 120	<0.020	ug/L	NC (1)	20
8930456	Dissolved Beryllium (Be)	2018/03/10	97	80 - 120	104	80 - 120	<0.010	ug/L	NC (1)	20
8930456	Dissolved Bismuth (Bi)	2018/03/10	99	80 - 120	104	80 - 120	<0.0050	ug/L	NC (1)	20
8930456	Dissolved Boron (B)	2018/03/10	98	80 - 120	104	80 - 120	<10	ug/L	NC (1)	20
8930456	Dissolved Cadmium (Cd)	2018/03/10	95	80 - 120	96	80 - 120	<0.0050	ug/L	NC (1)	20
8930456	Dissolved Chromium (Cr)	2018/03/10	96	80 - 120	99	80 - 120	<0.10	ug/L	NC (1)	20
8930456	Dissolved Cobalt (Co)	2018/03/10	94	80 - 120	98	80 - 120	<0.0050	ug/L	NC (1)	20
8930456	Dissolved Copper (Cu)	2018/03/10	90	80 - 120	100	80 - 120	<0.050	ug/L	NC (1)	20
8930456	Dissolved Iron (Fe)	2018/03/10	100	80 - 120	100	80 - 120	<1.0	ug/L	NC (1)	20
8930456	Dissolved Lead (Pb)	2018/03/10	95	80 - 120	102	80 - 120	<0.0050	ug/L	NC (1)	20
8930456	Dissolved Lithium (Li)	2018/03/10	96	80 - 120	102	80 - 120	<0.50	ug/L	NC (1)	20
8930456	Dissolved Manganese (Mn)	2018/03/10	94	80 - 120	100	80 - 120	<0.050	ug/L	NC (1)	20
8930456	Dissolved Molybdenum (Mo)	2018/03/10	100	80 - 120	99	80 - 120	<0.050	ug/L	NC (1)	20
8930456	Dissolved Nickel (Ni)	2018/03/10	95	80 - 120	102	80 - 120	<0.020	ug/L	NC (1)	20
8930456	Dissolved Phosphorus (P)	2018/03/12	98	80 - 120	103	80 - 120	<2.0	ug/L		
8930456	Dissolved Selenium (Se)	2018/03/10	100	80 - 120	98	80 - 120	<0.040	ug/L	NC (1)	20
8930456	Dissolved Silicon (Si)	2018/03/10	100	80 - 120	107	80 - 120	<50	ug/L	NC (1)	20
8930456	Dissolved Silver (Ag)	2018/03/10	94	80 - 120	96	80 - 120	<0.0050	ug/L	NC (1)	20
8930456	Dissolved Strontium (Sr)	2018/03/10	97	80 - 120	101	80 - 120	<0.050	ug/L	NC (1)	20
8930456	Dissolved Thallium (Tl)	2018/03/10	99	80 - 120	101	80 - 120	<0.0020	ug/L	NC (1)	20
8930456	Dissolved Tin (Sn)	2018/03/10	98	80 - 120	101	80 - 120	<0.20	ug/L	NC (1)	20
8930456	Dissolved Titanium (Ti)	2018/03/10	98	80 - 120	98	80 - 120	<0.50	ug/L	NC (1)	20
8930456	Dissolved Uranium (U)	2018/03/10	96	80 - 120	106	80 - 120	<0.0020	ug/L	NC (1)	20
8930456	Dissolved Vanadium (V)	2018/03/10	97	80 - 120	100	80 - 120	<0.20	ug/L	NC (1)	20
8930456	Dissolved Zinc (Zn)	2018/03/10	96	80 - 120	102	80 - 120	<0.10	ug/L	NC (1)	20

Maxxam Job #: B817204
Report Date: 2018/03/15

QUALITY ASSURANCE REPORT(CONT'D)

GHD Limited
Client Project #: 56484-02
Site Location: SOLID WASTE ENGINEERING
Your P.O. #: 73506861-1
Sampler Initials: NT

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
8930456	Dissolved Zirconium (Zr)	2018/03/10	100	80 - 120	98	80 - 120	<0.10	ug/L	NC (1)	20
8930461	Total Aluminum (Al)	2018/03/12	95	80 - 120	110	80 - 120	<0.50	ug/L	0.72 (1)	20
8930461	Total Antimony (Sb)	2018/03/12	99	80 - 120	103	80 - 120	<0.020	ug/L	NC (1)	20
8930461	Total Arsenic (As)	2018/03/12	101	80 - 120	101	80 - 120	<0.020	ug/L	NC (1)	20
8930461	Total Barium (Ba)	2018/03/12	95	80 - 120	102	80 - 120	<0.020	ug/L	9.1 (1)	20
8930461	Total Beryllium (Be)	2018/03/12	98	80 - 120	104	80 - 120	<0.010	ug/L	NC (1)	20
8930461	Total Bismuth (Bi)	2018/03/12	99	80 - 120	104	80 - 120	<0.0050	ug/L	NC (1)	20
8930461	Total Boron (B)	2018/03/12	100	80 - 120	98	80 - 120	<10	ug/L	NC (1)	20
8930461	Total Cadmium (Cd)	2018/03/12	97	80 - 120	100	80 - 120	<0.0050	ug/L	NC (1)	20
8930461	Total Chromium (Cr)	2018/03/12	95	80 - 120	100	80 - 120	<0.10	ug/L	NC (1)	20
8930461	Total Cobalt (Co)	2018/03/12	93	80 - 120	97	80 - 120	<0.0050	ug/L	NC (1)	20
8930461	Total Copper (Cu)	2018/03/12	90	80 - 120	98	80 - 120	<0.050	ug/L	NC (1)	20
8930461	Total Iron (Fe)	2018/03/12	101	80 - 120	106	80 - 120	<1.0	ug/L	NC (1)	20
8930461	Total Lead (Pb)	2018/03/12	95	80 - 120	103	80 - 120	<0.0050	ug/L	15 (1)	20
8930461	Total Lithium (Li)	2018/03/12	92	80 - 120	99	80 - 120	<0.50	ug/L	NC (1)	20
8930461	Total Manganese (Mn)	2018/03/12	95	80 - 120	100	80 - 120	<0.050	ug/L	6.4 (1)	20
8930461	Total Molybdenum (Mo)	2018/03/12	99	80 - 120	102	80 - 120	<0.050	ug/L	NC (1)	20
8930461	Total Nickel (Ni)	2018/03/12	95	80 - 120	99	80 - 120	<0.020	ug/L	13 (1)	20
8930461	Total Phosphorus (P)	2018/03/12	100	80 - 120	104	80 - 120	<2.0	ug/L		
8930461	Total Selenium (Se)	2018/03/12	106	80 - 120	99	80 - 120	<0.040	ug/L	NC (1)	20
8930461	Total Silicon (Si)	2018/03/12	96	80 - 120	110	80 - 120	<50	ug/L	NC (1)	20
8930461	Total Silver (Ag)	2018/03/12	94	80 - 120	99	80 - 120	<0.0050	ug/L	NC (1)	20
8930461	Total Strontium (Sr)	2018/03/12	100	80 - 120	102	80 - 120	<0.050	ug/L	NC (1)	20
8930461	Total Thallium (Tl)	2018/03/12	98	80 - 120	102	80 - 120	<0.0020	ug/L	NC (1)	20
8930461	Total Tin (Sn)	2018/03/12	97	80 - 120	99	80 - 120	<0.20	ug/L	NC (1)	20
8930461	Total Titanium (Ti)	2018/03/12	98	80 - 120	98	80 - 120	<0.50	ug/L	NC (1)	20
8930461	Total Uranium (U)	2018/03/12	94	80 - 120	106	80 - 120	<0.0020	ug/L	NC (1)	20
8930461	Total Vanadium (V)	2018/03/12	97	80 - 120	100	80 - 120	<0.20	ug/L	NC (1)	20
8930461	Total Zinc (Zn)	2018/03/12	97	80 - 120	100	80 - 120	<0.10	ug/L	9.2 (1)	20
8930461	Total Zirconium (Zr)	2018/03/12	104	80 - 120	100	80 - 120	<0.10	ug/L	NC (1)	20

Maxxam Job #: B817204
Report Date: 2018/03/15

QUALITY ASSURANCE REPORT(CONT'D)

GHD Limited
Client Project #: 56484-02
Site Location: SOLID WASTE ENGINEERING
Your P.O. #: 73506861-1
Sampler Initials: NT

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
8930562	Nitrate plus Nitrite (N)	2018/03/09	103 (2)	80 - 120	103	80 - 120	<0.10	mg/L	NC (3)	25
8930564	Nitrite (N)	2018/03/09	99 (2)	80 - 120	99	80 - 120	<0.10	mg/L	NC (3)	20
8930565	Nitrate plus Nitrite (N)	2018/03/09	102	80 - 120	103	80 - 120	<0.10	mg/L	2.8 (1)	25
8930566	Nitrite (N)	2018/03/09	99	80 - 120	98	80 - 120	<0.10	mg/L	NC (1)	20
8930815	pH	2018/03/09			101	97 - 103			0.37 (1)	20
8930816	Conductivity	2018/03/09			101	80 - 120	<2.0	uS/cm		
8930817	Alkalinity (PP as CaCO ₃)	2018/03/10					<1.0	mg/L		
8930817	Alkalinity (Total as CaCO ₃)	2018/03/10	NC	80 - 120	97	80 - 120	<1.0	mg/L		
8930817	Bicarbonate (HCO ₃)	2018/03/10					<1.0	mg/L		
8930817	Carbonate (CO ₃)	2018/03/10					<1.0	mg/L		
8930817	Hydroxide (OH)	2018/03/10					<1.0	mg/L		
8930821	pH	2018/03/10			101	97 - 103				
8930822	Conductivity	2018/03/10			102	80 - 120	<2.0	uS/cm		
8930823	Alkalinity (PP as CaCO ₃)	2018/03/10					<1.0	mg/L		
8930823	Alkalinity (Total as CaCO ₃)	2018/03/10			98	80 - 120	<1.0	mg/L		
8930823	Bicarbonate (HCO ₃)	2018/03/10					<1.0	mg/L		
8930823	Carbonate (CO ₃)	2018/03/10					<1.0	mg/L		
8930823	Hydroxide (OH)	2018/03/10					<1.0	mg/L		
8931796	Dissolved Chloride (Cl)	2018/03/09	NC	80 - 120	103	80 - 120	<1.0	mg/L	0.79 (1)	20
8931800	Dissolved Sulphate (SO ₄)	2018/03/09	114	80 - 120	96	80 - 120	<1.0	mg/L	19 (1)	20
8931805	Dissolved Chloride (Cl)	2018/03/09	116	80 - 120	101	80 - 120	<1.0	mg/L	1.6 (1)	20
8931806	Dissolved Sulphate (SO ₄)	2018/03/09	108	80 - 120	93	80 - 120	<1.0	mg/L	1.8 (1)	20
8932357	Dissolved Chloride (Cl)	2018/03/12			105	80 - 120	<1.0	mg/L	0.36 (1)	20
8933107	Total Dissolved Solids	2018/03/14	99	80 - 120	98	80 - 120	<10	mg/L	5.9 (1)	20
8933498	Fluoride (F)	2018/03/13	100 (2)	80 - 120	104	80 - 120	<0.10	mg/L	NC (3)	20
8933501	Fluoride (F)	2018/03/13	97	80 - 120	104	80 - 120	<0.10	mg/L	NC (1)	20
8933599	Total Ammonia (N)	2018/03/13	107	80 - 120	95	80 - 120	<0.020	mg/L	NC (1)	20

Maxxam Job #: B817204
Report Date: 2018/03/15

QUALITY ASSURANCE REPORT(CONT'D)

GHD Limited
Client Project #: 56484-02
Site Location: SOLID WASTE ENGINEERING
Your P.O. #: 73506861-1
Sampler Initials: NT

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
8933601	Total Ammonia (N)	2018/03/13			98	80 - 120	<0.020	mg/L		

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

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

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

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

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) Matrix Spike Parent ID [TB4928-01]

(3) Duplicate Parent ID [TB4928-01]

Maxxam Job #: B817204
Report Date: 2018/03/15

GHD Limited
Client Project #: 56484-02
Site Location: SOLID WASTE ENGINEERING
Your P.O. #: 73506861-1
Sampler Initials: NT

VALIDATION SIGNATURE PAGE

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



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

Attention: Aïresse MacPhee

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

Your P.O. #: 73506861-1
Your Project #: 56484-02
Site#: CAMPBELL RIVER (PHASE 02) - Q
Site Location: SOLID WASTE ENGINEERING
Your C.O.C. #: 546181-01-01, 546181-02-01

Report Date: 2018/03/14

Report #: R2528357

Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B817212

Received: 2018/03/07, 09:00

Sample Matrix: Water
Samples Received: 21

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity - Water	20	2018/03/09	2018/03/10	BBY6SOP-00026	SM 22 2320 B m
Chloride by Automated Colourimetry	19	N/A	2018/03/09	BBY6SOP-00011	SM 22 4500-Cl- E m
Chloride by Automated Colourimetry	1	N/A	2018/03/12	BBY6SOP-00011	SM 22 4500-Cl- E m
Conductance - water	20	2018/03/09	2018/03/10	BBY6SOP-00026	SM 22 2510 B m
Fluoride (higher level)	20	N/A	2018/03/13	BBY6SOP-00048	SM 22 4500-F C m
Hardness (calculated as CaCO ₃)	20	N/A	2018/03/10	BBY WI-00033	Auto Calc
Mercury (Dissolved) by CVAf	11	N/A	2018/03/12	BBY7SOP-00015	BCMOE BCLM Oct2013 m
Mercury (Dissolved) by CVAf	9	N/A	2018/03/13	BBY7SOP-00015	BCMOE BCLM Oct2013 m
Na, K, Ca, Mg, S by CRC ICPMS (diss.)	20	N/A	2018/03/10	BBY WI-00033	Auto Calc
Elements by CRC ICPMS (dissolved)	20	N/A	2018/03/10	BBY7SOP-00002	EPA 6020b R2 m
Ammonia-N (Preserved)	18	N/A	2018/03/13	BBY6SOP-00009	EPA 350.1 m
Ammonia-N (Preserved)	2	N/A	2018/03/14	BBY6SOP-00009	EPA 350.1 m
Nitrate + Nitrite (N) (highlevel)	20	N/A	2018/03/09	BBY6SOP-00010	SM 22 4500-NO ₃ - I m
Nitrite (N) by CFA (highlevel)	20	N/A	2018/03/09	BBY6SOP-00010	SM 22 4500-NO ₃ - I m
Nitrogen - Nitrate (as N)	20	N/A	2018/03/10	BBY WI-00033	Auto Calc
Filter and HNO ₃ Preserve for Metals	6	N/A	2018/03/09	BBY7 WI-00004	BCMOE Reqs 08/14
Filter and HNO ₃ Preserve for Metals	13	N/A	2018/03/10	BBY7 WI-00004	BCMOE Reqs 08/14
Filter and HNO ₃ Preserve for Metals	1	N/A	2018/03/13	BBY7 WI-00004	BCMOE Reqs 08/14
pH Water (1)	20	2018/03/09	2018/03/10	BBY6SOP-00026	SM 22 4500-H+ B m
Sulphate by Automated Colourimetry	19	N/A	2018/03/09	BBY6SOP-00017	SM 22 4500-SO ₄ 2- E m
Sulphate by Automated Colourimetry	1	N/A	2018/03/12	BBY6SOP-00017	SM 22 4500-SO ₄ 2- E m
Total Dissolved Solids (Filt. Residue)	6	2018/03/12	2018/03/13	BBY6SOP-00033	SM 22 2540 C m
Total Dissolved Solids (Filt. Residue)	14	2018/03/13	2018/03/14	BBY6SOP-00033	SM 22 2540 C m
VOCs, VH, F1, LH in Water by HS GC/MS	2	N/A	2018/03/08	BBY8SOP-00009/11/12	BCMOE BCLM Jul 2017
VOCs, VH, F1, LH in Water by HS GC/MS	8	N/A	2018/03/09	BBY8SOP-00009/11/12	BCMOE BCLM Jul 2017
Volatile HC-BTEX	10	N/A	2018/03/09	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.

Attention: Aïresse MacPhee

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

Your P.O. #: 73506861-1
Your Project #: 56484-02
Site#: CAMPBELL RIVER (PHASE 02) - Q
Site Location: SOLID WASTE ENGINEERING
Your C.O.C. #: 546181-01-01, 546181-02-01

Report Date: 2018/03/14

Report #: R2528357

Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B817212

Received: 2018/03/07, 09:00

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) 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



Maxxam
14 Mar 2018 17:42:52

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

=====

This report has been generated and distributed using a secure automated process.

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 #: B817212
Report Date: 2018/03/14

GHD Limited
Client Project #: 56484-02
Site Location: SOLID WASTE ENGINEERING
Your P.O. #: 73506861-1
Sampler Initials: MD

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		TB4951	TB4952		TB4953		
Sampling Date		2018/03/05 12:15	2018/03/05 12:45		2018/03/05 13:30		
COC Number		546181-01-01	546181-01-01		546181-01-01		
	UNITS	WG-56484-050318-MD-01	WG-56484-050318-MD-02	QC Batch	WG-56484-050318-MD-03	RDL	QC Batch

ANIONS

Nitrite (N)	mg/L	<0.10	<0.10	8930564	<0.10	0.10	8930566

Calculated Parameters

Filter and HNO3 Preservation	N/A	FIELD	FIELD	ONSITE	FIELD	N/A	ONSITE
Nitrate (N)	mg/L	<0.10	0.71	8928906	0.76	0.10	8928906

Misc. Inorganics

Fluoride (F)	mg/L	<0.10	<0.10	8933498	<0.10	0.10	8933501
Alkalinity (Total as CaCO3)	mg/L	32.4	106	8930820	317	1.0	8930823
Alkalinity (PP as CaCO3)	mg/L	<1.0	<1.0	8930820	<1.0	1.0	8930823
Bicarbonate (HCO3)	mg/L	39.6	129	8930820	387	1.0	8930823
Carbonate (CO3)	mg/L	<1.0	<1.0	8930820	<1.0	1.0	8930823
Hydroxide (OH)	mg/L	<1.0	<1.0	8930820	<1.0	1.0	8930823

Anions

Dissolved Sulphate (SO4)	mg/L	2.0	3.0	8931803	8.5	1.0	8931803
Dissolved Chloride (Cl)	mg/L	2.0	4.3	8931801	28	1.0	8931801

Nutrients

Total Ammonia (N)	mg/L	<0.020	<0.020	8933599	<0.020	0.020	8933601
Nitrate plus Nitrite (N)	mg/L	<0.10	0.71	8930562	0.76	0.10	8930565

Physical Properties

Conductivity	uS/cm	75.7	220	8930819	678	2.0	8930822
pH	pH	7.64	8.07	8930818	8.21	N/A	8930821

Physical Properties

Total Dissolved Solids	mg/L	330	332	8931978	624	10	8931978

RDL = Reportable Detection Limit

N/A = Not Applicable

Maxxam Job #: B817212
Report Date: 2018/03/14

GHD Limited
Client Project #: 56484-02
Site Location: SOLID WASTE ENGINEERING
Your P.O. #: 73506861-1
Sampler Initials: MD

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		TB4954	TB4954		TB4955		
Sampling Date		2018/03/05 14:30	2018/03/05 14:30		2018/03/05 15:15		
COC Number		546181-01-01	546181-01-01		546181-01-01		
	UNITS	WG-56484-050318-MD-04	WG-56484-050318-MD-04 Lab-Dup	QC Batch	WG-56484-050318-MD-05	RDL	QC Batch

ANIONS

Nitrite (N)	mg/L	<0.10	N/A	8930564	<0.10	0.10	8930564

Calculated Parameters

Filter and HNO3 Preservation	N/A	FIELD	N/A	ONSITE	FIELD	N/A	ONSITE
Nitrate (N)	mg/L	<0.10	N/A	8928906	0.12	0.10	8928906

Misc. Inorganics

Fluoride (F)	mg/L	<0.10	N/A	8933498	<0.10	0.10	8933498
Alkalinity (Total as CaCO3)	mg/L	38.2	N/A	8930820	47.7	1.0	8930820
Alkalinity (PP as CaCO3)	mg/L	<1.0	N/A	8930820	<1.0	1.0	8930820
Bicarbonate (HCO3)	mg/L	46.6	N/A	8930820	58.2	1.0	8930820
Carbonate (CO3)	mg/L	<1.0	N/A	8930820	<1.0	1.0	8930820
Hydroxide (OH)	mg/L	<1.0	N/A	8930820	<1.0	1.0	8930820

Anions

Dissolved Sulphate (SO4)	mg/L	2.9	2.9	8932358	2.2	1.0	8931803
Dissolved Chloride (Cl)	mg/L	1.1	1.1	8932357	1.2	1.0	8931801

Nutrients

Total Ammonia (N)	mg/L	<0.020	N/A	8933599	<0.020	0.020	8933601
Nitrate plus Nitrite (N)	mg/L	<0.10	N/A	8930562	0.12	0.10	8930562

Physical Properties

Conductivity	uS/cm	84.1	N/A	8930819	101	2.0	8930819
pH	pH	7.71	N/A	8930818	7.80	N/A	8930818

Physical Properties

Total Dissolved Solids	mg/L	278	N/A	8931978	294	10	8931978

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

Maxxam Job #: B817212
Report Date: 2018/03/14

GHD Limited
Client Project #: 56484-02
Site Location: SOLID WASTE ENGINEERING
Your P.O. #: 73506861-1
Sampler Initials: MD

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		TB4956		TB4957		
Sampling Date		2018/03/05 16:30		2018/03/06 10:30		
COC Number		546181-01-01		546181-01-01		
	UNITS	WG-56484-050318-MD-06	QC Batch	WG-56484-060318-MD-07	RDL	QC Batch
ANIONS						
Nitrite (N)	mg/L	<0.10	8930564	<0.10	0.10	8930564
Calculated Parameters						
Filter and HNO3 Preservation	N/A	FIELD	ONSITE	FIELD	N/A	ONSITE
Nitrate (N)	mg/L	0.16	8928906	<0.10	0.10	8928906
Misc. Inorganics						
Fluoride (F)	mg/L	<0.10	8933498	<0.10	0.10	8933498
Alkalinity (Total as CaCO3)	mg/L	116	8930820	59.6	1.0	8930820
Alkalinity (PP as CaCO3)	mg/L	<1.0	8930820	<1.0	1.0	8930820
Bicarbonate (HCO3)	mg/L	142	8930820	72.7	1.0	8930820
Carbonate (CO3)	mg/L	<1.0	8930820	<1.0	1.0	8930820
Hydroxide (OH)	mg/L	<1.0	8930820	<1.0	1.0	8930820
Anions						
Dissolved Sulphate (SO4)	mg/L	2.9	8931803	2.2	1.0	8931803
Dissolved Chloride (Cl)	mg/L	1.8	8931801	1.2	1.0	8931801
Nutrients						
Total Ammonia (N)	mg/L	<0.020	8933599	<0.020	0.020	8933599
Nitrate plus Nitrite (N)	mg/L	0.16	8930562	<0.10	0.10	8930562
Physical Properties						
Conductivity	uS/cm	230	8930819	126	2.0	8930819
pH	pH	8.12	8930818	7.94	N/A	8930818
Physical Properties						
Total Dissolved Solids	mg/L	394	8931978	58	10	8933107
RDL = Reportable Detection Limit						
N/A = Not Applicable						

Maxxam Job #: B817212
Report Date: 2018/03/14

GHD Limited
Client Project #: 56484-02
Site Location: SOLID WASTE ENGINEERING
Your P.O. #: 73506861-1
Sampler Initials: MD

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		TB4958		TB4959	TB4959		
Sampling Date		2018/03/06 12:30		2018/03/06 13:30	2018/03/06 13:30		
COC Number		546181-01-01		546181-01-01	546181-01-01		
	UNITS	WG-56484-060318-MD-08	QC Batch	WG-56484-060318-MD-09	WG-56484-060318-MD-09 Lab-Dup	RDL	QC Batch

ANIONS

Nitrite (N)	mg/L	<0.10	8930564	<0.10	N/A	0.10	8930564

Calculated Parameters

Filter and HNO3 Preservation	N/A	FIELD	ONSITE	FIELD	N/A	N/A	ONSITE
Nitrate (N)	mg/L	0.18	8928906	0.43	N/A	0.10	8928906

Misc. Inorganics

Fluoride (F)	mg/L	<0.10	8933501	<0.10	N/A	0.10	8933498
Alkalinity (Total as CaCO3)	mg/L	98.4	8930820	60.8	60.3	1.0	8930820
Alkalinity (PP as CaCO3)	mg/L	<1.0	8930820	<1.0	<1.0	1.0	8930820
Bicarbonate (HCO3)	mg/L	120	8930820	74.1	73.6	1.0	8930820
Carbonate (CO3)	mg/L	<1.0	8930820	<1.0	<1.0	1.0	8930820
Hydroxide (OH)	mg/L	<1.0	8930820	<1.0	<1.0	1.0	8930820

Anions

Dissolved Sulphate (SO4)	mg/L	2.9	8931803	4.1	N/A	1.0	8931803
Dissolved Chloride (Cl)	mg/L	1.9	8931801	89	N/A	1.0	8931801

Nutrients

Total Ammonia (N)	mg/L	<0.020	8933598	<0.020	N/A	0.020	8933599
Nitrate plus Nitrite (N)	mg/L	0.18	8930562	0.43	N/A	0.10	8930562

Physical Properties

Conductivity	uS/cm	198	8930819	415	414	2.0	8930819
pH	pH	8.06	8930818	7.89	7.87	N/A	8930818

Physical Properties

Total Dissolved Solids	mg/L	94	8933107	300	N/A	10	8933107

RDL = Reportable Detection Limit

Lab-Dup = Laboratory Initiated Duplicate

N/A = Not Applicable

Maxxam Job #: B817212
Report Date: 2018/03/14

GHD Limited
Client Project #: 56484-02
Site Location: SOLID WASTE ENGINEERING
Your P.O. #: 73506861-1
Sampler Initials: MD

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		TB4960		TB4975		
Sampling Date		2018/03/06 13:35		2018/03/06 14:00		
COC Number		546181-01-01		546181-02-01		
	UNITS	WG-56484-060318-MD-10	QC Batch	WG-56484-060318-MD-11	RDL	QC Batch
ANIONS						
Nitrite (N)	mg/L	<0.10	8930564	<0.10	0.10	8930564
Calculated Parameters						
Filter and HNO3 Preservation	N/A	FIELD	ONSITE	FIELD	N/A	ONSITE
Nitrate (N)	mg/L	0.43	8928906	0.22	0.10	8928906
Misc. Inorganics						
Fluoride (F)	mg/L	<0.10	8933498	<0.10	0.10	8933498
Alkalinity (Total as CaCO3)	mg/L	60.3	8930820	51.1	1.0	8930820
Alkalinity (PP as CaCO3)	mg/L	<1.0	8930820	<1.0	1.0	8930820
Bicarbonate (HCO3)	mg/L	73.5	8930820	62.4	1.0	8930820
Carbonate (CO3)	mg/L	<1.0	8930820	<1.0	1.0	8930820
Hydroxide (OH)	mg/L	<1.0	8930820	<1.0	1.0	8930820
Anions						
Dissolved Sulphate (SO4)	mg/L	4.0	8931803	2.1	1.0	8931800
Dissolved Chloride (Cl)	mg/L	84	8931801	7.9	1.0	8931796
Nutrients						
Total Ammonia (N)	mg/L	<0.020	8933601	<0.020	0.020	8933598
Nitrate plus Nitrite (N)	mg/L	0.43	8930562	0.22	0.10	8930562
Physical Properties						
Conductivity	uS/cm	419	8930819	129	2.0	8930819
pH	pH	7.79	8930818	7.88	N/A	8930818
Physical Properties						
Total Dissolved Solids	mg/L	294	8933107	62	10	8933107
RDL = Reportable Detection Limit						
N/A = Not Applicable						

Maxxam Job #: B817212
Report Date: 2018/03/14

GHD Limited
Client Project #: 56484-02
Site Location: SOLID WASTE ENGINEERING
Your P.O. #: 73506861-1
Sampler Initials: MD

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		TB4976		TB4977		
Sampling Date		2018/03/06 14:30		2018/03/06 16:10		
COC Number		546181-02-01		546181-02-01		
	UNITS	WG-56484-060318-MD-12	QC Batch	WG-56484-060318-MD-13	RDL	QC Batch
ANIONS						
Nitrite (N)	mg/L	<0.10	8930566	<0.10	0.10	8930564
Calculated Parameters						
Filter and HNO3 Preservation	N/A	FIELD	ONSITE	FIELD	N/A	ONSITE
Nitrate (N)	mg/L	0.14	8928906	2.24	0.10	8928906
Misc. Inorganics						
Fluoride (F)	mg/L	<0.10	8933501	<0.10	0.10	8933498
Alkalinity (Total as CaCO ₃)	mg/L	95.5	8930820	308	1.0	8930820
Alkalinity (PP as CaCO ₃)	mg/L	<1.0	8930820	<1.0	1.0	8930820
Bicarbonate (HCO ₃)	mg/L	117	8930820	375	1.0	8930820
Carbonate (CO ₃)	mg/L	<1.0	8930820	<1.0	1.0	8930820
Hydroxide (OH)	mg/L	<1.0	8930820	<1.0	1.0	8930820
Anions						
Dissolved Sulphate (SO ₄)	mg/L	3.9	8931803	1.4	1.0	8931800
Dissolved Chloride (Cl)	mg/L	6.0	8931801	4.3	1.0	8931796
Nutrients						
Total Ammonia (N)	mg/L	<0.020	8933599	<0.020	0.020	8933598
Nitrate plus Nitrite (N)	mg/L	0.14	8930565	2.24	0.10	8930562
Physical Properties						
Conductivity	uS/cm	199	8930819	576	2.0	8930819
pH	pH	7.96	8930818	8.20	N/A	8930818
Physical Properties						
Total Dissolved Solids	mg/L	120	8933107	296	10	8933107
RDL = Reportable Detection Limit						
N/A = Not Applicable						

Maxxam Job #: B817212
Report Date: 2018/03/14

GHD Limited
Client Project #: 56484-02
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Your P.O. #: 73506861-1
Sampler Initials: MD

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		TB4978		TB4979	TB4979		
Sampling Date		2018/03/06 16:20		2018/03/06 16:25	2018/03/06 16:25		
COC Number		546181-02-01		546181-02-01	546181-02-01		
	UNITS	WG-56484-060318-MD-14	QC Batch	WG-56484-060318-MD-15	WG-56484-060318-MD-15 Lab-Dup	RDL	QC Batch

ANIONS

Nitrite (N)	mg/L	<0.10	8930564	<0.10	<0.10	0.10	8930566

Calculated Parameters

Filter and HNO3 Preservation	N/A	FIELD	ONSITE	FIELD	N/A	N/A	ONSITE
Nitrate (N)	mg/L	2.75	8928906	2.75	N/A	0.10	8928906

Misc. Inorganics

Fluoride (F)	mg/L	<0.10	8933498	<0.10	<0.10	0.10	8933501
Alkalinity (Total as CaCO3)	mg/L	349	8930820	347	N/A	1.0	8930823
Alkalinity (PP as CaCO3)	mg/L	<1.0	8930820	<1.0	N/A	1.0	8930823
Bicarbonate (HCO3)	mg/L	426	8930820	424	N/A	1.0	8930823
Carbonate (CO3)	mg/L	<1.0	8930820	<1.0	N/A	1.0	8930823
Hydroxide (OH)	mg/L	<1.0	8930820	<1.0	N/A	1.0	8930823

Anions

Dissolved Sulphate (SO4)	mg/L	12.5	8931800	12.3	N/A	1.0	8931803
Dissolved Chloride (Cl)	mg/L	44	8931796	42	N/A	1.0	8931801

Nutrients

Total Ammonia (N)	mg/L	0.020	8933599	<0.020	N/A	0.020	8933601
Nitrate plus Nitrite (N)	mg/L	2.75	8930562	2.75	2.83	0.10	8930565

Physical Properties

Conductivity	uS/cm	786	8930819	791	N/A	2.0	8930822
pH	pH	8.15	8930818	8.13	N/A	N/A	8930821

Physical Properties

Total Dissolved Solids	mg/L	408	8933107	398	N/A	10	8933107

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

Maxxam Job #: B817212
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GHD Limited
Client Project #: 56484-02
Site Location: SOLID WASTE ENGINEERING
Your P.O. #: 73506861-1
Sampler Initials: MD

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		TB4980			TB4981		
Sampling Date		2018/03/06 17:00			2018/03/06 17:20		
COC Number		546181-02-01			546181-02-01		
	UNITS	WG-56484-060318-MD-16	RDL	QC Batch	WG-56484-060318-MD-17	RDL	QC Batch
ANIONS							
Nitrite (N)	mg/L	<0.10	0.10	8930564	<0.10	0.10	8930564
Calculated Parameters							
Filter and HNO3 Preservation	N/A	FIELD	N/A	ONSITE	FIELD	N/A	ONSITE
Nitrate (N)	mg/L	0.58	0.10	8928906	<0.10	0.10	8928906
Misc. Inorganics							
Fluoride (F)	mg/L	<0.10	0.10	8933498	<0.10	0.10	8933498
Alkalinity (Total as CaCO3)	mg/L	99.1	1.0	8930820	124	1.0	8930817
Alkalinity (PP as CaCO3)	mg/L	<1.0	1.0	8930820	<1.0	1.0	8930817
Bicarbonate (HCO3)	mg/L	121	1.0	8930820	152	1.0	8930817
Carbonate (CO3)	mg/L	<1.0	1.0	8930820	<1.0	1.0	8930817
Hydroxide (OH)	mg/L	<1.0	1.0	8930820	<1.0	1.0	8930817
Anions							
Dissolved Sulphate (SO4)	mg/L	5.5	1.0	8931803	2.5	1.0	8931800
Dissolved Chloride (Cl)	mg/L	4.2	1.0	8931801	9.8	1.0	8931796
Nutrients							
Total Ammonia (N)	mg/L	<0.020	0.020	8933598	13 (1)	0.40	8934556
Nitrate plus Nitrite (N)	mg/L	0.58	0.10	8930562	<0.10	0.10	8930562
Physical Properties							
Conductivity	uS/cm	213	2.0	8930819	294	2.0	8930816
pH	pH	8.04	N/A	8930818	7.96	N/A	8930815
Physical Properties							
Total Dissolved Solids	mg/L	96	10	8933107	118	10	8933107
RDL = Reportable Detection Limit N/A = Not Applicable (1) Detection limits raised due to dilution to bring analyte within the calibrated range.							

Maxxam Job #: B817212
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Sampler Initials: MD

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		TB4982			TB4983		
Sampling Date		2018/03/06 17:45			2018/03/06 18:00		
COC Number		546181-02-01			546181-02-01		
	UNITS	WG-56484-060318-MD-18	RDL	QC Batch	WG-56484-060318-MD-19	RDL	QC Batch
ANIONS							
Nitrite (N)	mg/L	<0.10	0.10	8930566	<0.10	0.10	8930564
Calculated Parameters							
Filter and HNO3 Preservation	N/A	FIELD	N/A	ONSITE	FIELD	N/A	ONSITE
Nitrate (N)	mg/L	<0.10	0.10	8928906	<0.10	0.10	8928906
Misc. Inorganics							
Fluoride (F)	mg/L	<0.10	0.10	8933501	<0.10	0.10	8933498
Alkalinity (Total as CaCO ₃)	mg/L	467	1.0	8930823	243	1.0	8930820
Alkalinity (PP as CaCO ₃)	mg/L	<1.0	1.0	8930823	<1.0	1.0	8930820
Bicarbonate (HCO ₃)	mg/L	569	1.0	8930823	296	1.0	8930820
Carbonate (CO ₃)	mg/L	<1.0	1.0	8930823	<1.0	1.0	8930820
Hydroxide (OH)	mg/L	<1.0	1.0	8930823	<1.0	1.0	8930820
Anions							
Dissolved Sulphate (SO ₄)	mg/L	<1.0	1.0	8931803	2.6	1.0	8931803
Dissolved Chloride (Cl)	mg/L	45	1.0	8931801	33	1.0	8931801
Nutrients							
Total Ammonia (N)	mg/L	23 (1)	1.0	8934556	2.3 (1)	0.10	8933599
Nitrate plus Nitrite (N)	mg/L	<0.10	0.10	8930565	<0.10	0.10	8930562
Physical Properties							
Conductivity	uS/cm	1010	2.0	8930822	562	2.0	8930819
pH	pH	7.89	N/A	8930821	7.95	N/A	8930818
Physical Properties							
Total Dissolved Solids	mg/L	426	10	8933107	300	10	8933116
RDL = Reportable Detection Limit							
N/A = Not Applicable							
(1) Detection limits raised due to dilution to bring analyte within the calibrated range.							

Maxxam Job #: B817212
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Sampler Initials: MD

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		TB4984		
Sampling Date		2018/03/06 18:30		
COC Number		546181-02-01		
	UNITS	WG-56484-060318-MD-20	RDL	QC Batch
ANIONS				
Nitrite (N)	mg/L	<0.10	0.10	8930564
Calculated Parameters				
Filter and HNO3 Preservation	N/A	FIELD	N/A	ONSITE
Nitrate (N)	mg/L	<0.10	0.10	8928906
Misc. Inorganics				
Fluoride (F)	mg/L	<0.10	0.10	8933498
Alkalinity (Total as CaCO ₃)	mg/L	<1.0	1.0	8930820
Alkalinity (PP as CaCO ₃)	mg/L	<1.0	1.0	8930820
Bicarbonate (HCO ₃)	mg/L	<1.0	1.0	8930820
Carbonate (CO ₃)	mg/L	<1.0	1.0	8930820
Hydroxide (OH)	mg/L	<1.0	1.0	8930820
Anions				
Dissolved Sulphate (SO ₄)	mg/L	<1.0	1.0	8931800
Dissolved Chloride (Cl)	mg/L	<1.0	1.0	8931796
Nutrients				
Total Ammonia (N)	mg/L	<0.020	0.020	8933598
Nitrate plus Nitrite (N)	mg/L	<0.10	0.10	8930562
Physical Properties				
Conductivity	uS/cm	<2.0	2.0	8930819
pH	pH	5.24	N/A	8930818
Physical Properties				
Total Dissolved Solids	mg/L	<10	10	8933116
RDL = Reportable Detection Limit				
N/A = Not Applicable				

Maxxam Job #: B817212
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GHD Limited
Client Project #: 56484-02
Site Location: SOLID WASTE ENGINEERING
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Sampler Initials: MD

CSR DISSOLVED METALS IN WATER WITH CV HG (WATER)

Maxxam ID		TB4951	TB4951	TB4952		
Sampling Date		2018/03/05 12:15	2018/03/05 12:15	2018/03/05 12:45		
COC Number		546181-01-01	546181-01-01	546181-01-01		
	UNITS	WG-56484-050318-MD-01	WG-56484-050318-MD-01 Lab-Dup	WG-56484-050318-MD-02	RDL	QC Batch

Calculated Parameters						
Dissolved Hardness (CaCO ₃)	mg/L	33.3	N/A	109	0.50	8928849
Elements						
Dissolved Mercury (Hg)	ug/L	<0.0020	<0.0020	<0.0020	0.0020	8931598
Dissolved Metals by ICPMS						
Dissolved Aluminum (Al)	ug/L	5.0	5.0	3.4	3.0	8930001
Dissolved Antimony (Sb)	ug/L	<0.50	<0.50	<0.50	0.50	8930001
Dissolved Arsenic (As)	ug/L	0.13	0.14	0.14	0.10	8930001
Dissolved Barium (Ba)	ug/L	2.3	2.3	5.2	1.0	8930001
Dissolved Beryllium (Be)	ug/L	<0.10	<0.10	<0.10	0.10	8930001
Dissolved Bismuth (Bi)	ug/L	<1.0	<1.0	<1.0	1.0	8930001
Dissolved Boron (B)	ug/L	<50	<50	<50	50	8930001
Dissolved Cadmium (Cd)	ug/L	<0.010	<0.010	<0.010	0.010	8930001
Dissolved Chromium (Cr)	ug/L	<1.0	<1.0	2.3	1.0	8930001
Dissolved Cobalt (Co)	ug/L	<0.20	<0.20	<0.20	0.20	8930001
Dissolved Copper (Cu)	ug/L	<0.20	<0.20	<0.20	0.20	8930001
Dissolved Iron (Fe)	ug/L	<5.0	<5.0	<5.0	5.0	8930001
Dissolved Lead (Pb)	ug/L	<0.20	<0.20	<0.20	0.20	8930001
Dissolved Lithium (Li)	ug/L	<2.0	<2.0	<2.0	2.0	8930001
Dissolved Manganese (Mn)	ug/L	<1.0	<1.0	<1.0	1.0	8930001
Dissolved Molybdenum (Mo)	ug/L	<1.0	<1.0	<1.0	1.0	8930001
Dissolved Nickel (Ni)	ug/L	<1.0	<1.0	<1.0	1.0	8930001
Dissolved Phosphorus (P)	ug/L	<10	<10	<10	10	8930001
Dissolved Selenium (Se)	ug/L	<0.10	<0.10	0.13	0.10	8930001
Dissolved Silicon (Si)	ug/L	4950	4830	8350	100	8930001
Dissolved Silver (Ag)	ug/L	<0.020	<0.020	<0.020	0.020	8930001
Dissolved Strontium (Sr)	ug/L	16.3	15.9	55.9	1.0	8930001
Dissolved Thallium (Tl)	ug/L	<0.010	<0.010	<0.010	0.010	8930001
Dissolved Tin (Sn)	ug/L	<5.0	<5.0	<5.0	5.0	8930001
Dissolved Titanium (Ti)	ug/L	<5.0	<5.0	<5.0	5.0	8930001
RDL = Reportable Detection Limit						
Lab-Dup = Laboratory Initiated Duplicate						
N/A = Not Applicable						

Maxxam Job #: B817212
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GHD Limited
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Site Location: SOLID WASTE ENGINEERING
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Sampler Initials: MD

CSR DISSOLVED METALS IN WATER WITH CV HG (WATER)

Maxxam ID		TB4951	TB4951	TB4952		
Sampling Date		2018/03/05 12:15	2018/03/05 12:15	2018/03/05 12:45		
COC Number		546181-01-01	546181-01-01	546181-01-01		
	UNITS	WG-56484-050318-MD-01	WG-56484-050318-MD-01 Lab-Dup	WG-56484-050318-MD-02	RDL	QC Batch
Dissolved Uranium (U)	ug/L	<0.10	<0.10	0.15	0.10	8930001
Dissolved Vanadium (V)	ug/L	<5.0	<5.0	<5.0	5.0	8930001
Dissolved Zinc (Zn)	ug/L	<5.0	<5.0	<5.0	5.0	8930001
Dissolved Zirconium (Zr)	ug/L	<0.10	<0.10	<0.10	0.10	8930001
Dissolved Calcium (Ca)	mg/L	10.8	N/A	29.1	0.050	8928852
Dissolved Magnesium (Mg)	mg/L	1.56	N/A	8.70	0.050	8928852
Dissolved Potassium (K)	mg/L	0.237	N/A	0.425	0.050	8928852
Dissolved Sodium (Na)	mg/L	1.22	N/A	3.75	0.050	8928852
Dissolved Sulphur (S)	mg/L	<3.0	N/A	<3.0	3.0	8928852
RDL = Reportable Detection Limit Lab-Dup = Laboratory Initiated Duplicate N/A = Not Applicable						

Maxxam Job #: B817212
Report Date: 2018/03/14

GHD Limited
Client Project #: 56484-02
Site Location: SOLID WASTE ENGINEERING
Your P.O. #: 73506861-1
Sampler Initials: MD

CSR DISSOLVED METALS IN WATER WITH CV HG (WATER)

Maxxam ID		TB4953	TB4954		TB4955		
Sampling Date		2018/03/05 13:30	2018/03/05 14:30		2018/03/05 15:15		
COC Number		546181-01-01	546181-01-01		546181-01-01		
	UNITS	WG-56484-050318-MD-03	WG-56484-050318-MD-04	QC Batch	WG-56484-050318-MD-05	RDL	QC Batch

Calculated Parameters							
Dissolved Hardness (CaCO ₃)	mg/L	359	39.6	8928849	46.9	0.50	8928849
Elements							
Dissolved Mercury (Hg)	ug/L	<0.0020	<0.0020	8931953	<0.0020	0.0020	8932112
Dissolved Metals by ICPMS							
Dissolved Aluminum (Al)	ug/L	<3.0	7.3	8930001	6.0	3.0	8930001
Dissolved Antimony (Sb)	ug/L	<0.50	<0.50	8930001	<0.50	0.50	8930001
Dissolved Arsenic (As)	ug/L	<0.10	0.84	8930001	0.39	0.10	8930001
Dissolved Barium (Ba)	ug/L	12.5	<1.0	8930001	<1.0	1.0	8930001
Dissolved Beryllium (Be)	ug/L	<0.10	<0.10	8930001	<0.10	0.10	8930001
Dissolved Bismuth (Bi)	ug/L	<1.0	<1.0	8930001	<1.0	1.0	8930001
Dissolved Boron (B)	ug/L	<50	<50	8930001	<50	50	8930001
Dissolved Cadmium (Cd)	ug/L	0.013	<0.010	8930001	<0.010	0.010	8930001
Dissolved Chromium (Cr)	ug/L	1.0	<1.0	8930001	<1.0	1.0	8930001
Dissolved Cobalt (Co)	ug/L	<0.20	<0.20	8930001	<0.20	0.20	8930001
Dissolved Copper (Cu)	ug/L	<0.20	0.80	8930001	0.21	0.20	8930001
Dissolved Iron (Fe)	ug/L	<5.0	<5.0	8930001	<5.0	5.0	8930001
Dissolved Lead (Pb)	ug/L	<0.20	<0.20	8930001	<0.20	0.20	8930001
Dissolved Lithium (Li)	ug/L	<2.0	<2.0	8930001	<2.0	2.0	8930001
Dissolved Manganese (Mn)	ug/L	<1.0	<1.0	8930001	<1.0	1.0	8930001
Dissolved Molybdenum (Mo)	ug/L	<1.0	<1.0	8930001	<1.0	1.0	8930001
Dissolved Nickel (Ni)	ug/L	<1.0	<1.0	8930001	<1.0	1.0	8930001
Dissolved Phosphorus (P)	ug/L	<10	16	8930001	<10	10	8930001
Dissolved Selenium (Se)	ug/L	0.14	0.12	8930001	0.10	0.10	8930001
Dissolved Silicon (Si)	ug/L	8920	5610	8930001	4160	100	8930001
Dissolved Silver (Ag)	ug/L	<0.020	<0.020	8930001	<0.020	0.020	8930001
Dissolved Strontium (Sr)	ug/L	241	18.8	8930001	24.6	1.0	8930001
Dissolved Thallium (Tl)	ug/L	<0.010	<0.010	8930001	<0.010	0.010	8930001
Dissolved Tin (Sn)	ug/L	<5.0	<5.0	8930001	<5.0	5.0	8930001
Dissolved Titanium (Ti)	ug/L	<5.0	<5.0	8930001	<5.0	5.0	8930001
Dissolved Uranium (U)	ug/L	0.22	<0.10	8930001	<0.10	0.10	8930001
RDL = Reportable Detection Limit							

Maxxam Job #: B817212
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GHD Limited
Client Project #: 56484-02
Site Location: SOLID WASTE ENGINEERING
Your P.O. #: 73506861-1
Sampler Initials: MD

CSR DISSOLVED METALS IN WATER WITH CV HG (WATER)

Maxxam ID		TB4953	TB4954		TB4955		
Sampling Date		2018/03/05 13:30	2018/03/05 14:30		2018/03/05 15:15		
COC Number		546181-01-01	546181-01-01		546181-01-01		
	UNITS	WG-56484-050318-MD-03	WG-56484-050318-MD-04	QC Batch	WG-56484-050318-MD-05	RDL	QC Batch
Dissolved Vanadium (V)	ug/L	<5.0	5.6	8930001	<5.0	5.0	8930001
Dissolved Zinc (Zn)	ug/L	<5.0	<5.0	8930001	<5.0	5.0	8930001
Dissolved Zirconium (Zr)	ug/L	<0.10	<0.10	8930001	<0.10	0.10	8930001
Dissolved Calcium (Ca)	mg/L	122	12.8	8928852	16.2	0.050	8928852
Dissolved Magnesium (Mg)	mg/L	13.3	1.86	8928852	1.57	0.050	8928852
Dissolved Potassium (K)	mg/L	1.19	0.293	8928852	0.325	0.050	8928852
Dissolved Sodium (Na)	mg/L	4.97	1.33	8928852	1.32	0.050	8928852
Dissolved Sulphur (S)	mg/L	3.3	<3.0	8928852	<3.0	3.0	8928852
RDL = Reportable Detection Limit							

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GHD Limited
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Site Location: SOLID WASTE ENGINEERING
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Sampler Initials: MD

CSR DISSOLVED METALS IN WATER WITH CV HG (WATER)

Maxxam ID		TB4955	TB4956		TB4957		
Sampling Date		2018/03/05 15:15	2018/03/05 16:30		2018/03/06 10:30		
COC Number		546181-01-01	546181-01-01		546181-01-01		
	UNITS	WG-56484-050318-MD-05 Lab-Dup	WG-56484-050318-MD-06	QC Batch	WG-56484-060318-MD-07	RDL	QC Batch

Calculated Parameters							
Dissolved Hardness (CaCO3)	mg/L	N/A	114	8928849	58.9	0.50	8928849
Elements							
Dissolved Mercury (Hg)	ug/L	<0.0020	<0.0020	8932112	<0.0020	0.0020	8931596
Dissolved Metals by ICPMS							
Dissolved Aluminum (Al)	ug/L	N/A	5.6	8930001	5.3	3.0	8930001
Dissolved Antimony (Sb)	ug/L	N/A	<0.50	8930001	<0.50	0.50	8930001
Dissolved Arsenic (As)	ug/L	N/A	2.10	8930001	0.57	0.10	8930001
Dissolved Barium (Ba)	ug/L	N/A	5.4	8930001	<1.0	1.0	8930001
Dissolved Beryllium (Be)	ug/L	N/A	<0.10	8930001	<0.10	0.10	8930001
Dissolved Bismuth (Bi)	ug/L	N/A	<1.0	8930001	<1.0	1.0	8930001
Dissolved Boron (B)	ug/L	N/A	<50	8930001	<50	50	8930001
Dissolved Cadmium (Cd)	ug/L	N/A	<0.010	8930001	<0.010	0.010	8930001
Dissolved Chromium (Cr)	ug/L	N/A	<1.0	8930001	<1.0	1.0	8930001
Dissolved Cobalt (Co)	ug/L	N/A	<0.20	8930001	<0.20	0.20	8930001
Dissolved Copper (Cu)	ug/L	N/A	<0.20	8930001	0.21	0.20	8930001
Dissolved Iron (Fe)	ug/L	N/A	<5.0	8930001	<5.0	5.0	8930001
Dissolved Lead (Pb)	ug/L	N/A	<0.20	8930001	<0.20	0.20	8930001
Dissolved Lithium (Li)	ug/L	N/A	<2.0	8930001	<2.0	2.0	8930001
Dissolved Manganese (Mn)	ug/L	N/A	<1.0	8930001	<1.0	1.0	8930001
Dissolved Molybdenum (Mo)	ug/L	N/A	<1.0	8930001	<1.0	1.0	8930001
Dissolved Nickel (Ni)	ug/L	N/A	<1.0	8930001	<1.0	1.0	8930001
Dissolved Phosphorus (P)	ug/L	N/A	35	8930001	11	10	8930001
Dissolved Selenium (Se)	ug/L	N/A	0.17	8930001	0.14	0.10	8930001
Dissolved Silicon (Si)	ug/L	N/A	5520	8930001	4390	100	8930001
Dissolved Silver (Ag)	ug/L	N/A	<0.020	8930001	<0.020	0.020	8930001
Dissolved Strontium (Sr)	ug/L	N/A	45.8	8930001	29.6	1.0	8930001
Dissolved Thallium (Tl)	ug/L	N/A	<0.010	8930001	<0.010	0.010	8930001
Dissolved Tin (Sn)	ug/L	N/A	<5.0	8930001	<5.0	5.0	8930001
Dissolved Titanium (Ti)	ug/L	N/A	<5.0	8930001	<5.0	5.0	8930001

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

Maxxam Job #: B817212
Report Date: 2018/03/14

GHD Limited
Client Project #: 56484-02
Site Location: SOLID WASTE ENGINEERING
Your P.O. #: 73506861-1
Sampler Initials: MD

CSR DISSOLVED METALS IN WATER WITH CV HG (WATER)

Maxxam ID		TB4955	TB4956		TB4957		
Sampling Date		2018/03/05 15:15	2018/03/05 16:30		2018/03/06 10:30		
COC Number		546181-01-01	546181-01-01		546181-01-01		
	UNITS	WG-56484-050318-MD-05 Lab-Dup	WG-56484-050318-MD-06	QC Batch	WG-56484-060318-MD-07	RDL	QC Batch
Dissolved Uranium (U)	ug/L	N/A	0.33	8930001	<0.10	0.10	8930001
Dissolved Vanadium (V)	ug/L	N/A	18.2	8930001	<5.0	5.0	8930001
Dissolved Zinc (Zn)	ug/L	N/A	<5.0	8930001	<5.0	5.0	8930001
Dissolved Zirconium (Zr)	ug/L	N/A	<0.10	8930001	<0.10	0.10	8930001
Dissolved Calcium (Ca)	mg/L	N/A	36.8	8928852	20.0	0.050	8928852
Dissolved Magnesium (Mg)	mg/L	N/A	5.32	8928852	2.19	0.050	8928852
Dissolved Potassium (K)	mg/L	N/A	1.42	8928852	0.453	0.050	8928852
Dissolved Sodium (Na)	mg/L	N/A	1.62	8928852	1.99	0.050	8928852
Dissolved Sulphur (S)	mg/L	N/A	<3.0	8928852	<3.0	3.0	8928852
RDL = Reportable Detection Limit Lab-Dup = Laboratory Initiated Duplicate N/A = Not Applicable							

Maxxam Job #: B817212
Report Date: 2018/03/14

GHD Limited
Client Project #: 56484-02
Site Location: SOLID WASTE ENGINEERING
Your P.O. #: 73506861-1
Sampler Initials: MD

CSR DISSOLVED METALS IN WATER WITH CV HG (WATER)

Maxxam ID		TB4958		TB4959		TB4960		
Sampling Date		2018/03/06 12:30		2018/03/06 13:30		2018/03/06 13:35		
COC Number		546181-01-01		546181-01-01		546181-01-01		
	UNITS	WG-56484-060318-MD-08	QC Batch	WG-56484-060318-MD-09	WG-56484-060318-MD-10	RDL	QC Batch	

Calculated Parameters

Dissolved Hardness (CaCO ₃)	mg/L	98.3	8928849	175	174	0.50	8928849

Elements

Dissolved Mercury (Hg)	ug/L	<0.0020	8931598	<0.0020	<0.0020	0.0020	8931953

Dissolved Metals by ICPMS

Dissolved Aluminum (Al)	ug/L	3.3	8930001	<3.0	<3.0	3.0	8930001
Dissolved Antimony (Sb)	ug/L	<0.50	8930001	<0.50	<0.50	0.50	8930001
Dissolved Arsenic (As)	ug/L	0.83	8930001	0.14	0.12	0.10	8930001
Dissolved Barium (Ba)	ug/L	1.8	8930001	1.5	1.5	1.0	8930001
Dissolved Beryllium (Be)	ug/L	<0.10	8930001	<0.10	<0.10	0.10	8930001
Dissolved Bismuth (Bi)	ug/L	<1.0	8930001	<1.0	<1.0	1.0	8930001
Dissolved Boron (B)	ug/L	<50	8930001	<50	<50	50	8930001
Dissolved Cadmium (Cd)	ug/L	<0.010	8930001	<0.010	<0.010	0.010	8930001
Dissolved Chromium (Cr)	ug/L	<1.0	8930001	<1.0	<1.0	1.0	8930001
Dissolved Cobalt (Co)	ug/L	<0.20	8930001	<0.20	<0.20	0.20	8930001
Dissolved Copper (Cu)	ug/L	<0.20	8930001	<0.20	<0.20	0.20	8930001
Dissolved Iron (Fe)	ug/L	<5.0	8930001	<5.0	<5.0	5.0	8930001
Dissolved Lead (Pb)	ug/L	<0.20	8930001	<0.20	<0.20	0.20	8930001
Dissolved Lithium (Li)	ug/L	<2.0	8930001	<2.0	<2.0	2.0	8930001
Dissolved Manganese (Mn)	ug/L	<1.0	8930001	<1.0	<1.0	1.0	8930001
Dissolved Molybdenum (Mo)	ug/L	<1.0	8930001	<1.0	<1.0	1.0	8930001
Dissolved Nickel (Ni)	ug/L	<1.0	8930001	<1.0	<1.0	1.0	8930001
Dissolved Phosphorus (P)	ug/L	15	8930001	17	16	10	8930001
Dissolved Selenium (Se)	ug/L	0.13	8930001	0.15	0.13	0.10	8930001
Dissolved Silicon (Si)	ug/L	6460	8930001	4770	4750	100	8930001
Dissolved Silver (Ag)	ug/L	<0.020	8930001	<0.020	<0.020	0.020	8930001
Dissolved Strontium (Sr)	ug/L	47.8	8930001	94.4	94.1	1.0	8930001
Dissolved Thallium (Tl)	ug/L	<0.010	8930001	<0.010	<0.010	0.010	8930001
Dissolved Tin (Sn)	ug/L	<5.0	8930001	<5.0	<5.0	5.0	8930001
Dissolved Titanium (Ti)	ug/L	<5.0	8930001	<5.0	<5.0	5.0	8930001
Dissolved Uranium (U)	ug/L	<0.10	8930001	<0.10	<0.10	0.10	8930001

RDL = Reportable Detection Limit

Maxxam Job #: B817212
Report Date: 2018/03/14

GHD Limited
Client Project #: 56484-02
Site Location: SOLID WASTE ENGINEERING
Your P.O. #: 73506861-1
Sampler Initials: MD

CSR DISSOLVED METALS IN WATER WITH CV HG (WATER)

Maxxam ID		TB4958		TB4959	TB4960		
Sampling Date		2018/03/06 12:30		2018/03/06 13:30	2018/03/06 13:35		
COC Number		546181-01-01		546181-01-01	546181-01-01		
	UNITS	WG-56484-060318-MD-08	QC Batch	WG-56484-060318-MD-09	WG-56484-060318-MD-10	RDL	QC Batch
Dissolved Vanadium (V)	ug/L	5.5	8930001	<5.0	<5.0	5.0	8930001
Dissolved Zinc (Zn)	ug/L	<5.0	8930001	<5.0	<5.0	5.0	8930001
Dissolved Zirconium (Zr)	ug/L	<0.10	8930001	<0.10	<0.10	0.10	8930001
Dissolved Calcium (Ca)	mg/L	32.2	8928852	56.2	56.1	0.050	8928852
Dissolved Magnesium (Mg)	mg/L	4.36	8928852	8.27	8.22	0.050	8928852
Dissolved Potassium (K)	mg/L	0.756	8928852	0.490	0.512	0.050	8928852
Dissolved Sodium (Na)	mg/L	1.73	8928852	2.48	2.48	0.050	8928852
Dissolved Sulphur (S)	mg/L	<3.0	8928852	<3.0	<3.0	3.0	8928852
RDL = Reportable Detection Limit							

Maxxam Job #: B817212
Report Date: 2018/03/14

GHD Limited
Client Project #: 56484-02
Site Location: SOLID WASTE ENGINEERING
Your P.O. #: 73506861-1
Sampler Initials: MD

CSR DISSOLVED METALS IN WATER WITH CV HG (WATER)

Maxxam ID		TB4975	TB4976	TB4977		
Sampling Date		2018/03/06 14:00	2018/03/06 14:30	2018/03/06 16:10		
COC Number		546181-02-01	546181-02-01	546181-02-01		
	UNITS	WG-56484-060318-MD-11	WG-56484-060318-MD-12	WG-56484-060318-MD-13	RDL	QC Batch

Calculated Parameters						
Dissolved Hardness (CaCO ₃)	mg/L	55.2	94.7	303	0.50	8928849
Elements						
Dissolved Mercury (Hg)	ug/L	<0.0020	<0.0020	<0.0020	0.0020	8931953
Dissolved Metals by ICPMS						
Dissolved Aluminum (Al)	ug/L	4.9	18.3	<3.0	3.0	8930001
Dissolved Antimony (Sb)	ug/L	<0.50	7.10	<0.50	0.50	8930001
Dissolved Arsenic (As)	ug/L	1.82	0.12	0.11	0.10	8930001
Dissolved Barium (Ba)	ug/L	1.4	<1.0	7.4	1.0	8930001
Dissolved Beryllium (Be)	ug/L	<0.10	<0.10	<0.10	0.10	8930001
Dissolved Bismuth (Bi)	ug/L	<1.0	<1.0	<1.0	1.0	8930001
Dissolved Boron (B)	ug/L	<50	<50	<50	50	8930001
Dissolved Cadmium (Cd)	ug/L	<0.010	0.026	0.010	0.010	8930001
Dissolved Chromium (Cr)	ug/L	2.4	1.0	1.1	1.0	8930001
Dissolved Cobalt (Co)	ug/L	<0.20	<0.20	<0.20	0.20	8930001
Dissolved Copper (Cu)	ug/L	<0.20	0.39	<0.20	0.20	8930001
Dissolved Iron (Fe)	ug/L	<5.0	<5.0	<5.0	5.0	8930001
Dissolved Lead (Pb)	ug/L	<0.20	<0.20	<0.20	0.20	8930001
Dissolved Lithium (Li)	ug/L	<2.0	<2.0	<2.0	2.0	8930001
Dissolved Manganese (Mn)	ug/L	<1.0	<1.0	<1.0	1.0	8930001
Dissolved Molybdenum (Mo)	ug/L	<1.0	<1.0	<1.0	1.0	8930001
Dissolved Nickel (Ni)	ug/L	<1.0	<1.0	<1.0	1.0	8930001
Dissolved Phosphorus (P)	ug/L	48	30	<10	10	8930001
Dissolved Selenium (Se)	ug/L	0.26	0.12	<0.10	0.10	8930001
Dissolved Silicon (Si)	ug/L	6070	5210	11600	100	8930001
Dissolved Silver (Ag)	ug/L	<0.020	<0.020	<0.020	0.020	8930001
Dissolved Strontium (Sr)	ug/L	29.5	68.2	195	1.0	8930001
Dissolved Thallium (Tl)	ug/L	<0.010	<0.010	<0.010	0.010	8930001
Dissolved Tin (Sn)	ug/L	<5.0	<5.0	<5.0	5.0	8930001
Dissolved Titanium (Ti)	ug/L	<5.0	<5.0	<5.0	5.0	8930001
Dissolved Uranium (U)	ug/L	0.27	0.13	0.25	0.10	8930001
RDL = Reportable Detection Limit						

Maxxam Job #: B817212
Report Date: 2018/03/14

GHD Limited
Client Project #: 56484-02
Site Location: SOLID WASTE ENGINEERING
Your P.O. #: 73506861-1
Sampler Initials: MD

CSR DISSOLVED METALS IN WATER WITH CV HG (WATER)

Maxxam ID		TB4975	TB4976	TB4977		
Sampling Date		2018/03/06 14:00	2018/03/06 14:30	2018/03/06 16:10		
COC Number		546181-02-01	546181-02-01	546181-02-01		
	UNITS	WG-56484-060318-MD-11	WG-56484-060318-MD-12	WG-56484-060318-MD-13	RDL	QC Batch
Dissolved Vanadium (V)	ug/L	15.4	<5.0	<5.0	5.0	8930001
Dissolved Zinc (Zn)	ug/L	<5.0	<5.0	<5.0	5.0	8930001
Dissolved Zirconium (Zr)	ug/L	<0.10	<0.10	<0.10	0.10	8930001
Dissolved Calcium (Ca)	mg/L	17.3	30.2	93.4	0.050	8928852
Dissolved Magnesium (Mg)	mg/L	2.93	4.69	17.0	0.050	8928852
Dissolved Potassium (K)	mg/L	1.04	0.414	1.45	0.050	8928852
Dissolved Sodium (Na)	mg/L	2.67	3.06	6.13	0.050	8928852
Dissolved Sulphur (S)	mg/L	<3.0	<3.0	<3.0	3.0	8928852
RDL = Reportable Detection Limit						

Maxxam Job #: B817212
Report Date: 2018/03/14

GHD Limited
Client Project #: 56484-02
Site Location: SOLID WASTE ENGINEERING
Your P.O. #: 73506861-1
Sampler Initials: MD

CSR DISSOLVED METALS IN WATER WITH CV HG (WATER)

Maxxam ID		TB4978	TB4979	TB4980		
Sampling Date		2018/03/06 16:20	2018/03/06 16:25	2018/03/06 17:00		
COC Number		546181-02-01	546181-02-01	546181-02-01		
	UNITS	WG-56484-060318-MD-14	WG-56484-060318-MD-15	WG-56484-060318-MD-16	RDL	QC Batch

Calculated Parameters						
Dissolved Hardness (CaCO ₃)	mg/L	387	388	98.4	0.50	8928849
Elements						
Dissolved Mercury (Hg)	ug/L	<0.0020	<0.0020	<0.0020	0.0020	8932112
Dissolved Metals by ICPMS						
Dissolved Aluminum (Al)	ug/L	<3.0	<3.0	<3.0	3.0	8930001
Dissolved Antimony (Sb)	ug/L	<0.50	<0.50	<0.50	0.50	8930001
Dissolved Arsenic (As)	ug/L	0.16	0.14	0.26	0.10	8930001
Dissolved Barium (Ba)	ug/L	14.3	14.7	2.6	1.0	8930001
Dissolved Beryllium (Be)	ug/L	<0.10	<0.10	<0.10	0.10	8930001
Dissolved Bismuth (Bi)	ug/L	<1.0	<1.0	<1.0	1.0	8930001
Dissolved Boron (B)	ug/L	239	252	98	50	8930001
Dissolved Cadmium (Cd)	ug/L	0.036	0.034	<0.010	0.010	8930001
Dissolved Chromium (Cr)	ug/L	<1.0	<1.0	1.3	1.0	8930001
Dissolved Cobalt (Co)	ug/L	0.39	0.40	<0.20	0.20	8930001
Dissolved Copper (Cu)	ug/L	2.68	2.76	<0.20	0.20	8930001
Dissolved Iron (Fe)	ug/L	<5.0	<5.0	<5.0	5.0	8930001
Dissolved Lead (Pb)	ug/L	<0.20	<0.20	<0.20	0.20	8930001
Dissolved Lithium (Li)	ug/L	<2.0	<2.0	<2.0	2.0	8930001
Dissolved Manganese (Mn)	ug/L	69.7	69.9	<1.0	1.0	8930001
Dissolved Molybdenum (Mo)	ug/L	<1.0	<1.0	<1.0	1.0	8930001
Dissolved Nickel (Ni)	ug/L	1.3	1.3	<1.0	1.0	8930001
Dissolved Phosphorus (P)	ug/L	<10	<10	27	10	8930001
Dissolved Selenium (Se)	ug/L	<0.10	<0.10	<0.10	0.10	8930001
Dissolved Silicon (Si)	ug/L	12700	12700	7560	100	8930001
Dissolved Silver (Ag)	ug/L	<0.020	<0.020	<0.020	0.020	8930001
Dissolved Strontium (Sr)	ug/L	284	290	60.4	1.0	8930001
Dissolved Thallium (Tl)	ug/L	<0.010	<0.010	<0.010	0.010	8930001
Dissolved Tin (Sn)	ug/L	<5.0	<5.0	<5.0	5.0	8930001
Dissolved Titanium (Ti)	ug/L	<5.0	<5.0	<5.0	5.0	8930001
Dissolved Uranium (U)	ug/L	0.77	0.76	0.15	0.10	8930001
RDL = Reportable Detection Limit						

Maxxam Job #: B817212
Report Date: 2018/03/14

GHD Limited
Client Project #: 56484-02
Site Location: SOLID WASTE ENGINEERING
Your P.O. #: 73506861-1
Sampler Initials: MD

CSR DISSOLVED METALS IN WATER WITH CV HG (WATER)

Maxxam ID		TB4978	TB4979	TB4980		
Sampling Date		2018/03/06 16:20	2018/03/06 16:25	2018/03/06 17:00		
COC Number		546181-02-01	546181-02-01	546181-02-01		
	UNITS	WG-56484-060318-MD-14	WG-56484-060318-MD-15	WG-56484-060318-MD-16	RDL	QC Batch
Dissolved Vanadium (V)	ug/L	<5.0	<5.0	6.0	5.0	8930001
Dissolved Zinc (Zn)	ug/L	<5.0	<5.0	<5.0	5.0	8930001
Dissolved Zirconium (Zr)	ug/L	<0.10	<0.10	<0.10	0.10	8930001
Dissolved Calcium (Ca)	mg/L	116	116	29.5	0.050	8928852
Dissolved Magnesium (Mg)	mg/L	23.8	23.6	6.00	0.050	8928852
Dissolved Potassium (K)	mg/L	2.20	2.23	0.614	0.050	8928852
Dissolved Sodium (Na)	mg/L	17.1	17.2	4.69	0.050	8928852
Dissolved Sulphur (S)	mg/L	4.8	5.1	<3.0	3.0	8928852
RDL = Reportable Detection Limit						

Maxxam Job #: B817212
Report Date: 2018/03/14

GHD Limited
Client Project #: 56484-02
Site Location: SOLID WASTE ENGINEERING
Your P.O. #: 73506861-1
Sampler Initials: MD

CSR DISSOLVED METALS IN WATER WITH CV HG (WATER)

Maxxam ID		TB4981	TB4982	TB4983		
Sampling Date		2018/03/06 17:20	2018/03/06 17:45	2018/03/06 18:00		
COC Number		546181-02-01	546181-02-01	546181-02-01		
	UNITS	WG-56484-060318-MD-17	WG-56484-060318-MD-18	WG-56484-060318-MD-19	RDL	QC Batch

Calculated Parameters						
Dissolved Hardness (CaCO ₃)	mg/L	63.4	331	223	0.50	8928849
Elements						
Dissolved Mercury (Hg)	ug/L	<0.0020	<0.0020	<0.0020	0.0020	8932112
Dissolved Metals by ICPMS						
Dissolved Aluminum (Al)	ug/L	5.5	<3.0	<3.0	3.0	8930001
Dissolved Antimony (Sb)	ug/L	<0.50	<0.50	<0.50	0.50	8930001
Dissolved Arsenic (As)	ug/L	2.78	4.51	0.50	0.10	8930001
Dissolved Barium (Ba)	ug/L	8.2	43.1	11.8	1.0	8930001
Dissolved Beryllium (Be)	ug/L	<0.10	<0.10	<0.10	0.10	8930001
Dissolved Bismuth (Bi)	ug/L	<1.0	<1.0	<1.0	1.0	8930001
Dissolved Boron (B)	ug/L	111	507	198	50	8930001
Dissolved Cadmium (Cd)	ug/L	0.010	<0.010	<0.010	0.010	8930001
Dissolved Chromium (Cr)	ug/L	<1.0	<1.0	<1.0	1.0	8930001
Dissolved Cobalt (Co)	ug/L	<0.20	1.87	0.28	0.20	8930001
Dissolved Copper (Cu)	ug/L	<0.20	<0.20	0.35	0.20	8930001
Dissolved Iron (Fe)	ug/L	253	4350	2270	5.0	8930001
Dissolved Lead (Pb)	ug/L	<0.20	<0.20	<0.20	0.20	8930001
Dissolved Lithium (Li)	ug/L	<2.0	<2.0	<2.0	2.0	8930001
Dissolved Manganese (Mn)	ug/L	557	3080	1820	1.0	8930001
Dissolved Molybdenum (Mo)	ug/L	<1.0	<1.0	<1.0	1.0	8930001
Dissolved Nickel (Ni)	ug/L	<1.0	3.2	1.3	1.0	8930001
Dissolved Phosphorus (P)	ug/L	36	27	14	10	8930001
Dissolved Selenium (Se)	ug/L	<0.10	<0.10	<0.10	0.10	8930001
Dissolved Silicon (Si)	ug/L	10600	16700	7910	100	8930001
Dissolved Silver (Ag)	ug/L	<0.020	<0.020	<0.020	0.020	8930001
Dissolved Strontium (Sr)	ug/L	95.2	368	193	1.0	8930001
Dissolved Thallium (Tl)	ug/L	<0.010	<0.010	<0.010	0.010	8930001
Dissolved Tin (Sn)	ug/L	<5.0	<5.0	<5.0	5.0	8930001
Dissolved Titanium (Ti)	ug/L	<5.0	<5.0	<5.0	5.0	8930001
Dissolved Uranium (U)	ug/L	<0.10	0.36	<0.10	0.10	8930001
RDL = Reportable Detection Limit						

Maxxam Job #: B817212
Report Date: 2018/03/14

GHD Limited
Client Project #: 56484-02
Site Location: SOLID WASTE ENGINEERING
Your P.O. #: 73506861-1
Sampler Initials: MD

CSR DISSOLVED METALS IN WATER WITH CV HG (WATER)

Maxxam ID		TB4981	TB4982	TB4983		
Sampling Date		2018/03/06 17:20	2018/03/06 17:45	2018/03/06 18:00		
COC Number		546181-02-01	546181-02-01	546181-02-01		
	UNITS	WG-56484-060318-MD-17	WG-56484-060318-MD-18	WG-56484-060318-MD-19	RDL	QC Batch
Dissolved Vanadium (V)	ug/L	<5.0	<5.0	<5.0	5.0	8930001
Dissolved Zinc (Zn)	ug/L	<5.0	<5.0	<5.0	5.0	8930001
Dissolved Zirconium (Zr)	ug/L	<0.10	<0.10	<0.10	0.10	8930001
Dissolved Calcium (Ca)	mg/L	22.2	103	76.5	0.050	8928852
Dissolved Magnesium (Mg)	mg/L	1.95	17.6	7.85	0.050	8928852
Dissolved Potassium (K)	mg/L	4.15	11.3	3.32	0.050	8928852
Dissolved Sodium (Na)	mg/L	13.6	47.5	20.3	0.050	8928852
Dissolved Sulphur (S)	mg/L	<3.0	<3.0	<3.0	3.0	8928852
RDL = Reportable Detection Limit						

Maxxam Job #: B817212
Report Date: 2018/03/14

GHD Limited
Client Project #: 56484-02
Site Location: SOLID WASTE ENGINEERING
Your P.O. #: 73506861-1
Sampler Initials: MD

CSR DISSOLVED METALS IN WATER WITH CV HG (WATER)

Maxxam ID		TB4984		
Sampling Date		2018/03/06 18:30		
COC Number		546181-02-01		
	UNITS	WG-56484-060318-MD-20	RDL	QC Batch
Calculated Parameters				
Dissolved Hardness (CaCO ₃)	mg/L	<0.50	0.50	8928849
Elements				
Dissolved Mercury (Hg)	ug/L	<0.0020	0.0020	8932112
Dissolved Metals by ICPMS				
Dissolved Aluminum (Al)	ug/L	<3.0	3.0	8930001
Dissolved Antimony (Sb)	ug/L	<0.50	0.50	8930001
Dissolved Arsenic (As)	ug/L	<0.10	0.10	8930001
Dissolved Barium (Ba)	ug/L	<1.0	1.0	8930001
Dissolved Beryllium (Be)	ug/L	<0.10	0.10	8930001
Dissolved Bismuth (Bi)	ug/L	<1.0	1.0	8930001
Dissolved Boron (B)	ug/L	<50	50	8930001
Dissolved Cadmium (Cd)	ug/L	<0.010	0.010	8930001
Dissolved Chromium (Cr)	ug/L	<1.0	1.0	8930001
Dissolved Cobalt (Co)	ug/L	<0.20	0.20	8930001
Dissolved Copper (Cu)	ug/L	<0.20	0.20	8930001
Dissolved Iron (Fe)	ug/L	<5.0	5.0	8930001
Dissolved Lead (Pb)	ug/L	<0.20	0.20	8930001
Dissolved Lithium (Li)	ug/L	<2.0	2.0	8930001
Dissolved Manganese (Mn)	ug/L	<1.0	1.0	8930001
Dissolved Molybdenum (Mo)	ug/L	<1.0	1.0	8930001
Dissolved Nickel (Ni)	ug/L	<1.0	1.0	8930001
Dissolved Phosphorus (P)	ug/L	<10	10	8930001
Dissolved Selenium (Se)	ug/L	<0.10	0.10	8930001
Dissolved Silicon (Si)	ug/L	<100	100	8930001
Dissolved Silver (Ag)	ug/L	<0.020	0.020	8930001
Dissolved Strontium (Sr)	ug/L	<1.0	1.0	8930001
Dissolved Thallium (Tl)	ug/L	<0.010	0.010	8930001
Dissolved Tin (Sn)	ug/L	<5.0	5.0	8930001
Dissolved Titanium (Ti)	ug/L	<5.0	5.0	8930001
Dissolved Uranium (U)	ug/L	<0.10	0.10	8930001
RDL = Reportable Detection Limit				

Maxxam Job #: B817212
Report Date: 2018/03/14

GHD Limited
Client Project #: 56484-02
Site Location: SOLID WASTE ENGINEERING
Your P.O. #: 73506861-1
Sampler Initials: MD

CSR DISSOLVED METALS IN WATER WITH CV HG (WATER)

Maxxam ID		TB4984		
Sampling Date		2018/03/06 18:30		
COC Number		546181-02-01		
	UNITS	WG-56484-060318-MD-20	RDL	QC Batch
Dissolved Vanadium (V)	ug/L	<5.0	5.0	8930001
Dissolved Zinc (Zn)	ug/L	<5.0	5.0	8930001
Dissolved Zirconium (Zr)	ug/L	<0.10	0.10	8930001
Dissolved Calcium (Ca)	mg/L	<0.050	0.050	8928852
Dissolved Magnesium (Mg)	mg/L	<0.050	0.050	8928852
Dissolved Potassium (K)	mg/L	<0.050	0.050	8928852
Dissolved Sodium (Na)	mg/L	<0.050	0.050	8928852
Dissolved Sulphur (S)	mg/L	<3.0	3.0	8928852
RDL = Reportable Detection Limit				

Maxxam Job #: B817212
Report Date: 2018/03/14

GHD Limited
Client Project #: 56484-02
Site Location: SOLID WASTE ENGINEERING
Your P.O. #: 73506861-1
Sampler Initials: MD

CSR VOC + VPH IN WATER (WATER)

Maxxam ID		TB4951	TB4959	TB4960		
Sampling Date		2018/03/05 12:15	2018/03/06 13:30	2018/03/06 13:35		
COC Number		546181-01-01	546181-01-01	546181-01-01		
	UNITS	WG-56484-050318-MD-01	WG-56484-060318-MD-09	WG-56484-060318-MD-10	RDL	QC Batch

Calculated Parameters						
VPH (VHW6 to 10 - BTEX)	ug/L	<300	<300	<300	300	8928634
Volatiles						
VH C6-C10	ug/L	<300	<300	<300	300	8929497
1,1,1,2-tetrachloroethane	ug/L	<0.50	<0.50	<0.50	0.50	8929497
1,1,1-trichloroethane	ug/L	<0.50	<0.50	<0.50	0.50	8929497
1,1,2,2-tetrachloroethane	ug/L	<0.50	<0.50	<0.50	0.50	8929497
1,1,2Trichloro-1,2,2Trifluoroethane	ug/L	<2.0	<2.0	<2.0	2.0	8929497
1,1,2-trichloroethane	ug/L	<0.50	<0.50	<0.50	0.50	8929497
1,1-dichloroethane	ug/L	<0.50	<0.50	<0.50	0.50	8929497
1,1-dichloroethene	ug/L	<0.50	<0.50	<0.50	0.50	8929497
1,2,3-trichlorobenzene	ug/L	<2.0	<2.0	<2.0	2.0	8929497
1,2,4-trichlorobenzene	ug/L	<2.0	<2.0	<2.0	2.0	8929497
1,2-dibromoethane	ug/L	<0.20	<0.20	<0.20	0.20	8929497
1,2-dichlorobenzene	ug/L	<0.50	<0.50	<0.50	0.50	8929497
1,2-dichloroethane	ug/L	<0.50	<0.50	<0.50	0.50	8929497
1,2-dichloropropane	ug/L	<0.50	<0.50	<0.50	0.50	8929497
1,3,5-trimethylbenzene	ug/L	<2.0	<2.0	<2.0	2.0	8929497
1,3-dichlorobenzene	ug/L	<0.50	<0.50	<0.50	0.50	8929497
1,4-dichlorobenzene	ug/L	<0.50	<0.50	<0.50	0.50	8929497
Benzene	ug/L	<0.40	<0.40	<0.40	0.40	8929497
Bromobenzene	ug/L	<2.0	<2.0	<2.0	2.0	8929497
Bromodichloromethane	ug/L	<1.0	<1.0	<1.0	1.0	8929497
Bromoform	ug/L	<1.0	<1.0	<1.0	1.0	8929497
Bromomethane	ug/L	<1.0	<1.0	<1.0	1.0	8929497
Carbon tetrachloride	ug/L	<0.50	<0.50	<0.50	0.50	8929497
Chlorobenzene	ug/L	<0.50	<0.50	<0.50	0.50	8929497
Chlorodibromomethane	ug/L	<1.0	<1.0	<1.0	1.0	8929497
Chloroethane	ug/L	<1.0	<1.0	<1.0	1.0	8929497
Chloroform	ug/L	<1.0	<1.0	<1.0	1.0	8929497
Chloromethane	ug/L	<1.0	<1.0	<1.0	1.0	8929497
RDL = Reportable Detection Limit						

Maxxam Job #: B817212
Report Date: 2018/03/14

GHD Limited
Client Project #: 56484-02
Site Location: SOLID WASTE ENGINEERING
Your P.O. #: 73506861-1
Sampler Initials: MD

CSR VOC + VPH IN WATER (WATER)

Maxxam ID		TB4951	TB4959	TB4960		
Sampling Date		2018/03/05 12:15	2018/03/06 13:30	2018/03/06 13:35		
COC Number		546181-01-01	546181-01-01	546181-01-01		
	UNITS	WG-56484-050318-MD-01	WG-56484-060318-MD-09	WG-56484-060318-MD-10	RDL	QC Batch
cis-1,2-dichloroethene	ug/L	<1.0	<1.0	<1.0	1.0	8929497
cis-1,3-dichloropropene	ug/L	<1.0	<1.0	<1.0	1.0	8929497
Dichlorodifluoromethane	ug/L	<2.0	<2.0	<2.0	2.0	8929497
Dichloromethane	ug/L	<2.0	<2.0	<2.0	2.0	8929497
Ethylbenzene	ug/L	<0.40	<0.40	<0.40	0.40	8929497
Hexachlorobutadiene	ug/L	<0.50	<0.50	<0.50	0.50	8929497
Isopropylbenzene	ug/L	<2.0	<2.0	<2.0	2.0	8929497
Methyl-tert-butylether (MTBE)	ug/L	<4.0	<4.0	<4.0	4.0	8929497
Styrene	ug/L	<0.50	<0.50	<0.50	0.50	8929497
Tetrachloroethene	ug/L	<0.50	<0.50	<0.50	0.50	8929497
Toluene	ug/L	<0.40	<0.40	<0.40	0.40	8929497
trans-1,2-dichloroethene	ug/L	<1.0	<1.0	<1.0	1.0	8929497
trans-1,3-dichloropropene	ug/L	<1.0	<1.0	<1.0	1.0	8929497
Trichloroethene	ug/L	<0.50	<0.50	<0.50	0.50	8929497
Trichlorofluoromethane	ug/L	<4.0	<4.0	<4.0	4.0	8929497
Vinyl chloride	ug/L	<0.50	<0.50	<0.50	0.50	8929497
m & p-Xylene	ug/L	<0.40	<0.40	<0.40	0.40	8929497
o-Xylene	ug/L	<0.40	<0.40	<0.40	0.40	8929497
Xylenes (Total)	ug/L	<0.40	<0.40	<0.40	0.40	8929497
Surrogate Recovery (%)						
1,4-Difluorobenzene (sur.)	%	101	101	100	N/A	8929497
4-Bromofluorobenzene (sur.)	%	92	87	87	N/A	8929497
D4-1,2-Dichloroethane (sur.)	%	96	93	94	N/A	8929497
RDL = Reportable Detection Limit N/A = Not Applicable						

Maxxam Job #: B817212
Report Date: 2018/03/14

GHD Limited
Client Project #: 56484-02
Site Location: SOLID WASTE ENGINEERING
Your P.O. #: 73506861-1
Sampler Initials: MD

CSR VOC + VPH IN WATER (WATER)

Maxxam ID		TB4975	TB4976	TB4978		
Sampling Date		2018/03/06 14:00	2018/03/06 14:30	2018/03/06 16:20		
COC Number		546181-02-01	546181-02-01	546181-02-01		
	UNITS	WG-56484-060318-MD-11	WG-56484-060318-MD-12	WG-56484-060318-MD-14	RDL	QC Batch

Calculated Parameters						
VPH (VHW6 to 10 - BTEX)	ug/L	<300	<300	<300	300	8928634
Volatiles						
VH C6-C10	ug/L	<300	<300	<300	300	8929497
1,1,1,2-tetrachloroethane	ug/L	<0.50	<0.50	<0.50	0.50	8929497
1,1,1-trichloroethane	ug/L	<0.50	<0.50	<0.50	0.50	8929497
1,1,2,2-tetrachloroethane	ug/L	<0.50	<0.50	<0.50	0.50	8929497
1,1,2Trichloro-1,2,2Trifluoroethane	ug/L	<2.0	<2.0	<2.0	2.0	8929497
1,1,2-trichloroethane	ug/L	<0.50	<0.50	<0.50	0.50	8929497
1,1-dichloroethane	ug/L	<0.50	<0.50	<0.50	0.50	8929497
1,1-dichloroethene	ug/L	<0.50	<0.50	<0.50	0.50	8929497
1,2,3-trichlorobenzene	ug/L	<2.0	<2.0	<2.0	2.0	8929497
1,2,4-trichlorobenzene	ug/L	<2.0	<2.0	<2.0	2.0	8929497
1,2-dibromoethane	ug/L	<0.20	<0.20	<0.20	0.20	8929497
1,2-dichlorobenzene	ug/L	<0.50	<0.50	<0.50	0.50	8929497
1,2-dichloroethane	ug/L	<0.50	<0.50	<0.50	0.50	8929497
1,2-dichloropropane	ug/L	<0.50	<0.50	<0.50	0.50	8929497
1,3,5-trimethylbenzene	ug/L	<2.0	<2.0	<2.0	2.0	8929497
1,3-dichlorobenzene	ug/L	<0.50	<0.50	<0.50	0.50	8929497
1,4-dichlorobenzene	ug/L	<0.50	<0.50	<0.50	0.50	8929497
Benzene	ug/L	<0.40	<0.40	<0.40	0.40	8929497
Bromobenzene	ug/L	<2.0	<2.0	<2.0	2.0	8929497
Bromodichloromethane	ug/L	<1.0	<1.0	<1.0	1.0	8929497
Bromoform	ug/L	<1.0	<1.0	<1.0	1.0	8929497
Bromomethane	ug/L	<1.0	<1.0	<1.0	1.0	8929497
Carbon tetrachloride	ug/L	<0.50	<0.50	<0.50	0.50	8929497
Chlorobenzene	ug/L	<0.50	<0.50	<0.50	0.50	8929497
Chlorodibromomethane	ug/L	<1.0	<1.0	<1.0	1.0	8929497
Chloroethane	ug/L	<1.0	<1.0	<1.0	1.0	8929497
Chloroform	ug/L	<1.0	<1.0	<1.0	1.0	8929497
Chloromethane	ug/L	<1.0	<1.0	<1.0	1.0	8929497
RDL = Reportable Detection Limit						

Maxxam Job #: B817212
Report Date: 2018/03/14

GHD Limited
Client Project #: 56484-02
Site Location: SOLID WASTE ENGINEERING
Your P.O. #: 73506861-1
Sampler Initials: MD

CSR VOC + VPH IN WATER (WATER)

Maxxam ID		TB4975	TB4976	TB4978		
Sampling Date		2018/03/06 14:00	2018/03/06 14:30	2018/03/06 16:20		
COC Number		546181-02-01	546181-02-01	546181-02-01		
	UNITS	WG-56484-060318-MD-11	WG-56484-060318-MD-12	WG-56484-060318-MD-14	RDL	QC Batch
cis-1,2-dichloroethene	ug/L	<1.0	<1.0	<1.0	1.0	8929497
cis-1,3-dichloropropene	ug/L	<1.0	<1.0	<1.0	1.0	8929497
Dichlorodifluoromethane	ug/L	<2.0	<2.0	<2.0	2.0	8929497
Dichloromethane	ug/L	<2.0	<2.0	<2.0	2.0	8929497
Ethylbenzene	ug/L	<0.40	<0.40	<0.40	0.40	8929497
Hexachlorobutadiene	ug/L	<0.50	<0.50	<0.50	0.50	8929497
Isopropylbenzene	ug/L	<2.0	<2.0	<2.0	2.0	8929497
Methyl-tert-butylether (MTBE)	ug/L	<4.0	<4.0	<4.0	4.0	8929497
Styrene	ug/L	<0.50	<0.50	<0.50	0.50	8929497
Tetrachloroethene	ug/L	<0.50	<0.50	<0.50	0.50	8929497
Toluene	ug/L	<0.40	<0.40	<0.40	0.40	8929497
trans-1,2-dichloroethene	ug/L	<1.0	<1.0	<1.0	1.0	8929497
trans-1,3-dichloropropene	ug/L	<1.0	<1.0	<1.0	1.0	8929497
Trichloroethene	ug/L	<0.50	<0.50	<0.50	0.50	8929497
Trichlorofluoromethane	ug/L	<4.0	<4.0	<4.0	4.0	8929497
Vinyl chloride	ug/L	<0.50	<0.50	<0.50	0.50	8929497
m & p-Xylene	ug/L	<0.40	<0.40	<0.40	0.40	8929497
o-Xylene	ug/L	<0.40	<0.40	<0.40	0.40	8929497
Xylenes (Total)	ug/L	<0.40	<0.40	<0.40	0.40	8929497
Surrogate Recovery (%)						
1,4-Difluorobenzene (sur.)	%	101	101	101	N/A	8929497
4-Bromofluorobenzene (sur.)	%	86	86	87	N/A	8929497
D4-1,2-Dichloroethane (sur.)	%	92	91	97	N/A	8929497
RDL = Reportable Detection Limit						
N/A = Not Applicable						

Maxxam Job #: B817212
Report Date: 2018/03/14

GHD Limited
Client Project #: 56484-02
Site Location: SOLID WASTE ENGINEERING
Your P.O. #: 73506861-1
Sampler Initials: MD

CSR VOC + VPH IN WATER (WATER)

Maxxam ID		TB4979	TB4980	TB4981		
Sampling Date		2018/03/06 16:25	2018/03/06 17:00	2018/03/06 17:20		
COC Number		546181-02-01	546181-02-01	546181-02-01		
	UNITS	WG-56484-060318-MD-15	WG-56484-060318-MD-16	WG-56484-060318-MD-17	RDL	QC Batch

Calculated Parameters						
VPH (VHW6 to 10 - BTEX)	ug/L	<300	<300	<300	300	8928634
Volatiles						
VH C6-C10	ug/L	<300	<300	<300	300	8929497
1,1,1,2-tetrachloroethane	ug/L	<0.50	<0.50	<0.50	0.50	8929497
1,1,1-trichloroethane	ug/L	<0.50	<0.50	<0.50	0.50	8929497
1,1,2,2-tetrachloroethane	ug/L	<0.50	<0.50	<0.50	0.50	8929497
1,1,2Trichloro-1,2,2Trifluoroethane	ug/L	<2.0	<2.0	<2.0	2.0	8929497
1,1,2-trichloroethane	ug/L	<0.50	<0.50	<0.50	0.50	8929497
1,1-dichloroethane	ug/L	<0.50	<0.50	<0.50	0.50	8929497
1,1-dichloroethene	ug/L	<0.50	<0.50	<0.50	0.50	8929497
1,2,3-trichlorobenzene	ug/L	<2.0	<2.0	<2.0	2.0	8929497
1,2,4-trichlorobenzene	ug/L	<2.0	<2.0	<2.0	2.0	8929497
1,2-dibromoethane	ug/L	<0.20	<0.20	<0.20	0.20	8929497
1,2-dichlorobenzene	ug/L	<0.50	<0.50	<0.50	0.50	8929497
1,2-dichloroethane	ug/L	<0.50	<0.50	<0.50	0.50	8929497
1,2-dichloropropane	ug/L	<0.50	<0.50	<0.50	0.50	8929497
1,3,5-trimethylbenzene	ug/L	<2.0	<2.0	<2.0	2.0	8929497
1,3-dichlorobenzene	ug/L	<0.50	<0.50	<0.50	0.50	8929497
1,4-dichlorobenzene	ug/L	<0.50	<0.50	<0.50	0.50	8929497
Benzene	ug/L	<0.40	<0.40	<0.40	0.40	8929497
Bromobenzene	ug/L	<2.0	<2.0	<2.0	2.0	8929497
Bromodichloromethane	ug/L	<1.0	<1.0	<1.0	1.0	8929497
Bromoform	ug/L	<1.0	<1.0	<1.0	1.0	8929497
Bromomethane	ug/L	<1.0	<1.0	<1.0	1.0	8929497
Carbon tetrachloride	ug/L	<0.50	<0.50	<0.50	0.50	8929497
Chlorobenzene	ug/L	<0.50	<0.50	<0.50	0.50	8929497
Chlorodibromomethane	ug/L	<1.0	<1.0	<1.0	1.0	8929497
Chloroethane	ug/L	<1.0	<1.0	<1.0	1.0	8929497
Chloroform	ug/L	<1.0	<1.0	<1.0	1.0	8929497
Chloromethane	ug/L	<1.0	<1.0	<1.0	1.0	8929497
RDL = Reportable Detection Limit						

Maxxam Job #: B817212
Report Date: 2018/03/14

GHD Limited
Client Project #: 56484-02
Site Location: SOLID WASTE ENGINEERING
Your P.O. #: 73506861-1
Sampler Initials: MD

CSR VOC + VPH IN WATER (WATER)

Maxxam ID		TB4979	TB4980	TB4981		
Sampling Date		2018/03/06 16:25	2018/03/06 17:00	2018/03/06 17:20		
COC Number		546181-02-01	546181-02-01	546181-02-01		
	UNITS	WG-56484-060318-MD-15	WG-56484-060318-MD-16	WG-56484-060318-MD-17	RDL	QC Batch
cis-1,2-dichloroethene	ug/L	<1.0	<1.0	<1.0	1.0	8929497
cis-1,3-dichloropropene	ug/L	<1.0	<1.0	<1.0	1.0	8929497
Dichlorodifluoromethane	ug/L	<2.0	<2.0	<2.0	2.0	8929497
Dichloromethane	ug/L	<2.0	<2.0	<2.0	2.0	8929497
Ethylbenzene	ug/L	<0.40	<0.40	<0.40	0.40	8929497
Hexachlorobutadiene	ug/L	<0.50	<0.50	<0.50	0.50	8929497
Isopropylbenzene	ug/L	<2.0	<2.0	<2.0	2.0	8929497
Methyl-tert-butylether (MTBE)	ug/L	<4.0	<4.0	<4.0	4.0	8929497
Styrene	ug/L	<0.50	<0.50	<0.50	0.50	8929497
Tetrachloroethene	ug/L	<0.50	<0.50	<0.50	0.50	8929497
Toluene	ug/L	<0.40	<0.40	<0.40	0.40	8929497
trans-1,2-dichloroethene	ug/L	<1.0	<1.0	<1.0	1.0	8929497
trans-1,3-dichloropropene	ug/L	<1.0	<1.0	<1.0	1.0	8929497
Trichloroethene	ug/L	<0.50	<0.50	<0.50	0.50	8929497
Trichlorofluoromethane	ug/L	<4.0	<4.0	<4.0	4.0	8929497
Vinyl chloride	ug/L	<0.50	<0.50	<0.50	0.50	8929497
m & p-Xylene	ug/L	<0.40	<0.40	<0.40	0.40	8929497
o-Xylene	ug/L	<0.40	<0.40	<0.40	0.40	8929497
Xylenes (Total)	ug/L	<0.40	<0.40	<0.40	0.40	8929497
Surrogate Recovery (%)						
1,4-Difluorobenzene (sur.)	%	101	102	101	N/A	8929497
4-Bromofluorobenzene (sur.)	%	85	87	84	N/A	8929497
D4-1,2-Dichloroethane (sur.)	%	91	95	90	N/A	8929497
RDL = Reportable Detection Limit N/A = Not Applicable						

Maxxam Job #: B817212
Report Date: 2018/03/14

GHD Limited
Client Project #: 56484-02
Site Location: SOLID WASTE ENGINEERING
Your P.O. #: 73506861-1
Sampler Initials: MD

CSR VOC + VPH IN WATER (WATER)

Maxxam ID		TB4985		
Sampling Date		2018/03/07 09:00		
COC Number		546181-02-01		
	UNITS	TRIP BLANK	RDL	QC Batch
Calculated Parameters				
VPH (VHW6 to 10 - BTEX)	ug/L	<300	300	8928634
Volatiles				
VH C6-C10	ug/L	<300	300	8929497
1,1,1,2-tetrachloroethane	ug/L	<0.50	0.50	8929497
1,1,1-trichloroethane	ug/L	<0.50	0.50	8929497
1,1,2,2-tetrachloroethane	ug/L	<0.50	0.50	8929497
1,1,2Trichloro-1,2,2Trifluoroethane	ug/L	<2.0	2.0	8929497
1,1,2-trichloroethane	ug/L	<0.50	0.50	8929497
1,1-dichloroethane	ug/L	<0.50	0.50	8929497
1,1-dichloroethene	ug/L	<0.50	0.50	8929497
1,2,3-trichlorobenzene	ug/L	<2.0	2.0	8929497
1,2,4-trichlorobenzene	ug/L	<2.0	2.0	8929497
1,2-dibromoethane	ug/L	<0.20	0.20	8929497
1,2-dichlorobenzene	ug/L	<0.50	0.50	8929497
1,2-dichloroethane	ug/L	<0.50	0.50	8929497
1,2-dichloropropane	ug/L	<0.50	0.50	8929497
1,3,5-trimethylbenzene	ug/L	<2.0	2.0	8929497
1,3-dichlorobenzene	ug/L	<0.50	0.50	8929497
1,4-dichlorobenzene	ug/L	<0.50	0.50	8929497
Benzene	ug/L	<0.40	0.40	8929497
Bromobenzene	ug/L	<2.0	2.0	8929497
Bromodichloromethane	ug/L	<1.0	1.0	8929497
Bromoform	ug/L	<1.0	1.0	8929497
Bromomethane	ug/L	<1.0	1.0	8929497
Carbon tetrachloride	ug/L	<0.50	0.50	8929497
Chlorobenzene	ug/L	<0.50	0.50	8929497
Chlorodibromomethane	ug/L	<1.0	1.0	8929497
Chloroethane	ug/L	<1.0	1.0	8929497
Chloroform	ug/L	<1.0	1.0	8929497
Chloromethane	ug/L	<1.0	1.0	8929497
RDL = Reportable Detection Limit				

Maxxam Job #: B817212
Report Date: 2018/03/14

GHD Limited
Client Project #: 56484-02
Site Location: SOLID WASTE ENGINEERING
Your P.O. #: 73506861-1
Sampler Initials: MD

CSR VOC + VPH IN WATER (WATER)

Maxxam ID		TB4985		
Sampling Date		2018/03/07 09:00		
COC Number		546181-02-01		
	UNITS	TRIP BLANK	RDL	QC Batch
cis-1,2-dichloroethene	ug/L	<1.0	1.0	8929497
cis-1,3-dichloropropene	ug/L	<1.0	1.0	8929497
Dichlorodifluoromethane	ug/L	<2.0	2.0	8929497
Dichloromethane	ug/L	<2.0	2.0	8929497
Ethylbenzene	ug/L	<0.40	0.40	8929497
Hexachlorobutadiene	ug/L	<0.50	0.50	8929497
Isopropylbenzene	ug/L	<2.0	2.0	8929497
Methyl-tert-butylether (MTBE)	ug/L	<4.0	4.0	8929497
Styrene	ug/L	<0.50	0.50	8929497
Tetrachloroethene	ug/L	<0.50	0.50	8929497
Toluene	ug/L	<0.40	0.40	8929497
trans-1,2-dichloroethene	ug/L	<1.0	1.0	8929497
trans-1,3-dichloropropene	ug/L	<1.0	1.0	8929497
Trichloroethene	ug/L	<0.50	0.50	8929497
Trichlorofluoromethane	ug/L	<4.0	4.0	8929497
Vinyl chloride	ug/L	<0.50	0.50	8929497
m & p-Xylene	ug/L	<0.40	0.40	8929497
o-Xylene	ug/L	<0.40	0.40	8929497
Xylenes (Total)	ug/L	<0.40	0.40	8929497
Surrogate Recovery (%)				
1,4-Difluorobenzene (sur.)	%	102	N/A	8929497
4-Bromofluorobenzene (sur.)	%	88	N/A	8929497
D4-1,2-Dichloroethane (sur.)	%	91	N/A	8929497
RDL = Reportable Detection Limit N/A = Not Applicable				

Maxxam Job #: B817212
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GHD Limited
Client Project #: 56484-02
Site Location: SOLID WASTE ENGINEERING
Your P.O. #: 73506861-1
Sampler Initials: MD

GENERAL COMMENTS

Sample TB4951 [WG-56484-050318-MD-01] : Sample was analyzed past method specified hold time for Nitrate + Nitrite (N) (highlevel). {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 (highlevel).

Sample TB4952 [WG-56484-050318-MD-02] : Sample was analyzed past method specified hold time for Nitrate + Nitrite (N) (highlevel). {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 (highlevel).

Sample TB4953 [WG-56484-050318-MD-03] : Sample was analyzed past method specified hold time for Nitrate + Nitrite (N) (highlevel). {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 (highlevel).

Sample TB4954 [WG-56484-050318-MD-04] : Sample was analyzed past method specified hold time for Nitrate + Nitrite (N) (highlevel). {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 (highlevel).

Sample TB4955 [WG-56484-050318-MD-05] : Sample was analyzed past method specified hold time for Nitrate + Nitrite (N) (highlevel). {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 (highlevel).

Sample TB4956 [WG-56484-050318-MD-06] : Sample was analyzed past method specified hold time for Nitrate + Nitrite (N) (highlevel). {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 (highlevel).

Results relate only to the items tested.

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QUALITY ASSURANCE REPORT

GHD Limited
Client Project #: 56484-02
Site Location: SOLID WASTE ENGINEERING
Your P.O. #: 73506861-1
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
8929497	1,4-Difluorobenzene (sur.)	2018/03/08	100	70 - 130	103	70 - 130	101	%		
8929497	4-Bromofluorobenzene (sur.)	2018/03/08	99	70 - 130	92	70 - 130	83	%		
8929497	D4-1,2-Dichloroethane (sur.)	2018/03/08	93	70 - 130	88	70 - 130	82	%		
8929497	1,1,1,2-tetrachloroethane	2018/03/08	90	70 - 130	83	70 - 130	<0.50	ug/L		
8929497	1,1,1-trichloroethane	2018/03/08	95	70 - 130	85	70 - 130	<0.50	ug/L		
8929497	1,1,2,2-tetrachloroethane	2018/03/08	91	70 - 130	86	70 - 130	<0.50	ug/L		
8929497	1,1,2Trichloro-1,2,2Trifluoroethane	2018/03/08	101	70 - 130	91	70 - 130	<2.0	ug/L		
8929497	1,1,2-trichloroethane	2018/03/08	88	70 - 130	80	70 - 130	<0.50	ug/L		
8929497	1,1-dichloroethane	2018/03/08	95	70 - 130	86	70 - 130	<0.50	ug/L		
8929497	1,1-dichloroethene	2018/03/08	100	70 - 130	91	70 - 130	<0.50	ug/L		
8929497	1,2,3-trichlorobenzene	2018/03/08	102	70 - 130	98	70 - 130	<2.0	ug/L		
8929497	1,2,4-trichlorobenzene	2018/03/08	103	70 - 130	96	70 - 130	<2.0	ug/L		
8929497	1,2-dibromoethane	2018/03/08	85	70 - 130	82	70 - 130	<0.20	ug/L		
8929497	1,2-dichlorobenzene	2018/03/08	99	70 - 130	91	70 - 130	<0.50	ug/L		
8929497	1,2-dichloroethane	2018/03/08	90	70 - 130	84	70 - 130	<0.50	ug/L		
8929497	1,2-dichloropropane	2018/03/08	94	70 - 130	89	70 - 130	<0.50	ug/L		
8929497	1,3,5-trimethylbenzene	2018/03/08	108	70 - 130	101	70 - 130	<2.0	ug/L		
8929497	1,3-dichlorobenzene	2018/03/08	99	70 - 130	91	70 - 130	<0.50	ug/L		
8929497	1,4-dichlorobenzene	2018/03/08	95	70 - 130	88	70 - 130	<0.50	ug/L		
8929497	Benzene	2018/03/08	94	70 - 130	88	70 - 130	<0.40	ug/L		
8929497	Bromobenzene	2018/03/08	96	70 - 130	89	70 - 130	<2.0	ug/L		
8929497	Bromodichloromethane	2018/03/08	91	70 - 130	86	70 - 130	<1.0	ug/L	1.4 (1)	30
8929497	Bromoform	2018/03/08	90	70 - 130	86	70 - 130	<1.0	ug/L	NC (1)	30
8929497	Bromomethane	2018/03/08	93	60 - 140	85	60 - 140	<1.0	ug/L		
8929497	Carbon tetrachloride	2018/03/08	95	70 - 130	86	70 - 130	<0.50	ug/L		
8929497	Chlorobenzene	2018/03/08	93	70 - 130	86	70 - 130	<0.50	ug/L		
8929497	Chlorodibromomethane	2018/03/08	92	70 - 130	85	70 - 130	<1.0	ug/L	NC (1)	30
8929497	Chloroethane	2018/03/08	91	60 - 140	82	60 - 140	<1.0	ug/L		
8929497	Chloroform	2018/03/08	NC	70 - 130	82	70 - 130	<1.0	ug/L	2.2 (1)	30
8929497	Chloromethane	2018/03/08	111	60 - 140	101	60 - 140	<1.0	ug/L		

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QUALITY ASSURANCE REPORT(CONT'D)

GHD Limited
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Site Location: SOLID WASTE ENGINEERING
Your P.O. #: 73506861-1
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
8929497	cis-1,2-dichloroethene	2018/03/08	90	70 - 130	82	70 - 130	<1.0	ug/L		
8929497	cis-1,3-dichloropropene	2018/03/08	83	70 - 130	74	70 - 130	<1.0	ug/L		
8929497	Dichlorodifluoromethane	2018/03/08	134	60 - 140	118	60 - 140	<2.0	ug/L		
8929497	Dichloromethane	2018/03/08	88	70 - 130	80	70 - 130	<2.0	ug/L		
8929497	Ethylbenzene	2018/03/08	90	70 - 130	82	70 - 130	<0.40	ug/L		
8929497	Hexachlorobutadiene	2018/03/08	101	70 - 130	94	70 - 130	<0.50	ug/L		
8929497	Isopropylbenzene	2018/03/08	97	70 - 130	92	70 - 130	<2.0	ug/L		
8929497	m & p-Xylene	2018/03/08	96	70 - 130	88	70 - 130	<0.40	ug/L		
8929497	Methyl-tert-butylether (MTBE)	2018/03/08	88	70 - 130	81	70 - 130	<4.0	ug/L		
8929497	o-Xylene	2018/03/08	92	70 - 130	85	70 - 130	<0.40	ug/L		
8929497	Styrene	2018/03/08	96	70 - 130	92	70 - 130	<0.50	ug/L		
8929497	Tetrachloroethene	2018/03/08	97	70 - 130	88	70 - 130	<0.50	ug/L		
8929497	Toluene	2018/03/08	90	70 - 130	83	70 - 130	<0.40	ug/L		
8929497	trans-1,2-dichloroethene	2018/03/08	93	70 - 130	85	70 - 130	<1.0	ug/L		
8929497	trans-1,3-dichloropropene	2018/03/08	84	70 - 130	73	70 - 130	<1.0	ug/L		
8929497	Trichloroethene	2018/03/08	93	70 - 130	87	70 - 130	<0.50	ug/L		
8929497	Trichlorofluoromethane	2018/03/08	108	60 - 140	97	60 - 140	<4.0	ug/L		
8929497	VH C6-C10	2018/03/08			83	70 - 130	<300	ug/L		
8929497	Vinyl chloride	2018/03/08	95	60 - 140	85	60 - 140	<0.50	ug/L		
8929497	Xylenes (Total)	2018/03/08					<0.40	ug/L		
8930001	Dissolved Aluminum (Al)	2018/03/10	102 (2)	80 - 120	107	80 - 120	<3.0	ug/L	1.1 (3)	20
8930001	Dissolved Antimony (Sb)	2018/03/10	96 (2)	80 - 120	101	80 - 120	<0.50	ug/L	NC (3)	20
8930001	Dissolved Arsenic (As)	2018/03/10	102 (2)	80 - 120	102	80 - 120	<0.10	ug/L	5.3 (3)	20
8930001	Dissolved Barium (Ba)	2018/03/10	95 (2)	80 - 120	100	80 - 120	<1.0	ug/L	0.77 (3)	20
8930001	Dissolved Beryllium (Be)	2018/03/10	95 (2)	80 - 120	101	80 - 120	<0.10	ug/L	NC (3)	20
8930001	Dissolved Bismuth (Bi)	2018/03/10	96 (2)	80 - 120	101	80 - 120	<1.0	ug/L	NC (3)	20
8930001	Dissolved Boron (B)	2018/03/10	94 (2)	80 - 120	100	80 - 120	<50	ug/L	NC (3)	20
8930001	Dissolved Cadmium (Cd)	2018/03/10	95 (2)	80 - 120	100	80 - 120	<0.010	ug/L	NC (3)	20
8930001	Dissolved Chromium (Cr)	2018/03/10	95 (2)	80 - 120	92	80 - 120	<1.0	ug/L	NC (3)	20
8930001	Dissolved Cobalt (Co)	2018/03/10	95 (2)	80 - 120	93	80 - 120	<0.20	ug/L	NC (3)	20

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QUALITY ASSURANCE REPORT(CONT'D)

GHD Limited
Client Project #: 56484-02
Site Location: SOLID WASTE ENGINEERING
Your P.O. #: 73506861-1
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
8930001	Dissolved Copper (Cu)	2018/03/10	93 (2)	80 - 120	92	80 - 120	<0.20	ug/L	NC (3)	20
8930001	Dissolved Iron (Fe)	2018/03/10	97 (2)	80 - 120	100	80 - 120	<5.0	ug/L	NC (3)	20
8930001	Dissolved Lead (Pb)	2018/03/10	97 (2)	80 - 120	101	80 - 120	<0.20	ug/L	NC (3)	20
8930001	Dissolved Lithium (Li)	2018/03/10	94 (2)	80 - 120	97	80 - 120	<2.0	ug/L	NC (3)	20
8930001	Dissolved Manganese (Mn)	2018/03/10	96 (2)	80 - 120	95	80 - 120	<1.0	ug/L	NC (3)	20
8930001	Dissolved Molybdenum (Mo)	2018/03/10	97 (2)	80 - 120	99	80 - 120	<1.0	ug/L	NC (3)	20
8930001	Dissolved Nickel (Ni)	2018/03/10	95 (2)	80 - 120	95	80 - 120	<1.0	ug/L	NC (3)	20
8930001	Dissolved Phosphorus (P)	2018/03/10	108 (2)	80 - 120	104	80 - 120	<10	ug/L	NC (3)	20
8930001	Dissolved Selenium (Se)	2018/03/10	95 (2)	80 - 120	98	80 - 120	<0.10	ug/L	NC (3)	20
8930001	Dissolved Silicon (Si)	2018/03/10	105 (2)	80 - 120	108	80 - 120	<100	ug/L	2.4 (3)	20
8930001	Dissolved Silver (Ag)	2018/03/10	96 (2)	80 - 120	101	80 - 120	<0.020	ug/L	NC (3)	20
8930001	Dissolved Strontium (Sr)	2018/03/10	96 (2)	80 - 120	100	80 - 120	<1.0	ug/L	2.0 (3)	20
8930001	Dissolved Thallium (Tl)	2018/03/10	98 (2)	80 - 120	103	80 - 120	<0.010	ug/L	NC (3)	20
8930001	Dissolved Tin (Sn)	2018/03/10	95 (2)	80 - 120	100	80 - 120	<5.0	ug/L	NC (3)	20
8930001	Dissolved Titanium (Ti)	2018/03/10	102 (2)	80 - 120	99	80 - 120	<5.0	ug/L	NC (3)	20
8930001	Dissolved Uranium (U)	2018/03/10	97 (2)	80 - 120	101	80 - 120	<0.10	ug/L	NC (3)	20
8930001	Dissolved Vanadium (V)	2018/03/10	98 (2)	80 - 120	95	80 - 120	<5.0	ug/L	NC (3)	20
8930001	Dissolved Zinc (Zn)	2018/03/10	98 (2)	80 - 120	95	80 - 120	<5.0	ug/L	NC (3)	20
8930001	Dissolved Zirconium (Zr)	2018/03/10	98 (2)	80 - 120	101	80 - 120	<0.10	ug/L	NC (3)	20
8930562	Nitrate plus Nitrite (N)	2018/03/09	103	80 - 120	103	80 - 120	<0.10	mg/L	NC (1)	25
8930564	Nitrite (N)	2018/03/09	99	80 - 120	99	80 - 120	<0.10	mg/L	NC (1)	20
8930565	Nitrate plus Nitrite (N)	2018/03/09	102 (4)	80 - 120	103	80 - 120	<0.10	mg/L	2.8 (5)	25
8930566	Nitrite (N)	2018/03/09	99 (4)	80 - 120	98	80 - 120	<0.10	mg/L	NC (5)	20
8930815	pH	2018/03/09			101	97 - 103			0.37 (1)	20
8930816	Conductivity	2018/03/09			101	80 - 120	<2.0	uS/cm		
8930817	Alkalinity (PP as CaCO3)	2018/03/10					<1.0	mg/L		
8930817	Alkalinity (Total as CaCO3)	2018/03/10	NC	80 - 120	97	80 - 120	<1.0	mg/L		
8930817	Bicarbonate (HCO3)	2018/03/10					<1.0	mg/L		
8930817	Carbonate (CO3)	2018/03/10					<1.0	mg/L		
8930817	Hydroxide (OH)	2018/03/10					<1.0	mg/L		

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GHD Limited
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Site Location: SOLID WASTE ENGINEERING
Your P.O. #: 73506861-1
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
8930818	pH	2018/03/10			101	97 - 103			0.25 (6)	20
8930819	Conductivity	2018/03/10			102	80 - 120	<2.0	uS/cm	0.24 (6)	20
8930820	Alkalinity (PP as CaCO ₃)	2018/03/10					<1.0	mg/L	NC (6)	20
8930820	Alkalinity (Total as CaCO ₃)	2018/03/10	105 (7)	80 - 120	103	80 - 120	<1.0	mg/L	0.69 (6)	20
8930820	Bicarbonate (HCO ₃)	2018/03/10					<1.0	mg/L	0.69 (6)	20
8930820	Carbonate (CO ₃)	2018/03/10					<1.0	mg/L	NC (6)	20
8930820	Hydroxide (OH)	2018/03/10					<1.0	mg/L	NC (6)	20
8930821	pH	2018/03/10			101	97 - 103				
8930822	Conductivity	2018/03/10			102	80 - 120	<2.0	uS/cm		
8930823	Alkalinity (PP as CaCO ₃)	2018/03/10					<1.0	mg/L		
8930823	Alkalinity (Total as CaCO ₃)	2018/03/10			98	80 - 120	<1.0	mg/L		
8930823	Bicarbonate (HCO ₃)	2018/03/10					<1.0	mg/L		
8930823	Carbonate (CO ₃)	2018/03/10					<1.0	mg/L		
8930823	Hydroxide (OH)	2018/03/10					<1.0	mg/L		
8931596	Dissolved Mercury (Hg)	2018/03/12	101	80 - 120	99	80 - 120	<0.0020	ug/L	NC (1)	20
8931598	Dissolved Mercury (Hg)	2018/03/12	95 (8)	80 - 120	99	80 - 120	<0.0020	ug/L	NC (9)	20
8931796	Dissolved Chloride (Cl)	2018/03/09	NC	80 - 120	103	80 - 120	<1.0	mg/L	0.79 (1)	20
8931800	Dissolved Sulphate (SO ₄)	2018/03/09	114	80 - 120	96	80 - 120	<1.0	mg/L	19 (1)	20
8931801	Dissolved Chloride (Cl)	2018/03/09			104	80 - 120	<1.0	mg/L		
8931803	Dissolved Sulphate (SO ₄)	2018/03/09			94	80 - 120	<1.0	mg/L		
8931953	Dissolved Mercury (Hg)	2018/03/12	94 (10)	80 - 120	2.6 (11)	80 - 120	<0.0020	ug/L	NC (1)	20
8931978	Total Dissolved Solids	2018/03/13	106	80 - 120	104	80 - 120	<10	mg/L	4.3 (1)	20
8932112	Dissolved Mercury (Hg)	2018/03/13	103 (12)	80 - 120	98	80 - 120	<0.0020	ug/L	NC (13)	20
8932357	Dissolved Chloride (Cl)	2018/03/12			105	80 - 120	<1.0	mg/L	0.36 (14)	20
8932358	Dissolved Sulphate (SO ₄)	2018/03/12			100	80 - 120	<1.0	mg/L	1.5 (14)	20
8933107	Total Dissolved Solids	2018/03/14	99	80 - 120	98	80 - 120	<10	mg/L	5.9 (1)	20
8933116	Total Dissolved Solids	2018/03/14	110	80 - 120	98	80 - 120	<10	mg/L	4.0 (1)	20
8933498	Fluoride (F)	2018/03/13	100	80 - 120	104	80 - 120	<0.10	mg/L	NC (1)	20
8933501	Fluoride (F)	2018/03/13	97 (15)	80 - 120	104	80 - 120	<0.10	mg/L	NC (5)	20
8933598	Total Ammonia (N)	2018/03/13	NC	80 - 120	99	80 - 120	<0.020	mg/L	1.1 (1)	20

Maxxam Job #: B817212
Report Date: 2018/03/14

QUALITY ASSURANCE REPORT(CONT'D)

GHD Limited
Client Project #: 56484-02
Site Location: SOLID WASTE ENGINEERING
Your P.O. #: 73506861-1
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
8933599	Total Ammonia (N)	2018/03/13	107	80 - 120	95	80 - 120	<0.020	mg/L	NC (1)	20
8933601	Total Ammonia (N)	2018/03/13			98	80 - 120	<0.020	mg/L		
8934556	Total Ammonia (N)	2018/03/14			109	80 - 120	<0.020	mg/L		

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

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

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

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

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

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

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference $\leq 2 \times \text{RDL}$).

(1) Duplicate Parent ID

(2) Matrix Spike Parent ID [TB4951-02]

(3) Duplicate Parent ID [TB4951-02]

(4) Matrix Spike Parent ID [TB4979-01]

(5) Duplicate Parent ID [TB4979-01]

(6) Duplicate Parent ID [TB4959-01]

(7) Matrix Spike Parent ID [TB4951-01]

(8) Matrix Spike Parent ID [TB4951-03]

(9) Duplicate Parent ID [TB4951-03]

(10) Matrix Spike Parent ID [TB4953-03]

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

(12) Matrix Spike Parent ID [TB4955-03]

(13) Duplicate Parent ID [TB4955-03]

(14) Duplicate Parent ID [TB4954-01]

(15) Matrix Spike Parent ID [TB4953-01]

Maxxam Job #: B817212
Report Date: 2018/03/14

GHD Limited
Client Project #: 56484-02
Site Location: SOLID WASTE ENGINEERING
Your P.O. #: 73506861-1
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 Spécialist

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.



B817212_COC

Page 1 of 2

INVOICE TO:		Report Information		Project Information	
Company Name	#163 GHD Limited	Company Name	Airesse MacPhee	Quotation #	B70472
Contact Name	Airesse MacPhee	Contact Name	Airesse MacPhee	P.O. #	73506861-1
Address	651 COLBY DRIVE WATERLOO ON N2V 1C2	Address		Project #	56484-02
Phone	(519) 884-0510 x	Phone		Project Name	Campbell River(Phase 02)-Quart
Fax	(519) 725-1394 x	Fax		Site #	
Email	airesse.macphee@ghd.com; NationalEDDSupport@ma	Email	amacphee@craworld.com	Sampled By	MDyk N. Tur

Bottle Order #:



546181

Chain Of Custody Record

Project Manager



Nahed Amer

Regulatory Criteria:		Special Instructions		ANALYSIS REQUESTED (PLEASE BE SPECIFIC)						Turnaround Time (TAT) Required:	
☐ CSR ☐ CCME ☐ BC Water Quality ☐ Other _____		dissolved metals field filtered + preserved.		Metals Field Filtered ? (Y / N) Alkalinity, pH, Conductivity, TDS HIGH LEVEL ANIONS (Cl, F, SO4, NO2, NO3) Ammonia-N (Preserved) CSR Dissolved Metals in Water with CV Hg (including Sulfur) CSR VOC + VPH in Water						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)	Alkalinity, pH, Conductivity, TDS	HIGH LEVEL ANIONS (Cl, F, SO4, NO2, NO3)	Ammonia-N (Preserved)	CSR Dissolved Metals in Water with CV Hg (including Sulfur)	CSR VOC + VPH in Water	# of Bottles	Comments
1	WG-56484-050318-MD-01	Mar 5/18	12:15	WG	Y	X	X	X	X	X	6	
2	-02		12:45								4	Please correct
3	-03		13:30									sample IDs to
4	-04		14:30									all be "MD"
5	-05		15:15									instead of
6	-06		16:30									"MND" or "NT"
7	WG-56484-060318-MD-07	Mar 6/18	10:30									Thanks.
8	-08		12:30									
9	-09		13:30							X	6	
10	-10		13:35							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		
 Michael J. Bell		18/03/06	8:30	 Kevin O'Connell		2018/03/07	09:00	1	Time Sensitive	Temperature (°C) on Receipt	Custody Seal Intact on Cooler?
		18/03/07	15:00			2018/03/08	09:00	1	☒	0, 0, 0	☐ 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.

0, 0, 0
3, 3, 1, 2, 3

Maxxam Analytics International Corporation o/a Maxxam Analytics



GHD Field Sample Key (FSK)

Site	Campbell River 056484-02
Sample Reason	Q2 2018
Sampler Name	Cassie Ragan & Natasha Turl
Sampling Company	GHD
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)	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-56464-300418-NT-01	MW01-16	4/30/2018	11:30	N	WG	grab			7	12.97	C	82	uS	0.4	ntu	7.17	mg/L	268	mV	0.053
WG-56464-300418-NT-02	EBA11-2	4/30/2018	12:15	N	WG	grab			7.46	10.89	C	251	uS	34.3	ntu	10.63	mg/L	255	mV	0.163
WG-56464-300418-NT-03	EBA04-3	4/30/2018	12:45	N	WG	grab			7.07	11.68	C	815	uS	0	ntu	3.97	mg/L	263	mV	0.521
WG-56464-300418-NT-04	EBA04-3	4/30/2018	13:00	FD	WG	grab	WG-56464-300418-NT-03		7.07	11.68	C	815	uS	0	ntu	3.97	mg/L	263	mV	0.521
WG-56464-300418-NT-05	AG99-01	4/30/2018	13:50	N	WG	grab			7.84	11.7	C	217	uS	0	ntu	9.88	mg/L	250	mV	0.141
WG-56464-300418-NT-06	Field Blank	4/30/2018	14:00	FB	WG	grab			-	-	C	-	uS	-	ntu	-	mg/L	-	mV	-
WG-56464-300418-NT-07	EBA04-1	4/30/2018	14:20	N	WG	grab			8.41	12.38	C	96	uS	0	ntu	9.47	mg/L	233	mV	0.062
WG-56464-300418-NT-08	AG99-06	4/30/2018	15:00	N	WG	grab			6.85	8.68	C	192	uS	4.3	ntu	7.9	mg/L	175	mV	0.123
WG-56464-300418-NT-09	EBA11-3	4/30/2018	15:15	N	WG	grab			7.51	10.16	C	373	uS	0	ntu	9.89	mg/L	274	mV	0.243
WG-56464-300418-NT-10	EBA11-4	4/30/2018	15:45	N	WG	grab			7.88	10.02	C	129	uS	7.9	ntu	7.35	mg/L	265	mV	0.084
WG-56464-300418-NT-11	EBA11-1	4/30/2018	16:30	N	WG	grab			7.71	9.51	C	264	uS	2	ntu	5.93	mg/L	279	mV	0.170
WG-56464-010518-NT-12	EBA04-7	5/1/2018	9:00	N	WG	grab			6.9	8.64	C	874	uS	0	ntu	2.01	mg/L	234	mV	0.560
WG-56464-010518-NT-13	EBA04-7	5/1/2018	9:10	FD	WG	grab	WG-56464-300418-NT-12		6.9	8.64	C	874	uS	0	ntu	2.01	mg/L	234	mV	0.560
WG-56464-010518-NT-14	EBA04-6	5/1/2018	9:20	N	WG	grab			7.29	9.8	C	707	uS	0.1	ntu	2.35	mg/L	271	mV	0.452
WG-56464-010518-NT-15	AG99-05	5/1/2018	10:30	N	WG	grab			8.3	10.79	C	169	uS	0.6	ntu	4.72	mg/L	259	mV	0.110
WG-56464-010518-NT-16	AG99-02	5/1/2018	12:00	N	WG	grab			8.33	12.71	C	197	uS	0.2	ntu	6.22	mg/L	263	mV	0.128
WG-56464-010518-NT-17	AG99-04	5/1/2018	13:00	N	WG	grab			8.18	12.01	C	103	uS	0	ntu	8.47	mg/L	265	mV	0.067
WG-56464-010518-NT-18	HBT94-2	5/1/2018	14:40	N	WG	grab			7.39	13.81	C	296	uS	0.6	ntu	8.82	mg/L	-25	mV	0.193
WG-56464-010518-NT-19	HBT94-1	5/1/2018	15:00	N	WG	grab			6.95	14.73	C	658	uS	21.5	ntu	5.12	mg/L	-18	mV	0.422
SURFACE WATER																				
WS-56484-010518-NT-01	SW-1	5/1/2018	10:20	N	WS	grab			7.7	9.69	C	37	uS	0	ntu	5.29	mg/L	209	mV	0.024
WS-56484-010518-NT-02	SW03-17	5/1/2018	10:40	N	WS	grab			7.66	13.2	C	31	uS	1.9	ntu	5.67	mg/L	211	mV	0.020

Footnotes

1. _____

Key

Required Field

Populate When Appropriate

Field Data

Attention: Aïresse MacPhee

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

Your P.O. #: 73506861-2
Your Project #: 56484-02
Site#: CAMPBELL RIVER(PHASE 02)-QUART
Site Location: SOLID WASTE ENGINEERING
Your C.O.C. #: 548144-01-01

Report Date: 2018/05/10

Report #: R2552599

Version: 2 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B832950

Received: 2018/05/02, 09:00

Sample Matrix: Water
Samples Received: 2

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity - Water	2	2018/05/04	2018/05/05	BBY6SOP-00026	SM 22 2320 B m
Chloride by Automated Colourimetry	2	N/A	2018/05/04	BBY6SOP-00011	SM 22 4500-Cl- E m
Conductance - water	2	2018/05/04	2018/05/05	BBY6SOP-00026	SM 22 2510 B m
Fluoride (higher level)	2	N/A	2018/05/04	BBY6SOP-00048	SM 22 4500-F C m
Hardness Total (calculated as CaCO ₃) (1)	2	N/A	2018/05/07	BBY WI-00033	Auto Calc
Hardness (calculated as CaCO ₃)	2	N/A	2018/05/08	BBY WI-00033	Auto Calc
Mercury (Dissolved) by CVAf	2	N/A	2018/05/04	BBY7SOP-00015	BCMOE BCLM Oct2013 m
Mercury (Total) by CVAf	2	2018/05/04	2018/05/04	BBY7SOP-00015	BCMOE BCLM Oct2013 m
Na, K, Ca, Mg, S by CRC ICPMS (diss.)	2	N/A	2018/05/08	BBY WI-00033	Auto Calc
Elements by ICPMS Low Level (dissolved)	2	N/A	2018/05/08	BBY7SOP-00002	EPA 6020b R2 m
Na, K, Ca, Mg, S by CRC ICPMS (total)	2	N/A	2018/05/07	BBY WI-00033	Auto Calc
Elements by ICPMS Low Level (total)	2	N/A	2018/05/05	BBY7SOP-00002	EPA 6020b R2 m
Ammonia-N (Preserved)	2	N/A	2018/05/09	BBY6SOP-00009	EPA 350.1 m
Nitrate + Nitrite (N) (highlevel)	2	N/A	2018/05/04	BBY6SOP-00010	SM 23 4500-NO ₃ - I m
Nitrite (N) by CFA (highlevel)	2	N/A	2018/05/04	BBY6SOP-00010	SM 23 4500-NO ₃ - I m
Nitrogen - Nitrate (as N)	2	N/A	2018/05/08	BBY WI-00033	Auto Calc
Filter and HNO ₃ Preserve for Metals	2	N/A	2018/05/07	BBY7 WI-00004	BCMOE Reqs 08/14
pH Water (2)	2	2018/05/04	2018/05/05	BBY6SOP-00026	SM 22 4500-H+ B m
Sulphate by Automated Colourimetry	2	N/A	2018/05/04	BBY6SOP-00017	SM 22 4500-SO ₄ 2- E m
Total Dissolved Solids (Filt. Residue)	2	2018/05/06	2018/05/07	BBY6SOP-00033	SM 22 2540 C m

Remarks:

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

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Maxxam's profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Maxxam in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected.

Maxxam Analytics' liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Maxxam has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report.

Attention: Aïresse MacPhee

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

Your P.O. #: 73506861-2
Your Project #: 56484-02
Site#: CAMPBELL RIVER(PHASE 02)-QUART
Site Location: SOLID WASTE ENGINEERING
Your C.O.C. #: 548144-01-01

Report Date: 2018/05/10

Report #: R2552599

Version: 2 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B832950

Received: 2018/05/02, 09:00

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



Maxxam
10 May 2018 13:35:01

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 #: B832950
Report Date: 2018/05/10

GHD Limited
Client Project #: 56484-02
Site Location: SOLID WASTE ENGINEERING
Your P.O. #: 73506861-2
Sampler Initials: NT

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		TI9923		TI9924		
Sampling Date		2018/05/01 10:20		2018/05/01 10:40		
COC Number		548144-01-01		548144-01-01		
	UNITS	WS-56484-010518-NT-01	QC Batch	WS-56484-010518-NT-02	RDL	QC Batch
ANIONS						
Nitrite (N)	mg/L	<0.10	8982134	<0.10	0.10	8982134
Calculated Parameters						
Filter and HNO3 Preservation	N/A	FIELD	ONSITE	FIELD	N/A	ONSITE
Nitrate (N)	mg/L	<0.10	8975890	<0.10	0.10	8975890
Misc. Inorganics						
Fluoride (F)	mg/L	<0.10	8979286	<0.10	0.10	8979286
Alkalinity (Total as CaCO3)	mg/L	8.2	8979346	5.8	1.0	8979349
Alkalinity (PP as CaCO3)	mg/L	<1.0	8979346	<1.0	1.0	8979349
Bicarbonate (HCO3)	mg/L	10.0	8979346	7.1	1.0	8979349
Carbonate (CO3)	mg/L	<1.0	8979346	<1.0	1.0	8979349
Hydroxide (OH)	mg/L	<1.0	8979346	<1.0	1.0	8979349
Anions						
Dissolved Sulphate (SO4)	mg/L	<1.0	8979343	<1.0	1.0	8979343
Dissolved Chloride (Cl)	mg/L	3.6	8979342	3.4	1.0	8979342
Nutrients						
Total Ammonia (N)	mg/L	0.074	8983418	0.068	0.020	8983418
Nitrate plus Nitrite (N)	mg/L	<0.10	8979291	<0.10	0.10	8979291
Physical Properties						
Conductivity	uS/cm	34.1	8979348	31.6	2.0	8979353
pH	pH	6.97	8979347	6.88	N/A	8979352
Physical Properties						
Total Dissolved Solids	mg/L	64	8979626	20	10	8979626
RDL = Reportable Detection Limit N/A = Not Applicable						

Maxxam Job #: B832950
Report Date: 2018/05/10

GHD Limited
Client Project #: 56484-02
Site Location: SOLID WASTE ENGINEERING
Your P.O. #: 73506861-2
Sampler Initials: NT

LOW LEVEL DISSOLVED METALS WITH CV HG (WATER)

Maxxam ID		TI9923	TI9924		
Sampling Date		2018/05/01 10:20	2018/05/01 10:40		
COC Number		548144-01-01	548144-01-01		
	UNITS	WS-56484-010518-NT-01	WS-56484-010518-NT-02	RDL	QC Batch
Calculated Parameters					
Dissolved Hardness (CaCO ₃)	mg/L	9.97	7.97	0.50	8975959
Elements					
Dissolved Mercury (Hg)	ug/L	<0.0020	<0.0020	0.0020	8978574
Dissolved Metals by ICPMS					
Dissolved Aluminum (Al)	ug/L	60.6	43.6	0.50	8979641
Dissolved Antimony (Sb)	ug/L	0.035	0.030	0.020	8979641
Dissolved Arsenic (As)	ug/L	0.118	0.092	0.020	8979641
Dissolved Barium (Ba)	ug/L	1.62	1.31	0.020	8979641
Dissolved Beryllium (Be)	ug/L	<0.010	<0.010	0.010	8979641
Dissolved Bismuth (Bi)	ug/L	<0.0050	<0.0050	0.0050	8979641
Dissolved Boron (B)	ug/L	<10	<10	10	8979641
Dissolved Cadmium (Cd)	ug/L	<0.0050	<0.0050	0.0050	8979641
Dissolved Chromium (Cr)	ug/L	0.34	0.26	0.10	8979641
Dissolved Cobalt (Co)	ug/L	0.0778	0.0273	0.0050	8979641
Dissolved Copper (Cu)	ug/L	0.291	0.212	0.050	8979641
Dissolved Iron (Fe)	ug/L	145	60.9	1.0	8979641
Dissolved Lead (Pb)	ug/L	0.0686	0.0237	0.0050	8979641
Dissolved Lithium (Li)	ug/L	<0.50	<0.50	0.50	8979641
Dissolved Manganese (Mn)	ug/L	23.9	4.60	0.050	8979641
Dissolved Molybdenum (Mo)	ug/L	<0.050	<0.050	0.050	8979641
Dissolved Nickel (Ni)	ug/L	0.133	0.107	0.020	8979641
Dissolved Phosphorus (P)	ug/L	8.3	4.8	2.0	8979641
Dissolved Selenium (Se)	ug/L	<0.040	<0.040	0.040	8979641
Dissolved Silicon (Si)	ug/L	3220	2810	50	8979641
Dissolved Silver (Ag)	ug/L	<0.0050	<0.0050	0.0050	8979641
Dissolved Strontium (Sr)	ug/L	10.3	8.56	0.050	8979641
Dissolved Thallium (Tl)	ug/L	<0.0020	<0.0020	0.0020	8979641
Dissolved Tin (Sn)	ug/L	<0.20	<0.20	0.20	8979641
Dissolved Titanium (Ti)	ug/L	1.52	<0.50	0.50	8979641
Dissolved Uranium (U)	ug/L	<0.0020	<0.0020	0.0020	8979641
RDL = Reportable Detection Limit					

Maxxam Job #: B832950
Report Date: 2018/05/10

GHD Limited
Client Project #: 56484-02
Site Location: SOLID WASTE ENGINEERING
Your P.O. #: 73506861-2
Sampler Initials: NT

LOW LEVEL DISSOLVED METALS WITH CV HG (WATER)

Maxxam ID		TI9923	TI9924		
Sampling Date		2018/05/01 10:20	2018/05/01 10:40		
COC Number		548144-01-01	548144-01-01		
	UNITS	WS-56484-010518-NT-01	WS-56484-010518-NT-02	RDL	QC Batch
Dissolved Vanadium (V)	ug/L	0.48	<0.20	0.20	8979641
Dissolved Zinc (Zn)	ug/L	0.85	0.62	0.10	8979641
Dissolved Zirconium (Zr)	ug/L	<0.10	<0.10	0.10	8979641
Dissolved Calcium (Ca)	mg/L	2.40	1.90	0.050	8975960
Dissolved Magnesium (Mg)	mg/L	0.969	0.782	0.050	8975960
Dissolved Potassium (K)	mg/L	0.141	0.125	0.050	8975960
Dissolved Sodium (Na)	mg/L	2.59	2.44	0.050	8975960
Dissolved Sulphur (S)	mg/L	<3.0	<3.0	3.0	8975960
Dissolved Sulphur (S)	ug/L	<600	<600	600	8979641
RDL = Reportable Detection Limit					

Maxxam Job #: B832950
Report Date: 2018/05/10

GHD Limited
Client Project #: 56484-02
Site Location: SOLID WASTE ENGINEERING
Your P.O. #: 73506861-2
Sampler Initials: NT

LOW LEVEL TOTAL METALS WITH CV HG (WATER)

Maxxam ID		TI9923	TI9923	TI9924		
Sampling Date		2018/05/01 10:20	2018/05/01 10:20	2018/05/01 10:40		
COC Number		548144-01-01	548144-01-01	548144-01-01		
	UNITS	WS-56484-010518-NT-01	WS-56484-010518-NT-01 Lab-Dup	WS-56484-010518-NT-02	RDL	QC Batch

Calculated Parameters						
Total Hardness (CaCO ₃)	mg/L	9.58	N/A	7.86	0.50	8975882
Elements						
Total Mercury (Hg)	ug/L	<0.0020	<0.0020	<0.0020	0.0020	8978651
Total Metals by ICPMS						
Total Aluminum (Al)	ug/L	63.7	N/A	43.8	0.50	8978992
Total Antimony (Sb)	ug/L	0.022	N/A	0.023	0.020	8978992
Total Arsenic (As)	ug/L	0.115	N/A	0.083	0.020	8978992
Total Barium (Ba)	ug/L	1.56	N/A	1.27	0.020	8978992
Total Beryllium (Be)	ug/L	<0.010	N/A	<0.010	0.010	8978992
Total Bismuth (Bi)	ug/L	<0.0050	N/A	<0.0050	0.0050	8978992
Total Boron (B)	ug/L	<10	N/A	<10	10	8978992
Total Cadmium (Cd)	ug/L	0.0050	N/A	<0.0050	0.0050	8978992
Total Chromium (Cr)	ug/L	0.42	N/A	0.24	0.10	8978992
Total Cobalt (Co)	ug/L	0.0823	N/A	0.0341	0.0050	8978992
Total Copper (Cu)	ug/L	0.277	N/A	0.225	0.050	8978992
Total Iron (Fe)	ug/L	160	N/A	67.9	1.0	8978992
Total Lead (Pb)	ug/L	0.0896	N/A	0.0447	0.0050	8978992
Total Lithium (Li)	ug/L	<0.50	N/A	<0.50	0.50	8978992
Total Manganese (Mn)	ug/L	24.6	N/A	5.29	0.050	8978992
Total Molybdenum (Mo)	ug/L	0.162	N/A	<0.050	0.050	8978992
Total Nickel (Ni)	ug/L	0.156	N/A	0.112	0.020	8978992
Total Phosphorus (P)	ug/L	5.7	N/A	9.8	2.0	8978992
Total Selenium (Se)	ug/L	<0.040	N/A	<0.040	0.040	8978992
Total Silicon (Si)	ug/L	3010	N/A	2620	50	8978992
Total Silver (Ag)	ug/L	<0.0050	N/A	<0.0050	0.0050	8978992
Total Strontium (Sr)	ug/L	9.45	N/A	8.03	0.050	8978992
Total Thallium (Tl)	ug/L	<0.0020	N/A	<0.0020	0.0020	8978992
Total Tin (Sn)	ug/L	<0.20	N/A	<0.20	0.20	8978992
Total Titanium (Ti)	ug/L	1.85	N/A	<0.50	0.50	8978992
RDL = Reportable Detection Limit						
Lab-Dup = Laboratory Initiated Duplicate						
N/A = Not Applicable						

Maxxam Job #: B832950
Report Date: 2018/05/10

GHD Limited
Client Project #: 56484-02
Site Location: SOLID WASTE ENGINEERING
Your P.O. #: 73506861-2
Sampler Initials: NT

LOW LEVEL TOTAL METALS WITH CV HG (WATER)

Maxxam ID		TI9923	TI9923	TI9924		
Sampling Date		2018/05/01 10:20	2018/05/01 10:20	2018/05/01 10:40		
COC Number		548144-01-01	548144-01-01	548144-01-01		
	UNITS	WS-56484-010518-NT-01	WS-56484-010518-NT-01 Lab-Dup	WS-56484-010518-NT-02	RDL	QC Batch
Total Uranium (U)	ug/L	<0.0020	N/A	<0.0020	0.0020	8978992
Total Vanadium (V)	ug/L	0.47	N/A	<0.20	0.20	8978992
Total Zinc (Zn)	ug/L	0.91	N/A	0.75	0.10	8978992
Total Zirconium (Zr)	ug/L	<0.10	N/A	<0.10	0.10	8978992
Total Calcium (Ca)	mg/L	2.29	N/A	1.87	0.050	8975961
Total Magnesium (Mg)	mg/L	0.941	N/A	0.777	0.050	8975961
Total Potassium (K)	mg/L	0.138	N/A	0.130	0.050	8975961
Total Sodium (Na)	mg/L	2.54	N/A	2.43	0.050	8975961
Total Sulphur (S)	mg/L	<3.0	N/A	<3.0	3.0	8975961
Total Sulphur (S)	ug/L	<600	N/A	<600	600	8978992
RDL = Reportable Detection Limit Lab-Dup = Laboratory Initiated Duplicate N/A = Not Applicable						

Maxxam Job #: B832950
Report Date: 2018/05/10

GHD Limited
Client Project #: 56484-02
Site Location: SOLID WASTE ENGINEERING
Your P.O. #: 73506861-2
Sampler Initials: NT

GENERAL COMMENTS

Results relate only to the items tested.

Maxxam Job #: B832950
Report Date: 2018/05/10

QUALITY ASSURANCE REPORT

GHD Limited
Client Project #: 56484-02
Site Location: SOLID WASTE ENGINEERING
Your P.O. #: 73506861-2
Sampler Initials: NT

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
8978574	Dissolved Mercury (Hg)	2018/05/04	97	80 - 120	98	80 - 120	<0.0020	ug/L	NC (1)	20
8978651	Total Mercury (Hg)	2018/05/04	89 (2)	80 - 120	98	80 - 120	<0.0020	ug/L	NC (3)	20
8978992	Total Aluminum (Al)	2018/05/05	99	80 - 120	102	80 - 120	<0.50	ug/L	4.5 (1)	20
8978992	Total Antimony (Sb)	2018/05/05	96	80 - 120	97	80 - 120	<0.020	ug/L		
8978992	Total Arsenic (As)	2018/05/05	101	80 - 120	100	80 - 120	<0.020	ug/L	2.2 (1)	20
8978992	Total Barium (Ba)	2018/05/05	94	80 - 120	96	80 - 120	<0.020	ug/L		
8978992	Total Beryllium (Be)	2018/05/05	94	80 - 120	96	80 - 120	<0.010	ug/L		
8978992	Total Bismuth (Bi)	2018/05/05	92	80 - 120	96	80 - 120	<0.0050	ug/L		
8978992	Total Boron (B)	2018/05/05	89	80 - 120	91	80 - 120	<10	ug/L	2.3 (1)	20
8978992	Total Cadmium (Cd)	2018/05/05	98	80 - 120	99	80 - 120	<0.0050	ug/L	8.5 (1)	20
8978992	Total Chromium (Cr)	2018/05/05	93	80 - 120	97	80 - 120	<0.10	ug/L		
8978992	Total Cobalt (Co)	2018/05/05	93	80 - 120	98	80 - 120	<0.0050	ug/L	13 (1)	20
8978992	Total Copper (Cu)	2018/05/05	90	80 - 120	96	80 - 120	<0.050	ug/L	6.2 (1)	20
8978992	Total Iron (Fe)	2018/05/05	98	80 - 120	106	80 - 120	<1.0	ug/L	0.82 (1)	20
8978992	Total Lead (Pb)	2018/05/05	95	80 - 120	98	80 - 120	<0.0050	ug/L	12 (1)	20
8978992	Total Lithium (Li)	2018/05/05	93	80 - 120	93	80 - 120	<0.50	ug/L		
8978992	Total Manganese (Mn)	2018/05/05	94	80 - 120	99	80 - 120	<0.050	ug/L	6.0 (1)	20
8978992	Total Molybdenum (Mo)	2018/05/05	103	80 - 120	100	80 - 120	<0.050	ug/L	2.0 (1)	20
8978992	Total Nickel (Ni)	2018/05/05	95	80 - 120	101	80 - 120	<0.020	ug/L	0.44 (1)	20
8978992	Total Phosphorus (P)	2018/05/05	103	80 - 120	95	80 - 120	<2.0	ug/L		
8978992	Total Selenium (Se)	2018/05/05	99	80 - 120	99	80 - 120	<0.040	ug/L	10 (1)	20
8978992	Total Silicon (Si)	2018/05/05	NC	80 - 120	99	80 - 120	<50	ug/L		
8978992	Total Silver (Ag)	2018/05/05	97	80 - 120	99	80 - 120	<0.0050	ug/L	NC (1)	20
8978992	Total Strontium (Sr)	2018/05/05	NC	80 - 120	98	80 - 120	<0.050	ug/L		
8978992	Total Sulphur (S)	2018/05/05	100	80 - 120	96	80 - 120	<600	ug/L		
8978992	Total Thallium (Tl)	2018/05/05	95	80 - 120	97	80 - 120	<0.0020	ug/L		
8978992	Total Tin (Sn)	2018/05/05	97	80 - 120	97	80 - 120	<0.20	ug/L		
8978992	Total Titanium (Ti)	2018/05/05	98	80 - 120	104	80 - 120	<0.50	ug/L		
8978992	Total Uranium (U)	2018/05/05	99	80 - 120	101	80 - 120	<0.0020	ug/L		
8978992	Total Vanadium (V)	2018/05/05	97	80 - 120	101	80 - 120	<0.20	ug/L		

Maxxam Job #: B832950
Report Date: 2018/05/10

QUALITY ASSURANCE REPORT(CONT'D)

GHD Limited
Client Project #: 56484-02
Site Location: SOLID WASTE ENGINEERING
Your P.O. #: 73506861-2
Sampler Initials: NT

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
8978992	Total Zinc (Zn)	2018/05/05	95	80 - 120	97	80 - 120	<0.10	ug/L	3.6 (1)	20
8978992	Total Zirconium (Zr)	2018/05/05	99	80 - 120	98	80 - 120	<0.10	ug/L		
8979286	Fluoride (F)	2018/05/04	107	80 - 120	108	80 - 120	<0.10	mg/L	NC (1)	20
8979291	Nitrate plus Nitrite (N)	2018/05/04	158 (4)	80 - 120	105	80 - 120	<0.10	mg/L	0.95 (1)	25
8979342	Dissolved Chloride (Cl)	2018/05/04			105	80 - 120	<1.0	mg/L		
8979343	Dissolved Sulphate (SO4)	2018/05/04			103	80 - 120	<1.0	mg/L		
8979346	Alkalinity (PP as CaCO3)	2018/05/04					<1.0	mg/L	NC (1)	20
8979346	Alkalinity (Total as CaCO3)	2018/05/04	NC	80 - 120	88	80 - 120	<1.0	mg/L	1.0 (1)	20
8979346	Bicarbonate (HCO3)	2018/05/04					<1.0	mg/L	1.0 (1)	20
8979346	Carbonate (CO3)	2018/05/04					<1.0	mg/L	NC (1)	20
8979346	Hydroxide (OH)	2018/05/04					<1.0	mg/L	NC (1)	20
8979347	pH	2018/05/04			101	97 - 103			0.13 (1)	20
8979348	Conductivity	2018/05/04			101	80 - 120	<2.0	uS/cm	0.11 (1)	20
8979349	Alkalinity (PP as CaCO3)	2018/05/05					<1.0	mg/L	NC (1)	20
8979349	Alkalinity (Total as CaCO3)	2018/05/05	NC	80 - 120	94	80 - 120	<1.0	mg/L	2.3 (1)	20
8979349	Bicarbonate (HCO3)	2018/05/05					<1.0	mg/L	2.3 (1)	20
8979349	Carbonate (CO3)	2018/05/05					<1.0	mg/L	NC (1)	20
8979349	Hydroxide (OH)	2018/05/05					<1.0	mg/L	NC (1)	20
8979352	pH	2018/05/05			101	97 - 103			0.12 (1)	20
8979353	Conductivity	2018/05/05			101	80 - 120	<2.0	uS/cm	0.12 (1)	20
8979626	Total Dissolved Solids	2018/05/07	102	80 - 120	97	80 - 120	<10	mg/L	14 (1)	20
8979641	Dissolved Aluminum (Al)	2018/05/08	96	80 - 120	97	80 - 120	<0.50	ug/L	0.84 (1)	20
8979641	Dissolved Antimony (Sb)	2018/05/08	97	80 - 120	100	80 - 120	<0.020	ug/L		
8979641	Dissolved Arsenic (As)	2018/05/08	99	80 - 120	100	80 - 120	<0.020	ug/L	0.69 (1)	20
8979641	Dissolved Barium (Ba)	2018/05/08	95	80 - 120	99	80 - 120	<0.020	ug/L		
8979641	Dissolved Beryllium (Be)	2018/05/08	92	80 - 120	96	80 - 120	<0.010	ug/L		
8979641	Dissolved Bismuth (Bi)	2018/05/08	94	80 - 120	98	80 - 120	<0.0050	ug/L		
8979641	Dissolved Boron (B)	2018/05/08	90	80 - 120	93	80 - 120	<10	ug/L	0.067 (1)	20
8979641	Dissolved Cadmium (Cd)	2018/05/08	96	80 - 120	98	80 - 120	<0.0050	ug/L	NC (1)	20
8979641	Dissolved Chromium (Cr)	2018/05/08	95	80 - 120	97	80 - 120	<0.10	ug/L		

Maxxam Job #: B832950
Report Date: 2018/05/10

QUALITY ASSURANCE REPORT(CONT'D)

GHD Limited
Client Project #: 56484-02
Site Location: SOLID WASTE ENGINEERING
Your P.O. #: 73506861-2
Sampler Initials: NT

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
8979641	Dissolved Cobalt (Co)	2018/05/08	92	80 - 120	96	80 - 120	<0.0050	ug/L	2.3 (1)	20
8979641	Dissolved Copper (Cu)	2018/05/08	91	80 - 120	95	80 - 120	<0.050	ug/L	5.6 (1)	20
8979641	Dissolved Iron (Fe)	2018/05/08	100	80 - 120	107	80 - 120	<1.0	ug/L	0.34 (1)	20
8979641	Dissolved Lead (Pb)	2018/05/08	96	80 - 120	98	80 - 120	<0.0050	ug/L	NC (1)	20
8979641	Dissolved Lithium (Li)	2018/05/08	90	80 - 120	96	80 - 120	<0.50	ug/L		
8979641	Dissolved Manganese (Mn)	2018/05/08	94	80 - 120	97	80 - 120	<0.050	ug/L	3.7 (1)	20
8979641	Dissolved Molybdenum (Mo)	2018/05/08	100	80 - 120	101	80 - 120	<0.050	ug/L	5.4 (1)	20
8979641	Dissolved Nickel (Ni)	2018/05/08	94	80 - 120	98	80 - 120	<0.020	ug/L	7.1 (1)	20
8979641	Dissolved Phosphorus (P)	2018/05/08	98	80 - 120	98	80 - 120	<2.0	ug/L		
8979641	Dissolved Selenium (Se)	2018/05/08	96	80 - 120	97	80 - 120	<0.040	ug/L	8.0 (1)	20
8979641	Dissolved Silicon (Si)	2018/05/08	NC	80 - 120	108	80 - 120	<50	ug/L		
8979641	Dissolved Silver (Ag)	2018/05/08	96	80 - 120	98	80 - 120	<0.0050	ug/L	NC (1)	20
8979641	Dissolved Strontium (Sr)	2018/05/08	NC	80 - 120	101	80 - 120	<0.050	ug/L		
8979641	Dissolved Sulphur (S)	2018/05/08	96	80 - 120	97	80 - 120	<600	ug/L		
8979641	Dissolved Thallium (Tl)	2018/05/08	96	80 - 120	99	80 - 120	<0.0020	ug/L		
8979641	Dissolved Tin (Sn)	2018/05/08	95	80 - 120	98	80 - 120	<0.20	ug/L		
8979641	Dissolved Titanium (Ti)	2018/05/08	96	80 - 120	100	80 - 120	<0.50	ug/L		
8979641	Dissolved Uranium (U)	2018/05/08	100	80 - 120	102	80 - 120	<0.0020	ug/L		
8979641	Dissolved Vanadium (V)	2018/05/08	97	80 - 120	97	80 - 120	<0.20	ug/L		
8979641	Dissolved Zinc (Zn)	2018/05/08	94	80 - 120	97	80 - 120	<0.10	ug/L		
8979641	Dissolved Zirconium (Zr)	2018/05/08	98	80 - 120	98	80 - 120	<0.10	ug/L		
8982134	Nitrite (N)	2018/05/04	153 (4)	80 - 120	103	80 - 120	<0.10	mg/L	NC (1)	20

Maxxam Job #: B832950
Report Date: 2018/05/10

QUALITY ASSURANCE REPORT(CONT'D)

GHD Limited
Client Project #: 56484-02
Site Location: SOLID WASTE ENGINEERING
Your P.O. #: 73506861-2
Sampler Initials: NT

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
8983418	Total Ammonia (N)	2018/05/09	93	80 - 120	102	80 - 120	<0.020	mg/L	NC (1)	20
Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement. Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference. Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy. Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination. NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration) NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL). (1) Duplicate Parent ID (2) Matrix Spike Parent ID [TI9923-04] (3) Duplicate Parent ID [TI9923-04] (4) Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.										

Maxxam Job #: B832950
Report Date: 2018/05/10

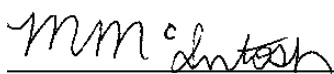
GHD Limited
Client Project #: 56484-02
Site Location: SOLID WASTE ENGINEERING
Your P.O. #: 73506861-2
Sampler Initials: NT

VALIDATION SIGNATURE PAGE

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



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



Melissa McIntosh, Project Manager



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.

Regulatory Criteria:	☐ CSR ☐ COME ☐ BC Water Quality ☐ Other _____
Special Instructions	
Conductivity Ions (Cl, F, SO ₄ , reserved) Metals with CV Metals with CV Hg Hardness Hardness	Please provide advance notice for rush projects (Standard 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 Ammonia are > 5 days - contact your Project Manager for details. ☒

[illegible]

02-May-18 09:00
Nahed Amer
B832950

Attention: Aïresse MacPhee

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

Your P.O. #: 73506861-2
Your Project #: 56484-02
Site#: Campbell River(Phase 02)-Quart
Site Location: SOLID WASTE ENGINEERING
Your C.O.C. #: 548141-02-01, 548141-03-01

Report Date: 2018/05/09

Report #: R2552309

Version: 2 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B832956

Received: 2018/05/02, 09:00

Sample Matrix: GROUND WATER
Samples Received: 19

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity - Water	19	2018/05/04	2018/05/05	BBY6SOP-00026	SM 22 2320 B m
Chloride by Automated Colourimetry	4	N/A	2018/05/04	BBY6SOP-00011	SM 22 4500-Cl- E m
Chloride by Automated Colourimetry	14	N/A	2018/05/05	BBY6SOP-00011	SM 22 4500-Cl- E m
Chloride by Automated Colourimetry	1	N/A	2018/05/07	BBY6SOP-00011	SM 22 4500-Cl- E m
Conductance - water	19	2018/05/04	2018/05/05	BBY6SOP-00026	SM 22 2510 B m
Fluoride (higher level)	19	N/A	2018/05/04	BBY6SOP-00048	SM 22 4500-F C m
Hardness (calculated as CaCO ₃)	19	N/A	2018/05/05	BBY WI-00033	Auto Calc
Mercury (Dissolved) by CVAf	19	N/A	2018/05/04	BBY7SOP-00015	BCMOE BCLM Oct2013 m
Na, K, Ca, Mg, S by CRC ICPMS (diss.)	19	N/A	2018/05/05	BBY WI-00033	Auto Calc
Elements by CRC ICPMS (dissolved)	19	N/A	2018/05/04	BBY7SOP-00002	EPA 6020b R2 m
Ammonia-N (Preserved)	19	N/A	2018/05/09	BBY6SOP-00009	EPA 350.1 m
Nitrate + Nitrite (N) (highlevel)	19	N/A	2018/05/04	BBY6SOP-00010	SM 23 4500-NO3- I m
Nitrite (N) by CFA (highlevel)	19	N/A	2018/05/04	BBY6SOP-00010	SM 23 4500-NO3- I m
Nitrogen - Nitrate (as N)	18	N/A	2018/05/08	BBY WI-00033	Auto Calc
Nitrogen - Nitrate (as N)	1	N/A	2018/05/09	BBY WI-00033	Auto Calc
Filter and HNO ₃ Preserve for Metals	11	N/A	2018/05/04	BBY7 WI-00004	BCMOE Reqs 08/14
Filter and HNO ₃ Preserve for Metals	7	N/A	2018/05/05	BBY7 WI-00004	BCMOE Reqs 08/14
Filter and HNO ₃ Preserve for Metals	1	N/A	2018/05/09	BBY7 WI-00004	BCMOE Reqs 08/14
pH Water (1)	19	2018/05/04	2018/05/05	BBY6SOP-00026	SM 22 4500-H+ B m
Sulphate by Automated Colourimetry	4	N/A	2018/05/04	BBY6SOP-00017	SM 22 4500-SO42- E m
Sulphate by Automated Colourimetry	8	N/A	2018/05/05	BBY6SOP-00017	SM 22 4500-SO42- E m
Sulphate by Automated Colourimetry	7	N/A	2018/05/07	BBY6SOP-00017	SM 22 4500-SO42- E m
Total Dissolved Solids (Filt. Residue)	19	2018/05/08	2018/05/09	BBY6SOP-00033	SM 22 2540 C m

Remarks:

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

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Maxxam's profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Maxxam in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless

Attention: Aïresse MacPhee

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

Your P.O. #: 73506861-2
Your Project #: 56484-02
Site#: Campbell River(Phase 02)-Quart
Site Location: SOLID WASTE ENGINEERING
Your C.O.C. #: 548141-02-01, 548141-03-01

Report Date: 2018/05/09

Report #: R2552309

Version: 2 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B832956

Received: 2018/05/02, 09:00

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



Maxxam
09 May 2018 19:50:06

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

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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 #: B832956
Report Date: 2018/05/09

GHD Limited
Client Project #: 56484-02
Site Location: SOLID WASTE ENGINEERING
Your P.O. #: 73506861-2
Sampler Initials: NT

RESULTS OF CHEMICAL ANALYSES OF GROUND WATER

Maxxam ID		TI9952		TI9953		
Sampling Date		2018/04/30 11:30		2018/04/30 12:15		
COC Number		548141-02-01		548141-02-01		
	UNITS	WG-56484-300418-NT-01	QC Batch	WG-56484-300418-NT-02	RDL	QC Batch
ANIONS						
Nitrite (N)	mg/L	<0.10	8982120	<0.10	0.10	8982120
Calculated Parameters						
Filter and HNO3 Preservation	N/A	FIELD	ONSITE	FIELD	N/A	ONSITE
Nitrate (N)	mg/L	<0.10	8975890	0.82	0.10	8975890
Misc. Inorganics						
Fluoride (F)	mg/L	<0.10	8979288	<0.10	0.10	8979286
Alkalinity (Total as CaCO3)	mg/L	35.0	8979354	110	1.0	8979354
Alkalinity (PP as CaCO3)	mg/L	<1.0	8979354	<1.0	1.0	8979354
Bicarbonate (HCO3)	mg/L	42.7	8979354	134	1.0	8979354
Carbonate (CO3)	mg/L	<1.0	8979354	<1.0	1.0	8979354
Hydroxide (OH)	mg/L	<1.0	8979354	<1.0	1.0	8979354
Anions						
Dissolved Sulphate (SO4)	mg/L	3.3	8982744	3.2	1.0	8980270
Dissolved Chloride (Cl)	mg/L	1.6	8980269	4.3	1.0	8980269
Nutrients						
Total Ammonia (N)	mg/L	<0.020	8983425	0.027	0.020	8983418
Nitrate plus Nitrite (N)	mg/L	<0.10	8979295	0.82	0.10	8979295
Physical Properties						
Conductivity	uS/cm	84.1	8979356	243	2.0	8979356
pH	pH	7.65	8979355	8.07	N/A	8979355
Physical Properties						
Total Dissolved Solids	mg/L	66	8982045	122	10	8982045
RDL = Reportable Detection Limit N/A = Not Applicable						

Maxxam Job #: B832956
Report Date: 2018/05/09

GHD Limited
Client Project #: 56484-02
Site Location: SOLID WASTE ENGINEERING
Your P.O. #: 73506861-2
Sampler Initials: NT

RESULTS OF CHEMICAL ANALYSES OF GROUND WATER

Maxxam ID		TI9954		TI9955		
Sampling Date		2018/04/30 12:45		2018/04/30 13:00		
COC Number		548141-02-01		548141-02-01		
	UNITS	WG-56484-300418-NT-03	QC Batch	WG-56484-300418-NT-04	RDL	QC Batch
ANIONS						
Nitrite (N)	mg/L	<0.10	8982120	<0.10	0.10	8982134
Calculated Parameters						
Filter and HNO3 Preservation	N/A	FIELD	ONSITE	FIELD	N/A	ONSITE
Nitrate (N)	mg/L	0.82	8975890	0.82	0.10	8975890
Misc. Inorganics						
Fluoride (F)	mg/L	<0.10	8979286	<0.10	0.10	8979286
Alkalinity (Total as CaCO3)	mg/L	358	8979354	356	1.0	8979349
Alkalinity (PP as CaCO3)	mg/L	<1.0	8979354	<1.0	1.0	8979349
Bicarbonate (HCO3)	mg/L	437	8979354	435	1.0	8979349
Carbonate (CO3)	mg/L	<1.0	8979354	<1.0	1.0	8979349
Hydroxide (OH)	mg/L	<1.0	8979354	<1.0	1.0	8979349
Anions						
Dissolved Sulphate (SO4)	mg/L	10.9 (1)	8982744	9.8	1.0	8979343
Dissolved Chloride (Cl)	mg/L	29	8980265	34	1.0	8979342
Nutrients						
Total Ammonia (N)	mg/L	<0.020	8983425	0.053	0.020	8983425
Nitrate plus Nitrite (N)	mg/L	0.82	8979295	0.82	0.10	8979291
Physical Properties						
Conductivity	uS/cm	782	8979356	768	2.0	8979353
pH	pH	8.10	8979355	8.20	N/A	8979352
Physical Properties						
Total Dissolved Solids	mg/L	444	8982045	436	10	8982045
RDL = Reportable Detection Limit						
N/A = Not Applicable						
(1) Matrix spike exceeds acceptance limits due to matrix interference. Re-analysis yields similar results.						

Maxxam Job #: B832956
Report Date: 2018/05/09

GHD Limited
Client Project #: 56484-02
Site Location: SOLID WASTE ENGINEERING
Your P.O. #: 73506861-2
Sampler Initials: NT

RESULTS OF CHEMICAL ANALYSES OF GROUND WATER

Maxxam ID		TI9956		TI9957		
Sampling Date		2018/04/30 13:50		2018/04/30 14:00		
COC Number		548141-02-01		548141-02-01		
	UNITS	WG-56484-300418-NT-05	QC Batch	WG-56484-300418-NT-06	RDL	QC Batch
ANIONS						
Nitrite (N)	mg/L	<0.10	8982134	<0.10	0.10	8982134
Calculated Parameters						
Filter and HNO3 Preservation	N/A	FIELD	ONSITE	FIELD	N/A	ONSITE
Nitrate (N)	mg/L	0.19	8975890	<0.10	0.10	8975890
Misc. Inorganics						
Fluoride (F)	mg/L	<0.10	8979286	<0.10	0.10	8979286
Alkalinity (Total as CaCO3)	mg/L	98.8	8979349	<1.0	1.0	8979349
Alkalinity (PP as CaCO3)	mg/L	<1.0	8979349	<1.0	1.0	8979349
Bicarbonate (HCO3)	mg/L	121	8979349	<1.0	1.0	8979349
Carbonate (CO3)	mg/L	<1.0	8979349	<1.0	1.0	8979349
Hydroxide (OH)	mg/L	<1.0	8979349	<1.0	1.0	8979349
Anions						
Dissolved Sulphate (SO4)	mg/L	4.0	8980266	<1.0	1.0	8980266
Dissolved Chloride (Cl)	mg/L	2.0	8980265	<1.0	1.0	8980265
Nutrients						
Total Ammonia (N)	mg/L	<0.020	8983425	<0.020	0.020	8983425
Nitrate plus Nitrite (N)	mg/L	0.19	8979291	<0.10	0.10	8982165
Physical Properties						
Conductivity	uS/cm	209	8979353	<2.0	2.0	8979353
pH	pH	8.08	8979352	4.68	N/A	8979352
Physical Properties						
Total Dissolved Solids	mg/L	122	8982045	10	10	8982045
RDL = Reportable Detection Limit						
N/A = Not Applicable						

Maxxam Job #: B832956
Report Date: 2018/05/09

GHD Limited
Client Project #: 56484-02
Site Location: SOLID WASTE ENGINEERING
Your P.O. #: 73506861-2
Sampler Initials: NT

RESULTS OF CHEMICAL ANALYSES OF GROUND WATER

Maxxam ID		TI9958		TI9959		TI9959		
Sampling Date		2018/04/30 14:20		2018/04/30 15:00		2018/04/30 15:00		
COC Number		548141-02-01		548141-02-01		548141-02-01		
	UNITS	WG-56484-300418-NT-07	QC Batch	WG-56484-300418-NT-08		WG-56484-300418-NT-08 Lab-Dup	RDL	QC Batch
ANIONS								
Nitrite (N)	mg/L	<0.10	8982134	<0.10		N/A	0.10	8982120
Calculated Parameters								
Filter and HNO3 Preservation	N/A	FIELD	ONSITE	FIELD		N/A	N/A	ONSITE
Nitrate (N)	mg/L	<0.10	8975890	0.18		N/A	0.10	8975890
Misc. Inorganics								
Fluoride (F)	mg/L	<0.10	8979286	<0.10		N/A	0.10	8979286
Alkalinity (Total as CaCO3)	mg/L	40.1	8979349	73.9		73.3	1.0	8979354
Alkalinity (PP as CaCO3)	mg/L	<1.0	8979349	<1.0		<1.0	1.0	8979354
Bicarbonate (HCO3)	mg/L	48.9	8979349	90.2		89.5	1.0	8979354
Carbonate (CO3)	mg/L	<1.0	8979349	<1.0		<1.0	1.0	8979354
Hydroxide (OH)	mg/L	<1.0	8979349	<1.0		<1.0	1.0	8979354
Anions								
Dissolved Sulphate (SO4)	mg/L	3.0	8980266	2.9		N/A	1.0	8982744
Dissolved Chloride (Cl)	mg/L	1.2	8982743	6.7		N/A	1.0	8980265
Nutrients								
Total Ammonia (N)	mg/L	<0.020	8983425	<0.020		N/A	0.020	8983426
Nitrate plus Nitrite (N)	mg/L	<0.10	8979291	0.18		N/A	0.10	8979295
Physical Properties								
Conductivity	uS/cm	95.6	8979353	181		181	2.0	8979356
pH	pH	7.81	8979352	7.89		7.94	N/A	8979355
Physical Properties								
Total Dissolved Solids	mg/L	40	8982045	84		N/A	10	8982045
RDL = Reportable Detection Limit Lab-Dup = Laboratory Initiated Duplicate N/A = Not Applicable								

Maxxam Job #: B832956
Report Date: 2018/05/09

GHD Limited
Client Project #: 56484-02
Site Location: SOLID WASTE ENGINEERING
Your P.O. #: 73506861-2
Sampler Initials: NT

RESULTS OF CHEMICAL ANALYSES OF GROUND WATER

Maxxam ID		TI9960	TI9960		TI9961		
Sampling Date		2018/04/30 15:15	2018/04/30 15:15		2018/04/30 15:45		
COC Number		548141-02-01	548141-02-01		548141-02-01		
	UNITS	WG-56484-300418-NT-09	WG-56484-300418-NT-09 Lab-Dup	QC Batch	WG-56484-300418-NT-10	RDL	QC Batch

ANIONS							
Nitrite (N)	mg/L	<0.10 (1)	<0.10	8982134	0.17	0.10	8983615

Calculated Parameters							
Filter and HNO3 Preservation	N/A	FIELD	N/A	ONSITE	FIELD	N/A	ONSITE
Nitrate (N)	mg/L	0.38	N/A	8975890	<0.10	0.10	8975890

Misc. Inorganics							
Fluoride (F)	mg/L	<0.10	<0.10	8979286	<0.10	0.10	8979286
Alkalinity (Total as CaCO3)	mg/L	46.2	N/A	8979349	46.7	1.0	8979354
Alkalinity (PP as CaCO3)	mg/L	<1.0	N/A	8979349	<1.0	1.0	8979354
Bicarbonate (HCO3)	mg/L	56.3	N/A	8979349	56.9	1.0	8979354
Carbonate (CO3)	mg/L	<1.0	N/A	8979349	<1.0	1.0	8979354
Hydroxide (OH)	mg/L	<1.0	N/A	8979349	<1.0	1.0	8979354

Anions							
Dissolved Sulphate (SO4)	mg/L	3.5	N/A	8979343	3.0 (1)	1.0	8982744
Dissolved Chloride (Cl)	mg/L	78	N/A	8979342	6.2	1.0	8980269

Nutrients							
Total Ammonia (N)	mg/L	0.034	N/A	8983426	<0.020	0.020	8983425
Nitrate plus Nitrite (N)	mg/L	0.38 (1)	0.38	8979291	0.11	0.10	8979295

Physical Properties							
Conductivity	uS/cm	354	N/A	8979353	128	2.0	8979356
pH	pH	7.73	N/A	8979352	7.77	N/A	8979355

Physical Properties							
Total Dissolved Solids	mg/L	248	N/A	8982045	72	10	8982045

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 #: B832956
Report Date: 2018/05/09

GHD Limited
Client Project #: 56484-02
Site Location: SOLID WASTE ENGINEERING
Your P.O. #: 73506861-2
Sampler Initials: NT

RESULTS OF CHEMICAL ANALYSES OF GROUND WATER

Maxxam ID		TI9961		TI9962	TI9962		
Sampling Date		2018/04/30 15:45		2018/04/30 16:30	2018/04/30 16:30		
COC Number		548141-02-01		548141-03-01	548141-03-01		
	UNITS	WG-56484-300418-NT-10 Lab-Dup	QC Batch	WG-56484-300418-NT-11	WG-56484-300418-NT-11 Lab-Dup	RDL	QC Batch
ANIONS							
Nitrite (N)	mg/L	N/A	8983615	<0.10	N/A	0.10	8982134
Calculated Parameters							
Filter and HNO3 Preservation	N/A	N/A	ONSITE	FIELD	N/A	N/A	ONSITE
Nitrate (N)	mg/L	N/A	8975890	0.70	N/A	0.10	8975890
Misc. Inorganics							
Fluoride (F)	mg/L	N/A	8979286	<0.10	N/A	0.10	8979286
Alkalinity (Total as CaCO3)	mg/L	N/A	8979354	109	N/A	1.0	8979349
Alkalinity (PP as CaCO3)	mg/L	N/A	8979354	<1.0	N/A	1.0	8979349
Bicarbonate (HCO3)	mg/L	N/A	8979354	133	N/A	1.0	8979349
Carbonate (CO3)	mg/L	N/A	8979354	<1.0	N/A	1.0	8979349
Hydroxide (OH)	mg/L	N/A	8979354	<1.0	N/A	1.0	8979349
Anions							
Dissolved Sulphate (SO4)	mg/L	2.6	8982744	10.6	N/A	1.0	8982744
Dissolved Chloride (Cl)	mg/L	6.2	8980269	3.8	N/A	1.0	8980265
Nutrients							
Total Ammonia (N)	mg/L	<0.020	8983425	<0.020	N/A	0.020	8983425
Nitrate plus Nitrite (N)	mg/L	N/A	8979295	0.70	N/A	0.10	8979291
Physical Properties							
Conductivity	uS/cm	N/A	8979356	252	N/A	2.0	8979353
pH	pH	N/A	8979355	8.08	N/A	N/A	8979352
Physical Properties							
Total Dissolved Solids	mg/L	N/A	8982045	122	132	10	8982045
RDL = Reportable Detection Limit Lab-Dup = Laboratory Initiated Duplicate N/A = Not Applicable							

Maxxam Job #: B832956
Report Date: 2018/05/09

GHD Limited
Client Project #: 56484-02
Site Location: SOLID WASTE ENGINEERING
Your P.O. #: 73506861-2
Sampler Initials: NT

RESULTS OF CHEMICAL ANALYSES OF GROUND WATER

Maxxam ID		TI9963		TI9964		TI9964		
Sampling Date		2018/05/01 09:00		2018/05/01 09:10		2018/05/01 09:10		
COC Number		548141-03-01		548141-03-01		548141-03-01		
	UNITS	WG-56484-010518-NT-12	QC Batch	WG-56484-010518-NT-13		WG-56484-010518-NT-13 Lab-Dup	RDL	QC Batch
ANIONS								
Nitrite (N)	mg/L	<0.10	8982120	<0.10		N/A	0.10	8982134
Calculated Parameters								
Filter and HNO3 Preservation	N/A	FIELD	ONSITE	FIELD		N/A	N/A	ONSITE
Nitrate (N)	mg/L	3.92	8975890	2.20		N/A	0.20	8975890
Misc. Inorganics								
Fluoride (F)	mg/L	<0.10	8979288	<0.10		N/A	0.10	8979286
Alkalinity (Total as CaCO3)	mg/L	305	8979354	317		310	1.0	8979349
Alkalinity (PP as CaCO3)	mg/L	<1.0	8979354	<1.0		<1.0	1.0	8979349
Bicarbonate (HCO3)	mg/L	372	8979354	387		378	1.0	8979349
Carbonate (CO3)	mg/L	<1.0	8979354	<1.0		<1.0	1.0	8979349
Hydroxide (OH)	mg/L	<1.0	8979354	<1.0		<1.0	1.0	8979349
Anions								
Dissolved Sulphate (SO4)	mg/L	12.2	8982744	12.3		N/A	1.0	8979343
Dissolved Chloride (Cl)	mg/L	54	8980269	60		N/A	1.0	8979342
Nutrients								
Total Ammonia (N)	mg/L	<0.020	8983425	<0.020		N/A	0.020	8983425
Nitrate plus Nitrite (N)	mg/L	3.92	8982165	2.20		N/A	0.20	8979291
Physical Properties								
Conductivity	uS/cm	801	8979356	814		815	2.0	8979353
pH	pH	8.19	8979355	8.10		8.11	N/A	8979352
Physical Properties								
Total Dissolved Solids	mg/L	452	8982045	480		N/A	10	8982045
RDL = Reportable Detection Limit Lab-Dup = Laboratory Initiated Duplicate N/A = Not Applicable								

Maxxam Job #: B832956
Report Date: 2018/05/09

GHD Limited
Client Project #: 56484-02
Site Location: SOLID WASTE ENGINEERING
Your P.O. #: 73506861-2
Sampler Initials: NT

RESULTS OF CHEMICAL ANALYSES OF GROUND WATER

Maxxam ID		T19965			T19966		
Sampling Date		2018/05/01 09:20			2018/05/01 10:30		
COC Number		548141-03-01			548141-03-01		
	UNITS	WG-56484-010518-NT-14	RDL	QC Batch	WG-56484-010518-NT-15	RDL	QC Batch
ANIONS							
Nitrite (N)	mg/L	<0.10	0.10	8982134	<0.10	0.10	8982120
Calculated Parameters							
Filter and HNO3 Preservation	N/A	FIELD	N/A	ONSITE	FIELD	N/A	ONSITE
Nitrate (N)	mg/L	1.96	0.20	8975890	<0.10	0.10	8975890
Misc. Inorganics							
Fluoride (F)	mg/L	<0.10	0.10	8979286	<0.10	0.10	8979288
Alkalinity (Total as CaCO3)	mg/L	330	1.0	8979349	72.2	1.0	8979354
Alkalinity (PP as CaCO3)	mg/L	<1.0	1.0	8979349	<1.0	1.0	8979354
Bicarbonate (HCO3)	mg/L	402	1.0	8979349	88.1	1.0	8979354
Carbonate (CO3)	mg/L	<1.0	1.0	8979349	<1.0	1.0	8979354
Hydroxide (OH)	mg/L	<1.0	1.0	8979349	<1.0	1.0	8979354
Anions							
Dissolved Sulphate (SO4)	mg/L	8.8	1.0	8980266	3.2	1.0	8982744
Dissolved Chloride (Cl)	mg/L	8.3	1.0	8980265	3.2	1.0	8980269
Nutrients							
Total Ammonia (N)	mg/L	0.10	0.020	8983426	<0.020	0.020	8983425
Nitrate plus Nitrite (N)	mg/L	1.96	0.20	8979291	<0.10	0.10	8979295
Physical Properties							
Conductivity	uS/cm	663	2.0	8979353	164	2.0	8979356
pH	pH	8.20	N/A	8979352	8.04	N/A	8979355
Physical Properties							
Total Dissolved Solids	mg/L	402	10	8982045	102	10	8982045
RDL = Reportable Detection Limit N/A = Not Applicable							

Maxxam Job #: B832956
Report Date: 2018/05/09

GHD Limited
Client Project #: 56484-02
Site Location: SOLID WASTE ENGINEERING
Your P.O. #: 73506861-2
Sampler Initials: NT

RESULTS OF CHEMICAL ANALYSES OF GROUND WATER

Maxxam ID		TI9967		TI9968		TI9968		
Sampling Date		2018/05/01 12:00		2018/05/01 13:00		2018/05/01 13:00		
COC Number		548141-03-01		548141-03-01		548141-03-01		
	UNITS	WG-56484-010518-NT-16	QC Batch	WG-56484-010518-NT-17		WG-56484-010518-NT-17 Lab-Dup	RDL	QC Batch
ANIONS								
Nitrite (N)	mg/L	<0.10	8982134	<0.10		N/A	0.10	8982120
Calculated Parameters								
Filter and HNO3 Preservation	N/A	FIELD	ONSITE	FIELD		N/A	N/A	ONSITE
Nitrate (N)	mg/L	0.16	8975890	<0.10		N/A	0.10	8975890
Misc. Inorganics								
Fluoride (F)	mg/L	<0.10	8979286	<0.10		N/A	0.10	8979286
Alkalinity (Total as CaCO3)	mg/L	89.7	8979349	44.9		N/A	1.0	8979349
Alkalinity (PP as CaCO3)	mg/L	<1.0	8979349	<1.0		N/A	1.0	8979349
Bicarbonate (HCO3)	mg/L	109	8979349	54.8		N/A	1.0	8979349
Carbonate (CO3)	mg/L	<1.0	8979349	<1.0		N/A	1.0	8979349
Hydroxide (OH)	mg/L	<1.0	8979349	<1.0		N/A	1.0	8979349
Anions								
Dissolved Sulphate (SO4)	mg/L	3.7	8980266	3.2		2.9	1.0	8980266
Dissolved Chloride (Cl)	mg/L	1.8	8980265	1.3		1.5	1.0	8980265
Nutrients								
Total Ammonia (N)	mg/L	<0.020	8983425	<0.020		N/A	0.020	8983425
Nitrate plus Nitrite (N)	mg/L	0.16	8979291	<0.10		N/A	0.10	8979295
Physical Properties								
Conductivity	uS/cm	196	8979353	100		N/A	2.0	8979353
pH	pH	8.13	8979352	7.82		N/A	N/A	8979352
Physical Properties								
Total Dissolved Solids	mg/L	94	8982045	54		N/A	10	8982045
RDL = Reportable Detection Limit Lab-Dup = Laboratory Initiated Duplicate N/A = Not Applicable								

Maxxam Job #: B832956
Report Date: 2018/05/09

GHD Limited
Client Project #: 56484-02
Site Location: SOLID WASTE ENGINEERING
Your P.O. #: 73506861-2
Sampler Initials: NT

RESULTS OF CHEMICAL ANALYSES OF GROUND WATER

Maxxam ID		TI9969			TI9970		
Sampling Date		2018/05/01 14:40			2018/05/01 15:00		
COC Number		548141-03-01			548141-03-01		
	UNITS	WG-56484-010518-NT-18	RDL	QC Batch	WG-56484-010518-NT-19	RDL	QC Batch
ANIONS							
Nitrite (N)	mg/L	<0.10	0.10	8982134	<0.10	0.10	8982134
Calculated Parameters							
Filter and HNO3 Preservation	N/A	FIELD	N/A	ONSITE	FIELD	N/A	ONSITE
Nitrate (N)	mg/L	<0.10	0.10	8975890	<0.10	0.10	8975890
Misc. Inorganics							
Fluoride (F)	mg/L	<0.10	0.10	8979286	<0.10	0.10	8979286
Alkalinity (Total as CaCO3)	mg/L	120	1.0	8979346	271	1.0	8979349
Alkalinity (PP as CaCO3)	mg/L	<1.0	1.0	8979346	<1.0	1.0	8979349
Bicarbonate (HCO3)	mg/L	146	1.0	8979346	330	1.0	8979349
Carbonate (CO3)	mg/L	<1.0	1.0	8979346	<1.0	1.0	8979349
Hydroxide (OH)	mg/L	<1.0	1.0	8979346	<1.0	1.0	8979349
Anions							
Dissolved Sulphate (SO4)	mg/L	3.3	1.0	8979343	<1.0	1.0	8980266
Dissolved Chloride (Cl)	mg/L	6.2	1.0	8979342	26	1.0	8980265
Nutrients							
Total Ammonia (N)	mg/L	2.1	0.20	8983426	1.6	0.020	8983425
Nitrate plus Nitrite (N)	mg/L	<0.10	0.10	8982165	<0.10	0.10	8979291
Physical Properties							
Conductivity	uS/cm	283	2.0	8979348	612	2.0	8979353
pH	pH	8.02	N/A	8979347	7.86	N/A	8979352
Physical Properties							
Total Dissolved Solids	mg/L	146	10	8982045	260	10	8982045
RDL = Reportable Detection Limit N/A = Not Applicable							

Maxxam Job #: B832956
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GHD Limited
Client Project #: 56484-02
Site Location: SOLID WASTE ENGINEERING
Your P.O. #: 73506861-2
Sampler Initials: NT

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

Maxxam ID		TI9952	TI9952	TI9953		
Sampling Date		2018/04/30 11:30	2018/04/30 11:30	2018/04/30 12:15		
COC Number		548141-02-01	548141-02-01	548141-02-01		
	UNITS	WG-56484-300418-NT-01	WG-56484-300418-NT-01 Lab-Dup	WG-56484-300418-NT-02	RDL	QC Batch

Calculated Parameters						
Dissolved Hardness (CaCO3)	mg/L	36.5	N/A	117	0.50	8975959
Elements						
Dissolved Mercury (Hg)	ug/L	<0.0020	N/A	<0.0020	0.0020	8978843
Dissolved Metals by ICPMS						
Dissolved Aluminum (Al)	ug/L	3.6	3.7	4.2	3.0	8979149
Dissolved Antimony (Sb)	ug/L	<0.50	<0.50	<0.50	0.50	8979149
Dissolved Arsenic (As)	ug/L	0.12	0.12	0.14	0.10	8979149
Dissolved Barium (Ba)	ug/L	3.0	3.0	5.9	1.0	8979149
Dissolved Beryllium (Be)	ug/L	<0.10	<0.10	<0.10	0.10	8979149
Dissolved Bismuth (Bi)	ug/L	<1.0	<1.0	<1.0	1.0	8979149
Dissolved Boron (B)	ug/L	<50	<50	<50	50	8979149
Dissolved Cadmium (Cd)	ug/L	<0.010	<0.010	<0.010	0.010	8979149
Dissolved Chromium (Cr)	ug/L	<1.0	<1.0	2.4	1.0	8979149
Dissolved Cobalt (Co)	ug/L	<0.20	<0.20	<0.20	0.20	8979149
Dissolved Copper (Cu)	ug/L	0.22	0.22	<0.20	0.20	8979149
Dissolved Iron (Fe)	ug/L	<5.0	<5.0	<5.0	5.0	8979149
Dissolved Lead (Pb)	ug/L	<0.20	<0.20	<0.20	0.20	8979149
Dissolved Lithium (Li)	ug/L	<2.0	<2.0	<2.0	2.0	8979149
Dissolved Manganese (Mn)	ug/L	<1.0	<1.0	<1.0	1.0	8979149
Dissolved Molybdenum (Mo)	ug/L	<1.0	<1.0	<1.0	1.0	8979149
Dissolved Nickel (Ni)	ug/L	<1.0	<1.0	<1.0	1.0	8979149
Dissolved Phosphorus (P)	ug/L	<10	<10	<10	10	8979149
Dissolved Selenium (Se)	ug/L	<0.10	<0.10	0.13	0.10	8979149
Dissolved Silicon (Si)	ug/L	3710	3800	7890	100	8979149
Dissolved Silver (Ag)	ug/L	<0.020	<0.020	<0.020	0.020	8979149
Dissolved Strontium (Sr)	ug/L	17.5	17.6	62.5	1.0	8979149
Dissolved Thallium (Tl)	ug/L	<0.010	<0.010	<0.010	0.010	8979149
Dissolved Tin (Sn)	ug/L	<5.0	<5.0	<5.0	5.0	8979149
Dissolved Titanium (Ti)	ug/L	<5.0	<5.0	<5.0	5.0	8979149
RDL = Reportable Detection Limit						
Lab-Dup = Laboratory Initiated Duplicate						
N/A = Not Applicable						

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GHD Limited
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Your P.O. #: 73506861-2
Sampler Initials: NT

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

Maxxam ID		TI9952	TI9952	TI9953		
Sampling Date		2018/04/30 11:30	2018/04/30 11:30	2018/04/30 12:15		
COC Number		548141-02-01	548141-02-01	548141-02-01		
	UNITS	WG-56484-300418-NT-01	WG-56484-300418-NT-01 Lab-Dup	WG-56484-300418-NT-02	RDL	QC Batch
Dissolved Uranium (U)	ug/L	<0.10	<0.10	0.18	0.10	8979149
Dissolved Vanadium (V)	ug/L	<5.0	<5.0	<5.0	5.0	8979149
Dissolved Zinc (Zn)	ug/L	<5.0	<5.0	<5.0	5.0	8979149
Dissolved Zirconium (Zr)	ug/L	<0.10	<0.10	<0.10	0.10	8979149
Dissolved Calcium (Ca)	mg/L	11.8	N/A	31.4	0.050	8976146
Dissolved Magnesium (Mg)	mg/L	1.71	N/A	9.42	0.050	8976146
Dissolved Potassium (K)	mg/L	0.189	N/A	0.400	0.050	8976146
Dissolved Sodium (Na)	mg/L	1.28	N/A	4.36	0.050	8976146
Dissolved Sulphur (S)	mg/L	<3.0	N/A	<3.0	3.0	8976146
Dissolved Sulphur (S)	ug/L	<3000	<3000	<3000	3000	8979149
RDL = Reportable Detection Limit Lab-Dup = Laboratory Initiated Duplicate N/A = Not Applicable						

Maxxam Job #: B832956
Report Date: 2018/05/09

GHD Limited
Client Project #: 56484-02
Site Location: SOLID WASTE ENGINEERING
Your P.O. #: 73506861-2
Sampler Initials: NT

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

Maxxam ID		TI9954	TI9955	TI9956		
Sampling Date		2018/04/30 12:45	2018/04/30 13:00	2018/04/30 13:50		
COC Number		548141-02-01	548141-02-01	548141-02-01		
	UNITS	WG-56484-300418-NT-03	WG-56484-300418-NT-04	WG-56484-300418-NT-05	RDL	QC Batch

Calculated Parameters						
Dissolved Hardness (CaCO ₃)	mg/L	435	430	104	0.50	8975959
Elements						
Dissolved Mercury (Hg)	ug/L	<0.0020	<0.0020	<0.0020	0.0020	8978843
Dissolved Metals by ICPMS						
Dissolved Aluminum (Al)	ug/L	<3.0	<3.0	4.5	3.0	8979149
Dissolved Antimony (Sb)	ug/L	<0.50	<0.50	<0.50	0.50	8979149
Dissolved Arsenic (As)	ug/L	<0.10	<0.10	0.82	0.10	8979149
Dissolved Barium (Ba)	ug/L	14.3	14.1	1.8	1.0	8979149
Dissolved Beryllium (Be)	ug/L	<0.10	<0.10	<0.10	0.10	8979149
Dissolved Bismuth (Bi)	ug/L	<1.0	<1.0	<1.0	1.0	8979149
Dissolved Boron (B)	ug/L	<50	<50	<50	50	8979149
Dissolved Cadmium (Cd)	ug/L	0.025	0.015	<0.010	0.010	8979149
Dissolved Chromium (Cr)	ug/L	1.2	1.2	<1.0	1.0	8979149
Dissolved Cobalt (Co)	ug/L	<0.20	<0.20	<0.20	0.20	8979149
Dissolved Copper (Cu)	ug/L	<0.20	<0.20	<0.20	0.20	8979149
Dissolved Iron (Fe)	ug/L	<5.0	<5.0	<5.0	5.0	8979149
Dissolved Lead (Pb)	ug/L	<0.20	<0.20	<0.20	0.20	8979149
Dissolved Lithium (Li)	ug/L	<2.0	<2.0	<2.0	2.0	8979149
Dissolved Manganese (Mn)	ug/L	<1.0	<1.0	<1.0	1.0	8979149
Dissolved Molybdenum (Mo)	ug/L	<1.0	<1.0	<1.0	1.0	8979149
Dissolved Nickel (Ni)	ug/L	<1.0	<1.0	<1.0	1.0	8979149
Dissolved Phosphorus (P)	ug/L	<10	<10	15	10	8979149
Dissolved Selenium (Se)	ug/L	0.13	0.13	<0.10	0.10	8979149
Dissolved Silicon (Si)	ug/L	8250	8390	5940	100	8979149
Dissolved Silver (Ag)	ug/L	<0.020	<0.020	<0.020	0.020	8979149
Dissolved Strontium (Sr)	ug/L	288	286	51.0	1.0	8979149
Dissolved Thallium (Tl)	ug/L	<0.010	<0.010	<0.010	0.010	8979149
Dissolved Tin (Sn)	ug/L	<5.0	<5.0	<5.0	5.0	8979149
Dissolved Titanium (Ti)	ug/L	<5.0	<5.0	<5.0	5.0	8979149
Dissolved Uranium (U)	ug/L	0.25	0.26	<0.10	0.10	8979149
RDL = Reportable Detection Limit						

Maxxam Job #: B832956
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GHD Limited
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Site Location: SOLID WASTE ENGINEERING
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Sampler Initials: NT

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

Maxxam ID		TI9954	TI9955	TI9956		
Sampling Date		2018/04/30 12:45	2018/04/30 13:00	2018/04/30 13:50		
COC Number		548141-02-01	548141-02-01	548141-02-01		
	UNITS	WG-56484-300418-NT-03	WG-56484-300418-NT-04	WG-56484-300418-NT-05	RDL	QC Batch
Dissolved Vanadium (V)	ug/L	<5.0	<5.0	5.6	5.0	8979149
Dissolved Zinc (Zn)	ug/L	<5.0	<5.0	<5.0	5.0	8979149
Dissolved Zirconium (Zr)	ug/L	<0.10	<0.10	<0.10	0.10	8979149
Dissolved Calcium (Ca)	mg/L	148	146	33.8	0.050	8976146
Dissolved Magnesium (Mg)	mg/L	15.8	15.7	4.85	0.050	8976146
Dissolved Potassium (K)	mg/L	1.19	1.19	0.733	0.050	8976146
Dissolved Sodium (Na)	mg/L	6.44	6.53	2.00	0.050	8976146
Dissolved Sulphur (S)	mg/L	3.4	3.5	<3.0	3.0	8976146
Dissolved Sulphur (S)	ug/L	3450	3470	<3000	3000	8979149
RDL = Reportable Detection Limit						

Maxxam Job #: B832956
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GHD Limited
Client Project #: 56484-02
Site Location: SOLID WASTE ENGINEERING
Your P.O. #: 73506861-2
Sampler Initials: NT

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

Maxxam ID		TI9957	TI9958	TI9959		
Sampling Date		2018/04/30 14:00	2018/04/30 14:20	2018/04/30 15:00		
COC Number		548141-02-01	548141-02-01	548141-02-01		
	UNITS	WG-56484-300418-NT-06	WG-56484-300418-NT-07	WG-56484-300418-NT-08	RDL	QC Batch

Calculated Parameters						
Dissolved Hardness (CaCO ₃)	mg/L	<0.50	42.9	83.3	0.50	8975959
Elements						
Dissolved Mercury (Hg)	ug/L	<0.0020	<0.0020	<0.0020	0.0020	8978843
Dissolved Metals by ICPMS						
Dissolved Aluminum (Al)	ug/L	<3.0	6.1	<3.0	3.0	8979149
Dissolved Antimony (Sb)	ug/L	<0.50	<0.50	<0.50	0.50	8979149
Dissolved Arsenic (As)	ug/L	<0.10	0.75	<0.10	0.10	8979149
Dissolved Barium (Ba)	ug/L	<1.0	<1.0	<1.0	1.0	8979149
Dissolved Beryllium (Be)	ug/L	<0.10	<0.10	<0.10	0.10	8979149
Dissolved Bismuth (Bi)	ug/L	<1.0	<1.0	<1.0	1.0	8979149
Dissolved Boron (B)	ug/L	<50	<50	<50	50	8979149
Dissolved Cadmium (Cd)	ug/L	<0.010	<0.010	<0.010	0.010	8979149
Dissolved Chromium (Cr)	ug/L	<1.0	<1.0	1.1	1.0	8979149
Dissolved Cobalt (Co)	ug/L	<0.20	<0.20	<0.20	0.20	8979149
Dissolved Copper (Cu)	ug/L	<0.20	1.10	<0.20	0.20	8979149
Dissolved Iron (Fe)	ug/L	<5.0	<5.0	<5.0	5.0	8979149
Dissolved Lead (Pb)	ug/L	<0.20	<0.20	<0.20	0.20	8979149
Dissolved Lithium (Li)	ug/L	<2.0	<2.0	<2.0	2.0	8979149
Dissolved Manganese (Mn)	ug/L	<1.0	<1.0	<1.0	1.0	8979149
Dissolved Molybdenum (Mo)	ug/L	<1.0	<1.0	<1.0	1.0	8979149
Dissolved Nickel (Ni)	ug/L	<1.0	<1.0	<1.0	1.0	8979149
Dissolved Phosphorus (P)	ug/L	<10	15	26	10	8979149
Dissolved Selenium (Se)	ug/L	<0.10	0.15	0.16	0.10	8979149
Dissolved Silicon (Si)	ug/L	<100	5650	4360	100	8979149
Dissolved Silver (Ag)	ug/L	<0.020	<0.020	<0.020	0.020	8979149
Dissolved Strontium (Sr)	ug/L	<1.0	20.1	62.0	1.0	8979149
Dissolved Thallium (Tl)	ug/L	<0.010	<0.010	<0.010	0.010	8979149
Dissolved Tin (Sn)	ug/L	<5.0	<5.0	<5.0	5.0	8979149
Dissolved Titanium (Ti)	ug/L	<5.0	<5.0	<5.0	5.0	8979149
Dissolved Uranium (U)	ug/L	<0.10	<0.10	0.11	0.10	8979149
RDL = Reportable Detection Limit						

Maxxam Job #: B832956
Report Date: 2018/05/09

GHD Limited
Client Project #: 56484-02
Site Location: SOLID WASTE ENGINEERING
Your P.O. #: 73506861-2
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CSR DISSOLVED METALS IN WATER WITH CV HG (GROUND WATER)

Maxxam ID		TI9957	TI9958	TI9959		
Sampling Date		2018/04/30 14:00	2018/04/30 14:20	2018/04/30 15:00		
COC Number		548141-02-01	548141-02-01	548141-02-01		
	UNITS	WG-56484-300418-NT-06	WG-56484-300418-NT-07	WG-56484-300418-NT-08	RDL	QC Batch
Dissolved Vanadium (V)	ug/L	<5.0	5.8	<5.0	5.0	8979149
Dissolved Zinc (Zn)	ug/L	<5.0	<5.0	<5.0	5.0	8979149
Dissolved Zirconium (Zr)	ug/L	<0.10	<0.10	<0.10	0.10	8979149
Dissolved Calcium (Ca)	mg/L	<0.050	13.4	25.9	0.050	8976146
Dissolved Magnesium (Mg)	mg/L	<0.050	2.29	4.54	0.050	8976146
Dissolved Potassium (K)	mg/L	<0.050	0.301	0.320	0.050	8976146
Dissolved Sodium (Na)	mg/L	<0.050	1.69	3.17	0.050	8976146
Dissolved Sulphur (S)	mg/L	<3.0	<3.0	<3.0	3.0	8976146
Dissolved Sulphur (S)	ug/L	<3000	<3000	<3000	3000	8979149
RDL = Reportable Detection Limit						

Maxxam Job #: B832956
Report Date: 2018/05/09

GHD Limited
Client Project #: 56484-02
Site Location: SOLID WASTE ENGINEERING
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Sampler Initials: NT

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

Maxxam ID		TI9960	TI9961	TI9962		
Sampling Date		2018/04/30 15:15	2018/04/30 15:45	2018/04/30 16:30		
COC Number		548141-02-01	548141-02-01	548141-03-01		
	UNITS	WG-56484-300418-NT-09	WG-56484-300418-NT-10	WG-56484-300418-NT-11	RDL	QC Batch

Calculated Parameters						
Dissolved Hardness (CaCO3)	mg/L	141	54.7	122	0.50	8975959
Elements						
Dissolved Mercury (Hg)	ug/L	<0.0020	<0.0020	<0.0020	0.0020	8978843
Dissolved Metals by ICPMS						
Dissolved Aluminum (Al)	ug/L	<3.0	3.7	<3.0	3.0	8979149
Dissolved Antimony (Sb)	ug/L	<0.50	<0.50	<0.50	0.50	8979149
Dissolved Arsenic (As)	ug/L	0.10	1.95	0.24	0.10	8979149
Dissolved Barium (Ba)	ug/L	1.4	1.3	3.2	1.0	8979149
Dissolved Beryllium (Be)	ug/L	<0.10	<0.10	<0.10	0.10	8979149
Dissolved Bismuth (Bi)	ug/L	<1.0	<1.0	<1.0	1.0	8979149
Dissolved Boron (B)	ug/L	<50	<50	99	50	8979149
Dissolved Cadmium (Cd)	ug/L	<0.010	<0.010	<0.010	0.010	8979149
Dissolved Chromium (Cr)	ug/L	<1.0	1.7	1.8	1.0	8979149
Dissolved Cobalt (Co)	ug/L	<0.20	<0.20	<0.20	0.20	8979149
Dissolved Copper (Cu)	ug/L	<0.20	0.32	<0.20	0.20	8979149
Dissolved Iron (Fe)	ug/L	<5.0	<5.0	<5.0	5.0	8979149
Dissolved Lead (Pb)	ug/L	<0.20	<0.20	<0.20	0.20	8979149
Dissolved Lithium (Li)	ug/L	<2.0	<2.0	<2.0	2.0	8979149
Dissolved Manganese (Mn)	ug/L	<1.0	<1.0	<1.0	1.0	8979149
Dissolved Molybdenum (Mo)	ug/L	<1.0	<1.0	<1.0	1.0	8979149
Dissolved Nickel (Ni)	ug/L	<1.0	<1.0	<1.0	1.0	8979149
Dissolved Phosphorus (P)	ug/L	16	48	23	10	8979149
Dissolved Selenium (Se)	ug/L	0.18	0.23	<0.10	0.10	8979149
Dissolved Silicon (Si)	ug/L	4290	5850	6610	100	8979149
Dissolved Silver (Ag)	ug/L	<0.020	<0.020	<0.020	0.020	8979149
Dissolved Strontium (Sr)	ug/L	82.3	29.2	76.0	1.0	8979149
Dissolved Thallium (Tl)	ug/L	<0.010	<0.010	<0.010	0.010	8979149
Dissolved Tin (Sn)	ug/L	<5.0	<5.0	<5.0	5.0	8979149
Dissolved Titanium (Ti)	ug/L	<5.0	<5.0	<5.0	5.0	8979149
Dissolved Uranium (U)	ug/L	<0.10	0.28	0.21	0.10	8979149
RDL = Reportable Detection Limit						

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

Maxxam ID		TI9960	TI9961	TI9962		
Sampling Date		2018/04/30 15:15	2018/04/30 15:45	2018/04/30 16:30		
COC Number		548141-02-01	548141-02-01	548141-03-01		
	UNITS	WG-56484-300418-NT-09	WG-56484-300418-NT-10	WG-56484-300418-NT-11	RDL	QC Batch
Dissolved Vanadium (V)	ug/L	<5.0	16.4	5.6	5.0	8979149
Dissolved Zinc (Zn)	ug/L	<5.0	<5.0	<5.0	5.0	8979149
Dissolved Zirconium (Zr)	ug/L	<0.10	<0.10	<0.10	0.10	8979149
Dissolved Calcium (Ca)	mg/L	44.2	17.0	35.8	0.050	8976146
Dissolved Magnesium (Mg)	mg/L	7.50	2.98	7.89	0.050	8976146
Dissolved Potassium (K)	mg/L	0.437	0.817	0.593	0.050	8976146
Dissolved Sodium (Na)	mg/L	2.57	2.73	4.52	0.050	8976146
Dissolved Sulphur (S)	mg/L	<3.0	<3.0	<3.0	3.0	8976146
Dissolved Sulphur (S)	ug/L	<3000	<3000	<3000	3000	8979149
RDL = Reportable Detection Limit						

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

Maxxam ID		TI9963	TI9964		TI9965		
Sampling Date		2018/05/01 09:00	2018/05/01 09:10		2018/05/01 09:20		
COC Number		548141-03-01	548141-03-01		548141-03-01		
	UNITS	WG-56484-010518-NT-12	WG-56484-010518-NT-13	QC Batch	WG-56484-010518-NT-14	RDL	QC Batch

Calculated Parameters							
Dissolved Hardness (CaCO ₃)	mg/L	385	402	8975959	367	0.50	8975959
Elements							
Dissolved Mercury (Hg)	ug/L	<0.0020	<0.0020	8978843	<0.0020	0.0020	8978860
Dissolved Metals by ICPMS							
Dissolved Aluminum (Al)	ug/L	<3.0	<3.0	8979149	<3.0	3.0	8979149
Dissolved Antimony (Sb)	ug/L	<0.50	<0.50	8979149	<0.50	0.50	8979149
Dissolved Arsenic (As)	ug/L	0.14	0.13	8979149	0.10	0.10	8979149
Dissolved Barium (Ba)	ug/L	14.3	14.7	8979149	8.2	1.0	8979149
Dissolved Beryllium (Be)	ug/L	<0.10	<0.10	8979149	<0.10	0.10	8979149
Dissolved Bismuth (Bi)	ug/L	<1.0	<1.0	8979149	<1.0	1.0	8979149
Dissolved Boron (B)	ug/L	203	204	8979149	<50	50	8979149
Dissolved Cadmium (Cd)	ug/L	0.035	0.034	8979149	0.023	0.010	8979149
Dissolved Chromium (Cr)	ug/L	<1.0	<1.0	8979149	1.1	1.0	8979149
Dissolved Cobalt (Co)	ug/L	0.27	0.27	8979149	<0.20	0.20	8979149
Dissolved Copper (Cu)	ug/L	1.52	1.53	8979149	0.55	0.20	8979149
Dissolved Iron (Fe)	ug/L	<5.0	<5.0	8979149	<5.0	5.0	8979149
Dissolved Lead (Pb)	ug/L	<0.20	<0.20	8979149	<0.20	0.20	8979149
Dissolved Lithium (Li)	ug/L	<2.0	<2.0	8979149	<2.0	2.0	8979149
Dissolved Manganese (Mn)	ug/L	72.0	71.3	8979149	<1.0	1.0	8979149
Dissolved Molybdenum (Mo)	ug/L	<1.0	<1.0	8979149	<1.0	1.0	8979149
Dissolved Nickel (Ni)	ug/L	<1.0	<1.0	8979149	<1.0	1.0	8979149
Dissolved Phosphorus (P)	ug/L	<10	<10	8979149	<10	10	8979149
Dissolved Selenium (Se)	ug/L	<0.10	<0.10	8979149	<0.10	0.10	8979149
Dissolved Silicon (Si)	ug/L	11300	11400	8979149	10600	100	8979149
Dissolved Silver (Ag)	ug/L	<0.020	<0.020	8979149	<0.020	0.020	8979149
Dissolved Strontium (Sr)	ug/L	300	306	8979149	237	1.0	8979149
Dissolved Thallium (Tl)	ug/L	<0.010	<0.010	8979149	<0.010	0.010	8979149
Dissolved Tin (Sn)	ug/L	<5.0	<5.0	8979149	<5.0	5.0	8979149
Dissolved Titanium (Ti)	ug/L	<5.0	<5.0	8979149	<5.0	5.0	8979149
Dissolved Uranium (U)	ug/L	0.77	0.77	8979149	0.39	0.10	8979149
RDL = Reportable Detection Limit							

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

Maxxam ID		TI9963	TI9964		TI9965		
Sampling Date		2018/05/01 09:00	2018/05/01 09:10		2018/05/01 09:20		
COC Number		548141-03-01	548141-03-01		548141-03-01		
	UNITS	WG-56484-010518-NT-12	WG-56484-010518-NT-13	QC Batch	WG-56484-010518-NT-14	RDL	QC Batch
Dissolved Vanadium (V)	ug/L	<5.0	<5.0	8979149	<5.0	5.0	8979149
Dissolved Zinc (Zn)	ug/L	<5.0	<5.0	8979149	<5.0	5.0	8979149
Dissolved Zirconium (Zr)	ug/L	<0.10	<0.10	8979149	<0.10	0.10	8979149
Dissolved Calcium (Ca)	mg/L	113	120	8976146	113	0.050	8976146
Dissolved Magnesium (Mg)	mg/L	25.0	24.7	8976146	20.9	0.050	8976146
Dissolved Potassium (K)	mg/L	1.99	1.99	8976146	1.43	0.050	8976146
Dissolved Sodium (Na)	mg/L	18.9	18.8	8976146	7.33	0.050	8976146
Dissolved Sulphur (S)	mg/L	4.4	4.3	8976146	3.2	3.0	8976146
Dissolved Sulphur (S)	ug/L	4360	4330	8979149	3220	3000	8979149
RDL = Reportable Detection Limit							

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

Maxxam ID		TI9966	TI9967	TI9968		
Sampling Date		2018/05/01 10:30	2018/05/01 12:00	2018/05/01 13:00		
COC Number		548141-03-01	548141-03-01	548141-03-01		
	UNITS	WG-56484-010518-NT-15	WG-56484-010518-NT-16	WG-56484-010518-NT-17	RDL	QC Batch

Calculated Parameters						
Dissolved Hardness (CaCO3)	mg/L	77.4	97.3	46.3	0.50	8975959
Elements						
Dissolved Mercury (Hg)	ug/L	<0.0020	<0.0020	<0.0020	0.0020	8978860
Dissolved Metals by ICPMS						
Dissolved Aluminum (Al)	ug/L	4.6	5.6	6.4	3.0	8979149
Dissolved Antimony (Sb)	ug/L	<0.50	<0.50	<0.50	0.50	8979149
Dissolved Arsenic (As)	ug/L	0.47	2.30	0.47	0.10	8979149
Dissolved Barium (Ba)	ug/L	1.0	4.4	<1.0	1.0	8979149
Dissolved Beryllium (Be)	ug/L	<0.10	<0.10	<0.10	0.10	8979149
Dissolved Bismuth (Bi)	ug/L	<1.0	<1.0	<1.0	1.0	8979149
Dissolved Boron (B)	ug/L	<50	<50	<50	50	8979149
Dissolved Cadmium (Cd)	ug/L	<0.010	<0.010	<0.010	0.010	8979149
Dissolved Chromium (Cr)	ug/L	<1.0	<1.0	<1.0	1.0	8979149
Dissolved Cobalt (Co)	ug/L	<0.20	<0.20	<0.20	0.20	8979149
Dissolved Copper (Cu)	ug/L	0.48	<0.20	0.25	0.20	8979149
Dissolved Iron (Fe)	ug/L	<5.0	<5.0	<5.0	5.0	8979149
Dissolved Lead (Pb)	ug/L	<0.20	<0.20	<0.20	0.20	8979149
Dissolved Lithium (Li)	ug/L	<2.0	<2.0	<2.0	2.0	8979149
Dissolved Manganese (Mn)	ug/L	<1.0	<1.0	<1.0	1.0	8979149
Dissolved Molybdenum (Mo)	ug/L	<1.0	<1.0	<1.0	1.0	8979149
Dissolved Nickel (Ni)	ug/L	<1.0	<1.0	<1.0	1.0	8979149
Dissolved Phosphorus (P)	ug/L	<10	36	<10	10	8979149
Dissolved Selenium (Se)	ug/L	<0.10	0.20	<0.10	0.10	8979149
Dissolved Silicon (Si)	ug/L	4120	5200	3740	100	8979149
Dissolved Silver (Ag)	ug/L	<0.020	<0.020	<0.020	0.020	8979149
Dissolved Strontium (Sr)	ug/L	39.4	37.8	24.1	1.0	8979149
Dissolved Thallium (Tl)	ug/L	<0.010	<0.010	<0.010	0.010	8979149
Dissolved Tin (Sn)	ug/L	<5.0	<5.0	<5.0	5.0	8979149
Dissolved Titanium (Ti)	ug/L	<5.0	<5.0	<5.0	5.0	8979149
Dissolved Uranium (U)	ug/L	<0.10	0.23	<0.10	0.10	8979149
RDL = Reportable Detection Limit						

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

Maxxam ID		TI9966	TI9967	TI9968		
Sampling Date		2018/05/01 10:30	2018/05/01 12:00	2018/05/01 13:00		
COC Number		548141-03-01	548141-03-01	548141-03-01		
	UNITS	WG-56484-010518-NT-15	WG-56484-010518-NT-16	WG-56484-010518-NT-17	RDL	QC Batch
Dissolved Vanadium (V)	ug/L	<5.0	19.7	<5.0	5.0	8979149
Dissolved Zinc (Zn)	ug/L	<5.0	<5.0	<5.0	5.0	8979149
Dissolved Zirconium (Zr)	ug/L	<0.10	<0.10	<0.10	0.10	8979149
Dissolved Calcium (Ca)	mg/L	26.1	31.2	15.9	0.050	8976146
Dissolved Magnesium (Mg)	mg/L	2.99	4.70	1.62	0.050	8976146
Dissolved Potassium (K)	mg/L	0.460	1.17	0.294	0.050	8976146
Dissolved Sodium (Na)	mg/L	2.11	1.58	1.35	0.050	8976146
Dissolved Sulphur (S)	mg/L	<3.0	<3.0	<3.0	3.0	8976146
Dissolved Sulphur (S)	ug/L	<3000	<3000	<3000	3000	8979149
RDL = Reportable Detection Limit						

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

Maxxam ID		T19969	T19970		
Sampling Date		2018/05/01 14:40	2018/05/01 15:00		
COC Number		548141-03-01	548141-03-01		
	UNITS	WG-56484-010518-NT-18	WG-56484-010518-NT-19	RDL	QC Batch
Calculated Parameters					
Dissolved Hardness (CaCO ₃)	mg/L	61.5	256	0.50	8975959
Elements					
Dissolved Mercury (Hg)	ug/L	<0.0020	<0.0020	0.0020	8978860
Dissolved Metals by ICPMS					
Dissolved Aluminum (Al)	ug/L	4.9	6.6	3.0	8979149
Dissolved Antimony (Sb)	ug/L	<0.50	<0.50	0.50	8979149
Dissolved Arsenic (As)	ug/L	2.50	0.32	0.10	8979149
Dissolved Barium (Ba)	ug/L	7.5	19.0	1.0	8979149
Dissolved Beryllium (Be)	ug/L	<0.10	<0.10	0.10	8979149
Dissolved Bismuth (Bi)	ug/L	<1.0	<1.0	1.0	8979149
Dissolved Boron (B)	ug/L	96	175	50	8979149
Dissolved Cadmium (Cd)	ug/L	0.013	<0.010	0.010	8979149
Dissolved Chromium (Cr)	ug/L	<1.0	<1.0	1.0	8979149
Dissolved Cobalt (Co)	ug/L	<0.20	0.72	0.20	8979149
Dissolved Copper (Cu)	ug/L	0.32	0.99	0.20	8979149
Dissolved Iron (Fe)	ug/L	220	9560	5.0	8979149
Dissolved Lead (Pb)	ug/L	<0.20	<0.20	0.20	8979149
Dissolved Lithium (Li)	ug/L	<2.0	<2.0	2.0	8979149
Dissolved Manganese (Mn)	ug/L	636	3210	1.0	8979149
Dissolved Molybdenum (Mo)	ug/L	<1.0	<1.0	1.0	8979149
Dissolved Nickel (Ni)	ug/L	<1.0	1.9	1.0	8979149
Dissolved Phosphorus (P)	ug/L	30	<10	10	8979149
Dissolved Selenium (Se)	ug/L	<0.10	<0.10	0.10	8979149
Dissolved Silicon (Si)	ug/L	9240	7660	100	8979149
Dissolved Silver (Ag)	ug/L	<0.020	<0.020	0.020	8979149
Dissolved Strontium (Sr)	ug/L	94.4	226	1.0	8979149
Dissolved Thallium (Tl)	ug/L	<0.010	<0.010	0.010	8979149
Dissolved Tin (Sn)	ug/L	<5.0	<5.0	5.0	8979149
Dissolved Titanium (Ti)	ug/L	<5.0	<5.0	5.0	8979149
Dissolved Uranium (U)	ug/L	<0.10	<0.10	0.10	8979149
RDL = Reportable Detection Limit					

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

Maxxam ID		T19969	T19970		
Sampling Date		2018/05/01 14:40	2018/05/01 15:00		
COC Number		548141-03-01	548141-03-01		
	UNITS	WG-56484-010518-NT-18	WG-56484-010518-NT-19	RDL	QC Batch
Dissolved Vanadium (V)	ug/L	<5.0	<5.0	5.0	8979149
Dissolved Zinc (Zn)	ug/L	<5.0	8.4	5.0	8979149
Dissolved Zirconium (Zr)	ug/L	<0.10	<0.10	0.10	8979149
Dissolved Calcium (Ca)	mg/L	21.2	86.9	0.050	8976146
Dissolved Magnesium (Mg)	mg/L	2.06	9.53	0.050	8976146
Dissolved Potassium (K)	mg/L	3.83	3.32	0.050	8976146
Dissolved Sodium (Na)	mg/L	12.6	25.7	0.050	8976146
Dissolved Sulphur (S)	mg/L	<3.0	<3.0	3.0	8976146
Dissolved Sulphur (S)	ug/L	<3000	<3000	3000	8979149
RDL = Reportable Detection Limit					

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GENERAL COMMENTS

Sample TI9952 [WG-56484-300418-NT-01] : Sample was analyzed past method specified hold time for Nitrate + Nitrite (N) (highlevel). {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 (highlevel). Sample analyzed past method specified hold time for Total Dissolved Solids (Filt. Residue). {Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised.}

Sample TI9953 [WG-56484-300418-NT-02] : Sample was analyzed past method specified hold time for Nitrate + Nitrite (N) (highlevel). {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 (highlevel). Sample analyzed past method specified hold time for Total Dissolved Solids (Filt. Residue). {Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised.}

Sample TI9954 [WG-56484-300418-NT-03] : Sample was analyzed past method specified hold time for Nitrate + Nitrite (N) (highlevel). {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 (highlevel). Sample analyzed past method specified hold time for Total Dissolved Solids (Filt. Residue). {Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised.}

Sample TI9955 [WG-56484-300418-NT-04] : Sample was analyzed past method specified hold time for Nitrate + Nitrite (N) (highlevel). {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 (highlevel). Sample analyzed past method specified hold time for Total Dissolved Solids (Filt. Residue). {Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised.}

Sample TI9956 [WG-56484-300418-NT-05] : Sample was analyzed past method specified hold time for Nitrate + Nitrite (N) (highlevel). {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 (highlevel). Sample analyzed past method specified hold time for Total Dissolved Solids (Filt. Residue). {Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised.}

Sample TI9957 [WG-56484-300418-NT-06] : Sample was analyzed past method specified hold time for Nitrate + Nitrite (N) (highlevel). {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 (highlevel). Sample analyzed past method specified hold time for Total Dissolved Solids (Filt. Residue). {Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised.}

Sample TI9958 [WG-56484-300418-NT-07] : Sample was analyzed past method specified hold time for Nitrate + Nitrite (N) (highlevel). {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 (highlevel). Sample analyzed past method specified hold time for Total Dissolved Solids (Filt. Residue). {Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised.}

Sample TI9959 [WG-56484-300418-NT-08] : Sample was analyzed past method specified hold time for Nitrate + Nitrite (N) (highlevel). {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 (highlevel). Sample analyzed past method specified hold time for Total Dissolved Solids (Filt. Residue). {Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised.}

Sample TI9960 [WG-56484-300418-NT-09] : Sample was analyzed past method specified hold time for Nitrate + Nitrite (N) (highlevel). {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 (highlevel). Sample analyzed past method specified hold time for Total Dissolved Solids (Filt. Residue). {Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised.}

Sample TI9961 [WG-56484-300418-NT-10] : Sample was analyzed past method specified hold time for Nitrate + Nitrite (N) (highlevel). {Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised.} Sample analyzed past method specified hold time for Total Dissolved Solids (Filt. Residue). Sample was analyzed past method specified hold time for Nitrite (N) by CFA (highlevel). {Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised.}

Sample TI9962 [WG-56484-300418-NT-11] : Sample was analyzed past method specified hold time for Nitrate + Nitrite (N) (highlevel). {Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised.} Sample was analyzed past method

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specified hold time for Nitrite (N) by CFA (highlevel). Sample analyzed past method specified hold time for Total Dissolved Solids (Filt. Residue).
{Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised.}

Results relate only to the items tested.

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QUALITY ASSURANCE REPORT

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QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
8978843	Dissolved Mercury (Hg)	2018/05/04	91	80 - 120	90	80 - 120	<0.0020	ug/L	NC (1)	20
8978860	Dissolved Mercury (Hg)	2018/05/04	88	80 - 120	91	80 - 120	<0.0020	ug/L	NC (1)	20
8979149	Dissolved Aluminum (Al)	2018/05/04	92 (2)	80 - 120	102	80 - 120	<3.0	ug/L	2.7 (3)	20
8979149	Dissolved Antimony (Sb)	2018/05/04	95 (2)	80 - 120	104	80 - 120	<0.50	ug/L	NC (3)	20
8979149	Dissolved Arsenic (As)	2018/05/04	103 (2)	80 - 120	106	80 - 120	<0.10	ug/L	0.91 (3)	20
8979149	Dissolved Barium (Ba)	2018/05/04	91 (2)	80 - 120	101	80 - 120	<1.0	ug/L	0.70 (3)	20
8979149	Dissolved Beryllium (Be)	2018/05/04	97 (2)	80 - 120	104	80 - 120	<0.10	ug/L	NC (3)	20
8979149	Dissolved Bismuth (Bi)	2018/05/04	90 (2)	80 - 120	101	80 - 120	<1.0	ug/L	NC (3)	20
8979149	Dissolved Boron (B)	2018/05/04	93 (2)	80 - 120	100	80 - 120	<50	ug/L	NC (3)	20
8979149	Dissolved Cadmium (Cd)	2018/05/04	95 (2)	80 - 120	104	80 - 120	<0.010	ug/L	NC (3)	20
8979149	Dissolved Chromium (Cr)	2018/05/04	96 (2)	80 - 120	102	80 - 120	<1.0	ug/L	NC (3)	20
8979149	Dissolved Cobalt (Co)	2018/05/04	92 (2)	80 - 120	99	80 - 120	<0.20	ug/L	NC (3)	20
8979149	Dissolved Copper (Cu)	2018/05/04	92 (2)	80 - 120	99	80 - 120	<0.20	ug/L	2.7 (3)	20
8979149	Dissolved Iron (Fe)	2018/05/04	98 (2)	80 - 120	105	80 - 120	<5.0	ug/L	NC (3)	20
8979149	Dissolved Lead (Pb)	2018/05/04	94 (2)	80 - 120	105	80 - 120	<0.20	ug/L	NC (3)	20
8979149	Dissolved Lithium (Li)	2018/05/04	97 (2)	80 - 120	106	80 - 120	<2.0	ug/L	NC (3)	20
8979149	Dissolved Manganese (Mn)	2018/05/04	96 (2)	80 - 120	102	80 - 120	<1.0	ug/L	NC (3)	20
8979149	Dissolved Molybdenum (Mo)	2018/05/04	98 (2)	80 - 120	109	80 - 120	<1.0	ug/L	NC (3)	20
8979149	Dissolved Nickel (Ni)	2018/05/04	93 (2)	80 - 120	99	80 - 120	<1.0	ug/L	NC (3)	20
8979149	Dissolved Phosphorus (P)	2018/05/04	101 (2)	80 - 120	104	80 - 120	<10	ug/L	NC (3)	20
8979149	Dissolved Selenium (Se)	2018/05/04	101 (2)	80 - 120	103	80 - 120	<0.10	ug/L	NC (3)	20
8979149	Dissolved Silicon (Si)	2018/05/04	94 (2)	80 - 120	100	80 - 120	<100	ug/L	2.4 (3)	20
8979149	Dissolved Silver (Ag)	2018/05/04	92 (2)	80 - 120	101	80 - 120	<0.020	ug/L	NC (3)	20
8979149	Dissolved Strontium (Sr)	2018/05/04	100 (2)	80 - 120	106	80 - 120	<1.0	ug/L	0.69 (3)	20
8979149	Dissolved Sulphur (S)	2018/05/04	100 (2)	80 - 120	104	80 - 120	<3000	ug/L	NC (3)	20
8979149	Dissolved Thallium (Tl)	2018/05/04	88 (2)	80 - 120	102	80 - 120	<0.010	ug/L	NC (3)	20
8979149	Dissolved Tin (Sn)	2018/05/04	93 (2)	80 - 120	104	80 - 120	<5.0	ug/L	NC (3)	20
8979149	Dissolved Titanium (Ti)	2018/05/04	97 (2)	80 - 120	106	80 - 120	<5.0	ug/L	NC (3)	20
8979149	Dissolved Uranium (U)	2018/05/04	97 (2)	80 - 120	107	80 - 120	<0.10	ug/L	NC (3)	20
8979149	Dissolved Vanadium (V)	2018/05/04	97 (2)	80 - 120	103	80 - 120	<5.0	ug/L	NC (3)	20

Maxxam Job #: B832956
Report Date: 2018/05/09

QUALITY ASSURANCE REPORT(CONT'D)

GHD Limited
Client Project #: 56484-02
Site Location: SOLID WASTE ENGINEERING
Your P.O. #: 73506861-2
Sampler Initials: NT

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
8979149	Dissolved Zinc (Zn)	2018/05/04	100 (2)	80 - 120	102	80 - 120	<5.0	ug/L	NC (3)	20
8979149	Dissolved Zirconium (Zr)	2018/05/04	98 (2)	80 - 120	103	80 - 120	<0.10	ug/L	NC (3)	20
8979286	Fluoride (F)	2018/05/04	107 (4)	80 - 120	108	80 - 120	<0.10	mg/L	NC (5)	20
8979288	Fluoride (F)	2018/05/04	109 (6)	80 - 120	104	80 - 120	<0.10	mg/L	NC (1)	20
8979291	Nitrate plus Nitrite (N)	2018/05/04	158 (7,8)	80 - 120	105	80 - 120	<0.10	mg/L	0.95 (5)	25
8979295	Nitrate plus Nitrite (N)	2018/05/04	NC	80 - 120	107	80 - 120	<0.10	mg/L	2.0 (1)	25
8979342	Dissolved Chloride (Cl)	2018/05/04			105	80 - 120	<1.0	mg/L		
8979343	Dissolved Sulphate (SO ₄)	2018/05/04			103	80 - 120	<1.0	mg/L		
8979346	Alkalinity (PP as CaCO ₃)	2018/05/04					<1.0	mg/L	NC (1)	20
8979346	Alkalinity (Total as CaCO ₃)	2018/05/04	NC	80 - 120	88	80 - 120	<1.0	mg/L	1.0 (1)	20
8979346	Bicarbonate (HCO ₃)	2018/05/04					<1.0	mg/L	1.0 (1)	20
8979346	Carbonate (CO ₃)	2018/05/04					<1.0	mg/L	NC (1)	20
8979346	Hydroxide (OH)	2018/05/04					<1.0	mg/L	NC (1)	20
8979347	pH	2018/05/04			101	97 - 103			0.13 (1)	20
8979348	Conductivity	2018/05/04			101	80 - 120	<2.0	uS/cm	0.11 (1)	20
8979349	Alkalinity (PP as CaCO ₃)	2018/05/05					<1.0	mg/L	NC (10)	20
8979349	Alkalinity (Total as CaCO ₃)	2018/05/05	NC (9)	80 - 120	94	80 - 120	<1.0	mg/L	2.3 (10)	20
8979349	Bicarbonate (HCO ₃)	2018/05/05					<1.0	mg/L	2.3 (10)	20
8979349	Carbonate (CO ₃)	2018/05/05					<1.0	mg/L	NC (10)	20
8979349	Hydroxide (OH)	2018/05/05					<1.0	mg/L	NC (10)	20
8979352	pH	2018/05/05			101	97 - 103			0.12 (10)	20
8979353	Conductivity	2018/05/05			101	80 - 120	<2.0	uS/cm	0.12 (10)	20
8979354	Alkalinity (PP as CaCO ₃)	2018/05/05					<1.0	mg/L	NC (11)	20
8979354	Alkalinity (Total as CaCO ₃)	2018/05/05	NC	80 - 120	93	80 - 120	<1.0	mg/L	0.77 (11)	20
8979354	Bicarbonate (HCO ₃)	2018/05/05					<1.0	mg/L	0.77 (11)	20
8979354	Carbonate (CO ₃)	2018/05/05					<1.0	mg/L	NC (11)	20
8979354	Hydroxide (OH)	2018/05/05					<1.0	mg/L	NC (11)	20
8979355	pH	2018/05/05			101	97 - 103			0.63 (11)	20
8979356	Conductivity	2018/05/05			101	80 - 120	<2.0	uS/cm	0.28 (11)	20
8980265	Dissolved Chloride (Cl)	2018/05/05			105	80 - 120	<1.0	mg/L	11 (12)	20

Maxxam Job #: B832956
Report Date: 2018/05/09

QUALITY ASSURANCE REPORT(CONT'D)

GHD Limited
Client Project #: 56484-02
Site Location: SOLID WASTE ENGINEERING
Your P.O. #: 73506861-2
Sampler Initials: NT

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
8980266	Dissolved Sulphate (SO4)	2018/05/05			105	80 - 120	<1.0	mg/L	8.9 (12)	20
8980269	Dissolved Chloride (Cl)	2018/05/05	119 (13)	80 - 120	98	80 - 120	<1.0	mg/L	0.45 (14)	20
8980270	Dissolved Sulphate (SO4)	2018/05/05			104	80 - 120	<1.0	mg/L		
8982045	Total Dissolved Solids	2018/05/09	100 (15)	80 - 120	91	80 - 120	<10	mg/L	7.9 (16)	20
8982120	Nitrite (N)	2018/05/04	109	80 - 120	104	80 - 120	<0.10	mg/L	NC (1)	20
8982134	Nitrite (N)	2018/05/04	153 (7,8)	80 - 120	103	80 - 120	<0.10	mg/L	NC (5)	20
8982165	Nitrate plus Nitrite (N)	2018/05/05			106	80 - 120	<0.10	mg/L		
8982743	Dissolved Chloride (Cl)	2018/05/07			110	80 - 120	<1.0	mg/L		
8982744	Dissolved Sulphate (SO4)	2018/05/07			99	80 - 120	<1.0	mg/L	17 (14)	20
8983418	Total Ammonia (N)	2018/05/09	93	80 - 120	102	80 - 120	<0.020	mg/L	NC (1)	20
8983425	Total Ammonia (N)	2018/05/09	91 (17)	80 - 120	104	80 - 120	<0.020	mg/L	NC (18)	20
8983426	Total Ammonia (N)	2018/05/09	96	80 - 120	98	80 - 120	<0.020	mg/L	0.79 (1)	20

Maxxam Job #: B832956
Report Date: 2018/05/09

QUALITY ASSURANCE REPORT(CONT'D)

GHD Limited
Client Project #: 56484-02
Site Location: SOLID WASTE ENGINEERING
Your P.O. #: 73506861-2
Sampler Initials: NT

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
8983615	Nitrite (N)	2018/05/08			112	80 - 120	<0.10	mg/L		

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

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

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

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

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) Matrix Spike Parent ID [TI9952-03]

(3) Duplicate Parent ID [TI9952-03]

(4) Matrix Spike Parent ID [TI9959-01]

(5) Duplicate Parent ID [TI9960-01]

(6) Matrix Spike Parent ID [TI9952-01]

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

(8) Matrix Spike Parent ID [TI9960-01]

(9) Matrix Spike Parent ID [TI9964-01]

(10) Duplicate Parent ID [TI9964-01]

(11) Duplicate Parent ID [TI9959-01]

(12) Duplicate Parent ID [TI9968-01]

(13) Matrix Spike Parent ID [TI9961-01]

(14) Duplicate Parent ID [TI9961-01]

(15) Matrix Spike Parent ID [TI9962-01]

(16) Duplicate Parent ID [TI9962-01]

(17) Matrix Spike Parent ID [TI9961-02]

(18) Duplicate Parent ID [TI9961-02]

Maxxam Job #: B832956
Report Date: 2018/05/09

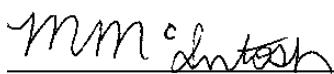
GHD Limited
Client Project #: 56484-02
Site Location: SOLID WASTE ENGINEERING
Your P.O. #: 73506861-2
Sampler Initials: NT

VALIDATION SIGNATURE PAGE

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



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



Melissa McIntosh, Project Manager



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.

INVOICE TO:

Report Information

Project Information

Laboratory Use Only

Page 1 of 2

Company Name: #183 GHD Limited
Contact Name: Alesse MacPhee
Address: 651 COLBY DRIVE
WATERLOO ON N2V 1C2
Phone: (519) 884-0510 x
Fax: (519) 726-1394 x
Email: alesse.macphee@ghd.com, NationalEDSupport@ma

Company Name: Alesse MacPhee
Contact Name: Alesse MacPhee
Address: Alesse MacPhee
Phone: alesse.macphee@ghd.com
Fax: alesse.macphee@ghd.com
Email: alesse.macphee@ghd.com

Question #: B70472
P.O. #: 73506861-1
Project #: 56484-02
Project Name: Campbell River/Phase 02-Quart
Site #: N121, C1 Kagan
Sampled By: N121, C1 Kagan

Maxxim Job #: 56484-02
Chain of Custody Record: 56484-02
Project Manager: Naled Amer
Barcode: 56484-02-01

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

Special Instructions:
Metals Field Filtered ? (Y/N)
Speciated Alkalinity, pH, Conductivity
HIGH LEVEL ANIONS (Cl, F, SO4, NO2, NO3)
Ammonia-N (Preserved)
CSR Dissolved Metals in Water with CV Hg (including Sulfur)
+ Dissolved Hardness
TDS

ANALYSIS REQUESTED (PLEASE BE SPECIFIC)
Regular (Standard) TAT: (not 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 submission)
1 Day ☐ 2 Day ☐ 3 Day ☐ Date Required: ☐
Rush Confirmation Number: ☐
Comments: (only lab for #)

Turnaround Time (TAT) Required:
Please provide advance notice for rush projects

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

Sample Barcode Label	Sample Location Identification	Date Sampled	Time Sampled	Matrix	Metals Field Filtered ? (Y/N)	Speciated Alkalinity, pH, Conductivity	HIGH LEVEL ANIONS (Cl, F, SO4, NO2, NO3)	Ammonia-N (Preserved)	CSR Dissolved Metals in Water with CV Hg (including Sulfur)	+ Dissolved Hardness	TDS
Wk-56484-800118-KT-01		18/04/30	11:30	AW	Y	X	X	X	X	X	X
			12:15			X	X	X	X	X	X
			12:45			X	X	X	X	X	X
			13:00			X	X	X	X	X	X
			13:50			X	X	X	X	X	X
			14:00			X	X	X	X	X	X
			14:20			X	X	X	X	X	X
			15:00			X	X	X	X	X	X
			15:15			X	X	X	X	X	X
			15:45			X	X	X	X	X	X

02-May-18 09:00
Naled Amer
B832956
NIBU

RECEIVED BY: [Signature]
Date (YYMMDD): 18/05/02
Time: 09:00
Jars used and not submitted: 4
Temperature / °C on Receipt: 0.4 / 2.0
Chain of Custody Seal used on Receipt? ☐ Yes ☐ No
While known: ☐ While blind: ☐

Maxxam Analytics International Corporation via Maxxam Analytics										Chain Of Custody Record		Page 2 of 2						
Maxxam Analytics International Corporation via Maxxam Analytics 4606 Canada Way, Burnaby, British Columbia Canada V5G 1K5 Tel: (604) 734-7278 Toll-free: 800-563-6286 Fax: (604) 731-2386 www.maxxam.ca										Project Information		Laboratory Use Only						
INVOICE TO:					Report Information					Project Information		Laboratory Use Only						
Company Name: #163 GHD Limited Address: 651 COLBY DRIVE Address: WATERLOO ON N2V 1C2 Phone: (519) 884-0510 x Fax: (519) 725-1394 x Email: address.macphie@ghd.com; NationalEDSsupport@ma					Company Name: Address: MacPhie Contact Name: Address: Address: Phone: Email: amacphie@crworld.com Fax:					Quotation # P.O. # Project # Project Name Site # Sampled By:		Maxxam Job # 73506851-1 56484-02 Campbell River (Phase 02) - Quant Chain Of Custody Record C854914-02-01 Naled Amer		Bottle Order #: 548141 Project Manager: Naled Amer				
Regulatory Criteria: ☐ CSR ☐ DOME ☐ BC Water Quality ☐ Other:										Special Instructions					ANALYSIS REQUESTED (PLEASE BE SPECIFIC) Metals Field Filtered ? (Y/N) Alkalinity, pH, Conductivity HIGH LEVEL ANIONS (Cl, F, SO4, NO2, NO3) Ammonia-N (Preserved) CSR Dissolved Metals in Water with CV Hg (including Sulfur) + dissolved hardness TDS		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 Oxygen 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										# of Bottles		Comments						
Sample Barcode Label	Sample Location/Identification	Date Sampled	Time Sampled	Matrix	Metals Field Filtered ? (Y/N)	Alkalinity, pH, Conductivity	HIGH LEVEL ANIONS (Cl, F, SO4, NO2, NO3)	Ammonia-N (Preserved)	CSR Dissolved Metals in Water with CV Hg (including Sulfur)	+ dissolved hardness	TDS	# of Bottles	Comments					
W6-56484-300418-NT-11	18/04/30	16:30	6W									4						
-010518-NT-12	18/05/01	9:00										4						
-13		9:10										4						
-14		9:20										4						
-15		10:30										4						
-16		12:00										4						
-17		13:00										4						
-18		14:40										4						
-19		15:00										4						

02-May-18 09:00
 Naled Amer
 B832956
 MBL

Lab Use Only
 Date (YY/MM/DD): 18/05/02 09:00
 Time: 09:00
 # Jars used and not submitted: 4
 Temperature of on Receipt: 11.4/12.0
 Custody Seal Intact on Receipt? ☐ Yes ☐ No
 White Maxxam ☐ Yellow Chain



GHD Field Sample Key (FSK)

Site	Campbell River 056484-02
Sample Reason	Q3 2018
Sampler Name	Michaela Dyck & Rimi Plaha
Sampling Company	GHD
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)
GROUNDWATER								
WG-56484-170918-MND-01	AG99-05	9/17/2018	13:00	N	WG	grab		
WG-56484-170918-MND-02	MW03-18	9/17/2018	12:50	N	WG	grab		
WG-56484-170918-MND-03	MW03-18	9/17/2018	12:55	FD	WG	grab	WG-56464-170918-MND-02	
WG-56484-170918-MND-04	Field Blank	9/17/2018	14:55	FB	WG	grab		
WG-56484-170918-MND-05	EBA04-1	9/17/2018	15:05	N	WG	grab		
WG-56484-170918-MND-06	EBA11-2	9/17/2018	15:45	N	WG	grab		
WG-56484-170918-MND-07	EBA11-1	9/17/2018	16:30	N	WG	grab		
WG-56484-170918-MND-08	MW01-16	9/17/2018	17:00	N	WG	grab		
WG-56484-170918-MND-09	HBT94-2	9/17/2018	18:10	N	WG	grab		
WG-56484-170918-MND-10	HBT94-1	9/17/2018	18:30	N	WG	grab		
WG-56484-180918-MND-11	AG99-02	9/18/2018	9:30	N	WG	grab		
WG-56484-180918-MND-12	MW02-18	9/18/2018	10:00	N	WG	grab		
WG-56484-180918-MND-13	MW02-18	9/18/2018	10:05	FD	WG	grab	WG-56464-180918-MND-12	
WG-56484-180918-MND-14	AG99-01	9/18/2018	11:30	N	WG	grab		
WG-56484-180918-MND-15	AG99-04	9/18/2018	13:00	N	WG	grab		
WG-56484-180918-MND-16	EBA11-3	9/18/2018	14:00	N	WG	grab		
WG-56484-180918-MND-17	EBA11-4	9/18/2018	14:30	N	WG	grab		
WG-56484-180918-MND-18	AG99-06	9/18/2018	15:00	N	WG	grab		
WG-56484-180918-MND-19	EBA04-6	9/18/2018	16:20	N	WG	grab		
WG-56484-180918-MND-20	EBA04-7	9/18/2018	17:20	N	WG	grab		
SURFACE WATER								
WS-56484-170918-MND-01	SW-1	9/17/2018	13:45	N	WS	grab		
WS-56484-170918-MND-02	SW03-17	9/17/2018	13:55	N	WS	grab		

Footnotes

1.

pH	Temperature	Conductivity	Turbidity	DO	Eh / ORP						
Field pH	Sample Temp.	Temp Units	Conductivity	Conductivity Units	Turbidity	Turbidity Units	DO	DO Units	Eh/ORP	Eh/ORP Units	TDS (g/L)
7.57	11.37	C	105	uS	2.5	ntu	-	mg/L	227	mV	0.068
6.96	11.83	C	160	uS	3.1	ntu	-	mg/L	250	mV	0.104
6.96	11.83	C	160	uS	3.1	ntu	-	mg/L	250	mV	0.104
-	-	C	-	uS	-	ntu	-	mg/L	-	mV	-
7.34	10.95	C	94	uS	0	ntu	-	mg/L	226	mV	0.060
7.52	10.35	C	291	uS	84	ntu	-	mg/L	226	mV	0.189
7.64	9.46	C	212	uS	7.6	ntu	-	mg/L	213	mV	0.137
7.84	8.11	C	79	uS	11.2	ntu	-	mg/L	207	mV	0.051
7.5	12.1	C	498	uS	52.6	ntu	-	mg/L	-61	mV	0.324
7.65	12.66	C	575	uS	6.8	ntu	-	mg/L	-62	mV	0.368
7.28	10.75	C	187	uS	0.4	ntu	-	mg/L	207	mV	0.121
6.91	11.22	C	840	uS	2	ntu	-	mg/L	75	mV	0.537
6.91	11.22	C	840	uS	2	ntu	-	mg/L	75	mV	0.537
7.89	10.96	C	227	uS	1.7	ntu	-	mg/L	152	mV	0.148
8.08	10.2	C	113	uS	0	ntu	-	mg/L	158	mV	0.073
7.87	9.85	C	169	uS	11.1	ntu	-	mg/L	180	mV	0.109
7.87	9.64	C	132	uS	22.9	ntu	-	mg/L	180	mV	0.086
7.78	9.59	C	297	uS	792	ntu	-	mg/L	195	mV	0.193
7.26	10.22	C	701	uS	9.1	ntu	-	mg/L	203	mV	9.100
7.2	10.16	C	1007	uS	1.5	ntu	-	mg/L	196	mV	0.681
7.21	11.99	C	98	uS	2.2	ntu	11.78	mg/L	219	mV	0.064
7.35	15.8	C	37	uS	13.8	ntu	6.25	mg/L	214	mV	0.024

Key

Required Field

Populate When Appropriate

Field Data

Attention: Aïresse MacPhee

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

Your P.O. #: 73506861-1
Your Project #: 56484-02
Site#: Campbell River(Phase 02)-Quart
Site Location: Campbell River (Phase 02) - Quarterly
Your C.O.C. #: 548145-01-01

Report Date: 2018/09/26

Report #: R2625755

Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B880711

Received: 2018/09/19, 09:00

Sample Matrix: SURFACE WATER
Samples Received: 2

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity - Water	2	N/A	2018/09/21	BBY6SOP-00026	SM 22 2320 B m
Chloride by Automated Colourimetry	2	N/A	2018/09/20	BBY6SOP-00011	SM 22 4500-Cl- E m
Conductance - water	2	N/A	2018/09/21	BBY6SOP-00026	SM 22 2510 B m
Fluoride (higher level)	2	N/A	2018/09/25	BBY6SOP-00048	SM 22 4500-F C m
Hardness Total (calculated as CaCO ₃) (1)	2	N/A	2018/09/24	BBY WI-00033	Auto Calc
Hardness (calculated as CaCO ₃)	2	N/A	2018/09/21	BBY WI-00033	Auto Calc
Mercury (Dissolved) by CVAf	2	N/A	2018/09/21	BBY7SOP-00015	BCMOE BCLM Oct2013 m
Mercury (Total) by CVAf	2	2018/09/21	2018/09/21	BBY7SOP-00015	BCMOE BCLM Oct2013 m
Na, K, Ca, Mg, S by CRC ICPMS (diss.)	2	N/A	2018/09/21	BBY WI-00033	Auto Calc
Elements by ICPMS Low Level (dissolved)	2	N/A	2018/09/20	BBY7SOP-00002	EPA 6020b R2 m
Na, K, Ca, Mg, S by CRC ICPMS (total)	2	N/A	2018/09/24	BBY WI-00033	Auto Calc
Elements by ICPMS Low Level (total)	2	N/A	2018/09/21	BBY7SOP-00002	EPA 6020b R2 m
Ammonia-N (Preserved)	2	N/A	2018/09/21	BBY6SOP-00009	EPA 350.1 m
Nitrate + Nitrite (N) (highlevel)	2	N/A	2018/09/20	BBY6SOP-00010	SM 23 4500-NO3- I m
Nitrite (N) by CFA (highlevel)	2	N/A	2018/09/20	BBY6SOP-00010	SM 23 4500-NO3- I m
Nitrogen - Nitrate (as N)	2	N/A	2018/09/21	BBY WI-00033	Auto Calc
Filter and HNO ₃ Preserve for Metals	2	N/A	2018/09/19	BBY7 WI-00004	BCMOE Reqs 08/14
pH Water (2)	2	N/A	2018/09/21	BBY6SOP-00026	SM 22 4500-H+ B m
Sulphate by Automated Colourimetry	2	N/A	2018/09/20	BBY6SOP-00017	SM 22 4500-SO42- E m
Total Dissolved Solids (Filt. Residue)	2	2018/09/21	2018/09/24	BBY6SOP-00033	SM 22 2540 C m

Remarks:

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

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

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

Attention: Aïresse MacPhee

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

Your P.O. #: 73506861-1
Your Project #: 56484-02
Site#: Campbell River(Phase 02)-Quart
Site Location: Campbell River (Phase 02) - Quarterly
Your C.O.C. #: 548145-01-01

Report Date: 2018/09/26

Report #: R2625755

Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B880711

Received: 2018/09/19, 09:00

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. Maxxam is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.

Results relate to samples tested. When sampling is not conducted by Maxxam, results relate to the supplied samples tested.

This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) "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



Maxxam

26 Sep 2018 16:58:24

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

=====

This report has been generated and distributed using a secure automated process.

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 #: B880711
Report Date: 2018/09/26

GHD Limited
Client Project #: 56484-02
Site Location: Campbell River (Phase 02) - Quarterly
Your P.O. #: 73506861-1

RESULTS OF CHEMICAL ANALYSES OF SURFACE WATER

Maxxam ID		UI7964	UI7964		UI7965		
Sampling Date		2018/09/17 13:45	2018/09/17 13:45		2018/09/17 13:55		
COC Number		548145-01-01	548145-01-01		548145-01-01		
	UNITS	WS-56484-170918-MND-01	WS-56484-170918-MND-01 Lab-Dup	QC Batch	WS-56484-170918-MND-02	RDL	QC Batch
ANIONS							
Nitrite (N)	mg/L	<0.10	N/A	9152087	<0.10	0.10	9152087
Calculated Parameters							
Filter and HNO3 Preservation	N/A	FIELD	N/A	ONSITE	FIELD	N/A	ONSITE
Nitrate (N)	mg/L	<0.10	N/A	9149129	<0.10	0.10	9149129
Misc. Inorganics							
Fluoride (F)	mg/L	<0.10	N/A	9158849	<0.10	0.10	9158849
Alkalinity (Total as CaCO3)	mg/L	16.3	N/A	9152476	8.3	1.0	9152476
Alkalinity (PP as CaCO3)	mg/L	<1.0	N/A	9152476	<1.0	1.0	9152476
Bicarbonate (HCO3)	mg/L	19.9	N/A	9152476	10.2	1.0	9152476
Carbonate (CO3)	mg/L	<1.0	N/A	9152476	<1.0	1.0	9152476
Hydroxide (OH)	mg/L	<1.0	N/A	9152476	<1.0	1.0	9152476
Anions							
Dissolved Sulphate (SO4)	mg/L	12.4	12.6	9152432	<1.0	1.0	9152432
Dissolved Chloride (Cl)	mg/L	5.5	5.5	9152429	3.5	1.0	9152429
Nutrients							
Total Ammonia (N)	mg/L	0.044	N/A	9153778	<0.020	0.020	9153784
Nitrate plus Nitrite (N)	mg/L	<0.10	N/A	9152084	<0.10	0.10	9152084
Physical Properties							
Conductivity	uS/cm	88.6	N/A	9152478	31.2	2.0	9152478
pH	pH	7.05	N/A	9152477	6.88	N/A	9152477
Physical Properties							
Total Dissolved Solids	mg/L	68	N/A	9153443	20	10	9153443
RDL = Reportable Detection Limit Lab-Dup = Laboratory Initiated Duplicate N/A = Not Applicable							

Maxxam Job #: B880711
Report Date: 2018/09/26

GHD Limited
Client Project #: 56484-02
Site Location: Campbell River (Phase 02) - Quarterly
Your P.O. #: 73506861-1

LOW LEVEL DISSOLVED METALS WITH CV HG (SURFACE WATER)

Maxxam ID		UI7964	UI7965		
Sampling Date		2018/09/17 13:45	2018/09/17 13:55		
COC Number		548145-01-01	548145-01-01		
	UNITS	WS-56484-170918-MND-01	WS-56484-170918-MND-02	RDL	QC Batch
Calculated Parameters					
Dissolved Hardness (CaCO ₃)	mg/L	31.4	8.48	0.50	9149122
Elements					
Dissolved Mercury (Hg)	ug/L	0.0032	<0.0020	0.0020	9153623
Dissolved Metals by ICPMS					
Dissolved Aluminum (Al)	ug/L	78.7	16.2	0.50	9152080
Dissolved Antimony (Sb)	ug/L	0.066	<0.020	0.020	9152080
Dissolved Arsenic (As)	ug/L	0.155	0.101	0.020	9152080
Dissolved Barium (Ba)	ug/L	3.92	1.30	0.020	9152080
Dissolved Beryllium (Be)	ug/L	<0.010	<0.010	0.010	9152080
Dissolved Bismuth (Bi)	ug/L	<0.0050	<0.0050	0.0050	9152080
Dissolved Boron (B)	ug/L	<10	<10	10	9152080
Dissolved Cadmium (Cd)	ug/L	<0.0050	<0.0050	0.0050	9152080
Dissolved Chromium (Cr)	ug/L	0.27	<0.10	0.10	9152080
Dissolved Cobalt (Co)	ug/L	0.0645	0.0194	0.0050	9152080
Dissolved Copper (Cu)	ug/L	0.774	0.208	0.050	9152080
Dissolved Iron (Fe)	ug/L	87.1	29.5	1.0	9152080
Dissolved Lead (Pb)	ug/L	0.124	0.0098	0.0050	9152080
Dissolved Lithium (Li)	ug/L	<0.50	<0.50	0.50	9152080
Dissolved Manganese (Mn)	ug/L	23.2	6.36	0.050	9152080
Dissolved Molybdenum (Mo)	ug/L	<0.050	<0.050	0.050	9152080
Dissolved Nickel (Ni)	ug/L	0.200	0.083	0.020	9152080
Dissolved Phosphorus (P)	ug/L	26.1	2.6	2.0	9152080
Dissolved Selenium (Se)	ug/L	0.070	<0.040	0.040	9152080
Dissolved Silicon (Si)	ug/L	6400	1880	50	9152080
Dissolved Silver (Ag)	ug/L	<0.0050	<0.0050	0.0050	9152080
Dissolved Strontium (Sr)	ug/L	29.7	9.51	0.050	9152080
Dissolved Thallium (Tl)	ug/L	0.0025	<0.0020	0.0020	9152080
Dissolved Tin (Sn)	ug/L	<0.20	<0.20	0.20	9152080
Dissolved Titanium (Ti)	ug/L	2.76	<0.50	0.50	9152080
Dissolved Uranium (U)	ug/L	0.0024	<0.0020	0.0020	9152080
Dissolved Vanadium (V)	ug/L	2.41	<0.20	0.20	9152080
RDL = Reportable Detection Limit					

Maxxam Job #: B880711
Report Date: 2018/09/26

GHD Limited
Client Project #: 56484-02
Site Location: Campbell River (Phase 02) - Quarterly
Your P.O. #: 73506861-1

LOW LEVEL DISSOLVED METALS WITH CV HG (SURFACE WATER)

Maxxam ID		UI7964	UI7965		
Sampling Date		2018/09/17 13:45	2018/09/17 13:55		
COC Number		548145-01-01	548145-01-01		
	UNITS	WS-56484-170918- MND-01	WS-56484-170918- MND-02	RDL	QC Batch
Dissolved Zinc (Zn)	ug/L	1.06	0.52	0.10	9152080
Dissolved Zirconium (Zr)	ug/L	0.13	<0.10	0.10	9152080
Dissolved Calcium (Ca)	mg/L	7.52	2.02	0.050	9149164
Dissolved Magnesium (Mg)	mg/L	3.07	0.834	0.050	9149164
Dissolved Potassium (K)	mg/L	1.10	0.128	0.050	9149164
Dissolved Sodium (Na)	mg/L	3.94	2.56	0.050	9149164
Dissolved Sulphur (S)	mg/L	4.2	<3.0	3.0	9149164
Dissolved Sulphur (S)	ug/L	4200	<600	600	9152080
RDL = Reportable Detection Limit					

Maxxam Job #: B880711
Report Date: 2018/09/26

GHD Limited
Client Project #: 56484-02
Site Location: Campbell River (Phase 02) - Quarterly
Your P.O. #: 73506861-1

LOW LEVEL TOTAL METALS WITH CV HG (SURFACE WATER)

Maxxam ID		UI7964	UI7965		
Sampling Date		2018/09/17 13:45	2018/09/17 13:55		
COC Number		548145-01-01	548145-01-01		
	UNITS	WS-56484-170918-MND-01	WS-56484-170918-MND-02	RDL	QC Batch
Calculated Parameters					
Total Hardness (CaCO3)	mg/L	31.0	8.52	0.50	9148848
Elements					
Total Mercury (Hg)	ug/L	<0.0020	<0.0020	0.0020	9153849
Total Metals by ICPMS					
Total Aluminum (Al)	ug/L	1110	23.1	0.50	9152681
Total Antimony (Sb)	ug/L	0.080	0.028	0.020	9152681
Total Arsenic (As)	ug/L	0.250	0.101	0.020	9152681
Total Barium (Ba)	ug/L	6.64	1.41	0.020	9152681
Total Beryllium (Be)	ug/L	0.015	<0.010	0.010	9152681
Total Bismuth (Bi)	ug/L	<0.0050	<0.0050	0.0050	9152681
Total Boron (B)	ug/L	<10	<10	10	9152681
Total Cadmium (Cd)	ug/L	0.0199	<0.0050	0.0050	9152681
Total Chromium (Cr)	ug/L	1.07	<0.10	0.10	9152681
Total Cobalt (Co)	ug/L	0.521	0.0235	0.0050	9152681
Total Copper (Cu)	ug/L	1.79	0.274	0.050	9152681
Total Iron (Fe)	ug/L	756	36.0	1.0	9152681
Total Lead (Pb)	ug/L	0.531	0.0263	0.0050	9152681
Total Lithium (Li)	ug/L	<0.50	<0.50	0.50	9152681
Total Manganese (Mn)	ug/L	59.8	6.60	0.050	9152681
Total Molybdenum (Mo)	ug/L	0.053	<0.050	0.050	9152681
Total Nickel (Ni)	ug/L	0.659	0.085	0.020	9152681
Total Phosphorus (P)	ug/L	82.9	5.9	2.0	9152681
Total Selenium (Se)	ug/L	0.082	<0.040	0.040	9152681
Total Silicon (Si)	ug/L	6700	1860	50	9152681
Total Silver (Ag)	ug/L	0.0077	<0.0050	0.0050	9152681
Total Strontium (Sr)	ug/L	29.2	9.30	0.050	9152681
Total Thallium (Tl)	ug/L	0.0029	<0.0020	0.0020	9152681
Total Tin (Sn)	ug/L	<0.20	<0.20	0.20	9152681
Total Titanium (Ti)	ug/L	108	<0.50	0.50	9152681
Total Uranium (U)	ug/L	0.0104	<0.0020	0.0020	9152681
Total Vanadium (V)	ug/L	5.56	<0.20	0.20	9152681
RDL = Reportable Detection Limit					

Maxxam Job #: B880711
Report Date: 2018/09/26

GHD Limited
Client Project #: 56484-02
Site Location: Campbell River (Phase 02) - Quarterly
Your P.O. #: 73506861-1

LOW LEVEL TOTAL METALS WITH CV HG (SURFACE WATER)

Maxxam ID		UI7964	UI7965		
Sampling Date		2018/09/17 13:45	2018/09/17 13:55		
COC Number		548145-01-01	548145-01-01		
	UNITS	WS-56484-170918- MND-01	WS-56484-170918- MND-02	RDL	QC Batch
Total Zinc (Zn)	ug/L	2.80	0.78	0.10	9152681
Total Zirconium (Zr)	ug/L	0.42	<0.10	0.10	9152681
Total Calcium (Ca)	mg/L	7.24	1.96	0.050	9149165
Total Magnesium (Mg)	mg/L	3.14	0.879	0.050	9149165
Total Potassium (K)	mg/L	1.09	0.136	0.050	9149165
Total Sodium (Na)	mg/L	3.95	2.67	0.050	9149165
Total Sulphur (S)	mg/L	4.1	<3.0	3.0	9149165
Total Sulphur (S)	ug/L	4090	<600	600	9152681
RDL = Reportable Detection Limit					

Maxxam Job #: B880711
Report Date: 2018/09/26

GHD Limited
Client Project #: 56484-02
Site Location: Campbell River (Phase 02) - Quarterly
Your P.O. #: 73506861-1

GENERAL COMMENTS

Results relate only to the items tested.

Maxxam Job #: B880711
Report Date: 2018/09/26

QUALITY ASSURANCE REPORT

GHD Limited
Client Project #: 56484-02
Site Location: Campbell River (Phase 02) - Quarterly
Your P.O. #: 73506861-1

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
9152080	Dissolved Aluminum (Al)	2018/09/20	97	80 - 120	101	80 - 120	<0.50	ug/L	16 (1)	20
9152080	Dissolved Antimony (Sb)	2018/09/20	96	80 - 120	99	80 - 120	<0.020	ug/L	NC (1)	20
9152080	Dissolved Arsenic (As)	2018/09/20	98	80 - 120	100	80 - 120	<0.020	ug/L	NC (1)	20
9152080	Dissolved Barium (Ba)	2018/09/20	96	80 - 120	99	80 - 120	<0.020	ug/L	0.39 (1)	20
9152080	Dissolved Beryllium (Be)	2018/09/20	92	80 - 120	94	80 - 120	<0.010	ug/L	NC (1)	20
9152080	Dissolved Bismuth (Bi)	2018/09/20	97	80 - 120	101	80 - 120	<0.0050	ug/L	NC (1)	20
9152080	Dissolved Boron (B)	2018/09/20	91	80 - 120	94	80 - 120	<10	ug/L	NC (1)	20
9152080	Dissolved Cadmium (Cd)	2018/09/20	99	80 - 120	101	80 - 120	<0.0050	ug/L	NC (1)	20
9152080	Dissolved Chromium (Cr)	2018/09/20	99	80 - 120	102	80 - 120	<0.10	ug/L	NC (1)	20
9152080	Dissolved Cobalt (Co)	2018/09/20	98	80 - 120	100	80 - 120	<0.0050	ug/L	NC (1)	20
9152080	Dissolved Copper (Cu)	2018/09/20	98	80 - 120	101	80 - 120	<0.050	ug/L	2.6 (1)	20
9152080	Dissolved Iron (Fe)	2018/09/20	104	80 - 120	105	80 - 120	<1.0	ug/L	NC (1)	20
9152080	Dissolved Lead (Pb)	2018/09/20	97	80 - 120	101	80 - 120	<0.0050	ug/L	0.081 (1)	20
9152080	Dissolved Lithium (Li)	2018/09/20	91	80 - 120	90	80 - 120	<0.50	ug/L	NC (1)	20
9152080	Dissolved Manganese (Mn)	2018/09/20	100	80 - 120	102	80 - 120	<0.050	ug/L	NC (1)	20
9152080	Dissolved Molybdenum (Mo)	2018/09/20	100	80 - 120	102	80 - 120	<0.050	ug/L	NC (1)	20
9152080	Dissolved Nickel (Ni)	2018/09/20	99	80 - 120	102	80 - 120	<0.020	ug/L	13 (1)	20
9152080	Dissolved Phosphorus (P)	2018/09/20	97	80 - 120	97	80 - 120	<2.0	ug/L		
9152080	Dissolved Selenium (Se)	2018/09/20	97	80 - 120	99	80 - 120	<0.040	ug/L	NC (1)	20
9152080	Dissolved Silicon (Si)	2018/09/20	103	80 - 120	99	80 - 120	<50	ug/L	1.3 (1)	20
9152080	Dissolved Silver (Ag)	2018/09/20	96	80 - 120	100	80 - 120	<0.0050	ug/L	NC (1)	20
9152080	Dissolved Strontium (Sr)	2018/09/20	101	80 - 120	104	80 - 120	<0.050	ug/L	3.0 (1)	20
9152080	Dissolved Sulphur (S)	2018/09/20	99	80 - 120	98	80 - 120	<600	ug/L		
9152080	Dissolved Thallium (Tl)	2018/09/20	99	80 - 120	103	80 - 120	<0.0020	ug/L	NC (1)	20
9152080	Dissolved Tin (Sn)	2018/09/20	94	80 - 120	102	80 - 120	<0.20	ug/L	NC (1)	20
9152080	Dissolved Titanium (Ti)	2018/09/20	98	80 - 120	104	80 - 120	<0.50	ug/L	NC (1)	20
9152080	Dissolved Uranium (U)	2018/09/20	100	80 - 120	101	80 - 120	<0.0020	ug/L	NC (1)	20
9152080	Dissolved Vanadium (V)	2018/09/20	100	80 - 120	102	80 - 120	<0.20	ug/L	NC (1)	20
9152080	Dissolved Zinc (Zn)	2018/09/20	99	80 - 120	107	80 - 120	<0.10	ug/L	2.9 (1)	20
9152080	Dissolved Zirconium (Zr)	2018/09/20	98	80 - 120	101	80 - 120	<0.10	ug/L	NC (1)	20
9152084	Nitrate plus Nitrite (N)	2018/09/20	108	80 - 120	110	80 - 120	<0.10	mg/L	NC (1)	25

Maxxam Job #: B880711
Report Date: 2018/09/26

QUALITY ASSURANCE REPORT(CONT'D)

GHD Limited
Client Project #: 56484-02
Site Location: Campbell River (Phase 02) - Quarterly
Your P.O. #: 73506861-1

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
9152087	Nitrite (N)	2018/09/20	92	80 - 120	107	80 - 120	<0.10	mg/L	NC (1)	20
9152429	Dissolved Chloride (Cl)	2018/09/20	98 (2)	80 - 120	98	80 - 120	<1.0	mg/L	0.13 (3)	20
9152432	Dissolved Sulphate (SO4)	2018/09/20	112 (2)	80 - 120	93	80 - 120	<1.0	mg/L	1.9 (3)	20
9152476	Alkalinity (PP as CaCO3)	2018/09/21					<1.0	mg/L		
9152476	Alkalinity (Total as CaCO3)	2018/09/21	94	80 - 120	98	80 - 120	<1.0	mg/L		
9152476	Bicarbonate (HCO3)	2018/09/21					<1.0	mg/L		
9152476	Carbonate (CO3)	2018/09/21					<1.0	mg/L		
9152476	Hydroxide (OH)	2018/09/21					<1.0	mg/L		
9152477	pH	2018/09/21			101	97 - 103			0.86 (1)	20
9152478	Conductivity	2018/09/21			96	80 - 120	<2.0	uS/cm		
9152681	Total Aluminum (Al)	2018/09/21	100	80 - 120	101	80 - 120	<0.50	ug/L	NC (1)	20
9152681	Total Antimony (Sb)	2018/09/21	101	80 - 120	103	80 - 120	<0.020	ug/L	NC (1)	20
9152681	Total Arsenic (As)	2018/09/21	102	80 - 120	106	80 - 120	<0.020	ug/L	NC (1)	20
9152681	Total Barium (Ba)	2018/09/21	103	80 - 120	103	80 - 120	<0.020	ug/L	0.99 (1)	20
9152681	Total Beryllium (Be)	2018/09/21	100	80 - 120	103	80 - 120	<0.010	ug/L	NC (1)	20
9152681	Total Bismuth (Bi)	2018/09/21	99	80 - 120	98	80 - 120	<0.0050	ug/L	NC (1)	20
9152681	Total Boron (B)	2018/09/21	99	80 - 120	99	80 - 120	<10	ug/L	NC (1)	20
9152681	Total Cadmium (Cd)	2018/09/21	100	80 - 120	103	80 - 120	<0.0050	ug/L	NC (1)	20
9152681	Total Chromium (Cr)	2018/09/21	98	80 - 120	95	80 - 120	<0.10	ug/L	NC (1)	20
9152681	Total Cobalt (Co)	2018/09/21	99	80 - 120	96	80 - 120	<0.0050	ug/L	NC (1)	20
9152681	Total Copper (Cu)	2018/09/21	96	80 - 120	95	80 - 120	<0.050	ug/L	NC (1)	20
9152681	Total Iron (Fe)	2018/09/21	99	80 - 120	102	80 - 120	<1.0	ug/L	NC (1)	20
9152681	Total Lead (Pb)	2018/09/21	101	80 - 120	100	80 - 120	<0.0050	ug/L	NC (1)	20
9152681	Total Lithium (Li)	2018/09/21	101	80 - 120	101	80 - 120	<0.50	ug/L	NC (1)	20
9152681	Total Manganese (Mn)	2018/09/21	99	80 - 120	95	80 - 120	<0.050	ug/L	NC (1)	20
9152681	Total Molybdenum (Mo)	2018/09/21	103	80 - 120	103	80 - 120	<0.050	ug/L	NC (1)	20
9152681	Total Nickel (Ni)	2018/09/21	99	80 - 120	95	80 - 120	<0.020	ug/L	NC (1)	20
9152681	Total Phosphorus (P)	2018/09/21	102	80 - 120	103	80 - 120	<2.0	ug/L	4.2 (1)	20
9152681	Total Selenium (Se)	2018/09/21	98	80 - 120	105	80 - 120	<0.040	ug/L	NC (1)	20
9152681	Total Silicon (Si)	2018/09/21	99	80 - 120	101	80 - 120	<50	ug/L	NC (1)	20
9152681	Total Silver (Ag)	2018/09/21	98	80 - 120	90	80 - 120	<0.0050	ug/L	NC (1)	20

Maxxam Job #: B880711
Report Date: 2018/09/26

QUALITY ASSURANCE REPORT(CONT'D)

GHD Limited
Client Project #: 56484-02
Site Location: Campbell River (Phase 02) - Quarterly
Your P.O. #: 73506861-1

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
9152681	Total Strontium (Sr)	2018/09/21	99	80 - 120	100	80 - 120	<0.050	ug/L	11 (1)	20
9152681	Total Sulphur (S)	2018/09/21	102	80 - 120	100	80 - 120	<600	ug/L		
9152681	Total Thallium (Tl)	2018/09/21	100	80 - 120	99	80 - 120	<0.0020	ug/L	NC (1)	20
9152681	Total Tin (Sn)	2018/09/21	99	80 - 120	103	80 - 120	<0.20	ug/L	NC (1)	20
9152681	Total Titanium (Ti)	2018/09/21	98	80 - 120	100	80 - 120	<0.50	ug/L	NC (1)	20
9152681	Total Uranium (U)	2018/09/21	105	80 - 120	104	80 - 120	<0.0020	ug/L	NC (1)	20
9152681	Total Vanadium (V)	2018/09/21	100	80 - 120	97	80 - 120	<0.20	ug/L	NC (1)	20
9152681	Total Zinc (Zn)	2018/09/21	100	80 - 120	103	80 - 120	<0.10	ug/L	NC (1)	20
9152681	Total Zirconium (Zr)	2018/09/21	97	80 - 120	103	80 - 120	<0.10	ug/L	NC (1)	20
9153443	Total Dissolved Solids	2018/09/24	99	80 - 120	95	80 - 120	<10	mg/L	2.3 (1)	20
9153623	Dissolved Mercury (Hg)	2018/09/21	93	80 - 120	93	80 - 120	<0.0020	ug/L	NC (1)	20
9153778	Total Ammonia (N)	2018/09/21	93	80 - 120	112	80 - 120	<0.020	mg/L	NC (1)	20
9153784	Total Ammonia (N)	2018/09/21	103	80 - 120	113	80 - 120	<0.020	mg/L	NC (1)	20
9153849	Total Mercury (Hg)	2018/09/21	92	80 - 120	90	80 - 120	<0.0020	ug/L	NC (1)	20
9158849	Fluoride (F)	2018/09/25	104	80 - 120	104	80 - 120	<0.10	mg/L	NC (1)	20

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

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

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

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

NC (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 [UI7964-01]

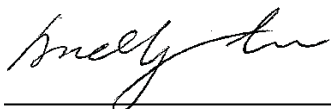
(3) Duplicate Parent ID [UI7964-01]

Maxxam Job #: B880711
Report Date: 2018/09/26

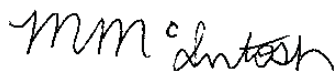
GHD Limited
Client Project #: 56484-02
Site Location: Campbell River (Phase 02) - Quarterly
Your P.O. #: 73506861-1

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



Melissa McIntosh, Project Manager

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.

Laboratory Use Only

Turnaround Time (TAD) Required

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Attention: Aïresse MacPhee

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

Your P.O. #: 73506861-1
Your Project #: 56484-02
Site#: Campbell River(Phase 02)-Quart
Site Location: Campbell River (Phase 02) - Quarterly
Your C.O.C. #: 548142-01-01, 548142-02-01

Report Date: 2018/09/26

Report #: R2625792

Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B880896

Received: 2018/09/19, 09:00

Sample Matrix: GROUND WATER
Samples Received: 20

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity - Water	20	N/A	2018/09/21	BBY6SOP-00026	SM 22 2320 B m
Chloride by Automated Colourimetry	15	N/A	2018/09/20	BBY6SOP-00011	SM 22 4500-Cl- E m
Chloride by Automated Colourimetry	5	N/A	2018/09/21	BBY6SOP-00011	SM 22 4500-Cl- E m
Conductance - water	20	N/A	2018/09/21	BBY6SOP-00026	SM 22 2510 B m
Fluoride (higher level)	16	N/A	2018/09/25	BBY6SOP-00048	SM 22 4500-F C m
Fluoride (higher level)	4	N/A	2018/09/26	BBY6SOP-00048	SM 22 4500-F C m
Hardness (calculated as CaCO3)	20	N/A	2018/09/26	BBY WI-00033	Auto Calc
Mercury (Dissolved) by CVAf	20	N/A	2018/09/21	BBY7SOP-00015	BCMOE BCLM Oct2013 m
Na, K, Ca, Mg, S by CRC ICPMS (diss.)	20	N/A	2018/09/26	BBY WI-00033	Auto Calc
Elements by CRC ICPMS (dissolved)	20	N/A	2018/09/22	BBY7SOP-00002	EPA 6020b R2 m
Ammonia-N (Preserved)	20	N/A	2018/09/21	BBY6SOP-00009	EPA 350.1 m
Nitrate + Nitrite (N) (highlevel)	16	N/A	2018/09/20	BBY6SOP-00010	SM 23 4500-NO3- I m
Nitrate + Nitrite (N) (highlevel)	4	N/A	2018/09/21	BBY6SOP-00010	SM 23 4500-NO3- I m
Nitrite (N) by CFA (highlevel)	16	N/A	2018/09/20	BBY6SOP-00010	SM 23 4500-NO3- I m
Nitrite (N) by CFA (highlevel)	4	N/A	2018/09/21	BBY6SOP-00010	SM 23 4500-NO3- I m
Nitrogen - Nitrate (as N)	20	N/A	2018/09/21	BBY WI-00033	Auto Calc
Filter and HNO3 Preserve for Metals	19	N/A	2018/09/19	BBY7 WI-00004	BCMOE Reqs 08/14
Filter and HNO3 Preserve for Metals	1	N/A	2018/09/20	BBY7 WI-00004	BCMOE Reqs 08/14
pH Water (1)	20	N/A	2018/09/21	BBY6SOP-00026	SM 22 4500-H+ B m
Sulphate by Automated Colourimetry	15	N/A	2018/09/20	BBY6SOP-00017	SM 22 4500-SO42- E m
Sulphate by Automated Colourimetry	4	N/A	2018/09/21	BBY6SOP-00017	SM 22 4500-SO42- E m
Sulphate by Automated Colourimetry	1	N/A	2018/09/24	BBY6SOP-00017	SM 22 4500-SO42- E m
Total Dissolved Solids (Filt. Residue)	1	2018/09/21	2018/09/22	BBY6SOP-00033	SM 22 2540 C m
Total Dissolved Solids (Filt. Residue)	19	2018/09/24	2018/09/25	BBY6SOP-00033	SM 22 2540 C m
VOCs, VH, F1, LH in Water by HS GC/MS	9	N/A	2018/09/26	BBY8SOP-00009/11/12	BCMOE BCLM Jul 2017
Volatile HC-BTEX (2)	9	N/A	2018/09/26	BBY WI-00033	Auto Calc

Sample Matrix: Water
Samples Received: 1

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method

Attention: Aïresse MacPhee

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

Your P.O. #: 73506861-1
Your Project #: 56484-02
Site#: Campbell River(Phase 02)-Quart
Site Location: Campbell River (Phase 02) - Quarterly
Your C.O.C. #: 548142-01-01, 548142-02-01

Report Date: 2018/09/26

Report #: R2625792

Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B880896

Received: 2018/09/19, 09:00

Sample Matrix: Water
Samples Received: 1

Analyses	Date		Laboratory Method	Analytical Method
	Quantity	Extracted		
VOCs, VH, F1, LH in Water by HS GC/MS	1	N/A	2018/09/26 BBY8SOP-00009/11/12	BCMOE BCLM Jul 2017
Volatile HC-BTEX (2)	1	N/A	2018/09/26 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 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. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

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. Maxxam is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.

Results relate to samples tested. When sampling is not conducted by Maxxam, results relate to the supplied samples tested.

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Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) 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.

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

Attention: Aïresse MacPhee

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

Your P.O. #: 73506861-1
Your Project #: 56484-02
Site#: Campbell River(Phase 02)-Quart
Site Location: Campbell River (Phase 02) - Quarterly
Your C.O.C. #: 548142-01-01, 548142-02-01

Report Date: 2018/09/26
Report #: R2625792
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B880896

Received: 2018/09/19, 09:00

Encryption Key



Tim Li
Project Manager
26 Sep 2018 18:02:22

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

Nahed Amer, Project Manager

Email: NAmer@maxxam.ca

Phone# (604) 734 7276

=====

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

Maxxam Job #: B880896
Report Date: 2018/09/26

GHD Limited
Client Project #: 56484-02
Site Location: Campbell River (Phase 02) - Quarterly
Your P.O. #: 73506861-1

RESULTS OF CHEMICAL ANALYSES OF GROUND WATER

Maxxam ID		UI8882		UI8883		UI8884		
Sampling Date		2018/09/17 13:00		2018/09/17 12:50		2018/09/17 12:55		
COC Number		548142-01-01		548142-01-01		548142-01-01		
	UNITS	WG-56484-170918-MND-01	QC Batch	WG-56484-170918-MND-02	QC Batch	WG-56484-170918-MND-03	RDL	QC Batch
ANIONS								
Nitrite (N)	mg/L	<0.10	9152087	<0.10	9152087	<0.10	0.10	9152087
Calculated Parameters								
Filter and HNO3 Preservation	N/A	FIELD	ONSITE	FIELD	ONSITE	FIELD	N/A	ONSITE
Nitrate (N)	mg/L	<0.10	9149129	0.15	9149129	0.15	0.10	9149129
Misc. Inorganics								
Fluoride (F)	mg/L	<0.10	9158849	<0.10	9158849	<0.10	0.10	9158849
Alkalinity (Total as CaCO3)	mg/L	46.2	9152482	68.1	9152476	69.5	1.0	9152482
Alkalinity (PP as CaCO3)	mg/L	<1.0	9152482	<1.0	9152476	<1.0	1.0	9152482
Bicarbonate (HCO3)	mg/L	56.4	9152482	83.0	9152476	84.8	1.0	9152482
Carbonate (CO3)	mg/L	<1.0	9152482	<1.0	9152476	<1.0	1.0	9152482
Hydroxide (OH)	mg/L	<1.0	9152482	<1.0	9152476	<1.0	1.0	9152482
Anions								
Dissolved Sulphate (SO4)	mg/L	1.6	9152432	1.5	9152432	2.0	1.0	9152432
Dissolved Chloride (Cl)	mg/L	<1.0	9152429	2.3	9152429	2.3	1.0	9152429
Nutrients								
Total Ammonia (N)	mg/L	<0.020	9153778	<0.020	9153778	<0.020	0.020	9153784
Nitrate plus Nitrite (N)	mg/L	<0.10	9152084	0.15	9152084	0.15	0.10	9152084
Physical Properties								
Conductivity	uS/cm	96.8	9152483	144	9152478	147	2.0	9152483
pH	pH	7.74	9152479	7.89	9152477	7.93	N/A	9152479
Physical Properties								
Total Dissolved Solids	mg/L	60	9156490	78	9156490	80	10	9156490
RDL = Reportable Detection Limit N/A = Not Applicable								

Maxxam Job #: B880896
Report Date: 2018/09/26

GHD Limited
Client Project #: 56484-02
Site Location: Campbell River (Phase 02) - Quarterly
Your P.O. #: 73506861-1

RESULTS OF CHEMICAL ANALYSES OF GROUND WATER

Maxxam ID		UI8884		UI8885		UI8886		
Sampling Date		2018/09/17 12:55		2018/09/17 14:55		2018/09/17 15:05		
COC Number		548142-01-01		548142-01-01		548142-01-01		
	UNITS	WG-56484-170918- MND-03 Lab-Dup	QC Batch	WG-56484-170918- MND-04	QC Batch	WG-56484-170918- MND-05	RDL	QC Batch
ANIONS								
Nitrite (N)	mg/L	N/A	9152087	<0.10	9152087	<0.10	0.10	9152087
Calculated Parameters								
Filter and HNO ₃ Preservation	N/A	N/A	ONSITE	FIELD	ONSITE	FIELD	N/A	ONSITE
Nitrate (N)	mg/L	N/A	9149129	<0.10	9149129	<0.10	0.10	9149129
Misc. Inorganics								
Fluoride (F)	mg/L	N/A	9158849	<0.10	9158849	<0.10	0.10	9158849
Alkalinity (Total as CaCO ₃)	mg/L	N/A	9152482	<1.0	9152476	42.0	1.0	9152476
Alkalinity (PP as CaCO ₃)	mg/L	N/A	9152482	<1.0	9152476	<1.0	1.0	9152476
Bicarbonate (HCO ₃)	mg/L	N/A	9152482	<1.0	9152476	51.2	1.0	9152476
Carbonate (CO ₃)	mg/L	N/A	9152482	<1.0	9152476	<1.0	1.0	9152476
Hydroxide (OH)	mg/L	N/A	9152482	<1.0	9152476	<1.0	1.0	9152476
Anions								
Dissolved Sulphate (SO ₄)	mg/L	N/A	9152432	<1.0	9152432	1.6	1.0	9152432
Dissolved Chloride (Cl)	mg/L	N/A	9152429	<1.0	9152429	<1.0	1.0	9152429
Nutrients								
Total Ammonia (N)	mg/L	<0.020	9153784	<0.020	9153778	0.067	0.020	9153784
Nitrate plus Nitrite (N)	mg/L	N/A	9152084	<0.10	9152084	<0.10	0.10	9152084
Physical Properties								
Conductivity	uS/cm	N/A	9152483	<2.0	9152478	89.2	2.0	9152478
pH	pH	N/A	9152479	5.41	9152477	7.61	N/A	9152477
Physical Properties								
Total Dissolved Solids	mg/L	N/A	9156490	<10	9156490	52	10	9156490
RDL = Reportable Detection Limit Lab-Dup = Laboratory Initiated Duplicate N/A = Not Applicable								

Maxxam Job #: B880896
Report Date: 2018/09/26

GHD Limited
Client Project #: 56484-02
Site Location: Campbell River (Phase 02) - Quarterly
Your P.O. #: 73506861-1

RESULTS OF CHEMICAL ANALYSES OF GROUND WATER

Maxxam ID		UI8887	UI8887		UI8888		
Sampling Date		2018/09/17 15:45	2018/09/17 15:45		2018/09/17 16:30		
COC Number		548142-01-01	548142-01-01		548142-01-01		
	UNITS	WG-56484-170918-MND-06	WG-56484-170918-MND-06 Lab-Dup	QC Batch	WG-56484-170918-MND-07	RDL	QC Batch
ANIONS							
Nitrite (N)	mg/L	<0.10	N/A	9153562	<0.10	0.10	9153562
Calculated Parameters							
Filter and HNO3 Preservation	N/A	FIELD	N/A	ONSITE	FIELD	N/A	ONSITE
Nitrate (N)	mg/L	0.52	N/A	9149129	0.39	0.10	9149129
Misc. Inorganics							
Fluoride (F)	mg/L	0.10	N/A	9159888	0.12	0.10	9159888
Alkalinity (Total as CaCO3)	mg/L	126	N/A	9154489	87.9	1.0	9154489
Alkalinity (PP as CaCO3)	mg/L	<1.0	N/A	9154489	<1.0	1.0	9154489
Bicarbonate (HCO3)	mg/L	154	N/A	9154489	107	1.0	9154489
Carbonate (CO3)	mg/L	<1.0	N/A	9154489	<1.0	1.0	9154489
Hydroxide (OH)	mg/L	<1.0	N/A	9154489	<1.0	1.0	9154489
Anions							
Dissolved Sulphate (SO4)	mg/L	3.2	N/A	9156812	4.7	1.0	9154823
Dissolved Chloride (Cl)	mg/L	8.1	N/A	9154822	4.7	1.0	9154822
Nutrients							
Total Ammonia (N)	mg/L	<0.020	<0.020	9153804	<0.020	0.020	9153804
Nitrate plus Nitrite (N)	mg/L	0.52	N/A	9153561	0.39	0.10	9153561
Physical Properties							
Conductivity	uS/cm	271	N/A	9154504	195	2.0	9154504
pH	pH	8.11	N/A	9154502	7.87	N/A	9154502
Physical Properties							
Total Dissolved Solids	mg/L	148	N/A	9156490	112	10	9156490
RDL = Reportable Detection Limit Lab-Dup = Laboratory Initiated Duplicate N/A = Not Applicable							

Maxxam Job #: B880896
Report Date: 2018/09/26

GHD Limited
Client Project #: 56484-02
Site Location: Campbell River (Phase 02) - Quarterly
Your P.O. #: 73506861-1

RESULTS OF CHEMICAL ANALYSES OF GROUND WATER

Maxxam ID		UI8889			UI8890	UI8890		
Sampling Date		2018/09/17 17:00			2018/09/17 18:10	2018/09/17 18:10		
COC Number		548142-01-01			548142-01-01	548142-01-01		
	UNITS	WG-56484-170918- MND-08	RDL	QC Batch	WG-56484-170918- MND-09	WG-56484-170918- MND-09 Lab-Dup	RDL	QC Batch
ANIONS								
Nitrite (N)	mg/L	<0.10	0.10	9153562	<0.10	<0.10	0.10	9153562
Calculated Parameters								
Filter and HNO3 Preservation	N/A	FIELD	N/A	ONSITE	FIELD	N/A	N/A	ONSITE
Nitrate (N)	mg/L	<0.10	0.10	9149129	<0.10	N/A	0.10	9149129
Misc. Inorganics								
Fluoride (F)	mg/L	0.11	0.10	9159888	<0.10	N/A	0.10	9159888
Alkalinity (Total as CaCO3)	mg/L	36.3	1.0	9154473	184	N/A	1.0	9154489
Alkalinity (PP as CaCO3)	mg/L	<1.0	1.0	9154473	<1.0	N/A	1.0	9154489
Bicarbonate (HCO3)	mg/L	44.3	1.0	9154473	224	N/A	1.0	9154489
Carbonate (CO3)	mg/L	<1.0	1.0	9154473	<1.0	N/A	1.0	9154489
Hydroxide (OH)	mg/L	<1.0	1.0	9154473	<1.0	N/A	1.0	9154489
Anions								
Dissolved Sulphate (SO4)	mg/L	2.2	1.0	9154823	1.6	N/A	1.0	9154823
Dissolved Chloride (Cl)	mg/L	1.0	1.0	9154822	25	N/A	1.0	9154822
Nutrients								
Total Ammonia (N)	mg/L	0.034	0.020	9153784	11 (1)	N/A	0.20	9153784
Nitrate plus Nitrite (N)	mg/L	<0.10	0.10	9153561	<0.10	<0.10	0.10	9153561
Physical Properties								
Conductivity	uS/cm	74.5	2.0	9154476	448	N/A	2.0	9154504
pH	pH	7.63	N/A	9154474	7.99	N/A	N/A	9154502
Physical Properties								
Total Dissolved Solids	mg/L	42	10	9156490	210	N/A	10	9156490
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 #: B880896
Report Date: 2018/09/26

GHD Limited
Client Project #: 56484-02
Site Location: Campbell River (Phase 02) - Quarterly
Your P.O. #: 73506861-1

RESULTS OF CHEMICAL ANALYSES OF GROUND WATER

Maxxam ID		UI8891	UI8891			UI8903		
Sampling Date		2018/09/17 18:30	2018/09/17 18:30			2018/09/18 09:30		
COC Number		548142-01-01	548142-01-01			548142-02-01		
	UNITS	WG-56484-170918-MND-10	WG-56484-170918-MND-10 Lab-Dup	RDL	QC Batch	WG-56484-180918-MND-11	RDL	QC Batch
ANIONS								
Nitrite (N)	mg/L	<0.10	<0.10	0.10	9152087	<0.10	0.10	9152087
Calculated Parameters								
Filter and HNO3 Preservation	N/A	FIELD	N/A	N/A	ONSITE	FIELD	N/A	ONSITE
Nitrate (N)	mg/L	<0.10	N/A	0.10	9149129	0.19	0.10	9149129
Misc. Inorganics								
Fluoride (F)	mg/L	0.11	N/A	0.10	9158849	<0.10	0.10	9158849
Alkalinity (Total as CaCO3)	mg/L	256	N/A	1.0	9152476	80.2	1.0	9152476
Alkalinity (PP as CaCO3)	mg/L	<1.0	N/A	1.0	9152476	<1.0	1.0	9152476
Bicarbonate (HCO3)	mg/L	313	N/A	1.0	9152476	97.9	1.0	9152476
Carbonate (CO3)	mg/L	<1.0	N/A	1.0	9152476	<1.0	1.0	9152476
Hydroxide (OH)	mg/L	<1.0	N/A	1.0	9152476	<1.0	1.0	9152476
Anions								
Dissolved Sulphate (SO4)	mg/L	<10 (1)	N/A	10	9154820	2.3	1.0	9152432
Dissolved Chloride (Cl)	mg/L	25	N/A	1.0	9154818	1.6	1.0	9152429
Nutrients								
Total Ammonia (N)	mg/L	5.3 (2)	N/A	0.10	9153784	0.042	0.020	9153784
Nitrate plus Nitrite (N)	mg/L	<0.10	<0.10	0.10	9152084	0.19	0.10	9152084
Physical Properties								
Conductivity	uS/cm	560	N/A	2.0	9152478	166	2.0	9152478
pH	pH	7.33	N/A	N/A	9152477	7.90	N/A	9152477
Physical Properties								
Total Dissolved Solids	mg/L	302	N/A	10	9156490	96	10	9156505
RDL = Reportable Detection Limit Lab-Dup = Laboratory Initiated Duplicate N/A = Not Applicable (1) RDL raised due to sample matrix interference. (2) Detection limits raised due to dilution to bring analyte within the calibrated range.								

Maxxam Job #: B880896
Report Date: 2018/09/26

GHD Limited
Client Project #: 56484-02
Site Location: Campbell River (Phase 02) - Quarterly
Your P.O. #: 73506861-1

RESULTS OF CHEMICAL ANALYSES OF GROUND WATER

Maxxam ID		UI8904		UI8905	UI8905		
Sampling Date		2018/09/18 10:00		2018/09/18 10:05	2018/09/18 10:05		
COC Number		548142-02-01		548142-02-01	548142-02-01		
	UNITS	WG-56484-180918- MND-12	QC Batch	WG-56484-180918- MND-13	WG-56484-180918- MND-13 Lab-Dup	RDL	QC Batch
ANIONS							
Nitrite (N)	mg/L	<0.10	9152087	<0.10	N/A	0.10	9152087
Calculated Parameters							
Filter and HNO3 Preservation	N/A	FIELD	ONSITE	FIELD	N/A	N/A	ONSITE
Nitrate (N)	mg/L	<0.10	9149129	<0.10	N/A	0.10	9149129
Misc. Inorganics							
Fluoride (F)	mg/L	<0.10	9158849	<0.10	<0.10	0.10	9158849
Alkalinity (Total as CaCO3)	mg/L	349	9152476	354	N/A	1.0	9152482
Alkalinity (PP as CaCO3)	mg/L	<1.0	9152476	<1.0	N/A	1.0	9152482
Bicarbonate (HCO3)	mg/L	426	9152476	432	N/A	1.0	9152482
Carbonate (CO3)	mg/L	<1.0	9152476	<1.0	N/A	1.0	9152482
Hydroxide (OH)	mg/L	<1.0	9152476	<1.0	N/A	1.0	9152482
Anions							
Dissolved Sulphate (SO4)	mg/L	4.5	9152432	3.8	N/A	1.0	9152432
Dissolved Chloride (Cl)	mg/L	18	9152429	18	N/A	1.0	9152429
Nutrients							
Total Ammonia (N)	mg/L	16 (1)	9153784	17 (1)	N/A	0.20	9153784
Nitrate plus Nitrite (N)	mg/L	<0.10	9152084	<0.10	N/A	0.10	9152084
Physical Properties							
Conductivity	uS/cm	732	9152478	738	N/A	2.0	9152483
pH	pH	7.85	9152477	8.01	N/A	N/A	9152479
Physical Properties							
Total Dissolved Solids	mg/L	378	9156505	360	N/A	10	9156505
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 #: B880896
Report Date: 2018/09/26

GHD Limited
Client Project #: 56484-02
Site Location: Campbell River (Phase 02) - Quarterly
Your P.O. #: 73506861-1

RESULTS OF CHEMICAL ANALYSES OF GROUND WATER

Maxxam ID		UI8906			UI8907	UI8907		
Sampling Date		2018/09/18 11:30			2018/09/18 13:00	2018/09/18 13:00		
COC Number		548142-02-01			548142-02-01	548142-02-01		
	UNITS	WG-56484-180918- MND-14	RDL	QC Batch	WG-56484-180918- MND-15	WG-56484-180918- MND-15 Lab-Dup	RDL	QC Batch
ANIONS								
Nitrite (N)	mg/L	<0.10	0.10	9152087	<0.10	N/A	0.10	9152087
Calculated Parameters								
Filter and HNO ₃ Preservation	N/A	FIELD	N/A	ONSITE	LAB	N/A	N/A	9148763
Nitrate (N)	mg/L	0.25	0.10	9149129	0.14	N/A	0.10	9149129
Misc. Inorganics								
Fluoride (F)	mg/L	0.10	0.10	9158849	0.11	N/A	0.10	9158849
Alkalinity (Total as CaCO ₃)	mg/L	98.9	1.0	9152476	48.3	48.2	1.0	9152482
Alkalinity (PP as CaCO ₃)	mg/L	<1.0	1.0	9152476	<1.0	<1.0	1.0	9152482
Bicarbonate (HCO ₃)	mg/L	121	1.0	9152476	59.0	58.8	1.0	9152482
Carbonate (CO ₃)	mg/L	<1.0	1.0	9152476	<1.0	<1.0	1.0	9152482
Hydroxide (OH)	mg/L	<1.0	1.0	9152476	<1.0	<1.0	1.0	9152482
Anions								
Dissolved Sulphate (SO ₄)	mg/L	2.4	1.0	9152432	1.5	N/A	1.0	9152432
Dissolved Chloride (Cl)	mg/L	2.9	1.0	9152429	<1.0	N/A	1.0	9152429
Nutrients								
Total Ammonia (N)	mg/L	0.077	0.020	9153778	<0.020	N/A	0.020	9153778
Nitrate plus Nitrite (N)	mg/L	0.25	0.10	9152084	0.14	N/A	0.10	9152084
Physical Properties								
Conductivity	uS/cm	200	2.0	9152478	102	102	2.0	9152483
pH	pH	8.03	N/A	9152477	7.74	7.74	N/A	9152479
Physical Properties								
Total Dissolved Solids	mg/L	116 (1)	11	9156505	50	N/A	10	9156505
RDL = Reportable Detection Limit Lab-Dup = Laboratory Initiated Duplicate N/A = Not Applicable (1) RDL raised due to limited initial sample amount.								

Maxxam Job #: B880896
Report Date: 2018/09/26

GHD Limited
Client Project #: 56484-02
Site Location: Campbell River (Phase 02) - Quarterly
Your P.O. #: 73506861-1

RESULTS OF CHEMICAL ANALYSES OF GROUND WATER

Maxxam ID		UI8908		UI8909	UI8909		
Sampling Date		2018/09/18 14:00		2018/09/18 14:30	2018/09/18 14:30		
COC Number		548142-02-01		548142-02-01	548142-02-01		
	UNITS	WG-56484-180918-MND-16	QC Batch	WG-56484-180918-MND-17	WG-56484-180918-MND-17 Lab-Dup	RDL	QC Batch
ANIONS							
Nitrite (N)	mg/L	<0.10	9152087	<0.10	N/A	0.10	9152087
Calculated Parameters							
Filter and HNO3 Preservation	N/A	FIELD	ONSITE	FIELD	N/A	N/A	ONSITE
Nitrate (N)	mg/L	<0.10	9149129	0.15	N/A	0.10	9149129
Misc. Inorganics							
Fluoride (F)	mg/L	0.11	9158849	0.11	N/A	0.10	9158849
Alkalinity (Total as CaCO3)	mg/L	60.0	9152476	50.4	N/A	1.0	9152476
Alkalinity (PP as CaCO3)	mg/L	<1.0	9152476	<1.0	N/A	1.0	9152476
Bicarbonate (HCO3)	mg/L	73.2	9152476	61.5	N/A	1.0	9152476
Carbonate (CO3)	mg/L	<1.0	9152476	<1.0	N/A	1.0	9152476
Hydroxide (OH)	mg/L	<1.0	9152476	<1.0	N/A	1.0	9152476
Anions							
Dissolved Sulphate (SO4)	mg/L	2.3	9152432	1.1	N/A	1.0	9152432
Dissolved Chloride (Cl)	mg/L	8.6	9152429	5.5	N/A	1.0	9152429
Nutrients							
Total Ammonia (N)	mg/L	0.022	9153778	0.058	N/A	0.020	9153784
Nitrate plus Nitrite (N)	mg/L	<0.10	9152084	0.15	N/A	0.10	9152084
Physical Properties							
Conductivity	uS/cm	152	9152478	119	N/A	2.0	9152478
pH	pH	7.82	9152477	7.73	N/A	N/A	9152477
Physical Properties							
Total Dissolved Solids	mg/L	84	9156505	74	72	10	9153404
RDL = Reportable Detection Limit Lab-Dup = Laboratory Initiated Duplicate N/A = Not Applicable							

Maxxam Job #: B880896
Report Date: 2018/09/26

GHD Limited
Client Project #: 56484-02
Site Location: Campbell River (Phase 02) - Quarterly
Your P.O. #: 73506861-1

RESULTS OF CHEMICAL ANALYSES OF GROUND WATER

Maxxam ID		UI8910			UI8911		
Sampling Date		2018/09/18 15:00			2018/09/18 16:20		
COC Number		548142-02-01			548142-02-01		
	UNITS	WG-56484-180918-MND-18	RDL	QC Batch	WG-56484-180918-MND-19	RDL	QC Batch
ANIONS							
Nitrite (N)	mg/L	<0.10	0.10	9152087	<0.10	0.10	9152087
Calculated Parameters							
Filter and HNO3 Preservation	N/A	FIELD	N/A	ONSITE	FIELD	N/A	ONSITE
Nitrate (N)	mg/L	0.15	0.10	9149129	2.14	0.20	9149129
Misc. Inorganics							
Fluoride (F)	mg/L	<0.10	0.10	9158849	<0.10	0.10	9158857
Alkalinity (Total as CaCO3)	mg/L	113	1.0	9152476	310	1.0	9152476
Alkalinity (PP as CaCO3)	mg/L	<1.0	1.0	9152476	<1.0	1.0	9152476
Bicarbonate (HCO3)	mg/L	138	1.0	9152476	378	1.0	9152476
Carbonate (CO3)	mg/L	<1.0	1.0	9152476	<1.0	1.0	9152476
Hydroxide (OH)	mg/L	<1.0	1.0	9152476	<1.0	1.0	9152476
Anions							
Dissolved Sulphate (SO4)	mg/L	2.8	1.0	9152432	15.2	1.0	9152432
Dissolved Chloride (Cl)	mg/L	7.8	1.0	9152429	6.5	1.0	9152429
Nutrients							
Total Ammonia (N)	mg/L	<0.020	0.020	9153778	0.074	0.020	9153784
Nitrate plus Nitrite (N)	mg/L	0.15	0.10	9152084	2.14 (1)	0.20	9152084
Physical Properties							
Conductivity	uS/cm	242	2.0	9152478	629	2.0	9152478
pH	pH	8.00	N/A	9152477	8.04	N/A	9152477
Physical Properties							
Total Dissolved Solids	mg/L	138	10	9156505	360	10	9156505
RDL = Reportable Detection Limit N/A = Not Applicable (1) Detection limits raised due to dilution to bring analyte within the calibrated range.							

Maxxam Job #: B880896
Report Date: 2018/09/26

GHD Limited
Client Project #: 56484-02
Site Location: Campbell River (Phase 02) - Quarterly
Your P.O. #: 73506861-1

RESULTS OF CHEMICAL ANALYSES OF GROUND WATER

Maxxam ID		UI8912	UI8912		
Sampling Date		2018/09/18 17:20	2018/09/18 17:20		
COC Number		548142-02-01	548142-02-01		
	UNITS	WG-56484-180918- MND-20	WG-56484-180918- MND-20 Lab-Dup	RDL	QC Batch
ANIONS					
Nitrite (N)	mg/L	<0.10	N/A	0.10	9152087
Calculated Parameters					
Filter and HNO3 Preservation	N/A	FIELD	N/A	N/A	ONSITE
Nitrate (N)	mg/L	1.95	N/A	0.10	9149129
Misc. Inorganics					
Fluoride (F)	mg/L	<0.10	N/A	0.10	9158857
Alkalinity (Total as CaCO3)	mg/L	327	N/A	1.0	9152482
Alkalinity (PP as CaCO3)	mg/L	<1.0	N/A	1.0	9152482
Bicarbonate (HCO3)	mg/L	399	N/A	1.0	9152482
Carbonate (CO3)	mg/L	<1.0	N/A	1.0	9152482
Hydroxide (OH)	mg/L	<1.0	N/A	1.0	9152482
Anions					
Dissolved Sulphate (SO4)	mg/L	12.0	12.8	1.0	9152434
Dissolved Chloride (Cl)	mg/L	110	110	1.0	9152433
Nutrients					
Total Ammonia (N)	mg/L	0.043	N/A	0.020	9153778
Nitrate plus Nitrite (N)	mg/L	1.95	N/A	0.10	9152084
Physical Properties					
Conductivity	uS/cm	961	N/A	2.0	9152483
pH	pH	8.01	N/A	N/A	9152479
Physical Properties					
Total Dissolved Solids	mg/L	586	N/A	10	9156505
RDL = Reportable Detection Limit Lab-Dup = Laboratory Initiated Duplicate N/A = Not Applicable					

Maxxam Job #: B880896
Report Date: 2018/09/26

GHD Limited
Client Project #: 56484-02
Site Location: Campbell River (Phase 02) - Quarterly
Your P.O. #: 73506861-1

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

Maxxam ID		UI8882	UI8882	UI8883	UI8884		
Sampling Date		2018/09/17 13:00	2018/09/17 13:00	2018/09/17 12:50	2018/09/17 12:55		
COC Number		548142-01-01	548142-01-01	548142-01-01	548142-01-01		
	UNITS	WG-56484-170918-MND-01	WG-56484-170918-MND-01 Lab-Dup	WG-56484-170918-MND-02	WG-56484-170918-MND-03	RDL	QC Batch

Calculated Parameters

Dissolved Hardness (CaCO3)	mg/L	45.2	N/A	65.4	61.3	0.50	9149122

Elements

Dissolved Mercury (Hg)	ug/L	<0.0020	<0.0020	<0.0020	<0.0020	0.0020	9153486

Dissolved Metals by ICPMS

Dissolved Aluminum (Al)	ug/L	6.3	6.1	10.6	9.3	3.0	9152983
Dissolved Antimony (Sb)	ug/L	<0.50	<0.50	<0.50	<0.50	0.50	9152983
Dissolved Arsenic (As)	ug/L	0.56	0.55	0.53	0.55	0.10	9152983
Dissolved Barium (Ba)	ug/L	<1.0	<1.0	2.7	2.7	1.0	9152983
Dissolved Beryllium (Be)	ug/L	<0.10	<0.10	<0.10	<0.10	0.10	9152983
Dissolved Bismuth (Bi)	ug/L	<1.0	<1.0	<1.0	<1.0	1.0	9152983
Dissolved Boron (B)	ug/L	<50	<50	<50	<50	50	9152983
Dissolved Cadmium (Cd)	ug/L	<0.010	<0.010	<0.010	<0.010	0.010	9152983
Dissolved Chromium (Cr)	ug/L	<1.0	<1.0	<1.0	<1.0	1.0	9152983
Dissolved Cobalt (Co)	ug/L	<0.20	<0.20	<0.20	<0.20	0.20	9152983
Dissolved Copper (Cu)	ug/L	<0.20	0.22	0.27	0.23	0.20	9152983
Dissolved Iron (Fe)	ug/L	<5.0	<5.0	<5.0	<5.0	5.0	9152983
Dissolved Lead (Pb)	ug/L	<0.20	<0.20	<0.20	<0.20	0.20	9152983
Dissolved Lithium (Li)	ug/L	<2.0	<2.0	<2.0	<2.0	2.0	9152983
Dissolved Manganese (Mn)	ug/L	<1.0	<1.0	<1.0	<1.0	1.0	9152983
Dissolved Molybdenum (Mo)	ug/L	<1.0	<1.0	<1.0	<1.0	1.0	9152983
Dissolved Nickel (Ni)	ug/L	<1.0	<1.0	<1.0	<1.0	1.0	9152983
Dissolved Phosphorus (P)	ug/L	<10	<10	<10	12	10	9152983
Dissolved Selenium (Se)	ug/L	0.11	<0.10	0.17	0.16	0.10	9152983
Dissolved Silicon (Si)	ug/L	4100	4080	4230	4260	100	9152983
Dissolved Silver (Ag)	ug/L	<0.020	<0.020	<0.020	<0.020	0.020	9152983
Dissolved Strontium (Sr)	ug/L	23.2	23.0	39.5	40.0	1.0	9152983
Dissolved Thallium (Tl)	ug/L	<0.010	<0.010	<0.010	<0.010	0.010	9152983
Dissolved Tin (Sn)	ug/L	<5.0	<5.0	<5.0	<5.0	5.0	9152983
Dissolved Titanium (Ti)	ug/L	<5.0	<5.0	<5.0	<5.0	5.0	9152983
Dissolved Uranium (U)	ug/L	<0.10	<0.10	<0.10	<0.10	0.10	9152983

RDL = Reportable Detection Limit

Lab-Dup = Laboratory Initiated Duplicate

N/A = Not Applicable

Maxxam Job #: B880896
Report Date: 2018/09/26

GHD Limited
Client Project #: 56484-02
Site Location: Campbell River (Phase 02) - Quarterly
Your P.O. #: 73506861-1

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

Maxxam ID		UI8882	UI8882	UI8883	UI8884		
Sampling Date		2018/09/17 13:00	2018/09/17 13:00	2018/09/17 12:50	2018/09/17 12:55		
COC Number		548142-01-01	548142-01-01	548142-01-01	548142-01-01		
	UNITS	WG-56484-170918- MND-01	WG-56484-170918- MND-01 Lab-Dup	WG-56484-170918- MND-02	WG-56484-170918- MND-03	RDL	QC Batch
Dissolved Vanadium (V)	ug/L	<5.0	<5.0	<5.0	<5.0	5.0	9152983
Dissolved Zinc (Zn)	ug/L	<5.0	<5.0	<5.0	<5.0	5.0	9152983
Dissolved Zirconium (Zr)	ug/L	<0.10	<0.10	<0.10	<0.10	0.10	9152983
Dissolved Calcium (Ca)	mg/L	15.4	N/A	23.2	21.5	0.050	9149125
Dissolved Magnesium (Mg)	mg/L	1.65	N/A	1.83	1.83	0.050	9149125
Dissolved Potassium (K)	mg/L	0.352	N/A	0.605	0.611	0.050	9149125
Dissolved Sodium (Na)	mg/L	1.44	N/A	3.30	3.28	0.050	9149125
Dissolved Sulphur (S)	mg/L	<3.0	N/A	<3.0	<3.0	3.0	9149125
Dissolved Sulphur (S)	ug/L	<3000	<3000	<3000	<3000	3000	9152983
RDL = Reportable Detection Limit Lab-Dup = Laboratory Initiated Duplicate N/A = Not Applicable							

Maxxam Job #: B880896
Report Date: 2018/09/26

GHD Limited
Client Project #: 56484-02
Site Location: Campbell River (Phase 02) - Quarterly
Your P.O. #: 73506861-1

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

Maxxam ID		UI8885	UI8886	UI8887	UI8888		
Sampling Date		2018/09/17 14:55	2018/09/17 15:05	2018/09/17 15:45	2018/09/17 16:30		
COC Number		548142-01-01	548142-01-01	548142-01-01	548142-01-01		
	UNITS	WG-56484-170918- MND-04	WG-56484-170918- MND-05	WG-56484-170918- MND-06	WG-56484-170918- MND-07	RDL	QC Batch
Calculated Parameters							
Dissolved Hardness (CaCO3)	mg/L	<0.50	41.9	130	92.0	0.50	9149122
Elements							
Dissolved Mercury (Hg)	ug/L	<0.0020	<0.0020	<0.0020	<0.0020	0.0020	9153486
Dissolved Metals by ICPMS							
Dissolved Aluminum (Al)	ug/L	<3.0	5.9	8.0	3.1	3.0	9152983
Dissolved Antimony (Sb)	ug/L	<0.50	<0.50	<0.50	<0.50	0.50	9152983
Dissolved Arsenic (As)	ug/L	<0.10	0.37	0.13	0.22	0.10	9152983
Dissolved Barium (Ba)	ug/L	<1.0	<1.0	6.9	2.6	1.0	9152983
Dissolved Beryllium (Be)	ug/L	<0.10	<0.10	<0.10	<0.10	0.10	9152983
Dissolved Bismuth (Bi)	ug/L	<1.0	<1.0	<1.0	<1.0	1.0	9152983
Dissolved Boron (B)	ug/L	<50	<50	<50	83	50	9152983
Dissolved Cadmium (Cd)	ug/L	<0.010	<0.010	<0.010	<0.010	0.010	9152983
Dissolved Chromium (Cr)	ug/L	<1.0	<1.0	2.0	1.3	1.0	9152983
Dissolved Cobalt (Co)	ug/L	<0.20	<0.20	<0.20	<0.20	0.20	9152983
Dissolved Copper (Cu)	ug/L	<0.20	0.71	<0.20	<0.20	0.20	9152983
Dissolved Iron (Fe)	ug/L	<5.0	<5.0	6.4	<5.0	5.0	9152983
Dissolved Lead (Pb)	ug/L	<0.20	<0.20	<0.20	<0.20	0.20	9152983
Dissolved Lithium (Li)	ug/L	<2.0	<2.0	<2.0	<2.0	2.0	9152983
Dissolved Manganese (Mn)	ug/L	<1.0	<1.0	<1.0	<1.0	1.0	9152983
Dissolved Molybdenum (Mo)	ug/L	<1.0	<1.0	<1.0	<1.0	1.0	9152983
Dissolved Nickel (Ni)	ug/L	<1.0	<1.0	<1.0	<1.0	1.0	9152983
Dissolved Phosphorus (P)	ug/L	<10	<10	<10	22	10	9152983
Dissolved Selenium (Se)	ug/L	<0.10	0.12	0.15	<0.10	0.10	9152983
Dissolved Silicon (Si)	ug/L	<100	3610	7980	6320	100	9152983
Dissolved Silver (Ag)	ug/L	<0.020	<0.020	<0.020	<0.020	0.020	9152983
Dissolved Strontium (Sr)	ug/L	<1.0	20.6	69.4	55.2	1.0	9152983
Dissolved Thallium (Tl)	ug/L	<0.010	<0.010	<0.010	<0.010	0.010	9152983
Dissolved Tin (Sn)	ug/L	<5.0	<5.0	<5.0	<5.0	5.0	9152983
Dissolved Titanium (Ti)	ug/L	<5.0	<5.0	<5.0	<5.0	5.0	9152983
Dissolved Uranium (U)	ug/L	<0.10	<0.10	0.23	0.14	0.10	9152983
Dissolved Vanadium (V)	ug/L	<5.0	<5.0	<5.0	5.4	5.0	9152983
RDL = Reportable Detection Limit							

Maxxam Job #: B880896
Report Date: 2018/09/26

GHD Limited
Client Project #: 56484-02
Site Location: Campbell River (Phase 02) - Quarterly
Your P.O. #: 73506861-1

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

Maxxam ID		UI8885	UI8886	UI8887	UI8888		
Sampling Date		2018/09/17 14:55	2018/09/17 15:05	2018/09/17 15:45	2018/09/17 16:30		
COC Number		548142-01-01	548142-01-01	548142-01-01	548142-01-01		
	UNITS	WG-56484-170918- MND-04	WG-56484-170918- MND-05	WG-56484-170918- MND-06	WG-56484-170918- MND-07	RDL	QC Batch
Dissolved Zinc (Zn)	ug/L	<5.0	<5.0	<5.0	<5.0	5.0	9152983
Dissolved Zirconium (Zr)	ug/L	<0.10	<0.10	<0.10	<0.10	0.10	9152983
Dissolved Calcium (Ca)	mg/L	<0.050	13.8	35.8	27.2	0.050	9149125
Dissolved Magnesium (Mg)	mg/L	<0.050	1.81	9.93	5.84	0.050	9149125
Dissolved Potassium (K)	mg/L	<0.050	0.252	0.470	0.497	0.050	9149125
Dissolved Sodium (Na)	mg/L	<0.050	1.02	3.86	3.89	0.050	9149125
Dissolved Sulphur (S)	mg/L	<3.0	<3.0	<3.0	<3.0	3.0	9149125
Dissolved Sulphur (S)	ug/L	<3000	<3000	<3000	<3000	3000	9152983
RDL = Reportable Detection Limit							

Maxxam Job #: B880896
Report Date: 2018/09/26

GHD Limited
Client Project #: 56484-02
Site Location: Campbell River (Phase 02) - Quarterly
Your P.O. #: 73506861-1

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

Maxxam ID		UI8889	UI8890	UI8891	UI8903		
Sampling Date		2018/09/17 17:00	2018/09/17 18:10	2018/09/17 18:30	2018/09/18 09:30		
COC Number		548142-01-01	548142-01-01	548142-01-01	548142-02-01		
	UNITS	WG-56484-170918-MND-08	WG-56484-170918-MND-09	WG-56484-170918-MND-10	WG-56484-180918-MND-11	RDL	QC Batch

Calculated Parameters							
Dissolved Hardness (CaCO ₃)	mg/L	33.5	155	216	83.2	0.50	9149122
Elements							
Dissolved Mercury (Hg)	ug/L	<0.0020	<0.0020	<0.0020	<0.0020	0.0020	9153486
Dissolved Metals by ICPMS							
Dissolved Aluminum (Al)	ug/L	<3.0	4.8	7.0	5.4	3.0	9152983
Dissolved Antimony (Sb)	ug/L	<0.50	<0.50	<0.50	<0.50	0.50	9152983
Dissolved Arsenic (As)	ug/L	<0.10	2.32	0.32	2.38	0.10	9152983
Dissolved Barium (Ba)	ug/L	1.4	13.8	14.5	3.9	1.0	9152983
Dissolved Beryllium (Be)	ug/L	<0.10	<0.10	<0.10	<0.10	0.10	9152983
Dissolved Bismuth (Bi)	ug/L	<1.0	<1.0	<1.0	<1.0	1.0	9152983
Dissolved Boron (B)	ug/L	<50	104	216	<50	50	9152983
Dissolved Cadmium (Cd)	ug/L	<0.010	0.018	<0.010	<0.010	0.010	9152983
Dissolved Chromium (Cr)	ug/L	<1.0	<1.0	<1.0	<1.0	1.0	9152983
Dissolved Cobalt (Co)	ug/L	<0.20	<0.20	0.63	<0.20	0.20	9152983
Dissolved Copper (Cu)	ug/L	<0.20	0.22	0.49	<0.20	0.20	9152983
Dissolved Iron (Fe)	ug/L	<5.0	528	5720	<5.0	5.0	9152983
Dissolved Lead (Pb)	ug/L	<0.20	<0.20	<0.20	<0.20	0.20	9152983
Dissolved Lithium (Li)	ug/L	<2.0	<2.0	<2.0	<2.0	2.0	9152983
Dissolved Manganese (Mn)	ug/L	<1.0	1460	2490	<1.0	1.0	9152983
Dissolved Molybdenum (Mo)	ug/L	<1.0	<1.0	<1.0	<1.0	1.0	9152983
Dissolved Nickel (Ni)	ug/L	<1.0	<1.0	1.6	<1.0	1.0	9152983
Dissolved Phosphorus (P)	ug/L	<10	25	70	34	10	9152983
Dissolved Selenium (Se)	ug/L	0.11	<0.10	<0.10	0.17	0.10	9152983
Dissolved Silicon (Si)	ug/L	3290	7700	7390	5100	100	9152983
Dissolved Silver (Ag)	ug/L	<0.020	<0.020	<0.020	<0.020	0.020	9152983
Dissolved Strontium (Sr)	ug/L	15.2	203	186	31.5	1.0	9152983
Dissolved Thallium (Tl)	ug/L	<0.010	<0.010	<0.010	<0.010	0.010	9152983
Dissolved Tin (Sn)	ug/L	<5.0	<5.0	<5.0	<5.0	5.0	9152983
Dissolved Titanium (Ti)	ug/L	<5.0	<5.0	<5.0	<5.0	5.0	9152983
Dissolved Uranium (U)	ug/L	<0.10	<0.10	<0.10	0.16	0.10	9152983
Dissolved Vanadium (V)	ug/L	<5.0	<5.0	<5.0	20.3	5.0	9152983
RDL = Reportable Detection Limit							

Maxxam Job #: B880896
Report Date: 2018/09/26

GHD Limited
Client Project #: 56484-02
Site Location: Campbell River (Phase 02) - Quarterly
Your P.O. #: 73506861-1

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

Maxxam ID		UI8889	UI8890	UI8891	UI8903		
Sampling Date		2018/09/17 17:00	2018/09/17 18:10	2018/09/17 18:30	2018/09/18 09:30		
COC Number		548142-01-01	548142-01-01	548142-01-01	548142-02-01		
	UNITS	WG-56484-170918- MND-08	WG-56484-170918- MND-09	WG-56484-170918- MND-10	WG-56484-180918- MND-11	RDL	QC Batch
Dissolved Zinc (Zn)	ug/L	<5.0	<5.0	<5.0	<5.0	5.0	9152983
Dissolved Zirconium (Zr)	ug/L	<0.10	<0.10	<0.10	<0.10	0.10	9152983
Dissolved Calcium (Ca)	mg/L	10.8	53.0	73.3	27.0	0.050	9149125
Dissolved Magnesium (Mg)	mg/L	1.61	5.42	7.99	3.83	0.050	9149125
Dissolved Potassium (K)	mg/L	0.131	4.39	3.36	1.06	0.050	9149125
Dissolved Sodium (Na)	mg/L	0.954	9.64	22.1	1.36	0.050	9149125
Dissolved Sulphur (S)	mg/L	<3.0	<3.0	<3.0	<3.0	3.0	9149125
Dissolved Sulphur (S)	ug/L	<3000	<3000	<3000	<3000	3000	9152983
RDL = Reportable Detection Limit							

Maxxam Job #: B880896
Report Date: 2018/09/26

GHD Limited
Client Project #: 56484-02
Site Location: Campbell River (Phase 02) - Quarterly
Your P.O. #: 73506861-1

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

Maxxam ID		UI8904	UI8905	UI8906	UI8907		
Sampling Date		2018/09/18 10:00	2018/09/18 10:05	2018/09/18 11:30	2018/09/18 13:00		
COC Number		548142-02-01	548142-02-01	548142-02-01	548142-02-01		
	UNITS	WG-56484-180918-MND-12	WG-56484-180918-MND-13	WG-56484-180918-MND-14	WG-56484-180918-MND-15	RDL	QC Batch

Calculated Parameters							
Dissolved Hardness (CaCO ₃)	mg/L	238	237	100	47.9	0.50	9149122
Elements							
Dissolved Mercury (Hg)	ug/L	<0.0020	<0.0020	<0.0020	<0.0020	0.0020	9153486
Dissolved Metals by ICPMS							
Dissolved Aluminum (Al)	ug/L	3.5	<3.0	<3.0	5.3	3.0	9152983
Dissolved Antimony (Sb)	ug/L	<0.50	<0.50	<0.50	<0.50	0.50	9152983
Dissolved Arsenic (As)	ug/L	0.24	0.27	0.79	0.37	0.10	9152983
Dissolved Barium (Ba)	ug/L	44.1	44.5	1.8	<1.0	1.0	9152983
Dissolved Beryllium (Be)	ug/L	<0.10	<0.10	<0.10	<0.10	0.10	9152983
Dissolved Bismuth (Bi)	ug/L	<1.0	<1.0	<1.0	<1.0	1.0	9152983
Dissolved Boron (B)	ug/L	590	600	<50	<50	50	9152983
Dissolved Cadmium (Cd)	ug/L	0.124	0.126	<0.010	<0.010	0.010	9152983
Dissolved Chromium (Cr)	ug/L	<1.0	<1.0	<1.0	<1.0	1.0	9152983
Dissolved Cobalt (Co)	ug/L	1.93	1.89	<0.20	<0.20	0.20	9152983
Dissolved Copper (Cu)	ug/L	18.4	18.1	<0.20	0.28	0.20	9152983
Dissolved Iron (Fe)	ug/L	23.6	20.9	<5.0	<5.0	5.0	9152983
Dissolved Lead (Pb)	ug/L	<0.20	<0.20	<0.20	<0.20	0.20	9152983
Dissolved Lithium (Li)	ug/L	<2.0	<2.0	<2.0	<2.0	2.0	9152983
Dissolved Manganese (Mn)	ug/L	3000	2920	<1.0	<1.0	1.0	9152983
Dissolved Molybdenum (Mo)	ug/L	1.1	1.1	<1.0	<1.0	1.0	9152983
Dissolved Nickel (Ni)	ug/L	3.8	3.5	<1.0	<1.0	1.0	9152983
Dissolved Phosphorus (P)	ug/L	16	15	15	<10	10	9152983
Dissolved Selenium (Se)	ug/L	<0.10	<0.10	0.12	0.10	0.10	9152983
Dissolved Silicon (Si)	ug/L	13600	13800	6180	3650	100	9152983
Dissolved Silver (Ag)	ug/L	<0.020	<0.020	<0.020	<0.020	0.020	9152983
Dissolved Strontium (Sr)	ug/L	405	398	49.3	24.3	1.0	9152983
Dissolved Thallium (Tl)	ug/L	<0.010	<0.010	<0.010	<0.010	0.010	9152983
Dissolved Tin (Sn)	ug/L	<5.0	<5.0	<5.0	<5.0	5.0	9152983
Dissolved Titanium (Ti)	ug/L	<5.0	<5.0	<5.0	<5.0	5.0	9152983
Dissolved Uranium (U)	ug/L	0.51	0.51	<0.10	<0.10	0.10	9152983
Dissolved Vanadium (V)	ug/L	<5.0	<5.0	5.4	<5.0	5.0	9152983
RDL = Reportable Detection Limit							

Maxxam Job #: B880896
Report Date: 2018/09/26

GHD Limited
Client Project #: 56484-02
Site Location: Campbell River (Phase 02) - Quarterly
Your P.O. #: 73506861-1

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

Maxxam ID		UI8904	UI8905	UI8906	UI8907		
Sampling Date		2018/09/18 10:00	2018/09/18 10:05	2018/09/18 11:30	2018/09/18 13:00		
COC Number		548142-02-01	548142-02-01	548142-02-01	548142-02-01		
	UNITS	WG-56484-180918- MND-12	WG-56484-180918- MND-13	WG-56484-180918- MND-14	WG-56484-180918- MND-15	RDL	QC Batch
Dissolved Zinc (Zn)	ug/L	<5.0	<5.0	<5.0	<5.0	5.0	9152983
Dissolved Zirconium (Zr)	ug/L	<0.10	<0.10	<0.10	<0.10	0.10	9152983
Dissolved Calcium (Ca)	mg/L	72.4	72.1	32.6	16.4	0.050	9149125
Dissolved Magnesium (Mg)	mg/L	14.0	13.8	4.59	1.70	0.050	9149125
Dissolved Potassium (K)	mg/L	12.3	12.0	0.725	0.277	0.050	9149125
Dissolved Sodium (Na)	mg/L	35.2	34.3	1.94	1.28	0.050	9149125
Dissolved Sulphur (S)	mg/L	<3.0	<3.0	<3.0	<3.0	3.0	9149125
Dissolved Sulphur (S)	ug/L	<3000	<3000	<3000	<3000	3000	9152983
RDL = Reportable Detection Limit							

Maxxam Job #: B880896
Report Date: 2018/09/26

GHD Limited
Client Project #: 56484-02
Site Location: Campbell River (Phase 02) - Quarterly
Your P.O. #: 73506861-1

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

Maxxam ID		UI8908	UI8909	UI8910	UI8911		
Sampling Date		2018/09/18 14:00	2018/09/18 14:30	2018/09/18 15:00	2018/09/18 16:20		
COC Number		548142-02-01	548142-02-01	548142-02-01	548142-02-01		
	UNITS	WG-56484-180918-MND-16	WG-56484-180918-MND-17	WG-56484-180918-MND-18	WG-56484-180918-MND-19	RDL	QC Batch

Calculated Parameters							
Dissolved Hardness (CaCO3)	mg/L	69.8	51.3	122	319	0.50	9149122
Elements							
Dissolved Mercury (Hg)	ug/L	<0.0020	<0.0020	<0.0020	<0.0020	0.0020	9153486
Dissolved Metals by ICPMS							
Dissolved Aluminum (Al)	ug/L	<3.0	5.1	<3.0	<3.0	3.0	9152983
Dissolved Antimony (Sb)	ug/L	<0.50	<0.50	<0.50	<0.50	0.50	9152983
Dissolved Arsenic (As)	ug/L	0.18	1.98	0.12	0.11	0.10	9152983
Dissolved Barium (Ba)	ug/L	<1.0	1.2	<1.0	8.3	1.0	9152983
Dissolved Beryllium (Be)	ug/L	<0.10	<0.10	<0.10	<0.10	0.10	9152983
Dissolved Bismuth (Bi)	ug/L	<1.0	<1.0	<1.0	<1.0	1.0	9152983
Dissolved Boron (B)	ug/L	<50	<50	<50	121	50	9152983
Dissolved Cadmium (Cd)	ug/L	<0.010	<0.010	<0.010	0.019	0.010	9152983
Dissolved Chromium (Cr)	ug/L	<1.0	1.5	1.0	<1.0	1.0	9152983
Dissolved Cobalt (Co)	ug/L	<0.20	<0.20	<0.20	<0.20	0.20	9152983
Dissolved Copper (Cu)	ug/L	<0.20	0.30	<0.20	0.60	0.20	9152983
Dissolved Iron (Fe)	ug/L	<5.0	<5.0	<5.0	<5.0	5.0	9152983
Dissolved Lead (Pb)	ug/L	<0.20	<0.20	<0.20	<0.20	0.20	9152983
Dissolved Lithium (Li)	ug/L	<2.0	<2.0	<2.0	<2.0	2.0	9152983
Dissolved Manganese (Mn)	ug/L	<1.0	<1.0	<1.0	<1.0	1.0	9152983
Dissolved Molybdenum (Mo)	ug/L	<1.0	<1.0	<1.0	<1.0	1.0	9152983
Dissolved Nickel (Ni)	ug/L	<1.0	<1.0	<1.0	<1.0	1.0	9152983
Dissolved Phosphorus (P)	ug/L	21	48	28	<10	10	9152983
Dissolved Selenium (Se)	ug/L	0.16	0.21	0.16	<0.10	0.10	9152983
Dissolved Silicon (Si)	ug/L	4480	5990	4520	11100	100	9152983
Dissolved Silver (Ag)	ug/L	<0.020	<0.020	<0.020	<0.020	0.020	9152983
Dissolved Strontium (Sr)	ug/L	36.7	28.3	99.8	219	1.0	9152983
Dissolved Thallium (Tl)	ug/L	<0.010	<0.010	<0.010	<0.010	0.010	9152983
Dissolved Tin (Sn)	ug/L	<5.0	<5.0	<5.0	<5.0	5.0	9152983
Dissolved Titanium (Ti)	ug/L	<5.0	<5.0	<5.0	<5.0	5.0	9152983
Dissolved Uranium (U)	ug/L	<0.10	0.28	0.24	0.35	0.10	9152983
Dissolved Vanadium (V)	ug/L	<5.0	16.1	<5.0	<5.0	5.0	9152983
RDL = Reportable Detection Limit							

Maxxam Job #: B880896
Report Date: 2018/09/26

GHD Limited
Client Project #: 56484-02
Site Location: Campbell River (Phase 02) - Quarterly
Your P.O. #: 73506861-1

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

Maxxam ID		UI8908	UI8909	UI8910	UI8911		
Sampling Date		2018/09/18 14:00	2018/09/18 14:30	2018/09/18 15:00	2018/09/18 16:20		
COC Number		548142-02-01	548142-02-01	548142-02-01	548142-02-01		
	UNITS	WG-56484-180918- MND-16	WG-56484-180918- MND-17	WG-56484-180918- MND-18	WG-56484-180918- MND-19	RDL	QC Batch
Dissolved Zinc (Zn)	ug/L	<5.0	<5.0	<5.0	<5.0	5.0	9152983
Dissolved Zirconium (Zr)	ug/L	<0.10	<0.10	<0.10	<0.10	0.10	9152983
Dissolved Calcium (Ca)	mg/L	22.6	16.1	38.2	97.2	0.050	9149125
Dissolved Magnesium (Mg)	mg/L	3.27	2.69	6.42	18.5	0.050	9149125
Dissolved Potassium (K)	mg/L	0.294	0.691	0.374	1.37	0.050	9149125
Dissolved Sodium (Na)	mg/L	1.61	2.44	3.82	6.97	0.050	9149125
Dissolved Sulphur (S)	mg/L	<3.0	<3.0	<3.0	5.1	3.0	9149125
Dissolved Sulphur (S)	ug/L	<3000	<3000	<3000	5090	3000	9152983
RDL = Reportable Detection Limit							

Maxxam Job #: B880896
Report Date: 2018/09/26

GHD Limited
Client Project #: 56484-02
Site Location: Campbell River (Phase 02) - Quarterly
Your P.O. #: 73506861-1

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

Maxxam ID		UI8912		
Sampling Date		2018/09/18 17:20		
COC Number		548142-02-01		
	UNITS	WG-56484-180918- MND-20	RDL	QC Batch
Calculated Parameters				
Dissolved Hardness (CaCO3)	mg/L	435	0.50	9149122
Elements				
Dissolved Mercury (Hg)	ug/L	<0.0020	0.0020	9153486
Dissolved Metals by ICPMS				
Dissolved Aluminum (Al)	ug/L	<3.0	3.0	9152983
Dissolved Antimony (Sb)	ug/L	<0.50	0.50	9152983
Dissolved Arsenic (As)	ug/L	0.15	0.10	9152983
Dissolved Barium (Ba)	ug/L	17.0	1.0	9152983
Dissolved Beryllium (Be)	ug/L	<0.10	0.10	9152983
Dissolved Bismuth (Bi)	ug/L	<1.0	1.0	9152983
Dissolved Boron (B)	ug/L	173	50	9152983
Dissolved Cadmium (Cd)	ug/L	0.043	0.010	9152983
Dissolved Chromium (Cr)	ug/L	<1.0	1.0	9152983
Dissolved Cobalt (Co)	ug/L	0.31	0.20	9152983
Dissolved Copper (Cu)	ug/L	1.87	0.20	9152983
Dissolved Iron (Fe)	ug/L	8.2	5.0	9152983
Dissolved Lead (Pb)	ug/L	<0.20	0.20	9152983
Dissolved Lithium (Li)	ug/L	<2.0	2.0	9152983
Dissolved Manganese (Mn)	ug/L	112	1.0	9152983
Dissolved Molybdenum (Mo)	ug/L	<1.0	1.0	9152983
Dissolved Nickel (Ni)	ug/L	1.1	1.0	9152983
Dissolved Phosphorus (P)	ug/L	<10	10	9152983
Dissolved Selenium (Se)	ug/L	<0.10	0.10	9152983
Dissolved Silicon (Si)	ug/L	11900	100	9152983
Dissolved Silver (Ag)	ug/L	<0.020	0.020	9152983
Dissolved Strontium (Sr)	ug/L	352	1.0	9152983
Dissolved Thallium (Tl)	ug/L	<0.010	0.010	9152983
Dissolved Tin (Sn)	ug/L	<5.0	5.0	9152983
Dissolved Titanium (Ti)	ug/L	<5.0	5.0	9152983
Dissolved Uranium (U)	ug/L	0.72	0.10	9152983
Dissolved Vanadium (V)	ug/L	<5.0	5.0	9152983
RDL = Reportable Detection Limit				

Maxxam Job #: B880896
Report Date: 2018/09/26

GHD Limited
Client Project #: 56484-02
Site Location: Campbell River (Phase 02) - Quarterly
Your P.O. #: 73506861-1

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

Maxxam ID		UI8912		
Sampling Date		2018/09/18 17:20		
COC Number		548142-02-01		
	UNITS	WG-56484-180918- MND-20	RDL	QC Batch
Dissolved Zinc (Zn)	ug/L	<5.0	5.0	9152983
Dissolved Zirconium (Zr)	ug/L	<0.10	0.10	9152983
Dissolved Calcium (Ca)	mg/L	128	0.050	9149125
Dissolved Magnesium (Mg)	mg/L	28.0	0.050	9149125
Dissolved Potassium (K)	mg/L	2.16	0.050	9149125
Dissolved Sodium (Na)	mg/L	23.0	0.050	9149125
Dissolved Sulphur (S)	mg/L	4.3	3.0	9149125
Dissolved Sulphur (S)	ug/L	4350	3000	9152983
RDL = Reportable Detection Limit				

Maxxam Job #: B880896
Report Date: 2018/09/26

GHD Limited
Client Project #: 56484-02
Site Location: Campbell River (Phase 02) - Quarterly
Your P.O. #: 73506861-1

CSR VOC + VPH IN WATER (GROUND WATER)

Maxxam ID		UI8888	UI8889	UI8890		
Sampling Date		2018/09/17 16:30	2018/09/17 17:00	2018/09/17 18:10		
COC Number		548142-01-01	548142-01-01	548142-01-01		
	UNITS	WG-56484-170918-MND-07	WG-56484-170918-MND-08	WG-56484-170918-MND-09	RDL	QC Batch
Calculated Parameters						
VPH (VHW6 to 10 - BTEX)	ug/L	<300	<300	<300	300	9149135
Volatiles						
VH C6-C10	ug/L	<300	<300	<300	300	9158231
1,1,1,2-tetrachloroethane	ug/L	<0.50	<0.50	<0.50	0.50	9158231
1,1,1-trichloroethane	ug/L	<0.50	<0.50	<0.50	0.50	9158231
1,1,2,2-tetrachloroethane	ug/L	<0.50	<0.50	<0.50	0.50	9158231
1,1,2-Trichloro-1,2,2-Trifluoroethane	ug/L	<2.0	<2.0	<2.0	2.0	9158231
1,1,2-trichloroethane	ug/L	<0.50	<0.50	<0.50	0.50	9158231
1,1-dichloroethane	ug/L	<0.50	<0.50	<0.50	0.50	9158231
1,1-dichloroethene	ug/L	<0.50	<0.50	<0.50	0.50	9158231
1,2,3-trichlorobenzene	ug/L	<2.0	<2.0	<2.0	2.0	9158231
1,2,4-trichlorobenzene	ug/L	<2.0	<2.0	<2.0	2.0	9158231
1,2-dibromoethane	ug/L	<0.20	<0.20	<0.20	0.20	9158231
1,2-dichlorobenzene	ug/L	<0.50	<0.50	<0.50	0.50	9158231
1,2-dichloroethane	ug/L	<0.50	<0.50	<0.50	0.50	9158231
1,2-dichloropropane	ug/L	<0.50	<0.50	<0.50	0.50	9158231
1,3,5-trimethylbenzene	ug/L	<2.0	<2.0	<2.0	2.0	9158231
1,3-dichlorobenzene	ug/L	<0.50	<0.50	<0.50	0.50	9158231
1,4-dichlorobenzene	ug/L	<0.50	<0.50	<0.50	0.50	9158231
Benzene	ug/L	<0.40	<0.40	<0.40	0.40	9158231
Bromobenzene	ug/L	<2.0	<2.0	<2.0	2.0	9158231
Bromodichloromethane	ug/L	<1.0	<1.0	<1.0	1.0	9158231
Bromoform	ug/L	<1.0	<1.0	<1.0	1.0	9158231
Bromomethane	ug/L	<1.0	<1.0	<1.0	1.0	9158231
Carbon tetrachloride	ug/L	<0.50	<0.50	<0.50	0.50	9158231
Chlorobenzene	ug/L	<0.50	<0.50	<0.50	0.50	9158231
Chlorodibromomethane	ug/L	<1.0	<1.0	<1.0	1.0	9158231
Chloroethane	ug/L	<1.0	<1.0	<1.0	1.0	9158231
Chloroform	ug/L	<1.0	<1.0	<1.0	1.0	9158231
Chloromethane	ug/L	<1.0	<1.0	<1.0	1.0	9158231
cis-1,2-dichloroethene	ug/L	<1.0	<1.0	<1.0	1.0	9158231
RDL = Reportable Detection Limit						

Maxxam Job #: B880896
Report Date: 2018/09/26

GHD Limited
Client Project #: 56484-02
Site Location: Campbell River (Phase 02) - Quarterly
Your P.O. #: 73506861-1

CSR VOC + VPH IN WATER (GROUND WATER)

Maxxam ID		UI8888	UI8889	UI8890		
Sampling Date		2018/09/17 16:30	2018/09/17 17:00	2018/09/17 18:10		
COC Number		548142-01-01	548142-01-01	548142-01-01		
	UNITS	WG-56484-170918-MND-07	WG-56484-170918-MND-08	WG-56484-170918-MND-09	RDL	QC Batch
cis-1,3-dichloropropene	ug/L	<1.0	<1.0	<1.0	1.0	9158231
Dichlorodifluoromethane	ug/L	<2.0	<2.0	<2.0	2.0	9158231
Dichloromethane	ug/L	<2.0	<2.0	<2.0	2.0	9158231
Ethylbenzene	ug/L	<0.40	<0.40	<0.40	0.40	9158231
Hexachlorobutadiene	ug/L	<0.50	<0.50	<0.50	0.50	9158231
Isopropylbenzene	ug/L	<2.0	<2.0	<2.0	2.0	9158231
Methyl-tert-butylether (MTBE)	ug/L	<4.0	<4.0	<4.0	4.0	9158231
Styrene	ug/L	<0.50	<0.50	<0.50	0.50	9158231
Tetrachloroethene	ug/L	<0.50	<0.50	<0.50	0.50	9158231
Toluene	ug/L	<0.40	<0.40	<0.40	0.40	9158231
trans-1,2-dichloroethene	ug/L	<1.0	<1.0	<1.0	1.0	9158231
trans-1,3-dichloropropene	ug/L	<1.0	<1.0	<1.0	1.0	9158231
Trichloroethene	ug/L	<0.50	<0.50	<0.50	0.50	9158231
Trichlorofluoromethane	ug/L	<4.0	<4.0	<4.0	4.0	9158231
Vinyl chloride	ug/L	<0.50	<0.50	<0.50	0.50	9158231
m & p-Xylene	ug/L	<0.40	<0.40	<0.40	0.40	9158231
o-Xylene	ug/L	<0.40	<0.40	<0.40	0.40	9158231
Xylenes (Total)	ug/L	<0.40	<0.40	<0.40	0.40	9158231
Surrogate Recovery (%)						
1,4-Difluorobenzene (sur.)	%	105	105	104	N/A	9158231
4-Bromofluorobenzene (sur.)	%	90	88	89	N/A	9158231
D4-1,2-Dichloroethane (sur.)	%	105	105	103	N/A	9158231
RDL = Reportable Detection Limit						
N/A = Not Applicable						

Maxxam Job #: B880896
Report Date: 2018/09/26

GHD Limited
Client Project #: 56484-02
Site Location: Campbell River (Phase 02) - Quarterly
Your P.O. #: 73506861-1

CSR VOC + VPH IN WATER (GROUND WATER)

Maxxam ID		UI8904	UI8905	UI8908		
Sampling Date		2018/09/18 10:00	2018/09/18 10:05	2018/09/18 14:00		
COC Number		548142-02-01	548142-02-01	548142-02-01		
	UNITS	WG-56484-180918-MND-12	WG-56484-180918-MND-13	WG-56484-180918-MND-16	RDL	QC Batch
Calculated Parameters						
VPH (VHW6 to 10 - BTEX)	ug/L	<300	<300	<300	300	9149135
Volatiles						
VH C6-C10	ug/L	<300	<300	<300	300	9158231
1,1,1,2-tetrachloroethane	ug/L	<0.50	<0.50	<0.50	0.50	9158231
1,1,1-trichloroethane	ug/L	<0.50	<0.50	<0.50	0.50	9158231
1,1,2,2-tetrachloroethane	ug/L	<0.50	<0.50	<0.50	0.50	9158231
1,1,2Trichloro-1,2,2Trifluoroethane	ug/L	<2.0	<2.0	<2.0	2.0	9158231
1,1,2-trichloroethane	ug/L	<0.50	<0.50	<0.50	0.50	9158231
1,1-dichloroethane	ug/L	<0.50	<0.50	<0.50	0.50	9158231
1,1-dichloroethene	ug/L	<0.50	<0.50	<0.50	0.50	9158231
1,2,3-trichlorobenzene	ug/L	<2.0	<2.0	<2.0	2.0	9158231
1,2,4-trichlorobenzene	ug/L	<2.0	<2.0	<2.0	2.0	9158231
1,2-dibromoethane	ug/L	<0.20	<0.20	<0.20	0.20	9158231
1,2-dichlorobenzene	ug/L	<0.50	<0.50	<0.50	0.50	9158231
1,2-dichloroethane	ug/L	<0.50	<0.50	<0.50	0.50	9158231
1,2-dichloropropane	ug/L	<0.50	<0.50	<0.50	0.50	9158231
1,3,5-trimethylbenzene	ug/L	<2.0	<2.0	<2.0	2.0	9158231
1,3-dichlorobenzene	ug/L	<0.50	<0.50	<0.50	0.50	9158231
1,4-dichlorobenzene	ug/L	<0.50	<0.50	<0.50	0.50	9158231
Benzene	ug/L	<0.40	<0.40	<0.40	0.40	9158231
Bromobenzene	ug/L	<2.0	<2.0	<2.0	2.0	9158231
Bromodichloromethane	ug/L	<1.0	<1.0	<1.0	1.0	9158231
Bromoform	ug/L	<1.0	<1.0	<1.0	1.0	9158231
Bromomethane	ug/L	<1.0	<1.0	<1.0	1.0	9158231
Carbon tetrachloride	ug/L	<0.50	<0.50	<0.50	0.50	9158231
Chlorobenzene	ug/L	<0.50	<0.50	<0.50	0.50	9158231
Chlorodibromomethane	ug/L	<1.0	<1.0	<1.0	1.0	9158231
Chloroethane	ug/L	<1.0	<1.0	<1.0	1.0	9158231
Chloroform	ug/L	<1.0	<1.0	<1.0	1.0	9158231
Chloromethane	ug/L	<1.0	<1.0	<1.0	1.0	9158231
cis-1,2-dichloroethene	ug/L	<1.0	<1.0	<1.0	1.0	9158231
RDL = Reportable Detection Limit						

Maxxam Job #: B880896
Report Date: 2018/09/26

GHD Limited
Client Project #: 56484-02
Site Location: Campbell River (Phase 02) - Quarterly
Your P.O. #: 73506861-1

CSR VOC + VPH IN WATER (GROUND WATER)

Maxxam ID		UI8904	UI8905	UI8908		
Sampling Date		2018/09/18 10:00	2018/09/18 10:05	2018/09/18 14:00		
COC Number		548142-02-01	548142-02-01	548142-02-01		
	UNITS	WG-56484-180918-MND-12	WG-56484-180918-MND-13	WG-56484-180918-MND-16	RDL	QC Batch
cis-1,3-dichloropropene	ug/L	<1.0	<1.0	<1.0	1.0	9158231
Dichlorodifluoromethane	ug/L	<2.0	<2.0	<2.0	2.0	9158231
Dichloromethane	ug/L	<2.0	<2.0	<2.0	2.0	9158231
Ethylbenzene	ug/L	<0.40	<0.40	<0.40	0.40	9158231
Hexachlorobutadiene	ug/L	<0.50	<0.50	<0.50	0.50	9158231
Isopropylbenzene	ug/L	<2.0	<2.0	<2.0	2.0	9158231
Methyl-tert-butylether (MTBE)	ug/L	<4.0	<4.0	<4.0	4.0	9158231
Styrene	ug/L	<0.50	<0.50	<0.50	0.50	9158231
Tetrachloroethene	ug/L	<0.50	<0.50	<0.50	0.50	9158231
Toluene	ug/L	<0.40	<0.40	<0.40	0.40	9158231
trans-1,2-dichloroethene	ug/L	<1.0	<1.0	<1.0	1.0	9158231
trans-1,3-dichloropropene	ug/L	<1.0	<1.0	<1.0	1.0	9158231
Trichloroethene	ug/L	<0.50	<0.50	<0.50	0.50	9158231
Trichlorofluoromethane	ug/L	<4.0	<4.0	<4.0	4.0	9158231
Vinyl chloride	ug/L	<0.50	<0.50	<0.50	0.50	9158231
m & p-Xylene	ug/L	<0.40	<0.40	<0.40	0.40	9158231
o-Xylene	ug/L	<0.40	<0.40	<0.40	0.40	9158231
Xylenes (Total)	ug/L	<0.40	<0.40	<0.40	0.40	9158231
Surrogate Recovery (%)						
1,4-Difluorobenzene (sur.)	%	105	105	104	N/A	9158231
4-Bromofluorobenzene (sur.)	%	89	89	89	N/A	9158231
D4-1,2-Dichloroethane (sur.)	%	104	105	105	N/A	9158231
RDL = Reportable Detection Limit						
N/A = Not Applicable						

Maxxam Job #: B880896
Report Date: 2018/09/26

GHD Limited
Client Project #: 56484-02
Site Location: Campbell River (Phase 02) - Quarterly
Your P.O. #: 73506861-1

CSR VOC + VPH IN WATER (GROUND WATER)

Maxxam ID		UI8909	UI8910	UI8912		
Sampling Date		2018/09/18 14:30	2018/09/18 15:00	2018/09/18 17:20		
COC Number		548142-02-01	548142-02-01	548142-02-01		
	UNITS	WG-56484-180918-MND-17	WG-56484-180918-MND-18	WG-56484-180918-MND-20	RDL	QC Batch
Calculated Parameters						
VPH (VHW6 to 10 - BTEX)	ug/L	<300	<300	<300	300	9149135
Volatiles						
VH C6-C10	ug/L	<300	<300	<300	300	9158231
1,1,1,2-tetrachloroethane	ug/L	<0.50	<0.50	<0.50	0.50	9158231
1,1,1-trichloroethane	ug/L	<0.50	<0.50	<0.50	0.50	9158231
1,1,2,2-tetrachloroethane	ug/L	<0.50	<0.50	<0.50	0.50	9158231
1,1,2Trichloro-1,2,2Trifluoroethane	ug/L	<2.0	<2.0	<2.0	2.0	9158231
1,1,2-trichloroethane	ug/L	<0.50	<0.50	<0.50	0.50	9158231
1,1-dichloroethane	ug/L	<0.50	<0.50	<0.50	0.50	9158231
1,1-dichloroethene	ug/L	<0.50	<0.50	<0.50	0.50	9158231
1,2,3-trichlorobenzene	ug/L	<2.0	<2.0	<2.0	2.0	9158231
1,2,4-trichlorobenzene	ug/L	<2.0	<2.0	<2.0	2.0	9158231
1,2-dibromoethane	ug/L	<0.20	<0.20	<0.20	0.20	9158231
1,2-dichlorobenzene	ug/L	<0.50	<0.50	<0.50	0.50	9158231
1,2-dichloroethane	ug/L	<0.50	<0.50	<0.50	0.50	9158231
1,2-dichloropropane	ug/L	<0.50	<0.50	<0.50	0.50	9158231
1,3,5-trimethylbenzene	ug/L	<2.0	<2.0	<2.0	2.0	9158231
1,3-dichlorobenzene	ug/L	<0.50	<0.50	<0.50	0.50	9158231
1,4-dichlorobenzene	ug/L	<0.50	<0.50	<0.50	0.50	9158231
Benzene	ug/L	<0.40	<0.40	<0.40	0.40	9158231
Bromobenzene	ug/L	<2.0	<2.0	<2.0	2.0	9158231
Bromodichloromethane	ug/L	<1.0	<1.0	<1.0	1.0	9158231
Bromoform	ug/L	<1.0	<1.0	<1.0	1.0	9158231
Bromomethane	ug/L	<1.0	<1.0	<1.0	1.0	9158231
Carbon tetrachloride	ug/L	<0.50	<0.50	<0.50	0.50	9158231
Chlorobenzene	ug/L	<0.50	<0.50	<0.50	0.50	9158231
Chlorodibromomethane	ug/L	<1.0	<1.0	<1.0	1.0	9158231
Chloroethane	ug/L	<1.0	<1.0	<1.0	1.0	9158231
Chloroform	ug/L	<1.0	<1.0	<1.0	1.0	9158231
Chloromethane	ug/L	<1.0	<1.0	<1.0	1.0	9158231
cis-1,2-dichloroethene	ug/L	<1.0	<1.0	<1.0	1.0	9158231
RDL = Reportable Detection Limit						

Maxxam Job #: B880896
Report Date: 2018/09/26

GHD Limited
Client Project #: 56484-02
Site Location: Campbell River (Phase 02) - Quarterly
Your P.O. #: 73506861-1

CSR VOC + VPH IN WATER (GROUND WATER)

Maxxam ID		UI8909	UI8910	UI8912		
Sampling Date		2018/09/18 14:30	2018/09/18 15:00	2018/09/18 17:20		
COC Number		548142-02-01	548142-02-01	548142-02-01		
	UNITS	WG-56484-180918-MND-17	WG-56484-180918-MND-18	WG-56484-180918-MND-20	RDL	QC Batch
cis-1,3-dichloropropene	ug/L	<1.0	<1.0	<1.0	1.0	9158231
Dichlorodifluoromethane	ug/L	<2.0	<2.0	<2.0	2.0	9158231
Dichloromethane	ug/L	<2.0	<2.0	<2.0	2.0	9158231
Ethylbenzene	ug/L	<0.40	<0.40	<0.40	0.40	9158231
Hexachlorobutadiene	ug/L	<0.50	<0.50	<0.50	0.50	9158231
Isopropylbenzene	ug/L	<2.0	<2.0	<2.0	2.0	9158231
Methyl-tert-butylether (MTBE)	ug/L	<4.0	<4.0	<4.0	4.0	9158231
Styrene	ug/L	<0.50	<0.50	<0.50	0.50	9158231
Tetrachloroethene	ug/L	<0.50	<0.50	<0.50	0.50	9158231
Toluene	ug/L	<0.40	<0.40	<0.40	0.40	9158231
trans-1,2-dichloroethene	ug/L	<1.0	<1.0	<1.0	1.0	9158231
trans-1,3-dichloropropene	ug/L	<1.0	<1.0	<1.0	1.0	9158231
Trichloroethene	ug/L	<0.50	<0.50	<0.50	0.50	9158231
Trichlorofluoromethane	ug/L	<4.0	<4.0	<4.0	4.0	9158231
Vinyl chloride	ug/L	<0.50	<0.50	<0.50	0.50	9158231
m & p-Xylene	ug/L	<0.40	<0.40	<0.40	0.40	9158231
o-Xylene	ug/L	<0.40	<0.40	<0.40	0.40	9158231
Xylenes (Total)	ug/L	<0.40	<0.40	<0.40	0.40	9158231
Surrogate Recovery (%)						
1,4-Difluorobenzene (sur.)	%	103	104	103	N/A	9158231
4-Bromofluorobenzene (sur.)	%	89	89	88	N/A	9158231
D4-1,2-Dichloroethane (sur.)	%	106	109	105	N/A	9158231
RDL = Reportable Detection Limit						
N/A = Not Applicable						

Maxxam Job #: B880896
Report Date: 2018/09/26

GHD Limited
Client Project #: 56484-02
Site Location: Campbell River (Phase 02) - Quarterly
Your P.O. #: 73506861-1

CSR VOC + VPH IN WATER (WATER)

Maxxam ID		UI9635		
Sampling Date				
COC Number		548142-01-01		
	UNITS	TRIP BLANK	RDL	QC Batch
Calculated Parameters				
VPH (VHW6 to 10 - BTEX)	ug/L	<300	300	9149135
Volatiles				
VH C6-C10	ug/L	<300	300	9158231
1,1,1,2-tetrachloroethane	ug/L	<0.50	0.50	9158231
1,1,1-trichloroethane	ug/L	<0.50	0.50	9158231
1,1,2,2-tetrachloroethane	ug/L	<0.50	0.50	9158231
1,1,2Trichloro-1,2,2Trifluoroethane	ug/L	<2.0	2.0	9158231
1,1,2-trichloroethane	ug/L	<0.50	0.50	9158231
1,1-dichloroethane	ug/L	<0.50	0.50	9158231
1,1-dichloroethene	ug/L	<0.50	0.50	9158231
1,2,3-trichlorobenzene	ug/L	<2.0	2.0	9158231
1,2,4-trichlorobenzene	ug/L	<2.0	2.0	9158231
1,2-dibromoethane	ug/L	<0.20	0.20	9158231
1,2-dichlorobenzene	ug/L	<0.50	0.50	9158231
1,2-dichloroethane	ug/L	<0.50	0.50	9158231
1,2-dichloropropane	ug/L	<0.50	0.50	9158231
1,3,5-trimethylbenzene	ug/L	<2.0	2.0	9158231
1,3-dichlorobenzene	ug/L	<0.50	0.50	9158231
1,4-dichlorobenzene	ug/L	<0.50	0.50	9158231
Benzene	ug/L	<0.40	0.40	9158231
Bromobenzene	ug/L	<2.0	2.0	9158231
Bromodichloromethane	ug/L	<1.0	1.0	9158231
Bromoform	ug/L	<1.0	1.0	9158231
Bromomethane	ug/L	<1.0	1.0	9158231
Carbon tetrachloride	ug/L	<0.50	0.50	9158231
Chlorobenzene	ug/L	<0.50	0.50	9158231
Chlorodibromomethane	ug/L	<1.0	1.0	9158231
Chloroethane	ug/L	<1.0	1.0	9158231
Chloroform	ug/L	<1.0	1.0	9158231
Chloromethane	ug/L	<1.0	1.0	9158231
cis-1,2-dichloroethene	ug/L	<1.0	1.0	9158231
cis-1,3-dichloropropene	ug/L	<1.0	1.0	9158231
RDL = Reportable Detection Limit				

Maxxam Job #: B880896
Report Date: 2018/09/26

GHD Limited
Client Project #: 56484-02
Site Location: Campbell River (Phase 02) - Quarterly
Your P.O. #: 73506861-1

CSR VOC + VPH IN WATER (WATER)

Maxxam ID		UI9635		
Sampling Date				
COC Number		548142-01-01		
	UNITS	TRIP BLANK	RDL	QC Batch
Dichlorodifluoromethane	ug/L	<2.0	2.0	9158231
Dichloromethane	ug/L	<2.0	2.0	9158231
Ethylbenzene	ug/L	<0.40	0.40	9158231
Hexachlorobutadiene	ug/L	<0.50	0.50	9158231
Isopropylbenzene	ug/L	<2.0	2.0	9158231
Methyl-tert-butylether (MTBE)	ug/L	<4.0	4.0	9158231
Styrene	ug/L	<0.50	0.50	9158231
Tetrachloroethene	ug/L	<0.50	0.50	9158231
Toluene	ug/L	<0.40	0.40	9158231
trans-1,2-dichloroethene	ug/L	<1.0	1.0	9158231
trans-1,3-dichloropropene	ug/L	<1.0	1.0	9158231
Trichloroethene	ug/L	<0.50	0.50	9158231
Trichlorofluoromethane	ug/L	<4.0	4.0	9158231
Vinyl chloride	ug/L	<0.50	0.50	9158231
m & p-Xylene	ug/L	<0.40	0.40	9158231
o-Xylene	ug/L	<0.40	0.40	9158231
Xylenes (Total)	ug/L	<0.40	0.40	9158231
Surrogate Recovery (%)				
1,4-Difluorobenzene (sur.)	%	105	N/A	9158231
4-Bromofluorobenzene (sur.)	%	91	N/A	9158231
D4-1,2-Dichloroethane (sur.)	%	106	N/A	9158231
RDL = Reportable Detection Limit				
N/A = Not Applicable				

Maxxam Job #: B880896
Report Date: 2018/09/26

GHD Limited
Client Project #: 56484-02
Site Location: Campbell River (Phase 02) - Quarterly
Your P.O. #: 73506861-1

GENERAL COMMENTS

Sample UI8887 [WG-56484-170918-MND-06] : Sample was analyzed past method specified hold time for Nitrate + Nitrite (N) (highlevel). 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 (highlevel).

Sample UI8888 [WG-56484-170918-MND-07] : Sample was analyzed past method specified hold time for Nitrate + Nitrite (N) (highlevel). 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 (highlevel).

Sample UI8889 [WG-56484-170918-MND-08] : Sample was analyzed past method specified hold time for Nitrate + Nitrite (N) (highlevel). 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 (highlevel).

Sample UI8890 [WG-56484-170918-MND-09] : Sample was analyzed past method specified hold time for Nitrate + Nitrite (N) (highlevel). 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 (highlevel).

Results relate only to the items tested.

Maxxam Job #: B880896
Report Date: 2018/09/26

QUALITY ASSURANCE REPORT

GHD Limited
Client Project #: 56484-02
Site Location: Campbell River (Phase 02) - Quarterly
Your P.O. #: 73506861-1

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
9158231	1,4-Difluorobenzene (sur.)	2018/09/26	98	70 - 130	98	70 - 130	102	%		
9158231	4-Bromofluorobenzene (sur.)	2018/09/26	92	70 - 130	95	70 - 130	89	%		
9158231	D4-1,2-Dichloroethane (sur.)	2018/09/26	94	70 - 130	99	70 - 130	105	%		
9152084	Nitrate plus Nitrite (N)	2018/09/20	108 (1)	80 - 120	110	80 - 120	<0.10	mg/L	NC (2)	25
9152087	Nitrite (N)	2018/09/20	92 (1)	80 - 120	107	80 - 120	<0.10	mg/L	NC (2)	20
9152429	Dissolved Chloride (Cl)	2018/09/20	98	80 - 120	98	80 - 120	<1.0	mg/L	0.13 (3)	20
9152432	Dissolved Sulphate (SO4)	2018/09/20	112	80 - 120	93	80 - 120	<1.0	mg/L	1.9 (3)	20
9152433	Dissolved Chloride (Cl)	2018/09/20	NC (4)	80 - 120	98	80 - 120	<1.0	mg/L	1.1 (5)	20
9152434	Dissolved Sulphate (SO4)	2018/09/20	118 (4)	80 - 120	94	80 - 120	<1.0	mg/L	6.6 (5)	20
9152476	Alkalinity (PP as CaCO3)	2018/09/21					<1.0	mg/L		
9152476	Alkalinity (Total as CaCO3)	2018/09/21	94	80 - 120	98	80 - 120	<1.0	mg/L		
9152476	Bicarbonate (HCO3)	2018/09/21					<1.0	mg/L		
9152476	Carbonate (CO3)	2018/09/21					<1.0	mg/L		
9152476	Hydroxide (OH)	2018/09/21					<1.0	mg/L		
9152477	pH	2018/09/21			101	97 - 103			0.86 (3)	20
9152478	Conductivity	2018/09/21			96	80 - 120	<2.0	uS/cm		
9152479	pH	2018/09/21			101	97 - 103			0 (6)	20
9152482	Alkalinity (PP as CaCO3)	2018/09/21					<1.0	mg/L	NC (6)	20
9152482	Alkalinity (Total as CaCO3)	2018/09/21	NC	80 - 120	97	80 - 120	<1.0	mg/L	0.33 (6)	20
9152482	Bicarbonate (HCO3)	2018/09/21					<1.0	mg/L	0.33 (6)	20
9152482	Carbonate (CO3)	2018/09/21					<1.0	mg/L	NC (6)	20
9152482	Hydroxide (OH)	2018/09/21					<1.0	mg/L	NC (6)	20
9152483	Conductivity	2018/09/21			97	80 - 120	<2.0	uS/cm	0.20 (6)	20
9152983	Dissolved Aluminum (Al)	2018/09/22	99 (7)	80 - 120	99	80 - 120	<3.0	ug/L	3.3 (8)	20
9152983	Dissolved Antimony (Sb)	2018/09/22	100 (7)	80 - 120	103	80 - 120	<0.50	ug/L	NC (8)	20
9152983	Dissolved Arsenic (As)	2018/09/22	105 (7)	80 - 120	107	80 - 120	<0.10	ug/L	1.3 (8)	20
9152983	Dissolved Barium (Ba)	2018/09/22	108 (7)	80 - 120	103	80 - 120	<1.0	ug/L	NC (8)	20
9152983	Dissolved Beryllium (Be)	2018/09/22	102 (7)	80 - 120	101	80 - 120	<0.10	ug/L	NC (8)	20
9152983	Dissolved Bismuth (Bi)	2018/09/22	95 (7)	80 - 120	99	80 - 120	<1.0	ug/L	NC (8)	20
9152983	Dissolved Boron (B)	2018/09/22	99 (7)	80 - 120	97	80 - 120	<50	ug/L	NC (8)	20
9152983	Dissolved Cadmium (Cd)	2018/09/22	100 (7)	80 - 120	104	80 - 120	<0.010	ug/L	NC (8)	20

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QUALITY ASSURANCE REPORT(CONT'D)

GHD Limited
Client Project #: 56484-02
Site Location: Campbell River (Phase 02) - Quarterly
Your P.O. #: 73506861-1

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
9152983	Dissolved Chromium (Cr)	2018/09/22	95 (7)	80 - 120	96	80 - 120	<1.0	ug/L	NC (8)	20
9152983	Dissolved Cobalt (Co)	2018/09/22	94 (7)	80 - 120	96	80 - 120	<0.20	ug/L	NC (8)	20
9152983	Dissolved Copper (Cu)	2018/09/22	92 (7)	80 - 120	95	80 - 120	<0.20	ug/L	8.6 (8)	20
9152983	Dissolved Iron (Fe)	2018/09/22	100 (7)	80 - 120	103	80 - 120	<5.0	ug/L	NC (8)	20
9152983	Dissolved Lead (Pb)	2018/09/22	99 (7)	80 - 120	101	80 - 120	<0.20	ug/L	NC (8)	20
9152983	Dissolved Lithium (Li)	2018/09/22	100 (7)	80 - 120	101	80 - 120	<2.0	ug/L	NC (8)	20
9152983	Dissolved Manganese (Mn)	2018/09/22	95 (7)	80 - 120	96	80 - 120	<1.0	ug/L	NC (8)	20
9152983	Dissolved Molybdenum (Mo)	2018/09/22	103 (7)	80 - 120	104	80 - 120	<1.0	ug/L	NC (8)	20
9152983	Dissolved Nickel (Ni)	2018/09/22	93 (7)	80 - 120	96	80 - 120	<1.0	ug/L	NC (8)	20
9152983	Dissolved Phosphorus (P)	2018/09/22	103 (7)	80 - 120	104	80 - 120	<10	ug/L	NC (8)	20
9152983	Dissolved Selenium (Se)	2018/09/22	104 (7)	80 - 120	105	80 - 120	<0.10	ug/L	12 (8)	20
9152983	Dissolved Silicon (Si)	2018/09/22	98 (7)	80 - 120	101	80 - 120	<100	ug/L	0.40 (8)	20
9152983	Dissolved Silver (Ag)	2018/09/22	90 (7)	80 - 120	92	80 - 120	<0.020	ug/L	NC (8)	20
9152983	Dissolved Strontium (Sr)	2018/09/22	103 (7)	80 - 120	100	80 - 120	<1.0	ug/L	0.75 (8)	20
9152983	Dissolved Sulphur (S)	2018/09/22	102 (7)	80 - 120	101	80 - 120	<3000	ug/L	NC (8)	20
9152983	Dissolved Thallium (Tl)	2018/09/22	98 (7)	80 - 120	98	80 - 120	<0.010	ug/L	NC (8)	20
9152983	Dissolved Tin (Sn)	2018/09/22	98 (7)	80 - 120	101	80 - 120	<5.0	ug/L	NC (8)	20
9152983	Dissolved Titanium (Ti)	2018/09/22	98 (7)	80 - 120	99	80 - 120	<5.0	ug/L	NC (8)	20
9152983	Dissolved Uranium (U)	2018/09/22	103 (7)	80 - 120	102	80 - 120	<0.10	ug/L	NC (8)	20
9152983	Dissolved Vanadium (V)	2018/09/22	97 (7)	80 - 120	97	80 - 120	<5.0	ug/L	NC (8)	20
9152983	Dissolved Zinc (Zn)	2018/09/22	102 (7)	80 - 120	104	80 - 120	<5.0	ug/L	NC (8)	20
9152983	Dissolved Zirconium (Zr)	2018/09/22	99 (7)	80 - 120	100	80 - 120	<0.10	ug/L	NC (8)	20
9153404	Total Dissolved Solids	2018/09/22	100	80 - 120	90	80 - 120	<10	mg/L	2.7 (9)	20
9153486	Dissolved Mercury (Hg)	2018/09/21	84 (10)	80 - 120	94	80 - 120	<0.0020	ug/L	NC (11)	20
9153561	Nitrate plus Nitrite (N)	2018/09/21	104 (12)	80 - 120	105	80 - 120	<0.10	mg/L	NC (13)	25
9153562	Nitrite (N)	2018/09/21	99 (12)	80 - 120	103	80 - 120	<0.10	mg/L	NC (13)	20
9153778	Total Ammonia (N)	2018/09/21	93	80 - 120	112	80 - 120	<0.020	mg/L	NC (3)	20
9153784	Total Ammonia (N)	2018/09/21	103 (14)	80 - 120	113	80 - 120	<0.020	mg/L	NC (15)	20
9153804	Total Ammonia (N)	2018/09/21	93 (16)	80 - 120	107	80 - 120	<0.020	mg/L	NC (17)	20
9154473	Alkalinity (PP as CaCO3)	2018/09/21					<1.0	mg/L	NC (3)	20
9154473	Alkalinity (Total as CaCO3)	2018/09/21	NC	80 - 120	100	80 - 120	<1.0	mg/L	3.9 (3)	20

Maxxam Job #: B880896
Report Date: 2018/09/26

QUALITY ASSURANCE REPORT(CONT'D)

GHD Limited
Client Project #: 56484-02
Site Location: Campbell River (Phase 02) - Quarterly
Your P.O. #: 73506861-1

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
9154473	Bicarbonate (HCO ₃)	2018/09/21					<1.0	mg/L	3.9 (3)	20
9154473	Carbonate (CO ₃)	2018/09/21					<1.0	mg/L	NC (3)	20
9154473	Hydroxide (OH)	2018/09/21					<1.0	mg/L	NC (3)	20
9154474	pH	2018/09/21			101	97 - 103			0.13 (3)	20
9154476	Conductivity	2018/09/21			99	80 - 120	<2.0	uS/cm	0.42 (3)	20
9154489	Alkalinity (PP as CaCO ₃)	2018/09/21					<1.0	mg/L		
9154489	Alkalinity (Total as CaCO ₃)	2018/09/21	NC	80 - 120	102	80 - 120	<1.0	mg/L		
9154489	Bicarbonate (HCO ₃)	2018/09/21					<1.0	mg/L		
9154489	Carbonate (CO ₃)	2018/09/21					<1.0	mg/L		
9154489	Hydroxide (OH)	2018/09/21					<1.0	mg/L		
9154502	pH	2018/09/21			101	97 - 103				
9154504	Conductivity	2018/09/21			99	80 - 120	<2.0	uS/cm		
9154818	Dissolved Chloride (Cl)	2018/09/21	99	80 - 120	104	80 - 120	<1.0	mg/L		
9154820	Dissolved Sulphate (SO ₄)	2018/09/21			97	80 - 120	<1.0	mg/L	4.4 (3)	20
9154822	Dissolved Chloride (Cl)	2018/09/21	95	80 - 120	102	80 - 120	<1.0	mg/L	1.7 (3)	20
9154823	Dissolved Sulphate (SO ₄)	2018/09/21	NC	80 - 120	102	80 - 120	<1.0	mg/L	0.27 (3)	20
9156490	Total Dissolved Solids	2018/09/25	101	80 - 120	99	80 - 120	<10	mg/L	1.7 (3)	20
9156505	Total Dissolved Solids	2018/09/25	97	80 - 120	94	80 - 120	<10	mg/L	NC (3)	20
9156812	Dissolved Sulphate (SO ₄)	2018/09/24			96	80 - 120	<1.0	mg/L		
9158231	1,1,1,2-tetrachloroethane	2018/09/26	95	70 - 130	105	70 - 130	<0.50	ug/L		
9158231	1,1,1-trichloroethane	2018/09/26	91	70 - 130	98	70 - 130	<0.50	ug/L		
9158231	1,1,2,2-tetrachloroethane	2018/09/26	101	70 - 130	120	70 - 130	<0.50	ug/L		
9158231	1,1,2Trichloro-1,2,2Trifluoroethane	2018/09/26	95	N/A	98	70 - 130	<2.0	ug/L		
9158231	1,1,2-trichloroethane	2018/09/26	95	70 - 130	107	70 - 130	<0.50	ug/L		
9158231	1,1-dichloroethane	2018/09/26	98	70 - 130	105	70 - 130	<0.50	ug/L		
9158231	1,1-dichloroethene	2018/09/26	97	70 - 130	99	70 - 130	<0.50	ug/L		
9158231	1,2,3-trichlorobenzene	2018/09/26	92	N/A	101	70 - 130	<2.0	ug/L		
9158231	1,2,4-trichlorobenzene	2018/09/26	94	N/A	100	70 - 130	<2.0	ug/L		
9158231	1,2-dibromoethane	2018/09/26	94	70 - 130	107	70 - 130	<0.20	ug/L		
9158231	1,2-dichlorobenzene	2018/09/26	102	70 - 130	112	70 - 130	<0.50	ug/L		
9158231	1,2-dichloroethane	2018/09/26	97	70 - 130	109	70 - 130	<0.50	ug/L		

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QUALITY ASSURANCE REPORT(CONT'D)

GHD Limited
Client Project #: 56484-02
Site Location: Campbell River (Phase 02) - Quarterly
Your P.O. #: 73506861-1

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
9158231	1,2-dichloropropane	2018/09/26	99	70 - 130	108	70 - 130	<0.50	ug/L		
9158231	1,3,5-trimethylbenzene	2018/09/26	112	N/A	117	70 - 130	<2.0	ug/L		
9158231	1,3-dichlorobenzene	2018/09/26	101	70 - 130	107	70 - 130	<0.50	ug/L		
9158231	1,4-dichlorobenzene	2018/09/26	100	70 - 130	105	70 - 130	<0.50	ug/L		
9158231	Benzene	2018/09/26	94	70 - 130	101	70 - 130	<0.40	ug/L		
9158231	Bromobenzene	2018/09/26	101	N/A	110	70 - 130	<2.0	ug/L		
9158231	Bromodichloromethane	2018/09/26	90	70 - 130	101	70 - 130	<1.0	ug/L		
9158231	Bromoform	2018/09/26	94	70 - 130	107	70 - 130	<1.0	ug/L		
9158231	Bromomethane	2018/09/26	88	60 - 140	107	60 - 140	<1.0	ug/L		
9158231	Carbon tetrachloride	2018/09/26	92	70 - 130	97	70 - 130	<0.50	ug/L		
9158231	Chlorobenzene	2018/09/26	86	70 - 130	96	70 - 130	<0.50	ug/L		
9158231	Chlorodibromomethane	2018/09/26	90	70 - 130	102	70 - 130	<1.0	ug/L		
9158231	Chloroethane	2018/09/26			89	60 - 140	<1.0	ug/L		
9158231	Chloroform	2018/09/26	92	70 - 130	98	70 - 130	<1.0	ug/L		
9158231	Chloromethane	2018/09/26	96	60 - 140	105	60 - 140	<1.0	ug/L		
9158231	cis-1,2-dichloroethene	2018/09/26	97	70 - 130	105	70 - 130	<1.0	ug/L		
9158231	cis-1,3-dichloropropene	2018/09/26	94	70 - 130	113	70 - 130	<1.0	ug/L		
9158231	Dichlorodifluoromethane	2018/09/26	96	N/A	100	60 - 140	<2.0	ug/L		
9158231	Dichloromethane	2018/09/26	94	70 - 130	103	70 - 130	<2.0	ug/L		
9158231	Ethylbenzene	2018/09/26	96	70 - 130	102	70 - 130	<0.40	ug/L		
9158231	Hexachlorobutadiene	2018/09/26	92	N/A	94	70 - 130	<0.50	ug/L		
9158231	Isopropylbenzene	2018/09/26	106	N/A	109	70 - 130	<2.0	ug/L		
9158231	m & p-Xylene	2018/09/26	100	70 - 130	105	70 - 130	<0.40	ug/L		
9158231	Methyl-tert-butylether (MTBE)	2018/09/26	92	70 - 130	99	70 - 130	<4.0	ug/L		
9158231	o-Xylene	2018/09/26	97	70 - 130	105	70 - 130	<0.40	ug/L		
9158231	Styrene	2018/09/26	98	70 - 130	107	70 - 130	<0.50	ug/L		
9158231	Tetrachloroethene	2018/09/26	91	70 - 130	98	70 - 130	<0.50	ug/L		
9158231	Toluene	2018/09/26	95	70 - 130	102	70 - 130	<0.40	ug/L		
9158231	trans-1,2-dichloroethene	2018/09/26	95	70 - 130	98	70 - 130	<1.0	ug/L		
9158231	trans-1,3-dichloropropene	2018/09/26	81	70 - 130	101	70 - 130	<1.0	ug/L		
9158231	Trichloroethene	2018/09/26	93	70 - 130	98	70 - 130	<0.50	ug/L		

Maxxam Job #: B880896
Report Date: 2018/09/26

QUALITY ASSURANCE REPORT(CONT'D)

GHD Limited
Client Project #: 56484-02
Site Location: Campbell River (Phase 02) - Quarterly
Your P.O. #: 73506861-1

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
9158231	Trichlorofluoromethane	2018/09/26	94	60 - 140	98	60 - 140	<4.0	ug/L		
9158231	VH C6-C10	2018/09/26			92	70 - 130	<300	ug/L		
9158231	Vinyl chloride	2018/09/26	88	60 - 140	93	60 - 140	<0.50	ug/L	NC (3)	30
9158231	Xylenes (Total)	2018/09/26					<0.40	ug/L		
9158849	Fluoride (F)	2018/09/25	104 (18)	80 - 120	104	80 - 120	<0.10	mg/L	NC (19)	20
9158857	Fluoride (F)	2018/09/25	112	80 - 120	106	80 - 120	<0.10	mg/L	6.9 (3)	20
9159888	Fluoride (F)	2018/09/26	104	80 - 120	106	80 - 120	<0.10	mg/L	NC (3)	20

Maxxam Job #: B880896
Report Date: 2018/09/26

QUALITY ASSURANCE REPORT(CONT'D)

GHD Limited
Client Project #: 56484-02
Site Location: Campbell River (Phase 02) - Quarterly
Your P.O. #: 73506861-1

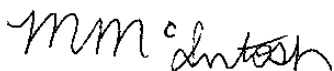
		Matrix Spike		Spiked Blank		Method Blank		RPD		
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.										
Matrix Spike: A sample to 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 [UI8891-01]										
(2) Duplicate Parent ID [UI8891-01]										
(3) Duplicate Parent ID										
(4) Matrix Spike Parent ID [UI8912-01]										
(5) Duplicate Parent ID [UI8912-01]										
(6) Duplicate Parent ID [UI8907-01]										
(7) Matrix Spike Parent ID [UI8882-04]										
(8) Duplicate Parent ID [UI8882-04]										
(9) Duplicate Parent ID [UI8909-02]										
(10) Matrix Spike Parent ID [UI8882-05]										
(11) Duplicate Parent ID [UI8882-05]										
(12) Matrix Spike Parent ID [UI8890-01]										
(13) Duplicate Parent ID [UI8890-01]										
(14) Matrix Spike Parent ID [UI8884-03]										
(15) Duplicate Parent ID [UI8884-03]										
(16) Matrix Spike Parent ID [UI8887-03]										
(17) Duplicate Parent ID [UI8887-03]										
(18) Matrix Spike Parent ID [UI8882-01]										
(19) Duplicate Parent ID [UI8905-01]										

Maxxam Job #: B880896
Report Date: 2018/09/26

GHD Limited
Client Project #: 56484-02
Site Location: Campbell River (Phase 02) - Quarterly
Your P.O. #: 73506861-1

VALIDATION SIGNATURE PAGE

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



Melissa McIntosh, Project Manager



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 / Maxxam Analytics 1850 Canada Way, Burnaby, British Columbia Canada V5G 1A3 Tel: (604) 734-2276 Toll free 800-561-4338 Fax: (604) 734-2366 www.maxxam.ca										Chain Of Custody Record			
INVOICE TO:			Report Information:			Project Information:			Laboratory Use Only				
Customer Name: #183 GHQ Limited Contact Name: Auresse MacPhee Address: 661 COLBY DRIVE WATERLOO ON N2V 1C2 Phone: (519) 884-0510 Fax: (519) 725-1394 Email: auresse_macphee@ghq.com, NationalEODSupport@ma			Company Name: Contact Name: Auresse MacPhee Address: Phone: Fax: Email: amacphee@draworld.com			Quadrant #: B70472 P.O. #: 73506851-1 Project #: 58484-02 Project Name: Campbell River (Phase 02)-Quart Site #: Sampled By: M. Dyck R. Phelan			Maxxam Job #: Batch Order #: Chain Of Custody Record: Project Manager: Batch Order:				
Regulatory Codes: ☐ CSRI ☐ CCME ☐ BC Water Quality ☐ Other:			Special Instructions: dissolved metals & Hg field filtered & preserved except sample -15			ANALYSIS REQUESTED (PLEASE BE SPECIFIC): Metals Field Filtered? (Y/N) ☒ Y Alkalinity, pH, Conductivity HIGH LEVEL ANIONS (Cl, F, SO4, NO2, NO3) Ammonia-N (Preserved) CSR Dissolved Metals in Water with CV Hg (including Sulphur) Total Dissolved Solids (Filt. Residue) CSR VOO + VPH in Water			Turnaround Time (TAT) Required: Please provide advance notice for rush projects Regular (Standard) TAT: (ask for quotes 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 ☐ Once Required ☐ Rush Confirmation Number:				
SAMPLES MUST BE KEPT COOL (< 10°C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM										# of Bottles: Comments:			
Sample Record Label	Sample Location / Identification	Date Sampled	Time Sampled	Matrix	Metals Field Filtered? (Y/N)	Alkalinity, pH, Conductivity	HIGH LEVEL ANIONS (Cl, F, SO4, NO2, NO3)	Ammonia-N (Preserved)	CSR Dissolved Metals in Water with CV Hg (including Sulphur)	Total Dissolved Solids (Filt. Residue)	CSR VOO + VPH in Water		
	W6-56424-120912-HND-11	12/09/12	9:30	ground water	Y	X	X	X	X	X			5
	-12		10:00								X		7
	-13		10:05								X		7
	-14		11:30										5
	-15		13:00										5
	-16		14:00								X		7
	-17		14:30								X		7
	-18		15:00								X		7
	-19		16:20										5
	-20		17:20								X		7
RELINQUISHED BY: (Signature/Print) 		Date: (YYMMDD) 12/09/12 Time: 8:00		RECEIVED BY: (Signature/Print) 		Date: (YYMMDD) 12/09/12 Time: 09:00		# jars used and not submitted		Time Bottles: ☐ Time Jars: ☐		Comments:	
* 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 RELINQUISHING 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 c/o Maxxam Analytics 4000 Canada Way, Burnaby, British Columbia, Canada V5G 4K5 Tel: (604) 734 7276 Toll Free: 800-963-0226 Fax: (604) 731 2385 www.maxxam.ca 										Chain Of Custody Record		Page 1 of 2			
INVOICE TO:			Report Information			Project Information			Laboratory Use Only						
Company Name: #153 GHD Limited Contact Name: Airessa MacPhee Address: 651 COLBY DRIVE WATERLOO ON N2V 1G2 Phone: (519) 884-0510 Fax: (519) 725-1394 Email: airessa_macphee@ghd.com; NationalEDDSupport@ma			Company Name: _____ Contact Name: Airessa MacPhee Address: _____ Phone: _____ Fax: _____ Email: amacphee@crowd.com			Quotation #: 870472 P.O. #: 73506881-1 Project #: 56484-02 Project Name: Campbell River (Phase 02)-Quart Site #: _____ Sampled By: M. Thuk & R. Pleban			Maxxam Job #: _____ Buttle Order #: Chain Of Custody Record: Project Manager: _____ Name: _____						
Regulatory Criteria: ☐ CSR ☐ CCMB ☐ BC Water Quality ☐ Other: _____			Special Handling: dissolved metals + Hg field filtered & preserved			ANALYSIS REQUESTED (PLEASE BE SPECIFIC)			Turnaround Time (TAT) Requested: Please provide advance notice for rush projects. Regular (Standard) TAT: ☒ Just in case 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 > 7 days - contact your Project Manager for details. Job Specific Rush TAT (if applies to entire submission): 1 Day ☐ 2 Day ☐ 3 Day ☐ Use 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	Metals	Metals Field Filtered? (Y/N)	Alkalinity, pH, Conductivity	HIGH LEVEL ANIONS (Cl, F, SO4, NO2, NO3)	Ammonia-N (Preserved)	CSR Dissolved Metals in Water with CV Hg (including Sulphur)	Total Dissolved Solids (Filtr. Residue)	CSR VOCs + VPH in Water			# of Copies	Comments
	WCA-56484-170919-MND-01	Sept 17/18	13:00	green water	Y	X	X	X	X	X				6	
		-02	12:50												
		-03	12:55												
		-04	14:55												
		-05	15:05												
		-06	15:45												
		-07	16:30								X			7	
		-08	17:00								X				
		-09	19:10								X				
		-10	18:30											5	
RELINQUISHED BY: (Signature/Print) 		Date: (YY/MM/DD) 10/09/19		Time: 08:00		RECEIVED BY: (Signature/Print) 		Date: (YY/MM/DD) 10/09/19		Time: 09:00		# jars used and not submitted ☐		Lab Use Only Time Submitted: ☐ 2/3/2 Time Received: ☐ Quantity: See notes on container ☒ Yes ☐ No Whole Maxxam ☐ Maxxam 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.															

19-Sep-18 09:00

Nahed Amer

B880896

MBU



GHD Field Sample Key (FSK)

SiteCampbell River 056484-02

Sample ReasonQ4 2018

Sampler NameNatasha Turl & Cassie Ragan

Sampling CompanyGHD

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)
GROUNDWATER								
WG-56484-191118-NT-01	MW01-16	11/19/2018	12:00	N	GW	grab		
WG-56484-191118-NT-02	AG99-01	11/19/2018	13:30	N	GW	grab		
WG-56484-191118-NT-03	EBA04-1	11/19/2018	13:10	N	GW	grab		
WG-56484-191118-NT-04	AG99-02	11/19/2018	14:30	N	GW	grab		
WG-56484-191118-NT-05	AG99-02	11/19/2018	14:40	FD	GW	grab	WG-56484-191118-NT-04	
WG-56484-191118-NT-06	MW02-18	11/19/2018	15:30	N	GW	grab		
WG-56484-201118-NT-07	EBA11-3	11/20/2018	8:10	N	GW	grab		
WG-56484-201118-NT-08	EBA11-4	11/20/2018	8:30	N	GW	grab		
WG-56484-201118-NT-09	AG99-06	11/20/2018	8:45	N	GW	grab		
WG-56484-201118-NT-10	MW03-18	11/20/2018	10:00	N	GW	grab		
WG-56484-201118-NT-11	MW03-18	11/20/2018	10:10	FD	GW	grab	WG-56484-201118-NT-10	
WG-56484-201118-NT-12	AG99-05	11/20/2018	10:20	N	GW	grab		
WG-56484-201118-NT-13	EBA11-2	11/20/2018	11:50	N	GW	grab		
WG-56484-201118-NT-14	Field Blank	11/20/2018	12:00	FB	GW	grab		
WG-56484-201118-NT-15	AG99-04	11/20/2018	13:00	N	GW	grab		
WG-56484-201118-NT-16	EBA11-1	11/20/2018	13:45	N	GW	grab		
WG-56484-201118-NT-17	EBA04-7	11/20/2018	14:20	N	GW	grab		
WG-56484-201118-NT-18	EBA04-6	11/20/2018	14:30	N	GW	grab		
WG-56484-201118-NT-19	HBT94-2	11/20/2018	15:00	N	GW	grab		
WG-56484-201118-NT-20	HBT94-1	11/20/2018	15:20	N	GW	grab		
SURFACE WATER								
WS-56484-201118-NT-01	SW-1	11/20/2018	11:00	N	SW	grab		
WS-56484-201118-NT-02	SW3-17	11/20/2018	11:10	N	SW	grab		

Footnotes

1. _____

pH	Temperature	Conductivity			Turbidity		DO		Eh / ORP		TDS	
Field pH	Sample Temp.	Temp Units	Conductivity	Conductivity Units	Turbidity	Turbidity Units	DO	DO Units	Eh/ORP	Eh/ORP Units	TDS	TDS Units
7.38	8.11	C	94	uS	3.5	ntu	-	mg/L	201	mV	0.061	g/L
7.90	10.02	C	180	uS	33.3	ntu	-	mg/L	188	mV	0.117	g/L
7.03	9.58	C	107	uS	8.7	ntu	-	mg/L	195	mV	0.069	g/L
8.37	10.49	C	179	uS	0.4	ntu	-	mg/L	176	mV	0.116	g/L
8.37	10.49	C	179	uS	0.4	ntu	-	mg/L	176	mV	0.116	g/L
6.92	10.84	C	766	uS	3.9	ntu	-	mg/L	72	mV	0.490	g/L
7.43	8.1	C	311	uS	20.9	ntu	-	mg/L	215	mV	0.202	g/L
7.83	8.19	C	122	uS	45	ntu	-	mg/L	198	mV	0.079	g/L
7.78	9.09	C	156	uS	820	ntu	-	mg/L	219	mV	0.101	g/L
8.23	11.11	C	242	uS	0.4	ntu	-	mg/L	205	mV	0.157	g/L
8.23	11.11	C	242	uS	0.4	ntu	-	mg/L	205	mV	0.157	g/L
8.37	8.87	C	105	uS	5.9	ntu	-	mg/L	172	mV	0.068	g/L
7.69	9.85	C	429	uS	21.5	ntu	-	mg/L	218	mV	0.279	g/L
-	-	C	-	uS	-	ntu	-	mg/L	-	mV	-	g/L
8.33	9.69	C	133	uS	0.0	ntu	-	mg/L	184	mV	0.087	g/L
7.89	9.02	C	205	uS	8.2	ntu	-	mg/L	199	mV	0.134	g/L
7.00	8.08	C	1020	uS	2.4	ntu	-	mg/L	211	mV	0.653	g/L
7.39	9.74	C	586	uS	0.7	ntu	-	mg/L	195	mV	0.375	g/L
7.50	9.93	C	419	uS	607	ntu	-	mg/L	-102	mV	0.273	g/L
6.82	11.18	C	548	uS	21.8	ntu	-	mg/L	-78	mV	0.351	g/L
7.09	6.96	C	34	uS	0	ntu	7.93	mg/L	229	mV	0.022	g/L
6.50	6.87	C	32	uS	0	ntu	4.80	mg/L	243	mV	0.021	g/L

Key

Required Field

Populate When Appropriate

Field Data

Attention: Aïresse MacPhee

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

Your P.O. #: 73506861-1
Your Project #: 56484-02
Site#: Campbell River(Phase 02)-Quart
Site Location: Campbell River (Phase 02) - Quarterly
Your C.O.C. #: 548146-01-01

Report Date: 2018/11/28

Report #: R2657357

Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B8A2228

Received: 2018/11/20, 16:30

Sample Matrix: SURFACE WATER
Samples Received: 2

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity - Water (1)	2	N/A	2018/11/23	BBY6SOP-00026	SM 22 2320 B m
Chloride by Automated Colourimetry (1)	1	N/A	2018/11/22	BBY6SOP-00011	SM 22 4500-Cl- E m
Chloride by Automated Colourimetry (1)	1	N/A	2018/11/23	BBY6SOP-00011	SM 22 4500-Cl- E m
Conductance - water (1)	2	N/A	2018/11/23	BBY6SOP-00026	SM 22 2510 B m
Fluoride (higher level) (1)	2	N/A	2018/11/24	BBY6SOP-00048	SM 22 4500-F C m
Hardness Total (calculated as CaCO ₃) (1, 2)	2	N/A	2018/11/26	BBY WI-00033	Auto Calc
Hardness (calculated as CaCO ₃) (1)	2	N/A	2018/11/26	BBY WI-00033	Auto Calc
Mercury (Dissolved) by CVAf (1)	2	N/A	2018/11/23	BBY7SOP-00015	BCMOE BCLM Oct2013 m
Mercury (Total) by CVAf (1)	2	2018/11/23	2018/11/23	BBY7SOP-00015	BCMOE BCLM Oct2013 m
Na, K, Ca, Mg, S by CRC ICPMS (diss.) (1)	2	N/A	2018/11/26	BBY WI-00033	Auto Calc
Elements by ICPMS Low Level (dissolved) (1)	2	N/A	2018/11/23	BBY7SOP-00002	EPA 6020b R2 m
Na, K, Ca, Mg, S by CRC ICPMS (total) (1)	2	N/A	2018/11/26	BBY WI-00033	Auto Calc
Elements by ICPMS Low Level (total) (1)	2	N/A	2018/11/23	BBY7SOP-00002	EPA 6020b R2 m
Ammonia-N (Preserved) (1)	2	N/A	2018/11/23	BBY6SOP-00009	EPA 350.1 m
Nitrate + Nitrite (N) (highlevel) (1)	2	N/A	2018/11/22	BBY6SOP-00010	SM 23 4500-NO ₃ - I m
Nitrite (N) by CFA (highlevel) (1)	2	N/A	2018/11/22	BBY6SOP-00010	SM 23 4500-NO ₃ - I m
Nitrogen - Nitrate (as N) (1)	2	N/A	2018/11/22	BBY WI-00033	Auto Calc
Filter and HNO ₃ Preserve for Metals (1)	2	N/A	2018/11/22	BBY7 WI-00004	BCMOE Reqs 08/14
pH Water (1, 3)	2	N/A	2018/11/23	BBY6SOP-00026	SM 22 4500-H+ B m
Sulphate by Automated Colourimetry (1)	1	N/A	2018/11/22	BBY6SOP-00017	SM 22 4500-SO ₄ 2- E m
Sulphate by Automated Colourimetry (1)	1	N/A	2018/11/23	BBY6SOP-00017	SM 22 4500-SO ₄ 2- E m
Total Dissolved Solids (Filt. Residue) (1)	2	2018/11/23	2018/11/26	BBY6SOP-00033	SM 23 2540 C m

Remarks:

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

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

Attention: Aïresse MacPhee

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

Your P.O. #: 73506861-1
Your Project #: 56484-02
Site#: Campbell River(Phase 02)-Quart
Site Location: Campbell River (Phase 02) - Quarterly
Your C.O.C. #: 548146-01-01

Report Date: 2018/11/28

Report #: R2657357

Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B8A2228

Received: 2018/11/20, 16:30

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. Maxxam is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.

Results relate to samples tested. When sampling is not conducted by Maxxam, results relate to the supplied samples tested.

This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) This test was performed by Maxxam Vancouver

(2) "Total Hardness" was calculated from Total Ca and Mg concentrations and may be biased high (Hardness, or Dissolved Hardness, calculated from Dissolved Ca and Mg, should be used for compliance if available).

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

Encryption Key



Nahed Amer
Project Manager
28 Nov 2018 15:41:55

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

Nahed Amer, Project Manager

Email: NAmer@maxxam.ca

Phone# (250) 338 7786

=====

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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 #: B8A2228
Report Date: 2018/11/28

GHD Limited
Client Project #: 56484-02
Site Location: Campbell River (Phase 02) - Quarterly
Your P.O. #: 73506861-1
Sampler Initials: CR

RESULTS OF CHEMICAL ANALYSES OF SURFACE WATER

Maxxam ID		UU9349	UU9349		UU9350		
Sampling Date		2018/11/20 11:00	2018/11/20 11:00		2018/11/20 11:10		
COC Number		548146-01-01	548146-01-01		548146-01-01		
	UNITS	WS-56484-201118-NT-01	WS-56484-201118-NT-01 Lab-Dup	QC Batch	WS-56484-201118-NT-02	RDL	QC Batch
ANIONS							
Nitrite (N)	mg/L	<0.10	<0.10	9238779	<0.10	0.10	9238779
Calculated Parameters							
Filter and HNO ₃ Preservation	N/A	FIELD	N/A	ONSITE	FIELD	N/A	ONSITE
Dissolved Hardness (CaCO ₃)	mg/L	8.88	N/A	9238049	8.21	0.50	9238049
Total Hardness (CaCO ₃)	mg/L	9.02	N/A	9237852	8.56	0.50	9237852
Nitrate (N)	mg/L	<0.10	N/A	9237901	<0.10	0.10	9237901
Misc. Inorganics							
Fluoride (F)	mg/L	<0.10	<0.10	9241189	<0.10	0.10	9241189
Alkalinity (Total as CaCO ₃)	mg/L	7.0	7.5	9239548	8.8	1.0	9239548
Alkalinity (PP as CaCO ₃)	mg/L	<1.0	<1.0	9239548	<1.0	1.0	9239548
Bicarbonate (HCO ₃)	mg/L	8.5	9.2	9239548	10.7	1.0	9239548
Carbonate (CO ₃)	mg/L	<1.0	<1.0	9239548	<1.0	1.0	9239548
Hydroxide (OH)	mg/L	<1.0	<1.0	9239548	<1.0	1.0	9239548
Anions							
Dissolved Sulphate (SO ₄)	mg/L	<1.0	N/A	9242388	<1.0	1.0	9240208
Dissolved Chloride (Cl)	mg/L	3.9	N/A	9242378	3.6	1.0	9240205
Nutrients							
Total Ammonia (N)	mg/L	<0.020	N/A	9240662	0.032	0.020	9240662
Nitrate plus Nitrite (N)	mg/L	<0.10	<0.10	9238778	<0.10	0.10	9238778
Physical Properties							
Conductivity	uS/cm	31.0	30.9	9239553	30.6	2.0	9239553
pH	pH	6.82	6.81	9239552	7.06	N/A	9239552
Physical Properties							
Total Dissolved Solids	mg/L	18	N/A	9238733	28	10	9238733
RDL = Reportable Detection Limit Lab-Dup = Laboratory Initiated Duplicate N/A = Not Applicable							

Maxxam Job #: B8A2228
Report Date: 2018/11/28

GHD Limited
Client Project #: 56484-02
Site Location: Campbell River (Phase 02) - Quarterly
Your P.O. #: 73506861-1
Sampler Initials: CR

RESULTS OF CHEMICAL ANALYSES OF SURFACE WATER

Maxxam ID		UU9350		
Sampling Date		2018/11/20 11:10		
COC Number		548146-01-01		
	UNITS	WS-56484-201118-NT-02 Lab-Dup	RDL	QC Batch

Nutrients				
Total Ammonia (N)	mg/L	<0.020	0.020	9240662
RDL = Reportable Detection Limit				
Lab-Dup = Laboratory Initiated Duplicate				

Maxxam Job #: B8A2228
Report Date: 2018/11/28

GHD Limited
Client Project #: 56484-02
Site Location: Campbell River (Phase 02) - Quarterly
Your P.O. #: 73506861-1
Sampler Initials: CR

MERCURY BY COLD VAPOR (SURFACE WATER)

Maxxam ID		UU9349	UU9350		
Sampling Date		2018/11/20 11:00	2018/11/20 11:10		
COC Number		548146-01-01	548146-01-01		
	UNITS	WS-56484-201118-NT-01	WS-56484-201118-NT-02	RDL	QC Batch
Elements					
Dissolved Mercury (Hg)	ug/L	<0.0020	<0.0020	0.0020	9239322
Total Mercury (Hg)	ug/L	<0.0020	<0.0020	0.0020	9239211
RDL = Reportable Detection Limit					

Maxxam Job #: B8A2228
Report Date: 2018/11/28

GHD Limited
Client Project #: 56484-02
Site Location: Campbell River (Phase 02) - Quarterly
Your P.O. #: 73506861-1
Sampler Initials: CR

ELEMENTS BY ATOMIC SPECTROSCOPY (SURFACE WATER)

Maxxam ID		UU9349	UU9350		
Sampling Date		2018/11/20 11:00	2018/11/20 11:10		
COC Number		548146-01-01	548146-01-01		
	UNITS	WS-56484-201118-NT-01	WS-56484-201118-NT-02	RDL	QC Batch
Dissolved Metals by ICPMS					
Dissolved Aluminum (Al)	ug/L	42.2	30.6	0.50	9238413
Dissolved Antimony (Sb)	ug/L	0.021	0.023	0.020	9238413
Dissolved Arsenic (As)	ug/L	0.116	0.108	0.020	9238413
Dissolved Barium (Ba)	ug/L	1.49	1.44	0.020	9238413
Dissolved Beryllium (Be)	ug/L	<0.010	<0.010	0.010	9238413
Dissolved Bismuth (Bi)	ug/L	<0.0050	<0.0050	0.0050	9238413
Dissolved Boron (B)	ug/L	<10	<10	10	9238413
Dissolved Cadmium (Cd)	ug/L	<0.0050	<0.0050	0.0050	9238413
Dissolved Chromium (Cr)	ug/L	0.10	<0.10	0.10	9238413
Dissolved Cobalt (Co)	ug/L	0.0257	0.0282	0.0050	9238413
Dissolved Copper (Cu)	ug/L	0.250	0.191	0.050	9238413
Dissolved Iron (Fe)	ug/L	80.6	62.5	1.0	9238413
Dissolved Lead (Pb)	ug/L	0.0346	0.0236	0.0050	9238413
Dissolved Lithium (Li)	ug/L	<0.50	<0.50	0.50	9238413
Dissolved Manganese (Mn)	ug/L	5.98	7.02	0.050	9238413
Dissolved Molybdenum (Mo)	ug/L	<0.050	<0.050	0.050	9238413
Dissolved Nickel (Ni)	ug/L	0.094	0.094	0.020	9238413
Dissolved Phosphorus (P)	ug/L	5.5	6.0	2.0	9238413
Dissolved Selenium (Se)	ug/L	<0.040	<0.040	0.040	9238413
Dissolved Silicon (Si)	ug/L	2010	1930	50	9238413
Dissolved Silver (Ag)	ug/L	<0.0050	<0.0050	0.0050	9238413
Dissolved Strontium (Sr)	ug/L	9.01	8.33	0.050	9238413
Dissolved Thallium (Tl)	ug/L	<0.0020	<0.0020	0.0020	9238413
Dissolved Tin (Sn)	ug/L	<0.20	<0.20	0.20	9238413
Dissolved Titanium (Ti)	ug/L	1.69	1.52	0.50	9238413
Dissolved Uranium (U)	ug/L	<0.0020	<0.0020	0.0020	9238413
Dissolved Vanadium (V)	ug/L	0.37	0.21	0.20	9238413
Dissolved Zinc (Zn)	ug/L	0.85	0.69	0.10	9238413
Dissolved Zirconium (Zr)	ug/L	<0.10	<0.10	0.10	9238413
Dissolved Calcium (Ca)	mg/L	2.11	2.00	0.050	9238052
RDL = Reportable Detection Limit					

Maxxam Job #: B8A2228
Report Date: 2018/11/28

GHD Limited
Client Project #: 56484-02
Site Location: Campbell River (Phase 02) - Quarterly
Your P.O. #: 73506861-1
Sampler Initials: CR

ELEMENTS BY ATOMIC SPECTROSCOPY (SURFACE WATER)

Maxxam ID		UU9349	UU9350		
Sampling Date		2018/11/20 11:00	2018/11/20 11:10		
COC Number		548146-01-01	548146-01-01		
	UNITS	WS-56484-201118-NT-01	WS-56484-201118-NT-02	RDL	QC Batch
Dissolved Magnesium (Mg)	mg/L	0.878	0.782	0.050	9238052
Dissolved Potassium (K)	mg/L	0.143	0.128	0.050	9238052
Dissolved Sodium (Na)	mg/L	2.56	2.35	0.050	9238052
Dissolved Sulphur (S)	mg/L	<3.0	<3.0	3.0	9238052
Dissolved Sulphur (S)	ug/L	<600	<600	600	9238413
Total Metals by ICPMS					
Total Aluminum (Al)	ug/L	46.4	36.2	0.50	9238568
Total Antimony (Sb)	ug/L	0.025	0.022	0.020	9238568
Total Arsenic (As)	ug/L	0.102	0.103	0.020	9238568
Total Barium (Ba)	ug/L	1.48	1.43	0.020	9238568
Total Beryllium (Be)	ug/L	<0.010	<0.010	0.010	9238568
Total Bismuth (Bi)	ug/L	<0.0050	<0.0050	0.0050	9238568
Total Boron (B)	ug/L	<10	<10	10	9238568
Total Cadmium (Cd)	ug/L	<0.0050	<0.0050	0.0050	9238568
Total Chromium (Cr)	ug/L	0.11	<0.10	0.10	9238568
Total Cobalt (Co)	ug/L	0.0385	0.0321	0.0050	9238568
Total Copper (Cu)	ug/L	0.260	0.207	0.050	9238568
Total Iron (Fe)	ug/L	90.5	78.7	1.0	9238568
Total Lead (Pb)	ug/L	0.0500	0.0337	0.0050	9238568
Total Lithium (Li)	ug/L	<0.50	<0.50	0.50	9238568
Total Manganese (Mn)	ug/L	6.75	8.13	0.050	9238568
Total Molybdenum (Mo)	ug/L	<0.050	<0.050	0.050	9238568
Total Nickel (Ni)	ug/L	0.118	0.095	0.020	9238568
Total Phosphorus (P)	ug/L	8.7	6.3	2.0	9238568
Total Selenium (Se)	ug/L	<0.040	<0.040	0.040	9238568
Total Silicon (Si)	ug/L	2200	2100	50	9238568
Total Silver (Ag)	ug/L	<0.0050	<0.0050	0.0050	9238568
Total Strontium (Sr)	ug/L	9.23	8.53	0.050	9238568
Total Thallium (Tl)	ug/L	<0.0020	<0.0020	0.0020	9238568
Total Tin (Sn)	ug/L	<0.20	<0.20	0.20	9238568
Total Titanium (Ti)	ug/L	0.97	1.10	0.50	9238568
RDL = Reportable Detection Limit					

Maxxam Job #: B8A2228
Report Date: 2018/11/28

GHD Limited
Client Project #: 56484-02
Site Location: Campbell River (Phase 02) - Quarterly
Your P.O. #: 73506861-1
Sampler Initials: CR

ELEMENTS BY ATOMIC SPECTROSCOPY (SURFACE WATER)

Maxxam ID		UU9349	UU9350		
Sampling Date		2018/11/20 11:00	2018/11/20 11:10		
COC Number		548146-01-01	548146-01-01		
	UNITS	WS-56484-201118-NT-01	WS-56484-201118-NT-02	RDL	QC Batch
Total Uranium (U)	ug/L	<0.0020	<0.0020	0.0020	9238568
Total Vanadium (V)	ug/L	0.31	<0.20	0.20	9238568
Total Zinc (Zn)	ug/L	0.76	0.78	0.10	9238568
Total Zirconium (Zr)	ug/L	<0.10	<0.10	0.10	9238568
Total Calcium (Ca)	mg/L	2.14	2.04	0.050	9238054
Total Magnesium (Mg)	mg/L	0.894	0.841	0.050	9238054
Total Potassium (K)	mg/L	0.149	0.137	0.050	9238054
Total Sodium (Na)	mg/L	2.52	2.52	0.050	9238054
Total Sulphur (S)	mg/L	<3.0	<3.0	3.0	9238054
Total Sulphur (S)	ug/L	<600	<600	600	9238568
RDL = Reportable Detection Limit					

Maxxam Job #: B8A2228
Report Date: 2018/11/28

GHD Limited
Client Project #: 56484-02
Site Location: Campbell River (Phase 02) - Quarterly
Your P.O. #: 73506861-1
Sampler Initials: CR

GENERAL COMMENTS

Results relate only to the items tested.

Maxxam Job #: B8A2228
Report Date: 2018/11/28

QUALITY ASSURANCE REPORT

GHD Limited
Client Project #: 56484-02
Site Location: Campbell River (Phase 02) - Quarterly
Your P.O. #: 73506861-1
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
9238413	Dissolved Aluminum (Al)	2018/11/23	98	80 - 120	99	80 - 120	<0.50	ug/L	3.1 (1)	20
9238413	Dissolved Antimony (Sb)	2018/11/23	103	80 - 120	101	80 - 120	<0.020	ug/L	3.9 (1)	20
9238413	Dissolved Arsenic (As)	2018/11/23	103	80 - 120	99	80 - 120	<0.020	ug/L	1.5 (1)	20
9238413	Dissolved Barium (Ba)	2018/11/23	NC	80 - 120	102	80 - 120	<0.020	ug/L	1.8 (1)	20
9238413	Dissolved Beryllium (Be)	2018/11/23	92	80 - 120	97	80 - 120	<0.010	ug/L	NC (1)	20
9238413	Dissolved Bismuth (Bi)	2018/11/23	94	80 - 120	99	80 - 120	<0.0050	ug/L	NC (1)	20
9238413	Dissolved Boron (B)	2018/11/23	86	80 - 120	93	80 - 120	<10	ug/L	1.4 (1)	20
9238413	Dissolved Cadmium (Cd)	2018/11/23	101	80 - 120	104	80 - 120	<0.0050	ug/L	2.7 (1)	20
9238413	Dissolved Chromium (Cr)	2018/11/23	100	80 - 120	102	80 - 120	<0.10	ug/L	2.0 (1)	20
9238413	Dissolved Cobalt (Co)	2018/11/23	95	80 - 120	98	80 - 120	<0.0050	ug/L	0.58 (1)	20
9238413	Dissolved Copper (Cu)	2018/11/23	90	80 - 120	99	80 - 120	<0.050	ug/L	0.97 (1)	20
9238413	Dissolved Iron (Fe)	2018/11/23	95	80 - 120	104	80 - 120	<1.0	ug/L	0.47 (1)	20
9238413	Dissolved Lead (Pb)	2018/11/23	96	80 - 120	99	80 - 120	<0.0050	ug/L	12 (1)	20
9238413	Dissolved Lithium (Li)	2018/11/23	92	80 - 120	97	80 - 120	<0.50	ug/L	0.71 (1)	20
9238413	Dissolved Manganese (Mn)	2018/11/23	NC	80 - 120	101	80 - 120	<0.050	ug/L	0.84 (1)	20
9238413	Dissolved Molybdenum (Mo)	2018/11/23	107	80 - 120	99	80 - 120	<0.050	ug/L	2.9 (1)	20
9238413	Dissolved Nickel (Ni)	2018/11/23	94	80 - 120	101	80 - 120	<0.020	ug/L	0.46 (1)	20
9238413	Dissolved Phosphorus (P)	2018/11/23	102	80 - 120	99	80 - 120	<2.0	ug/L		
9238413	Dissolved Selenium (Se)	2018/11/23	102	80 - 120	101	80 - 120	<0.040	ug/L	10 (1)	20
9238413	Dissolved Silicon (Si)	2018/11/23	NC	80 - 120	96	80 - 120	<50	ug/L	1.9 (1)	20
9238413	Dissolved Silver (Ag)	2018/11/23	100	80 - 120	102	80 - 120	<0.0050	ug/L	NC (1)	20
9238413	Dissolved Strontium (Sr)	2018/11/23	NC	80 - 120	99	80 - 120	<0.050	ug/L	0.55 (1)	20
9238413	Dissolved Sulphur (S)	2018/11/23	NC	80 - 120	101	80 - 120	<600	ug/L		
9238413	Dissolved Thallium (Tl)	2018/11/23	105	80 - 120	96	80 - 120	<0.0020	ug/L	5.2 (1)	20
9238413	Dissolved Tin (Sn)	2018/11/23	104	80 - 120	103	80 - 120	<0.20	ug/L	NC (1)	20
9238413	Dissolved Titanium (Ti)	2018/11/23	105	80 - 120	103	80 - 120	<0.50	ug/L	NC (1)	20
9238413	Dissolved Uranium (U)	2018/11/23	106	80 - 120	103	80 - 120	<0.0020	ug/L	0.73 (1)	20
9238413	Dissolved Vanadium (V)	2018/11/23	103	80 - 120	101	80 - 120	<0.20	ug/L	1.5 (1)	20
9238413	Dissolved Zinc (Zn)	2018/11/23	94	80 - 120	110	80 - 120	<0.10	ug/L	5.1 (1)	20
9238413	Dissolved Zirconium (Zr)	2018/11/23	104	80 - 120	100	80 - 120	<0.10	ug/L	5.8 (1)	20

Maxxam Job #: B8A2228
Report Date: 2018/11/28

QUALITY ASSURANCE REPORT(CONT'D)

GHD Limited
Client Project #: 56484-02
Site Location: Campbell River (Phase 02) - Quarterly
Your P.O. #: 73506861-1
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
9238568	Total Aluminum (Al)	2018/11/23	89	80 - 120	100	80 - 120	<0.50	ug/L	8.0 (1)	20
9238568	Total Antimony (Sb)	2018/11/23	90	80 - 120	101	80 - 120	<0.020	ug/L	2.6 (1)	20
9238568	Total Arsenic (As)	2018/11/23	89	80 - 120	99	80 - 120	<0.020	ug/L	3.0 (1)	20
9238568	Total Barium (Ba)	2018/11/23	90	80 - 120	103	80 - 120	<0.020	ug/L	1.9 (1)	20
9238568	Total Beryllium (Be)	2018/11/23	85	80 - 120	98	80 - 120	<0.010	ug/L	NC (1)	20
9238568	Total Bismuth (Bi)	2018/11/23	85	80 - 120	98	80 - 120	<0.0050	ug/L	NC (1)	20
9238568	Total Boron (B)	2018/11/23	82	80 - 120	95	80 - 120	<10	ug/L	0.75 (1)	20
9238568	Total Cadmium (Cd)	2018/11/23	90	80 - 120	104	80 - 120	<0.0050	ug/L	NC (1)	20
9238568	Total Chromium (Cr)	2018/11/23	88	80 - 120	101	80 - 120	<0.10	ug/L	3.4 (1)	20
9238568	Total Cobalt (Co)	2018/11/23	84	80 - 120	98	80 - 120	<0.0050	ug/L	5.2 (1)	20
9238568	Total Copper (Cu)	2018/11/23	81	80 - 120	97	80 - 120	<0.050	ug/L	20 (1)	20
9238568	Total Iron (Fe)	2018/11/23	85	80 - 120	101	80 - 120	<1.0	ug/L	3.5 (1)	20
9238568	Total Lead (Pb)	2018/11/23	87	80 - 120	99	80 - 120	<0.0050	ug/L	NC (1)	20
9238568	Total Lithium (Li)	2018/11/23	84	80 - 120	96	80 - 120	<0.50	ug/L	0.45 (1)	20
9238568	Total Manganese (Mn)	2018/11/23	87	80 - 120	101	80 - 120	<0.050	ug/L	0.40 (1)	20
9238568	Total Molybdenum (Mo)	2018/11/23	91	80 - 120	100	80 - 120	<0.050	ug/L	1.7 (1)	20
9238568	Total Nickel (Ni)	2018/11/23	84	80 - 120	101	80 - 120	<0.020	ug/L	7.7 (1)	20
9238568	Total Phosphorus (P)	2018/11/23	95	80 - 120	99	80 - 120	<2.0	ug/L		
9238568	Total Selenium (Se)	2018/11/23	88	80 - 120	100	80 - 120	<0.040	ug/L	0.85 (1)	20
9238568	Total Silicon (Si)	2018/11/23	NC	80 - 120	100	80 - 120	<50	ug/L	0.44 (1)	20
9238568	Total Silver (Ag)	2018/11/23	89	80 - 120	100	80 - 120	<0.0050	ug/L	NC (1)	20
9238568	Total Strontium (Sr)	2018/11/23	NC	80 - 120	100	80 - 120	<0.050	ug/L	1.1 (1)	20
9238568	Total Sulphur (S)	2018/11/23	93	80 - 120	101	80 - 120	<600	ug/L		
9238568	Total Thallium (Tl)	2018/11/23	91	80 - 120	97	80 - 120	<0.0020	ug/L	NC (1)	20
9238568	Total Tin (Sn)	2018/11/23	90	80 - 120	103	80 - 120	<0.20	ug/L	NC (1)	20
9238568	Total Titanium (Ti)	2018/11/23	93	80 - 120	103	80 - 120	<0.50	ug/L	NC (1)	20
9238568	Total Uranium (U)	2018/11/23	95	80 - 120	103	80 - 120	<0.0020	ug/L	1.0 (1)	20
9238568	Total Vanadium (V)	2018/11/23	91	80 - 120	101	80 - 120	<0.20	ug/L	NC (1)	20
9238568	Total Zinc (Zn)	2018/11/23	87	80 - 120	109	80 - 120	<0.10	ug/L	NC (1)	20
9238568	Total Zirconium (Zr)	2018/11/23	92	80 - 120	100	80 - 120	<0.10	ug/L	NC (1)	20

Maxxam Job #: B8A2228
Report Date: 2018/11/28

QUALITY ASSURANCE REPORT(CONT'D)

GHD Limited
Client Project #: 56484-02
Site Location: Campbell River (Phase 02) - Quarterly
Your P.O. #: 73506861-1
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
9238733	Total Dissolved Solids	2018/11/26	104	80 - 120	88	80 - 120	<10	mg/L	13 (1)	20
9238778	Nitrate plus Nitrite (N)	2018/11/22	100 (2)	80 - 120	110	80 - 120	<0.10	mg/L	NC (3)	25
9238779	Nitrite (N)	2018/11/22	93 (2)	80 - 120	104	80 - 120	<0.10	mg/L	NC (3)	20
9239211	Total Mercury (Hg)	2018/11/23	94	80 - 120	99	80 - 120	<0.0020	ug/L	3.3 (1)	20
9239322	Dissolved Mercury (Hg)	2018/11/23	95	80 - 120	95	80 - 120	<0.0020	ug/L	NC (1)	20
9239548	Alkalinity (PP as CaCO ₃)	2018/11/23					<1.0	mg/L	NC (4)	20
9239548	Alkalinity (Total as CaCO ₃)	2018/11/23	NC	80 - 120	101	80 - 120	<1.0	mg/L	7.6 (4)	20
9239548	Bicarbonate (HCO ₃)	2018/11/23					<1.0	mg/L	7.6 (4)	20
9239548	Carbonate (CO ₃)	2018/11/23					<1.0	mg/L	NC (4)	20
9239548	Hydroxide (OH)	2018/11/23					<1.0	mg/L	NC (4)	20
9239552	pH	2018/11/23			101	97 - 103			0.15 (4)	20
9239553	Conductivity	2018/11/23			101	80 - 120	<2.0	uS/cm	0.32 (4)	20
9240205	Dissolved Chloride (Cl)	2018/11/22	NC	80 - 120	96	80 - 120	<1.0	mg/L	0.10 (1)	20
9240208	Dissolved Sulphate (SO ₄)	2018/11/22	90	80 - 120	88	80 - 120	<1.0	mg/L	0.96 (1)	20
9240662	Total Ammonia (N)	2018/11/23	94 (5)	80 - 120	101	80 - 120	<0.020	mg/L	NC (6)	20
9241189	Fluoride (F)	2018/11/24	113 (2)	80 - 120	106	80 - 120	<0.10	mg/L	NC (3)	20
9242378	Dissolved Chloride (Cl)	2018/11/23			99	80 - 120	<1.0	mg/L		

Maxxam Job #: B8A2228
Report Date: 2018/11/28

QUALITY ASSURANCE REPORT(CONT'D)

GHD Limited
Client Project #: 56484-02
Site Location: Campbell River (Phase 02) - Quarterly
Your P.O. #: 73506861-1
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
9242388	Dissolved Sulphate (SO4)	2018/11/23			98	80 - 120	<1.0	mg/L		

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

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

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

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

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) Matrix Spike Parent ID [UU9349-02]

(3) Duplicate Parent ID [UU9349-02]

(4) Duplicate Parent ID [UU9349-01]

(5) Matrix Spike Parent ID [UU9350-09]

(6) Duplicate Parent ID [UU9350-09]

Attention: Aïresse MacPhee

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

Your P.O. #: 73506861-1
Your Project #: 56484-02
Site#: Campbell River(Phase 02)-Quart
Site Location: Campbell River (Phase 02) - Quarterly
Your C.O.C. #: 548143-01-01, 548143-02-01

Report Date: 2018/11/28

Report #: R2657453

Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B8A2250

Received: 2018/11/20, 16:30

Sample Matrix: GROUND WATER
Samples Received: 20

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity - Water (1)	20	N/A	2018/11/23	BBY6SOP-00026	SM 22 2320 B m
Chloride by Automated Colourimetry (1)	19	N/A	2018/11/22	BBY6SOP-00011	SM 22 4500-Cl- E m
Chloride by Automated Colourimetry (1)	1	N/A	2018/11/23	BBY6SOP-00011	SM 22 4500-Cl- E m
Conductance - water (1)	20	N/A	2018/11/23	BBY6SOP-00026	SM 22 2510 B m
Fluoride (higher level) (1)	20	N/A	2018/11/24	BBY6SOP-00048	SM 22 4500-F C m
Hardness (calculated as CaCO3) (1)	12	N/A	2018/11/23	BBY WI-00033	Auto Calc
Hardness (calculated as CaCO3) (1)	8	N/A	2018/11/26	BBY WI-00033	Auto Calc
Mercury (Dissolved) by CVAf (1)	20	N/A	2018/11/23	BBY7SOP-00015	BCMOE BCLM Oct2013 m
Na, K, Ca, Mg, S by CRC ICPMS (diss.) (1)	12	N/A	2018/11/23	BBY WI-00033	Auto Calc
Na, K, Ca, Mg, S by CRC ICPMS (diss.) (1)	8	N/A	2018/11/26	BBY WI-00033	Auto Calc
Elements by CRC ICPMS (dissolved) (1)	20	N/A	2018/11/23	BBY7SOP-00002	EPA 6020b R2 m
Ammonia-N (Preserved) (1)	20	N/A	2018/11/26	BBY6SOP-00009	EPA 350.1 m
Nitrate + Nitrite (N) (highlevel) (1)	20	N/A	2018/11/22	BBY6SOP-00010	SM 23 4500-NO3- I m
Nitrite (N) by CFA (highlevel) (1)	20	N/A	2018/11/22	BBY6SOP-00010	SM 23 4500-NO3- I m
Nitrogen - Nitrate (as N) (1)	20	N/A	2018/11/22	BBY WI-00033	Auto Calc
Filter and HNO3 Preserve for Metals (1)	20	N/A	2018/11/22	BBY7 WI-00004	BCMOE Reqs 08/14
pH Water (1, 2)	20	N/A	2018/11/23	BBY6SOP-00026	SM 22 4500-H+ B m
Sulphate by Automated Colourimetry (1)	20	N/A	2018/11/22	BBY6SOP-00017	SM 22 4500-SO42- E m
Total Dissolved Solids (Filt. Residue) (1)	10	2018/11/23	2018/11/26	BBY6SOP-00033	SM 23 2540 C m
Total Dissolved Solids (Filt. Residue) (1)	9	2018/11/23	2018/11/28	BBY6SOP-00033	SM 23 2540 C m
Total Dissolved Solids (Filt. Residue) (1)	1	2018/11/27	2018/11/28	BBY6SOP-00033	SM 23 2540 C m

Remarks:

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

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

Attention: Aïresse MacPhee

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

Your P.O. #: 73506861-1
Your Project #: 56484-02
Site#: Campbell River(Phase 02)-Quart
Site Location: Campbell River (Phase 02) - Quarterly
Your C.O.C. #: 548143-01-01, 548143-02-01

Report Date: 2018/11/28

Report #: R2657453

Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B8A2250

Received: 2018/11/20, 16:30

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. Maxxam is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.

Results relate to samples tested. When sampling is not conducted by Maxxam, results relate to the supplied samples tested.

This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) This test was performed by 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.

Encryption Key



Tanya Eugene
Project Manager
28 Nov 2018 17:56:23

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

Nahed Amer, Project Manager

Email: NAmer@maxxam.ca

Phone# (250) 338 7786

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This report has been generated and distributed using a secure automated process.

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 #: B8A2250
Report Date: 2018/11/28

GHD Limited
Client Project #: 56484-02
Site Location: Campbell River (Phase 02) - Quarterly
Your P.O. #: 73506861-1
Sampler Initials: CR

RESULTS OF CHEMICAL ANALYSES OF GROUND WATER

Maxxam ID		UU9436	UU9436		UU9437		
Sampling Date		2018/11/19 12:00	2018/11/19 12:00		2018/11/19 13:30		
COC Number		548143-01-01	548143-01-01		548143-01-01		
	UNITS	WG-56484-191118-NT-01	WG-56484-191118-NT-01 Lab-Dup	QC Batch	WG-56484-191118-NT-02	RDL	QC Batch
ANIONS							
Nitrite (N)	mg/L	<0.10	N/A	9238779	<0.10	0.10	9238779
Calculated Parameters							
Filter and HNO3 Preservation	N/A	FIELD	N/A	ONSITE	FIELD	N/A	ONSITE
Dissolved Hardness (CaCO3)	mg/L	43.2	N/A	9238049	84.6	0.50	9238049
Nitrate (N)	mg/L	<0.10	N/A	9237901	0.16	0.10	9237901
Misc. Inorganics							
Fluoride (F)	mg/L	<0.10	<0.10	9241187	<0.10	0.10	9241187
Alkalinity (Total as CaCO3)	mg/L	44.3	N/A	9239554	87.1	1.0	9239554
Alkalinity (PP as CaCO3)	mg/L	<1.0	N/A	9239554	<1.0	1.0	9239554
Bicarbonate (HCO3)	mg/L	54.0	N/A	9239554	106	1.0	9239554
Carbonate (CO3)	mg/L	<1.0	N/A	9239554	<1.0	1.0	9239554
Hydroxide (OH)	mg/L	<1.0	N/A	9239554	<1.0	1.0	9239554
Anions							
Dissolved Sulphate (SO4)	mg/L	2.8	N/A	9240224	2.8	1.0	9240224
Dissolved Chloride (Cl)	mg/L	<1.0	N/A	9240211	1.9	1.0	9240211
Nutrients							
Total Ammonia (N)	mg/L	0.047	N/A	9243313	<0.020	0.020	9243308
Nitrate plus Nitrite (N)	mg/L	<0.10	N/A	9238778	0.16	0.10	9238778
Physical Properties							
Conductivity	uS/cm	93.3	N/A	9239556	178	2.0	9239556
pH	pH	7.62	N/A	9239555	7.98	N/A	9239555
Physical Properties							
Total Dissolved Solids	mg/L	44	50	9238733	92	10	9238733
RDL = Reportable Detection Limit Lab-Dup = Laboratory Initiated Duplicate N/A = Not Applicable							

Maxxam Job #: B8A2250
Report Date: 2018/11/28

GHD Limited
Client Project #: 56484-02
Site Location: Campbell River (Phase 02) - Quarterly
Your P.O. #: 73506861-1
Sampler Initials: CR

RESULTS OF CHEMICAL ANALYSES OF GROUND WATER

Maxxam ID		UU9438		UU9439		
Sampling Date		2018/11/19 13:10		2018/11/19 14:30		
COC Number		548143-01-01		548143-01-01		
	UNITS	WG-56484-191118-NT-03	QC Batch	WG-56484-191118-NT-04	RDL	QC Batch
ANIONS						
Nitrite (N)	mg/L	<0.10	9238779	<0.10	0.10	9238779
Calculated Parameters						
Filter and HNO3 Preservation	N/A	FIELD	ONSITE	FIELD	N/A	ONSITE
Dissolved Hardness (CaCO3)	mg/L	40.0	9238049	85.4	0.50	9238049
Nitrate (N)	mg/L	<0.10	9237901	0.16	0.10	9237901
Misc. Inorganics						
Fluoride (F)	mg/L	<0.10	9241187	<0.10	0.10	9241187
Alkalinity (Total as CaCO3)	mg/L	41.8	9239554	86.7	1.0	9239548
Alkalinity (PP as CaCO3)	mg/L	<1.0	9239554	<1.0	1.0	9239548
Bicarbonate (HCO3)	mg/L	51.0	9239554	106	1.0	9239548
Carbonate (CO3)	mg/L	<1.0	9239554	<1.0	1.0	9239548
Hydroxide (OH)	mg/L	<1.0	9239554	<1.0	1.0	9239548
Anions						
Dissolved Sulphate (SO4)	mg/L	2.5	9240208	3.5	1.0	9240224
Dissolved Chloride (Cl)	mg/L	<1.0	9240205	1.6	1.0	9240211
Nutrients						
Total Ammonia (N)	mg/L	<0.020	9243308	0.022	0.020	9243308
Nitrate plus Nitrite (N)	mg/L	<0.10	9238778	0.16	0.10	9238778
Physical Properties						
Conductivity	uS/cm	86.1	9239556	177	2.0	9239553
pH	pH	7.68	9239555	7.95	N/A	9239552
Physical Properties						
Total Dissolved Solids	mg/L	40	9238733	94	10	9238733
RDL = Reportable Detection Limit						
N/A = Not Applicable						

Maxxam Job #: B8A2250
Report Date: 2018/11/28

GHD Limited
Client Project #: 56484-02
Site Location: Campbell River (Phase 02) - Quarterly
Your P.O. #: 73506861-1
Sampler Initials: CR

RESULTS OF CHEMICAL ANALYSES OF GROUND WATER

Maxxam ID		UU9440		UU9441		
Sampling Date		2018/11/19 14:40		2018/11/19 15:30		
COC Number		548143-01-01		548143-01-01		
	UNITS	WG-56484-191118-NT-05	RDL	WG-56484-191118-NT-06	RDL	QC Batch
ANIONS						
Nitrite (N)	mg/L	<0.10	0.10	<0.10	0.10	9238779
Calculated Parameters						
Filter and HNO3 Preservation	N/A	FIELD	N/A	FIELD	N/A	ONSITE
Dissolved Hardness (CaCO3)	mg/L	84.9	0.50	215	0.50	9238049
Nitrate (N)	mg/L	0.16	0.10	<0.10	0.10	9237901
Misc. Inorganics						
Fluoride (F)	mg/L	<0.10	0.10	<0.10	0.10	9241187
Alkalinity (Total as CaCO3)	mg/L	88.0	1.0	336	1.0	9239548
Alkalinity (PP as CaCO3)	mg/L	<1.0	1.0	<1.0	1.0	9239548
Bicarbonate (HCO3)	mg/L	107	1.0	410	1.0	9239548
Carbonate (CO3)	mg/L	<1.0	1.0	<1.0	1.0	9239548
Hydroxide (OH)	mg/L	<1.0	1.0	<1.0	1.0	9239548
Anions						
Dissolved Sulphate (SO4)	mg/L	3.2	1.0	3.3	1.0	9240224
Dissolved Chloride (Cl)	mg/L	1.3	1.0	38	1.0	9240211
Nutrients						
Total Ammonia (N)	mg/L	0.079	0.020	15 (1)	0.20	9243313
Nitrate plus Nitrite (N)	mg/L	0.16	0.10	<0.10	0.10	9238778
Physical Properties						
Conductivity	uS/cm	178	2.0	769	2.0	9239553
pH	pH	8.05	N/A	7.45	N/A	9239552
Physical Properties						
Total Dissolved Solids	mg/L	98	10	366	10	9238733
RDL = Reportable Detection Limit						
N/A = Not Applicable						
(1) Detection limits raised due to dilution to bring analyte within the calibrated range.						

Maxxam Job #: B8A2250
Report Date: 2018/11/28

GHD Limited
Client Project #: 56484-02
Site Location: Campbell River (Phase 02) - Quarterly
Your P.O. #: 73506861-1
Sampler Initials: CR

RESULTS OF CHEMICAL ANALYSES OF GROUND WATER

Maxxam ID		UU9442		UU9443		
Sampling Date		2018/11/20 08:10		2018/11/20 08:30		
COC Number		548143-01-01		548143-01-01		
	UNITS	WG-56484-201118-NT-07	QC Batch	WG-56484-201118-NT-08	RDL	QC Batch
ANIONS						
Nitrite (N)	mg/L	<0.10	9238779	<0.10	0.10	9238779
Calculated Parameters						
Filter and HNO3 Preservation	N/A	FIELD	ONSITE	FIELD	N/A	ONSITE
Dissolved Hardness (CaCO3)	mg/L	120	9238049	46.9	0.50	9238049
Nitrate (N)	mg/L	0.15	9237901	<0.10	0.10	9237901
Misc. Inorganics						
Fluoride (F)	mg/L	<0.10	9241187	<0.10	0.10	9241187
Alkalinity (Total as CaCO3)	mg/L	59.4	9239554	49.9	1.0	9239554
Alkalinity (PP as CaCO3)	mg/L	<1.0	9239554	<1.0	1.0	9239554
Bicarbonate (HCO3)	mg/L	72.4	9239554	60.9	1.0	9239554
Carbonate (CO3)	mg/L	<1.0	9239554	<1.0	1.0	9239554
Hydroxide (OH)	mg/L	<1.0	9239554	<1.0	1.0	9239554
Anions						
Dissolved Sulphate (SO4)	mg/L	2.6	9240208	2.6	1.0	9240208
Dissolved Chloride (Cl)	mg/L	47	9240205	3.9	1.0	9242378
Nutrients						
Total Ammonia (N)	mg/L	0.042	9243313	0.027	0.020	9243313
Nitrate plus Nitrite (N)	mg/L	0.15	9238778	<0.10	0.10	9238778
Physical Properties						
Conductivity	uS/cm	287	9239556	111	2.0	9239556
pH	pH	7.75	9239555	7.78	N/A	9239555
Physical Properties						
Total Dissolved Solids	mg/L	208	9238733	66	10	9238733
RDL = Reportable Detection Limit						
N/A = Not Applicable						

Maxxam Job #: B8A2250
Report Date: 2018/11/28

GHD Limited
Client Project #: 56484-02
Site Location: Campbell River (Phase 02) - Quarterly
Your P.O. #: 73506861-1
Sampler Initials: CR

RESULTS OF CHEMICAL ANALYSES OF GROUND WATER

Maxxam ID		UU9444		UU9445		
Sampling Date		2018/11/20 08:45		2018/11/20 10:00		
COC Number		548143-01-01		548143-01-01		
	UNITS	WG-56484-201118-NT-09	QC Batch	WG-56484-201118-NT-10	RDL	QC Batch
ANIONS						
Nitrite (N)	mg/L	<0.10	9238781	<0.10	0.10	9238781
Calculated Parameters						
Filter and HNO3 Preservation	N/A	FIELD	ONSITE	FIELD	N/A	ONSITE
Dissolved Hardness (CaCO3)	mg/L	67.5	9238049	110	0.50	9238049
Nitrate (N)	mg/L	0.22	9237901	0.27	0.10	9237901
Misc. Inorganics						
Fluoride (F)	mg/L	<0.10	9241187	<0.10	0.10	9241187
Alkalinity (Total as CaCO3)	mg/L	69.0	9239548	111	1.0	9239548
Alkalinity (PP as CaCO3)	mg/L	<1.0	9239548	<1.0	1.0	9239548
Bicarbonate (HCO3)	mg/L	84.2	9239548	136	1.0	9239548
Carbonate (CO3)	mg/L	<1.0	9239548	<1.0	1.0	9239548
Hydroxide (OH)	mg/L	<1.0	9239548	<1.0	1.0	9239548
Anions						
Dissolved Sulphate (SO4)	mg/L	2.7	9240224	2.8	1.0	9240224
Dissolved Chloride (Cl)	mg/L	3.2	9240211	5.1	1.0	9240211
Nutrients						
Total Ammonia (N)	mg/L	0.054	9243313	0.024	0.020	9243308
Nitrate plus Nitrite (N)	mg/L	0.22	9238780	0.27	0.10	9238780
Physical Properties						
Conductivity	uS/cm	148	9239553	237	2.0	9239553
pH	pH	7.72	9239552	8.01	N/A	9239552
Physical Properties						
Total Dissolved Solids	mg/L	80	9238733	108	10	9238733
RDL = Reportable Detection Limit						
N/A = Not Applicable						

Maxxam Job #: B8A2250
Report Date: 2018/11/28

GHD Limited
Client Project #: 56484-02
Site Location: Campbell River (Phase 02) - Quarterly
Your P.O. #: 73506861-1
Sampler Initials: CR

RESULTS OF CHEMICAL ANALYSES OF GROUND WATER

Maxxam ID		UU9446	UU9446		UU9447		
Sampling Date		2018/11/20 10:10	2018/11/20 10:10		2018/11/20 10:20		
COC Number		548143-02-01	548143-02-01		548143-02-01		
	UNITS	WG-56484-201118-NT-11	WG-56484-201118-NT-11 Lab-Dup	QC Batch	WG-56484-201118-NT-12	RDL	QC Batch

ANIONS

Nitrite (N)	mg/L	<0.10	N/A	9238779	<0.10	0.10	9238779

Calculated Parameters

Filter and HNO3 Preservation	N/A	FIELD	N/A	ONSITE	FIELD	N/A	ONSITE
Dissolved Hardness (CaCO3)	mg/L	110	N/A	9238049	43.2	0.50	9238049
Nitrate (N)	mg/L	0.26	N/A	9237901	<0.10	0.10	9237901

Misc. Inorganics

Fluoride (F)	mg/L	<0.10	N/A	9241187	<0.10	0.10	9241187
Alkalinity (Total as CaCO3)	mg/L	110	N/A	9239548	44.0	1.0	9239554
Alkalinity (PP as CaCO3)	mg/L	<1.0	N/A	9239548	<1.0	1.0	9239554
Bicarbonate (HCO3)	mg/L	134	N/A	9239548	53.7	1.0	9239554
Carbonate (CO3)	mg/L	<1.0	N/A	9239548	<1.0	1.0	9239554
Hydroxide (OH)	mg/L	<1.0	N/A	9239548	<1.0	1.0	9239554

Anions

Dissolved Sulphate (SO4)	mg/L	2.7	N/A	9240224	2.5	1.0	9240208
Dissolved Chloride (Cl)	mg/L	5.2	N/A	9240211	<1.0	1.0	9240205

Nutrients

Total Ammonia (N)	mg/L	<0.020	<0.020	9243313	<0.020	0.020	9243308
Nitrate plus Nitrite (N)	mg/L	0.26	N/A	9238778	<0.10	0.10	9238778

Physical Properties

Conductivity	uS/cm	235	N/A	9239553	93.8	2.0	9239556
pH	pH	7.99	N/A	9239552	7.56	N/A	9239555

Physical Properties

Total Dissolved Solids	mg/L	120	N/A	9238765	52	10	9238765

RDL = Reportable Detection Limit

Lab-Dup = Laboratory Initiated Duplicate

N/A = Not Applicable

Maxxam Job #: B8A2250
Report Date: 2018/11/28

GHD Limited
Client Project #: 56484-02
Site Location: Campbell River (Phase 02) - Quarterly
Your P.O. #: 73506861-1
Sampler Initials: CR

RESULTS OF CHEMICAL ANALYSES OF GROUND WATER

Maxxam ID		UU9448	UU9448	UU9449		
Sampling Date		2018/11/20 11:50	2018/11/20 11:50	2018/11/20 12:00		
COC Number		548143-02-01	548143-02-01	548143-02-01		
	UNITS	WG-56484-201118-NT-13	WG-56484-201118-NT-13 Lab-Dup	WG-56484-201118-NT-14	RDL	QC Batch
ANIONS						
Nitrite (N)	mg/L	<0.10	N/A	<0.10	0.10	9238779
Calculated Parameters						
Filter and HNO3 Preservation	N/A	FIELD	N/A	FIELD	N/A	ONSITE
Dissolved Hardness (CaCO3)	mg/L	210	N/A	<0.50	0.50	9238049
Nitrate (N)	mg/L	0.49	N/A	<0.10	0.10	9237901
Misc. Inorganics						
Fluoride (F)	mg/L	<0.10	N/A	<0.10	0.10	9241187
Alkalinity (Total as CaCO3)	mg/L	192	195	<1.0	1.0	9239554
Alkalinity (PP as CaCO3)	mg/L	<1.0	<1.0	<1.0	1.0	9239554
Bicarbonate (HCO3)	mg/L	234	237	<1.0	1.0	9239554
Carbonate (CO3)	mg/L	<1.0	<1.0	<1.0	1.0	9239554
Hydroxide (OH)	mg/L	<1.0	<1.0	<1.0	1.0	9239554
Anions						
Dissolved Sulphate (SO4)	mg/L	6.7	N/A	<1.0	1.0	9240224
Dissolved Chloride (Cl)	mg/L	14	N/A	<1.0	1.0	9240211
Nutrients						
Total Ammonia (N)	mg/L	<0.020	N/A	0.020	0.020	9243308
Nitrate plus Nitrite (N)	mg/L	0.49	N/A	<0.10	0.10	9238778
Physical Properties						
Conductivity	uS/cm	419	418	<2.0	2.0	9239556
pH	pH	7.98	8.04	5.73	N/A	9239555
Physical Properties						
Total Dissolved Solids	mg/L	454	N/A	<10	10	9238765
RDL = Reportable Detection Limit Lab-Dup = Laboratory Initiated Duplicate N/A = Not Applicable						

Maxxam Job #: B8A2250
Report Date: 2018/11/28

GHD Limited
Client Project #: 56484-02
Site Location: Campbell River (Phase 02) - Quarterly
Your P.O. #: 73506861-1
Sampler Initials: CR

RESULTS OF CHEMICAL ANALYSES OF GROUND WATER

Maxxam ID		UU9450		UU9451		
Sampling Date		2018/11/20 13:00		2018/11/20 13:45		
COC Number		548143-02-01		548143-02-01		
	UNITS	WG-56484-201118-NT-15	QC Batch	WG-56484-201118-NT-16	RDL	QC Batch
ANIONS						
Nitrite (N)	mg/L	<0.10	9238779	<0.10	0.10	9238779
Calculated Parameters						
Filter and HNO3 Preservation	N/A	FIELD	ONSITE	FIELD	N/A	ONSITE
Dissolved Hardness (CaCO3)	mg/L	62.3	9238049	91.9	0.50	9238049
Nitrate (N)	mg/L	0.13	9237901	0.42	0.10	9237901
Misc. Inorganics						
Fluoride (F)	mg/L	<0.10	9241187	<0.10	0.10	9241187
Alkalinity (Total as CaCO3)	mg/L	62.3	9239548	87.5	1.0	9239554
Alkalinity (PP as CaCO3)	mg/L	<1.0	9239548	<1.0	1.0	9239554
Bicarbonate (HCO3)	mg/L	76.0	9239548	107	1.0	9239554
Carbonate (CO3)	mg/L	<1.0	9239548	<1.0	1.0	9239554
Hydroxide (OH)	mg/L	<1.0	9239548	<1.0	1.0	9239554
Anions						
Dissolved Sulphate (SO4)	mg/L	3.0	9240224	7.3	1.0	9240208
Dissolved Chloride (Cl)	mg/L	1.1	9240211	3.9	1.0	9240205
Nutrients						
Total Ammonia (N)	mg/L	0.066	9243308	0.038	0.020	9243313
Nitrate plus Nitrite (N)	mg/L	0.13	9238778	0.42	0.10	9238778
Physical Properties						
Conductivity	uS/cm	129	9239553	201	2.0	9239556
pH	pH	7.85	9239552	7.92	N/A	9239555
Physical Properties						
Total Dissolved Solids	mg/L	68	9238765	120	10	9240172
RDL = Reportable Detection Limit						
N/A = Not Applicable						

Maxxam Job #: B8A2250
Report Date: 2018/11/28

GHD Limited
Client Project #: 56484-02
Site Location: Campbell River (Phase 02) - Quarterly
Your P.O. #: 73506861-1
Sampler Initials: CR

RESULTS OF CHEMICAL ANALYSES OF GROUND WATER

Maxxam ID		UU9452	UU9452		
Sampling Date		2018/11/20 14:20	2018/11/20 14:20		
COC Number		548143-02-01	548143-02-01		
	UNITS	WG-56484-201118-NT-17	WG-56484-201118-NT-17 Lab-Dup	RDL	QC Batch
ANIONS					
Nitrite (N)	mg/L	<0.10	N/A	0.10	9238779
Calculated Parameters					
Filter and HNO3 Preservation	N/A	FIELD	N/A	N/A	ONSITE
Dissolved Hardness (CaCO3)	mg/L	458	N/A	0.50	9238049
Nitrate (N)	mg/L	0.89	N/A	0.10	9237901
Misc. Inorganics					
Fluoride (F)	mg/L	<0.10	N/A	0.10	9241187
Alkalinity (Total as CaCO3)	mg/L	422	N/A	1.0	9239554
Alkalinity (PP as CaCO3)	mg/L	<1.0	N/A	1.0	9239554
Bicarbonate (HCO3)	mg/L	515	N/A	1.0	9239554
Carbonate (CO3)	mg/L	<1.0	N/A	1.0	9239554
Hydroxide (OH)	mg/L	<1.0	N/A	1.0	9239554
Anions					
Dissolved Sulphate (SO4)	mg/L	12.7	12.6	1.0	9240208
Dissolved Chloride (Cl)	mg/L	66	66	1.0	9240205
Nutrients					
Total Ammonia (N)	mg/L	0.039	N/A	0.020	9243313
Nitrate plus Nitrite (N)	mg/L	0.89	N/A	0.10	9238778
Physical Properties					
Conductivity	uS/cm	998	N/A	2.0	9239556
pH	pH	7.79	N/A	N/A	9239555
Physical Properties					
Total Dissolved Solids	mg/L	548	N/A	10	9238765
RDL = Reportable Detection Limit Lab-Dup = Laboratory Initiated Duplicate N/A = Not Applicable					

Maxxam Job #: B8A2250
Report Date: 2018/11/28

GHD Limited
Client Project #: 56484-02
Site Location: Campbell River (Phase 02) - Quarterly
Your P.O. #: 73506861-1
Sampler Initials: CR

RESULTS OF CHEMICAL ANALYSES OF GROUND WATER

Maxxam ID		UU9453			UU9454		
Sampling Date		2018/11/20 14:30			2018/11/20 15:00		
COC Number		548143-02-01			548143-02-01		
	UNITS	WG-56484-201118-NT-18	RDL	QC Batch	WG-56484-201118-NT-19	RDL	QC Batch
ANIONS							
Nitrite (N)	mg/L	<0.10	0.10	9238779	<0.10	0.10	9238779
Calculated Parameters							
Filter and HNO3 Preservation	N/A	FIELD	N/A	ONSITE	FIELD	N/A	ONSITE
Dissolved Hardness (CaCO3)	mg/L	291	0.50	9238049	142	0.50	9238049
Nitrate (N)	mg/L	2.66	0.20	9237901	<0.10	0.10	9237901
Misc. Inorganics							
Fluoride (F)	mg/L	<0.10	0.10	9241187	<0.10	0.10	9241187
Alkalinity (Total as CaCO3)	mg/L	288	1.0	9239554	162	1.0	9239554
Alkalinity (PP as CaCO3)	mg/L	<1.0	1.0	9239554	<1.0	1.0	9239554
Bicarbonate (HCO3)	mg/L	351	1.0	9239554	198	1.0	9239554
Carbonate (CO3)	mg/L	<1.0	1.0	9239554	<1.0	1.0	9239554
Hydroxide (OH)	mg/L	<1.0	1.0	9239554	<1.0	1.0	9239554
Anions							
Dissolved Sulphate (SO4)	mg/L	5.3	1.0	9240224	2.9	1.0	9240208
Dissolved Chloride (Cl)	mg/L	4.4	1.0	9240211	19	1.0	9240205
Nutrients							
Total Ammonia (N)	mg/L	0.020	0.020	9243308	4.4 (1)	0.10	9243313
Nitrate plus Nitrite (N)	mg/L	2.66 (1)	0.20	9238778	<0.10	0.10	9238778
Physical Properties							
Conductivity	uS/cm	575	2.0	9239556	383	2.0	9239556
pH	pH	7.93	N/A	9239555	7.85	N/A	9239555
Physical Properties							
Total Dissolved Solids	mg/L	322	10	9238765	182	10	9238765
RDL = Reportable Detection Limit							
N/A = Not Applicable							
(1) Detection limits raised due to dilution to bring analyte within the calibrated range.							

Maxxam Job #: B8A2250
Report Date: 2018/11/28

GHD Limited
Client Project #: 56484-02
Site Location: Campbell River (Phase 02) - Quarterly
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Sampler Initials: CR

RESULTS OF CHEMICAL ANALYSES OF GROUND WATER

Maxxam ID		UU9455		
Sampling Date		2018/11/20 15:20		
COC Number		548143-02-01		
	UNITS	WG-56484-201118-NT-20	RDL	QC Batch
ANIONS				
Nitrite (N)	mg/L	<0.10	0.10	9238779
Calculated Parameters				
Filter and HNO3 Preservation	N/A	FIELD	N/A	ONSITE
Dissolved Hardness (CaCO3)	mg/L	185	0.50	9238049
Nitrate (N)	mg/L	<0.10	0.10	9237901
Misc. Inorganics				
Fluoride (F)	mg/L	<0.10	0.10	9241187
Alkalinity (Total as CaCO3)	mg/L	215	1.0	9239554
Alkalinity (PP as CaCO3)	mg/L	<1.0	1.0	9239554
Bicarbonate (HCO3)	mg/L	263	1.0	9239554
Carbonate (CO3)	mg/L	<1.0	1.0	9239554
Hydroxide (OH)	mg/L	<1.0	1.0	9239554
Anions				
Dissolved Sulphate (SO4)	mg/L	<1.0	1.0	9240208
Dissolved Chloride (Cl)	mg/L	25	1.0	9240205
Nutrients				
Total Ammonia (N)	mg/L	2.4 (1)	0.040	9243313
Nitrate plus Nitrite (N)	mg/L	<0.10	0.10	9238778
Physical Properties				
Conductivity	uS/cm	489	2.0	9239556
pH	pH	7.61	N/A	9239555
Physical Properties				
Total Dissolved Solids	mg/L	252	10	9238765
RDL = Reportable Detection Limit N/A = Not Applicable (1) Detection limits raised due to dilution to bring analyte within the calibrated range.				

Maxxam Job #: B8A2250
Report Date: 2018/11/28

GHD Limited
Client Project #: 56484-02
Site Location: Campbell River (Phase 02) - Quarterly
Your P.O. #: 73506861-1
Sampler Initials: CR

MERCURY BY COLD VAPOR (GROUND WATER)

Maxxam ID		UU9436		UU9437	UU9438		
Sampling Date		2018/11/19 12:00		2018/11/19 13:30	2018/11/19 13:10		
COC Number		548143-01-01		548143-01-01	548143-01-01		
	UNITS	WG-56484-191118-NT-01	QC Batch	WG-56484-191118-NT-02	WG-56484-191118-NT-03	RDL	QC Batch

Elements							
Dissolved Mercury (Hg)	ug/L	<0.0020	9239336	<0.0020	<0.0020	0.0020	9239331
RDL = Reportable Detection Limit							

Maxxam ID		UU9439	UU9440	UU9441		
Sampling Date		2018/11/19 14:30	2018/11/19 14:40	2018/11/19 15:30		
COC Number		548143-01-01	548143-01-01	548143-01-01		
	UNITS	WG-56484-191118-NT-04	WG-56484-191118-NT-05	WG-56484-191118-NT-06	RDL	QC Batch

Elements						
Dissolved Mercury (Hg)	ug/L	<0.0020	<0.0020	<0.0020	0.0020	9239331
RDL = Reportable Detection Limit						

Maxxam ID		UU9442	UU9443	UU9444		
Sampling Date		2018/11/20 08:10	2018/11/20 08:30	2018/11/20 08:45		
COC Number		548143-01-01	548143-01-01	548143-01-01		
	UNITS	WG-56484-201118-NT-07	WG-56484-201118-NT-08	WG-56484-201118-NT-09	RDL	QC Batch

Elements						
Dissolved Mercury (Hg)	ug/L	<0.0020	<0.0020	<0.0020	0.0020	9239331
RDL = Reportable Detection Limit						

Maxxam ID		UU9445	UU9446		UU9447		
Sampling Date		2018/11/20 10:00	2018/11/20 10:10		2018/11/20 10:20		
COC Number		548143-01-01	548143-02-01		548143-02-01		
	UNITS	WG-56484-201118-NT-10	WG-56484-201118-NT-11	QC Batch	WG-56484-201118-NT-12	RDL	QC Batch

Elements							
Dissolved Mercury (Hg)	ug/L	<0.0020	<0.0020	9239331	<0.0020	0.0020	9239336
RDL = Reportable Detection Limit							

Maxxam Job #: B8A2250
Report Date: 2018/11/28

GHD Limited
Client Project #: 56484-02
Site Location: Campbell River (Phase 02) - Quarterly
Your P.O. #: 73506861-1
Sampler Initials: CR

MERCURY BY COLD VAPOR (GROUND WATER)

Maxxam ID		UU9448	UU9449	UU9450		
Sampling Date		2018/11/20 11:50	2018/11/20 12:00	2018/11/20 13:00		
COC Number		548143-02-01	548143-02-01	548143-02-01		
	UNITS	WG-56484-201118-NT-13	WG-56484-201118-NT-14	WG-56484-201118-NT-15	RDL	QC Batch

Elements						
Dissolved Mercury (Hg)	ug/L	<0.0020	<0.0020	<0.0020	0.0020	9239336
RDL = Reportable Detection Limit						

Maxxam ID		UU9451		UU9452	UU9453		
Sampling Date		2018/11/20 13:45		2018/11/20 14:20	2018/11/20 14:30		
COC Number		548143-02-01		548143-02-01	548143-02-01		
	UNITS	WG-56484-201118-NT-16	QC Batch	WG-56484-201118-NT-17	WG-56484-201118-NT-18	RDL	QC Batch

Elements							
Dissolved Mercury (Hg)	ug/L	<0.0020	9239336	<0.0020	<0.0020	0.0020	9239331
RDL = Reportable Detection Limit							

Maxxam ID		UU9454		UU9455		
Sampling Date		2018/11/20 15:00		2018/11/20 15:20		
COC Number		548143-02-01		548143-02-01		
	UNITS	WG-56484-201118-NT-19	QC Batch	WG-56484-201118-NT-20	RDL	QC Batch

Elements						
Dissolved Mercury (Hg)	ug/L	<0.0020	9239336	<0.0020	0.0020	9239331
RDL = Reportable Detection Limit						

Maxxam Job #: B8A2250
Report Date: 2018/11/28

GHD Limited
Client Project #: 56484-02
Site Location: Campbell River (Phase 02) - Quarterly
Your P.O. #: 73506861-1
Sampler Initials: CR

ELEMENTS BY ATOMIC SPECTROSCOPY (GROUND WATER)

Maxxam ID		UU9436	UU9437	UU9438		
Sampling Date		2018/11/19 12:00	2018/11/19 13:30	2018/11/19 13:10		
COC Number		548143-01-01	548143-01-01	548143-01-01		
	UNITS	WG-56484-191118-NT-01	WG-56484-191118-NT-02	WG-56484-191118-NT-03	RDL	QC Batch
Dissolved Metals by ICPMS						
Dissolved Aluminum (Al)	ug/L	3.1	4.8	7.5	3.0	9238650
Dissolved Antimony (Sb)	ug/L	<0.50	<0.50	<0.50	0.50	9238650
Dissolved Arsenic (As)	ug/L	<0.10	0.85	0.36	0.10	9238650
Dissolved Barium (Ba)	ug/L	7.0	1.5	<1.0	1.0	9238650
Dissolved Beryllium (Be)	ug/L	<0.10	<0.10	<0.10	0.10	9238650
Dissolved Bismuth (Bi)	ug/L	<1.0	<1.0	<1.0	1.0	9238650
Dissolved Boron (B)	ug/L	<50	<50	<50	50	9238650
Dissolved Cadmium (Cd)	ug/L	<0.010	<0.010	<0.010	0.010	9238650
Dissolved Chromium (Cr)	ug/L	<1.0	<1.0	<1.0	1.0	9238650
Dissolved Cobalt (Co)	ug/L	<0.20	<0.20	<0.20	0.20	9238650
Dissolved Copper (Cu)	ug/L	<0.20	<0.20	1.47	0.20	9238650
Dissolved Iron (Fe)	ug/L	<5.0	<5.0	<5.0	5.0	9238650
Dissolved Lead (Pb)	ug/L	<0.20	<0.20	<0.20	0.20	9238650
Dissolved Lithium (Li)	ug/L	<2.0	<2.0	<2.0	2.0	9238650
Dissolved Manganese (Mn)	ug/L	<1.0	<1.0	<1.0	1.0	9238650
Dissolved Molybdenum (Mo)	ug/L	<1.0	<1.0	<1.0	1.0	9238650
Dissolved Nickel (Ni)	ug/L	<1.0	<1.0	<1.0	1.0	9238650
Dissolved Phosphorus (P)	ug/L	<10	13	<10	10	9238650
Dissolved Selenium (Se)	ug/L	0.12	0.12	<0.10	0.10	9238650
Dissolved Silicon (Si)	ug/L	3580	5860	4090	100	9238650
Dissolved Silver (Ag)	ug/L	<0.020	<0.020	<0.020	0.020	9238650
Dissolved Strontium (Sr)	ug/L	20.0	42.2	20.1	1.0	9238650
Dissolved Thallium (Tl)	ug/L	<0.010	<0.010	<0.010	0.010	9238650
Dissolved Tin (Sn)	ug/L	<5.0	<5.0	<5.0	5.0	9238650
Dissolved Titanium (Ti)	ug/L	<5.0	<5.0	<5.0	5.0	9238650
Dissolved Uranium (U)	ug/L	<0.10	<0.10	<0.10	0.10	9238650
Dissolved Vanadium (V)	ug/L	<5.0	5.7	<5.0	5.0	9238650
Dissolved Zinc (Zn)	ug/L	<5.0	<5.0	<5.0	5.0	9238650
Dissolved Zirconium (Zr)	ug/L	<0.10	<0.10	<0.10	0.10	9238650
Dissolved Calcium (Ca)	mg/L	14.0	27.4	13.4	0.050	9238478
RDL = Reportable Detection Limit						

Maxxam Job #: B8A2250
Report Date: 2018/11/28

GHD Limited
Client Project #: 56484-02
Site Location: Campbell River (Phase 02) - Quarterly
Your P.O. #: 73506861-1
Sampler Initials: CR

ELEMENTS BY ATOMIC SPECTROSCOPY (GROUND WATER)

Maxxam ID		UU9436	UU9437	UU9438		
Sampling Date		2018/11/19 12:00	2018/11/19 13:30	2018/11/19 13:10		
COC Number		548143-01-01	548143-01-01	548143-01-01		
	UNITS	WG-56484-191118-NT-01	WG-56484-191118-NT-02	WG-56484-191118-NT-03	RDL	QC Batch
Dissolved Magnesium (Mg)	mg/L	2.00	3.92	1.57	0.050	9238478
Dissolved Potassium (K)	mg/L	0.175	0.679	0.260	0.050	9238478
Dissolved Sodium (Na)	mg/L	1.16	1.78	1.22	0.050	9238478
Dissolved Sulphur (S)	mg/L	<3.0	<3.0	<3.0	3.0	9238478
Dissolved Sulphur (S)	ug/L	<3000	<3000	<3000	3000	9238650
RDL = Reportable Detection Limit						

Maxxam Job #: B8A2250
Report Date: 2018/11/28

GHD Limited
Client Project #: 56484-02
Site Location: Campbell River (Phase 02) - Quarterly
Your P.O. #: 73506861-1
Sampler Initials: CR

ELEMENTS BY ATOMIC SPECTROSCOPY (GROUND WATER)

Maxxam ID		UU9439	UU9440	UU9441		
Sampling Date		2018/11/19 14:30	2018/11/19 14:40	2018/11/19 15:30		
COC Number		548143-01-01	548143-01-01	548143-01-01		
	UNITS	WG-56484-191118-NT-04	WG-56484-191118-NT-05	WG-56484-191118-NT-06	RDL	QC Batch
Dissolved Metals by ICPMS						
Dissolved Aluminum (Al)	ug/L	6.4	5.8	<3.0	3.0	9238650
Dissolved Antimony (Sb)	ug/L	<0.50	<0.50	<0.50	0.50	9238650
Dissolved Arsenic (As)	ug/L	2.19	2.21	0.24	0.10	9238650
Dissolved Barium (Ba)	ug/L	4.1	4.1	36.9	1.0	9238650
Dissolved Beryllium (Be)	ug/L	<0.10	<0.10	<0.10	0.10	9238650
Dissolved Bismuth (Bi)	ug/L	<1.0	<1.0	<1.0	1.0	9238650
Dissolved Boron (B)	ug/L	<50	<50	651	50	9238650
Dissolved Cadmium (Cd)	ug/L	<0.010	<0.010	0.119	0.010	9238650
Dissolved Chromium (Cr)	ug/L	<1.0	<1.0	<1.0	1.0	9238650
Dissolved Cobalt (Co)	ug/L	<0.20	<0.20	1.77	0.20	9238650
Dissolved Copper (Cu)	ug/L	<0.20	<0.20	18.6	0.20	9238650
Dissolved Iron (Fe)	ug/L	<5.0	<5.0	40.4	5.0	9238650
Dissolved Lead (Pb)	ug/L	<0.20	<0.20	<0.20	0.20	9238650
Dissolved Lithium (Li)	ug/L	<2.0	<2.0	<2.0	2.0	9238650
Dissolved Manganese (Mn)	ug/L	<1.0	<1.0	2670	1.0	9238650
Dissolved Molybdenum (Mo)	ug/L	<1.0	<1.0	<1.0	1.0	9238650
Dissolved Nickel (Ni)	ug/L	<1.0	<1.0	3.7	1.0	9238650
Dissolved Phosphorus (P)	ug/L	33	33	16	10	9238650
Dissolved Selenium (Se)	ug/L	0.15	0.15	<0.10	0.10	9238650
Dissolved Silicon (Si)	ug/L	5240	5230	13500	100	9238650
Dissolved Silver (Ag)	ug/L	<0.020	<0.020	<0.020	0.020	9238650
Dissolved Strontium (Sr)	ug/L	33.8	34.3	348	1.0	9238650
Dissolved Thallium (Tl)	ug/L	<0.010	<0.010	<0.010	0.010	9238650
Dissolved Tin (Sn)	ug/L	<5.0	<5.0	<5.0	5.0	9238650
Dissolved Titanium (Ti)	ug/L	<5.0	<5.0	<5.0	5.0	9238650
Dissolved Uranium (U)	ug/L	0.16	0.17	0.42	0.10	9238650
Dissolved Vanadium (V)	ug/L	20.1	20.4	<5.0	5.0	9238650
Dissolved Zinc (Zn)	ug/L	<5.0	<5.0	<5.0	5.0	9238650
Dissolved Zirconium (Zr)	ug/L	<0.10	<0.10	<0.10	0.10	9238650
Dissolved Calcium (Ca)	mg/L	27.3	27.3	65.0	0.050	9238478
RDL = Reportable Detection Limit						

Maxxam Job #: B8A2250
Report Date: 2018/11/28

GHD Limited
Client Project #: 56484-02
Site Location: Campbell River (Phase 02) - Quarterly
Your P.O. #: 73506861-1
Sampler Initials: CR

ELEMENTS BY ATOMIC SPECTROSCOPY (GROUND WATER)

Maxxam ID		UU9439	UU9440	UU9441		
Sampling Date		2018/11/19 14:30	2018/11/19 14:40	2018/11/19 15:30		
COC Number		548143-01-01	548143-01-01	548143-01-01		
	UNITS	WG-56484-191118-NT-04	WG-56484-191118-NT-05	WG-56484-191118-NT-06	RDL	QC Batch
Dissolved Magnesium (Mg)	mg/L	4.17	4.08	12.7	0.050	9238478
Dissolved Potassium (K)	mg/L	1.13	1.14	11.4	0.050	9238478
Dissolved Sodium (Na)	mg/L	1.42	1.42	43.8	0.050	9238478
Dissolved Sulphur (S)	mg/L	<3.0	<3.0	<3.0	3.0	9238478
Dissolved Sulphur (S)	ug/L	<3000	<3000	<3000	3000	9238650
RDL = Reportable Detection Limit						

Maxxam Job #: B8A2250
Report Date: 2018/11/28

GHD Limited
Client Project #: 56484-02
Site Location: Campbell River (Phase 02) - Quarterly
Your P.O. #: 73506861-1
Sampler Initials: CR

ELEMENTS BY ATOMIC SPECTROSCOPY (GROUND WATER)

Maxxam ID		UU9442	UU9443	UU9444		
Sampling Date		2018/11/20 08:10	2018/11/20 08:30	2018/11/20 08:45		
COC Number		548143-01-01	548143-01-01	548143-01-01		
	UNITS	WG-56484-201118-NT-07	WG-56484-201118-NT-08	WG-56484-201118-NT-09	RDL	QC Batch
Dissolved Metals by ICPMS						
Dissolved Aluminum (Al)	ug/L	<3.0	4.6	5.7	3.0	9238650
Dissolved Antimony (Sb)	ug/L	<0.50	<0.50	<0.50	0.50	9238650
Dissolved Arsenic (As)	ug/L	0.13	1.67	0.15	0.10	9238650
Dissolved Barium (Ba)	ug/L	1.2	1.4	<1.0	1.0	9238650
Dissolved Beryllium (Be)	ug/L	<0.10	<0.10	<0.10	0.10	9238650
Dissolved Bismuth (Bi)	ug/L	<1.0	<1.0	<1.0	1.0	9238650
Dissolved Boron (B)	ug/L	<50	<50	<50	50	9238650
Dissolved Cadmium (Cd)	ug/L	<0.010	<0.010	<0.010	0.010	9238650
Dissolved Chromium (Cr)	ug/L	<1.0	<1.0	1.1	1.0	9238650
Dissolved Cobalt (Co)	ug/L	<0.20	<0.20	<0.20	0.20	9238650
Dissolved Copper (Cu)	ug/L	<0.20	<0.20	0.35	0.20	9238650
Dissolved Iron (Fe)	ug/L	<5.0	<5.0	6.2	5.0	9238650
Dissolved Lead (Pb)	ug/L	<0.20	<0.20	<0.20	0.20	9238650
Dissolved Lithium (Li)	ug/L	<2.0	<2.0	<2.0	2.0	9238650
Dissolved Manganese (Mn)	ug/L	<1.0	<1.0	<1.0	1.0	9238650
Dissolved Molybdenum (Mo)	ug/L	<1.0	<1.0	<1.0	1.0	9238650
Dissolved Nickel (Ni)	ug/L	<1.0	<1.0	<1.0	1.0	9238650
Dissolved Phosphorus (P)	ug/L	17	41	400	10	9238650
Dissolved Selenium (Se)	ug/L	0.13	0.16	0.12	0.10	9238650
Dissolved Silicon (Si)	ug/L	4480	5050	4480	100	9238650
Dissolved Silver (Ag)	ug/L	<0.020	<0.020	<0.020	0.020	9238650
Dissolved Strontium (Sr)	ug/L	64.9	26.3	52.7	1.0	9238650
Dissolved Thallium (Tl)	ug/L	<0.010	<0.010	<0.010	0.010	9238650
Dissolved Tin (Sn)	ug/L	<5.0	<5.0	<5.0	5.0	9238650
Dissolved Titanium (Ti)	ug/L	<5.0	<5.0	<5.0	5.0	9238650
Dissolved Uranium (U)	ug/L	<0.10	0.22	0.11	0.10	9238650
Dissolved Vanadium (V)	ug/L	<5.0	15.4	<5.0	5.0	9238650
Dissolved Zinc (Zn)	ug/L	<5.0	<5.0	<5.0	5.0	9238650
Dissolved Zirconium (Zr)	ug/L	<0.10	<0.10	<0.10	0.10	9238650
Dissolved Calcium (Ca)	mg/L	38.3	14.5	21.3	0.050	9238478
RDL = Reportable Detection Limit						

Maxxam Job #: B8A2250
Report Date: 2018/11/28

GHD Limited
Client Project #: 56484-02
Site Location: Campbell River (Phase 02) - Quarterly
Your P.O. #: 73506861-1
Sampler Initials: CR

ELEMENTS BY ATOMIC SPECTROSCOPY (GROUND WATER)

Maxxam ID		UU9442	UU9443	UU9444		
Sampling Date		2018/11/20 08:10	2018/11/20 08:30	2018/11/20 08:45		
COC Number		548143-01-01	548143-01-01	548143-01-01		
	UNITS	WG-56484-201118-NT-07	WG-56484-201118-NT-08	WG-56484-201118-NT-09	RDL	QC Batch
Dissolved Magnesium (Mg)	mg/L	6.00	2.61	3.50	0.050	9238478
Dissolved Potassium (K)	mg/L	0.410	0.961	0.715	0.050	9238478
Dissolved Sodium (Na)	mg/L	2.15	2.75	2.75	0.050	9238478
Dissolved Sulphur (S)	mg/L	<3.0	<3.0	<3.0	3.0	9238478
Dissolved Sulphur (S)	ug/L	<3000	<3000	<3000	3000	9238650
RDL = Reportable Detection Limit						

Maxxam Job #: B8A2250
Report Date: 2018/11/28

GHD Limited
Client Project #: 56484-02
Site Location: Campbell River (Phase 02) - Quarterly
Your P.O. #: 73506861-1
Sampler Initials: CR

ELEMENTS BY ATOMIC SPECTROSCOPY (GROUND WATER)

Maxxam ID		UU9445	UU9446	UU9447		
Sampling Date		2018/11/20 10:00	2018/11/20 10:10	2018/11/20 10:20		
COC Number		548143-01-01	548143-02-01	548143-02-01		
	UNITS	WG-56484-201118-NT-10	WG-56484-201118-NT-11	WG-56484-201118-NT-12	RDL	QC Batch
Dissolved Metals by ICPMS						
Dissolved Aluminum (Al)	ug/L	6.3	5.6	6.0	3.0	9238650
Dissolved Antimony (Sb)	ug/L	<0.50	<0.50	<0.50	0.50	9238650
Dissolved Arsenic (As)	ug/L	0.45	0.45	0.55	0.10	9238650
Dissolved Barium (Ba)	ug/L	3.3	3.3	<1.0	1.0	9238650
Dissolved Beryllium (Be)	ug/L	<0.10	<0.10	<0.10	0.10	9238650
Dissolved Bismuth (Bi)	ug/L	<1.0	<1.0	<1.0	1.0	9238650
Dissolved Boron (B)	ug/L	<50	<50	<50	50	9238650
Dissolved Cadmium (Cd)	ug/L	<0.010	<0.010	<0.010	0.010	9238650
Dissolved Chromium (Cr)	ug/L	<1.0	<1.0	<1.0	1.0	9238650
Dissolved Cobalt (Co)	ug/L	<0.20	<0.20	<0.20	0.20	9238650
Dissolved Copper (Cu)	ug/L	0.94	0.90	<0.20	0.20	9238650
Dissolved Iron (Fe)	ug/L	<5.0	<5.0	<5.0	5.0	9238650
Dissolved Lead (Pb)	ug/L	<0.20	<0.20	<0.20	0.20	9238650
Dissolved Lithium (Li)	ug/L	<2.0	<2.0	<2.0	2.0	9238650
Dissolved Manganese (Mn)	ug/L	<1.0	<1.0	<1.0	1.0	9238650
Dissolved Molybdenum (Mo)	ug/L	<1.0	<1.0	<1.0	1.0	9238650
Dissolved Nickel (Ni)	ug/L	<1.0	<1.0	<1.0	1.0	9238650
Dissolved Phosphorus (P)	ug/L	11	<10	<10	10	9238650
Dissolved Selenium (Se)	ug/L	0.13	0.13	<0.10	0.10	9238650
Dissolved Silicon (Si)	ug/L	4310	4370	3990	100	9238650
Dissolved Silver (Ag)	ug/L	<0.020	<0.020	<0.020	0.020	9238650
Dissolved Strontium (Sr)	ug/L	67.0	66.5	21.9	1.0	9238650
Dissolved Thallium (Tl)	ug/L	<0.010	<0.010	<0.010	0.010	9238650
Dissolved Tin (Sn)	ug/L	<5.0	<5.0	<5.0	5.0	9238650
Dissolved Titanium (Ti)	ug/L	<5.0	<5.0	<5.0	5.0	9238650
Dissolved Uranium (U)	ug/L	<0.10	<0.10	<0.10	0.10	9238650
Dissolved Vanadium (V)	ug/L	<5.0	<5.0	<5.0	5.0	9238650
Dissolved Zinc (Zn)	ug/L	<5.0	<5.0	<5.0	5.0	9238650
Dissolved Zirconium (Zr)	ug/L	<0.10	<0.10	<0.10	0.10	9238650
Dissolved Calcium (Ca)	mg/L	38.6	38.8	14.7	0.050	9238478
RDL = Reportable Detection Limit						

Maxxam Job #: B8A2250
Report Date: 2018/11/28

GHD Limited
Client Project #: 56484-02
Site Location: Campbell River (Phase 02) - Quarterly
Your P.O. #: 73506861-1
Sampler Initials: CR

ELEMENTS BY ATOMIC SPECTROSCOPY (GROUND WATER)

Maxxam ID		UU9445	UU9446	UU9447		
Sampling Date		2018/11/20 10:00	2018/11/20 10:10	2018/11/20 10:20		
COC Number		548143-01-01	548143-02-01	548143-02-01		
	UNITS	WG-56484-201118-NT-10	WG-56484-201118-NT-11	WG-56484-201118-NT-12	RDL	QC Batch
Dissolved Magnesium (Mg)	mg/L	3.30	3.31	1.58	0.050	9238478
Dissolved Potassium (K)	mg/L	0.751	0.756	0.356	0.050	9238478
Dissolved Sodium (Na)	mg/L	3.73	3.78	1.60	0.050	9238478
Dissolved Sulphur (S)	mg/L	<3.0	<3.0	<3.0	3.0	9238478
Dissolved Sulphur (S)	ug/L	<3000	<3000	<3000	3000	9238650
RDL = Reportable Detection Limit						

Maxxam Job #: B8A2250
Report Date: 2018/11/28

GHD Limited
Client Project #: 56484-02
Site Location: Campbell River (Phase 02) - Quarterly
Your P.O. #: 73506861-1
Sampler Initials: CR

ELEMENTS BY ATOMIC SPECTROSCOPY (GROUND WATER)

Maxxam ID		UU9448	UU9449	UU9450		
Sampling Date		2018/11/20 11:50	2018/11/20 12:00	2018/11/20 13:00		
COC Number		548143-02-01	548143-02-01	548143-02-01		
	UNITS	WG-56484-201118-NT-13	WG-56484-201118-NT-14	WG-56484-201118-NT-15	RDL	QC Batch
Dissolved Metals by ICPMS						
Dissolved Aluminum (Al)	ug/L	3.3	<3.0	5.2	3.0	9239290
Dissolved Antimony (Sb)	ug/L	<0.50	<0.50	<0.50	0.50	9239290
Dissolved Arsenic (As)	ug/L	0.13	<0.10	0.36	0.10	9239290
Dissolved Barium (Ba)	ug/L	9.7	<1.0	<1.0	1.0	9239290
Dissolved Beryllium (Be)	ug/L	<0.10	<0.10	<0.10	0.10	9239290
Dissolved Bismuth (Bi)	ug/L	<1.0	<1.0	<1.0	1.0	9239290
Dissolved Boron (B)	ug/L	<50	<50	<50	50	9239290
Dissolved Cadmium (Cd)	ug/L	<0.010	<0.010	<0.010	0.010	9239290
Dissolved Chromium (Cr)	ug/L	1.9	<1.0	<1.0	1.0	9239290
Dissolved Cobalt (Co)	ug/L	<0.20	<0.20	<0.20	0.20	9239290
Dissolved Copper (Cu)	ug/L	<0.20	<0.20	<0.20	0.20	9239290
Dissolved Iron (Fe)	ug/L	<5.0	<5.0	<5.0	5.0	9239290
Dissolved Lead (Pb)	ug/L	<0.20	<0.20	<0.20	0.20	9239290
Dissolved Lithium (Li)	ug/L	<2.0	<2.0	<2.0	2.0	9239290
Dissolved Manganese (Mn)	ug/L	<1.0	<1.0	<1.0	1.0	9239290
Dissolved Molybdenum (Mo)	ug/L	<1.0	<1.0	<1.0	1.0	9239290
Dissolved Nickel (Ni)	ug/L	<1.0	<1.0	<1.0	1.0	9239290
Dissolved Phosphorus (P)	ug/L	<10	<10	<10	10	9239290
Dissolved Selenium (Se)	ug/L	0.18	<0.10	0.13	0.10	9239290
Dissolved Silicon (Si)	ug/L	8850	<100	3960	100	9239290
Dissolved Silver (Ag)	ug/L	<0.020	<0.020	<0.020	0.020	9239290
Dissolved Strontium (Sr)	ug/L	132	<1.0	31.7	1.0	9239290
Dissolved Thallium (Tl)	ug/L	<0.010	<0.010	<0.010	0.010	9239290
Dissolved Tin (Sn)	ug/L	<5.0	<5.0	<5.0	5.0	9239290
Dissolved Titanium (Ti)	ug/L	<5.0	<5.0	<5.0	5.0	9239290
Dissolved Uranium (U)	ug/L	0.29	<0.10	<0.10	0.10	9239290
Dissolved Vanadium (V)	ug/L	<5.0	<5.0	<5.0	5.0	9239290
Dissolved Zinc (Zn)	ug/L	<5.0	<5.0	<5.0	5.0	9239290
Dissolved Zirconium (Zr)	ug/L	<0.10	<0.10	<0.10	0.10	9239290
Dissolved Calcium (Ca)	mg/L	62.6	<0.050	21.4	0.050	9238478
RDL = Reportable Detection Limit						

Maxxam Job #: B8A2250
Report Date: 2018/11/28

GHD Limited
Client Project #: 56484-02
Site Location: Campbell River (Phase 02) - Quarterly
Your P.O. #: 73506861-1
Sampler Initials: CR

ELEMENTS BY ATOMIC SPECTROSCOPY (GROUND WATER)

Maxxam ID		UU9448	UU9449	UU9450		
Sampling Date		2018/11/20 11:50	2018/11/20 12:00	2018/11/20 13:00		
COC Number		548143-02-01	548143-02-01	548143-02-01		
	UNITS	WG-56484-201118-NT-13	WG-56484-201118-NT-14	WG-56484-201118-NT-15	RDL	QC Batch
Dissolved Magnesium (Mg)	mg/L	13.1	<0.050	2.17	0.050	9238478
Dissolved Potassium (K)	mg/L	1.04	<0.050	0.323	0.050	9238478
Dissolved Sodium (Na)	mg/L	4.08	<0.050	1.40	0.050	9238478
Dissolved Sulphur (S)	mg/L	<3.0	<3.0	<3.0	3.0	9238478
Dissolved Sulphur (S)	ug/L	<3000	<3000	<3000	3000	9239290
RDL = Reportable Detection Limit						

Maxxam Job #: B8A2250
Report Date: 2018/11/28

GHD Limited
Client Project #: 56484-02
Site Location: Campbell River (Phase 02) - Quarterly
Your P.O. #: 73506861-1
Sampler Initials: CR

ELEMENTS BY ATOMIC SPECTROSCOPY (GROUND WATER)

Maxxam ID		UU9451	UU9452	UU9453		
Sampling Date		2018/11/20 13:45	2018/11/20 14:20	2018/11/20 14:30		
COC Number		548143-02-01	548143-02-01	548143-02-01		
	UNITS	WG-56484-201118-NT-16	WG-56484-201118-NT-17	WG-56484-201118-NT-18	RDL	QC Batch
Dissolved Metals by ICPMS						
Dissolved Aluminum (Al)	ug/L	7.4	<3.0	<3.0	3.0	9239290
Dissolved Antimony (Sb)	ug/L	<0.50	<0.50	<0.50	0.50	9239290
Dissolved Arsenic (As)	ug/L	0.24	0.15	<0.10	0.10	9239290
Dissolved Barium (Ba)	ug/L	2.8	17.7	7.0	1.0	9239290
Dissolved Beryllium (Be)	ug/L	<0.10	<0.10	<0.10	0.10	9239290
Dissolved Bismuth (Bi)	ug/L	<1.0	<1.0	<1.0	1.0	9239290
Dissolved Boron (B)	ug/L	79	192	84	50	9239290
Dissolved Cadmium (Cd)	ug/L	<0.010	0.048	<0.010	0.010	9239290
Dissolved Chromium (Cr)	ug/L	1.4	<1.0	1.3	1.0	9239290
Dissolved Cobalt (Co)	ug/L	<0.20	0.46	<0.20	0.20	9239290
Dissolved Copper (Cu)	ug/L	0.27	3.17	0.31	0.20	9239290
Dissolved Iron (Fe)	ug/L	5.6	5.1	<5.0	5.0	9239290
Dissolved Lead (Pb)	ug/L	<0.20	<0.20	<0.20	0.20	9239290
Dissolved Lithium (Li)	ug/L	<2.0	<2.0	<2.0	2.0	9239290
Dissolved Manganese (Mn)	ug/L	<1.0	136	<1.0	1.0	9239290
Dissolved Molybdenum (Mo)	ug/L	<1.0	<1.0	<1.0	1.0	9239290
Dissolved Nickel (Ni)	ug/L	<1.0	1.8	<1.0	1.0	9239290
Dissolved Phosphorus (P)	ug/L	21	<10	<10	10	9239290
Dissolved Selenium (Se)	ug/L	<0.10	<0.10	<0.10	0.10	9239290
Dissolved Silicon (Si)	ug/L	6900	12800	11700	100	9239290
Dissolved Silver (Ag)	ug/L	<0.020	<0.020	<0.020	0.020	9239290
Dissolved Strontium (Sr)	ug/L	58.3	364	192	1.0	9239290
Dissolved Thallium (Tl)	ug/L	<0.010	<0.010	<0.010	0.010	9239290
Dissolved Tin (Sn)	ug/L	<5.0	<5.0	<5.0	5.0	9239290
Dissolved Titanium (Ti)	ug/L	<5.0	<5.0	<5.0	5.0	9239290
Dissolved Uranium (U)	ug/L	0.13	0.71	0.25	0.10	9239290
Dissolved Vanadium (V)	ug/L	6.2	<5.0	<5.0	5.0	9239290
Dissolved Zinc (Zn)	ug/L	<5.0	<5.0	<5.0	5.0	9239290
Dissolved Zirconium (Zr)	ug/L	<0.10	<0.10	<0.10	0.10	9239290
Dissolved Calcium (Ca)	mg/L	27.1	138	88.3	0.050	9238478
RDL = Reportable Detection Limit						

Maxxam Job #: B8A2250
Report Date: 2018/11/28

GHD Limited
Client Project #: 56484-02
Site Location: Campbell River (Phase 02) - Quarterly
Your P.O. #: 73506861-1
Sampler Initials: CR

ELEMENTS BY ATOMIC SPECTROSCOPY (GROUND WATER)

Maxxam ID		UU9451	UU9452	UU9453		
Sampling Date		2018/11/20 13:45	2018/11/20 14:20	2018/11/20 14:30		
COC Number		548143-02-01	548143-02-01	548143-02-01		
	UNITS	WG-56484-201118-NT-16	WG-56484-201118-NT-17	WG-56484-201118-NT-18	RDL	QC Batch
Dissolved Magnesium (Mg)	mg/L	5.88	27.9	17.2	0.050	9238478
Dissolved Potassium (K)	mg/L	0.584	2.20	1.37	0.050	9238478
Dissolved Sodium (Na)	mg/L	3.86	26.8	6.96	0.050	9238478
Dissolved Sulphur (S)	mg/L	<3.0	4.5	<3.0	3.0	9238478
Dissolved Sulphur (S)	ug/L	<3000	4510	<3000	3000	9239290
RDL = Reportable Detection Limit						

Maxxam Job #: B8A2250
Report Date: 2018/11/28

GHD Limited
Client Project #: 56484-02
Site Location: Campbell River (Phase 02) - Quarterly
Your P.O. #: 73506861-1
Sampler Initials: CR

ELEMENTS BY ATOMIC SPECTROSCOPY (GROUND WATER)

Maxxam ID		UU9454	UU9455	UU9455		
Sampling Date		2018/11/20 15:00	2018/11/20 15:20	2018/11/20 15:20		
COC Number		548143-02-01	548143-02-01	548143-02-01		
	UNITS	WG-56484-201118-NT-19	WG-56484-201118-NT-20	WG-56484-201118-NT-20 Lab-Dup	RDL	QC Batch
Dissolved Metals by ICPMS						
Dissolved Aluminum (Al)	ug/L	5.2	9.9	9.8	3.0	9239290
Dissolved Antimony (Sb)	ug/L	<0.50	<0.50	<0.50	0.50	9239290
Dissolved Arsenic (As)	ug/L	1.70	0.42	0.42	0.10	9239290
Dissolved Barium (Ba)	ug/L	8.5	19.6	19.3	1.0	9239290
Dissolved Beryllium (Be)	ug/L	<0.10	<0.10	<0.10	0.10	9239290
Dissolved Bismuth (Bi)	ug/L	<1.0	<1.0	<1.0	1.0	9239290
Dissolved Boron (B)	ug/L	110	167	169	50	9239290
Dissolved Cadmium (Cd)	ug/L	0.014	<0.010	<0.010	0.010	9239290
Dissolved Chromium (Cr)	ug/L	<1.0	<1.0	<1.0	1.0	9239290
Dissolved Cobalt (Co)	ug/L	<0.20	0.55	0.56	0.20	9239290
Dissolved Copper (Cu)	ug/L	<0.20	0.74	0.76	0.20	9239290
Dissolved Iron (Fe)	ug/L	1110	15900	16000	5.0	9239290
Dissolved Lead (Pb)	ug/L	<0.20	<0.20	<0.20	0.20	9239290
Dissolved Lithium (Li)	ug/L	<2.0	<2.0	<2.0	2.0	9239290
Dissolved Manganese (Mn)	ug/L	1010	1880	1850	1.0	9239290
Dissolved Molybdenum (Mo)	ug/L	<1.0	<1.0	<1.0	1.0	9239290
Dissolved Nickel (Ni)	ug/L	<1.0	1.3	1.2	1.0	9239290
Dissolved Phosphorus (P)	ug/L	27	53	56	10	9239290
Dissolved Selenium (Se)	ug/L	<0.10	<0.10	<0.10	0.10	9239290
Dissolved Silicon (Si)	ug/L	7010	7850	7790	100	9239290
Dissolved Silver (Ag)	ug/L	<0.020	<0.020	<0.020	0.020	9239290
Dissolved Strontium (Sr)	ug/L	144	195	192	1.0	9239290
Dissolved Thallium (Tl)	ug/L	<0.010	<0.010	<0.010	0.010	9239290
Dissolved Tin (Sn)	ug/L	<5.0	<5.0	<5.0	5.0	9239290
Dissolved Titanium (Ti)	ug/L	<5.0	<5.0	<5.0	5.0	9239290
Dissolved Uranium (U)	ug/L	<0.10	<0.10	<0.10	0.10	9239290
Dissolved Vanadium (V)	ug/L	<5.0	<5.0	<5.0	5.0	9239290
Dissolved Zinc (Zn)	ug/L	<5.0	<5.0	<5.0	5.0	9239290
Dissolved Zirconium (Zr)	ug/L	<0.10	<0.10	<0.10	0.10	9239290
RDL = Reportable Detection Limit						
Lab-Dup = Laboratory Initiated Duplicate						

Maxxam Job #: B8A2250
Report Date: 2018/11/28

GHD Limited
Client Project #: 56484-02
Site Location: Campbell River (Phase 02) - Quarterly
Your P.O. #: 73506861-1
Sampler Initials: CR

ELEMENTS BY ATOMIC SPECTROSCOPY (GROUND WATER)

Maxxam ID		UU9454	UU9455	UU9455		
Sampling Date		2018/11/20 15:00	2018/11/20 15:20	2018/11/20 15:20		
COC Number		548143-02-01	548143-02-01	548143-02-01		
	UNITS	WG-56484-201118-NT-19	WG-56484-201118-NT-20	WG-56484-201118-NT-20 Lab-Dup	RDL	QC Batch
Dissolved Calcium (Ca)	mg/L	48.7	63.4	N/A	0.050	9238478
Dissolved Magnesium (Mg)	mg/L	4.97	6.51	N/A	0.050	9238478
Dissolved Potassium (K)	mg/L	2.99	3.47	N/A	0.050	9238478
Dissolved Sodium (Na)	mg/L	14.2	22.2	N/A	0.050	9238478
Dissolved Sulphur (S)	mg/L	<3.0	<3.0	N/A	3.0	9238478
Dissolved Sulphur (S)	ug/L	<3000	<3000	<3000	3000	9239290
RDL = Reportable Detection Limit Lab-Dup = Laboratory Initiated Duplicate N/A = Not Applicable						

Maxxam Job #: B8A2250
Report Date: 2018/11/28

GHD Limited
Client Project #: 56484-02
Site Location: Campbell River (Phase 02) - Quarterly
Your P.O. #: 73506861-1
Sampler Initials: CR

GENERAL COMMENTS

Results relate only to the items tested.

Maxxam Job #: B8A2250
Report Date: 2018/11/28

QUALITY ASSURANCE REPORT

GHD Limited
Client Project #: 56484-02
Site Location: Campbell River (Phase 02) - Quarterly
Your P.O. #: 73506861-1
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
9238650	Dissolved Aluminum (Al)	2018/11/23	99	80 - 120	104	80 - 120	<3.0	ug/L	NC (1)	20
9238650	Dissolved Antimony (Sb)	2018/11/23	99	80 - 120	103	80 - 120	<0.50	ug/L	NC (1)	20
9238650	Dissolved Arsenic (As)	2018/11/23	99	80 - 120	103	80 - 120	<0.10	ug/L	NC (1)	20
9238650	Dissolved Barium (Ba)	2018/11/23	96	80 - 120	101	80 - 120	<1.0	ug/L	NC (1)	20
9238650	Dissolved Beryllium (Be)	2018/11/23	95	80 - 120	99	80 - 120	<0.10	ug/L	NC (1)	20
9238650	Dissolved Bismuth (Bi)	2018/11/23	102	80 - 120	105	80 - 120	<1.0	ug/L	NC (1)	20
9238650	Dissolved Boron (B)	2018/11/23	94	80 - 120	95	80 - 120	<50	ug/L	NC (1)	20
9238650	Dissolved Cadmium (Cd)	2018/11/23	98	80 - 120	102	80 - 120	<0.010	ug/L	NC (1)	20
9238650	Dissolved Chromium (Cr)	2018/11/23	98	80 - 120	104	80 - 120	<1.0	ug/L	0.85 (1)	20
9238650	Dissolved Cobalt (Co)	2018/11/23	99	80 - 120	104	80 - 120	<0.20	ug/L	NC (1)	20
9238650	Dissolved Copper (Cu)	2018/11/23	98	80 - 120	102	80 - 120	<0.20	ug/L	1.1 (1)	20
9238650	Dissolved Iron (Fe)	2018/11/23	99	80 - 120	103	80 - 120	<5.0	ug/L	NC (1)	20
9238650	Dissolved Lead (Pb)	2018/11/23	100	80 - 120	105	80 - 120	<0.20	ug/L	1.9 (1)	20
9238650	Dissolved Lithium (Li)	2018/11/23	98	80 - 120	98	80 - 120	<2.0	ug/L	NC (1)	20
9238650	Dissolved Manganese (Mn)	2018/11/23	99	80 - 120	104	80 - 120	<1.0	ug/L	NC (1)	20
9238650	Dissolved Molybdenum (Mo)	2018/11/23	99	80 - 120	104	80 - 120	<1.0	ug/L	NC (1)	20
9238650	Dissolved Nickel (Ni)	2018/11/23	99	80 - 120	104	80 - 120	<1.0	ug/L	NC (1)	20
9238650	Dissolved Phosphorus (P)	2018/11/23	104	80 - 120	104	80 - 120	<10	ug/L		
9238650	Dissolved Selenium (Se)	2018/11/23	99	80 - 120	102	80 - 120	<0.10	ug/L	NC (1)	20
9238650	Dissolved Silicon (Si)	2018/11/23	95	80 - 120	103	80 - 120	<100	ug/L	NC (1)	20
9238650	Dissolved Silver (Ag)	2018/11/23	96	80 - 120	102	80 - 120	<0.020	ug/L	NC (1)	20
9238650	Dissolved Strontium (Sr)	2018/11/23	99	80 - 120	101	80 - 120	<1.0	ug/L	NC (1)	20
9238650	Dissolved Sulphur (S)	2018/11/23	103	80 - 120	103	80 - 120	<3000	ug/L		
9238650	Dissolved Thallium (Tl)	2018/11/23	103	80 - 120	107	80 - 120	<0.010	ug/L	NC (1)	20
9238650	Dissolved Tin (Sn)	2018/11/23	100	80 - 120	101	80 - 120	<5.0	ug/L	NC (1)	20
9238650	Dissolved Titanium (Ti)	2018/11/23	104	80 - 120	106	80 - 120	<5.0	ug/L	NC (1)	20
9238650	Dissolved Uranium (U)	2018/11/23	101	80 - 120	104	80 - 120	<0.10	ug/L	NC (1)	20
9238650	Dissolved Vanadium (V)	2018/11/23	98	80 - 120	102	80 - 120	<5.0	ug/L	NC (1)	20
9238650	Dissolved Zinc (Zn)	2018/11/23	101	80 - 120	105	80 - 120	<5.0	ug/L	NC (1)	20
9238650	Dissolved Zirconium (Zr)	2018/11/23	97	80 - 120	103	80 - 120	<0.10	ug/L	NC (1)	20

Maxxam Job #: B8A2250
Report Date: 2018/11/28

QUALITY ASSURANCE REPORT(CONT'D)

GHD Limited
Client Project #: 56484-02
Site Location: Campbell River (Phase 02) - Quarterly
Your P.O. #: 73506861-1
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
9238733	Total Dissolved Solids	2018/11/26	104 (2)	80 - 120	88	80 - 120	<10	mg/L	13 (3)	20
9238765	Total Dissolved Solids	2018/11/28	101	80 - 120	89	80 - 120	<10	mg/L		
9238778	Nitrate plus Nitrite (N)	2018/11/22	100	80 - 120	110	80 - 120	<0.10	mg/L	NC (1)	25
9238779	Nitrite (N)	2018/11/22	93	80 - 120	104	80 - 120	<0.10	mg/L	NC (1)	20
9238780	Nitrate plus Nitrite (N)	2018/11/22			110	80 - 120	<0.10	mg/L		
9238781	Nitrite (N)	2018/11/22			106	80 - 120	<0.10	mg/L		
9239290	Dissolved Aluminum (Al)	2018/11/23	98 (4)	80 - 120	101	80 - 120	<3.0	ug/L	0.45 (5)	20
9239290	Dissolved Antimony (Sb)	2018/11/23	102 (4)	80 - 120	102	80 - 120	<0.50	ug/L	NC (5)	20
9239290	Dissolved Arsenic (As)	2018/11/23	102 (4)	80 - 120	100	80 - 120	<0.10	ug/L	0.26 (5)	20
9239290	Dissolved Barium (Ba)	2018/11/23	95 (4)	80 - 120	99	80 - 120	<1.0	ug/L	1.5 (5)	20
9239290	Dissolved Beryllium (Be)	2018/11/23	95 (4)	80 - 120	96	80 - 120	<0.10	ug/L	NC (5)	20
9239290	Dissolved Bismuth (Bi)	2018/11/23	97 (4)	80 - 120	103	80 - 120	<1.0	ug/L	NC (5)	20
9239290	Dissolved Boron (B)	2018/11/23	90 (4)	80 - 120	92	80 - 120	<50	ug/L	1.0 (5)	20
9239290	Dissolved Cadmium (Cd)	2018/11/23	99 (4)	80 - 120	100	80 - 120	<0.010	ug/L	NC (5)	20
9239290	Dissolved Chromium (Cr)	2018/11/23	98 (4)	80 - 120	100	80 - 120	<1.0	ug/L	NC (5)	20
9239290	Dissolved Cobalt (Co)	2018/11/23	97 (4)	80 - 120	101	80 - 120	<0.20	ug/L	2.2 (5)	20
9239290	Dissolved Copper (Cu)	2018/11/23	93 (4)	80 - 120	100	80 - 120	<0.20	ug/L	2.2 (5)	20
9239290	Dissolved Iron (Fe)	2018/11/23	NC (4)	80 - 120	101	80 - 120	<5.0	ug/L	0.60 (5)	20
9239290	Dissolved Lead (Pb)	2018/11/23	99 (4)	80 - 120	102	80 - 120	<0.20	ug/L	NC (5)	20
9239290	Dissolved Lithium (Li)	2018/11/23	94 (4)	80 - 120	98	80 - 120	<2.0	ug/L	NC (5)	20
9239290	Dissolved Manganese (Mn)	2018/11/23	NC (4)	80 - 120	102	80 - 120	<1.0	ug/L	1.2 (5)	20
9239290	Dissolved Molybdenum (Mo)	2018/11/23	105 (4)	80 - 120	100	80 - 120	<1.0	ug/L	NC (5)	20
9239290	Dissolved Nickel (Ni)	2018/11/23	96 (4)	80 - 120	101	80 - 120	<1.0	ug/L	2.4 (5)	20
9239290	Dissolved Phosphorus (P)	2018/11/23	104 (4)	80 - 120	102	80 - 120	<10	ug/L	4.7 (5)	20
9239290	Dissolved Selenium (Se)	2018/11/23	84 (4)	80 - 120	99	80 - 120	<0.10	ug/L	NC (5)	20
9239290	Dissolved Silicon (Si)	2018/11/23	NC (4)	80 - 120	104	80 - 120	<100	ug/L	0.76 (5)	20
9239290	Dissolved Silver (Ag)	2018/11/23	82 (4)	80 - 120	100	80 - 120	<0.020	ug/L	NC (5)	20
9239290	Dissolved Strontium (Sr)	2018/11/23	NC (4)	80 - 120	101	80 - 120	<1.0	ug/L	1.6 (5)	20
9239290	Dissolved Sulphur (S)	2018/11/23	105 (4)	80 - 120	101	80 - 120	<3000	ug/L	NC (5)	20
9239290	Dissolved Thallium (Tl)	2018/11/23	87 (4)	80 - 120	105	80 - 120	<0.010	ug/L	NC (5)	20

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QUALITY ASSURANCE REPORT(CONT'D)

GHD Limited
Client Project #: 56484-02
Site Location: Campbell River (Phase 02) - Quarterly
Your P.O. #: 73506861-1
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
9239290	Dissolved Tin (Sn)	2018/11/23	100 (4)	80 - 120	100	80 - 120	<5.0	ug/L	NC (5)	20
9239290	Dissolved Titanium (Ti)	2018/11/23	98 (4)	80 - 120	101	80 - 120	<5.0	ug/L	NC (5)	20
9239290	Dissolved Uranium (U)	2018/11/23	101 (4)	80 - 120	103	80 - 120	<0.10	ug/L	NC (5)	20
9239290	Dissolved Vanadium (V)	2018/11/23	99 (4)	80 - 120	99	80 - 120	<5.0	ug/L	NC (5)	20
9239290	Dissolved Zinc (Zn)	2018/11/23	98 (4)	80 - 120	102	80 - 120	<5.0	ug/L	NC (5)	20
9239290	Dissolved Zirconium (Zr)	2018/11/23	105 (4)	80 - 120	100	80 - 120	<0.10	ug/L	NC (5)	20
9239331	Dissolved Mercury (Hg)	2018/11/23	92	80 - 120	98	80 - 120	<0.0020	ug/L	NC (1)	20
9239336	Dissolved Mercury (Hg)	2018/11/23	95	80 - 120	98	80 - 120	<0.0020	ug/L	NC (1)	20
9239548	Alkalinity (PP as CaCO3)	2018/11/23					<1.0	mg/L	NC (1)	20
9239548	Alkalinity (Total as CaCO3)	2018/11/23	NC	80 - 120	101	80 - 120	<1.0	mg/L	7.6 (1)	20
9239548	Bicarbonate (HCO3)	2018/11/23					<1.0	mg/L	7.6 (1)	20
9239548	Carbonate (CO3)	2018/11/23					<1.0	mg/L	NC (1)	20
9239548	Hydroxide (OH)	2018/11/23					<1.0	mg/L	NC (1)	20
9239552	pH	2018/11/23			101	97 - 103			0.15 (1)	20
9239553	Conductivity	2018/11/23			101	80 - 120	<2.0	uS/cm	0.32 (1)	20
9239554	Alkalinity (PP as CaCO3)	2018/11/23					<1.0	mg/L	NC (7)	20
9239554	Alkalinity (Total as CaCO3)	2018/11/23	NC (6)	80 - 120	101	80 - 120	<1.0	mg/L	1.3 (7)	20
9239554	Bicarbonate (HCO3)	2018/11/23					<1.0	mg/L	1.3 (7)	20
9239554	Carbonate (CO3)	2018/11/23					<1.0	mg/L	NC (7)	20
9239554	Hydroxide (OH)	2018/11/23					<1.0	mg/L	NC (7)	20
9239555	pH	2018/11/23			101	97 - 103			0.75 (7)	20
9239556	Conductivity	2018/11/23			102	80 - 120	<2.0	uS/cm	0.24 (7)	20
9240172	Total Dissolved Solids	2018/11/28	101	80 - 120	99	80 - 120	<10	mg/L	1.6 (1)	20
9240205	Dissolved Chloride (Cl)	2018/11/22	NC (8)	80 - 120	96	80 - 120	<1.0	mg/L	0.10 (9)	20
9240208	Dissolved Sulphate (SO4)	2018/11/22	90 (8)	80 - 120	88	80 - 120	<1.0	mg/L	0.96 (9)	20
9240211	Dissolved Chloride (Cl)	2018/11/22			98	80 - 120	<1.0	mg/L		
9240224	Dissolved Sulphate (SO4)	2018/11/22			99	80 - 120	<1.0	mg/L		
9241187	Fluoride (F)	2018/11/24	104 (10)	80 - 120	102	80 - 120	<0.10	mg/L	NC (11)	20
9242378	Dissolved Chloride (Cl)	2018/11/23			99	80 - 120	<1.0	mg/L		
9243308	Total Ammonia (N)	2018/11/26	100	80 - 120	107	80 - 120	<0.020	mg/L	NC (1)	20

Maxxam Job #: B8A2250
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QUALITY ASSURANCE REPORT(CONT'D)

GHD Limited
Client Project #: 56484-02
Site Location: Campbell River (Phase 02) - Quarterly
Your P.O. #: 73506861-1
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
9243313	Total Ammonia (N)	2018/11/26	102 (12)	80 - 120	101	80 - 120	<0.020	mg/L	NC (13)	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 $\leq 2 \times \text{RDL}$).

(1) Duplicate Parent ID

(2) Matrix Spike Parent ID [UU9442-01]

(3) Duplicate Parent ID [UU9436-01]

(4) Matrix Spike Parent ID [UU9455-03]

(5) Duplicate Parent ID [UU9455-03]

(6) Matrix Spike Parent ID [UU9451-01]

(7) Duplicate Parent ID [UU9448-01]

(8) Matrix Spike Parent ID [UU9452-02]

(9) Duplicate Parent ID [UU9452-02]

(10) Matrix Spike Parent ID [UU9436-02]

(11) Duplicate Parent ID [UU9436-02]

(12) Matrix Spike Parent ID [UU9446-05]

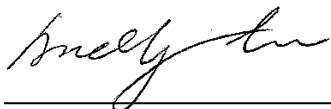
(13) Duplicate Parent ID [UU9446-05]

Maxxam Job #: B8A2250
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GHD Limited
Client Project #: 56484-02
Site Location: Campbell River (Phase 02) - Quarterly
Your P.O. #: 73506861-1
Sampler Initials: CR

VALIDATION SIGNATURE PAGE

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



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 d/b/a Maxxam Analytics
4606 Canada Way, Burnaby, British Columbia Canada V5G 1K5 Tel: (604) 734 7276 Toll-free 800-583-6266 Fax: (604) 731 2386 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	Airesse MacPhee	Quotation #	B70472	Maxxam Job #	Bottle Order #:
Contact Name	Airesse MacPhee	Contact Name	Airesse MacPhee	P.O. #	73506861-1		
Address	551 COLBY DRIVE WATERLOO ON N2V 1C2	Address		Project #	56484-02		
Phone	(519) 884-0510	Phone		Project Name	Campbell River(Phase 02)-Quart	Chain Of Custody Record	Project Manager
Fax	(519) 725-1394	Fax		Site #			Nahed Amer
Email	airesse.macphee@ghd.com; NationalEDDSupport@ma	Email	amacphee@craworld.com	Sampled By	C. Ragan + N. Turc		
Regulatory Criteria:		Special Instructions		ANALYSIS REQUESTED (PLEASE BE SPECIFIC)		Turnaround Time (TAT) Required:	
☐ CSR ☐ CCME ☐ BC Water Quality ☐ Other				Metals Field Filtered? (Y/N) Alkalinity, pH, Conductivity Speciated HIGH LEVEL ANIONS (Cl, F, SO4, NO2, NO3) Ammonia-N (Preserved) CSR Dissolved Metals in Water with CV Hg (including Sulfur) Total Dissolved Solids (Filt. Residue) Dissolved Hardness		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		# of Bottles	Comments
WG56484-201118-NT-11	Nov 20 2018	10:10	WG	Y	X	5	Short holding times. Metals field filtered & preserved.
	-12	10:20					
	-13	11:50					
	-14	12:00					
	-15	13:00					
	-16	13:45					
	-17	14:20					
	-18	14:30					
	-19	15:00					
	-20	15:20					
RELINQUISHED BY: (Signature/Print)		Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)		Date: (YY/MM/DD)	Time
Cassie Ragan		18/11/20	16:30	Michelle von Scholtz		18/11/20	16:30
# Jars used and not submitted		Time Sensitive		Temperature (°C) of Receipt		Custody Seal Intact on Cooler?	
		☐		5, 4, 5/35.5 N/A		☐ 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.						White Maxxam Yellow Client	
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 d/b/a Maxxam Analytics



Maxxam Analytics International Corporation c/o Maxxam Analytics
4806 Canada Way, Burnaby, British Columbia Canada V5G 1K5 Tel: (604) 734-7275 Toll-free: 800-563-6266 Fax: (604) 731-2386 www.maxxam.ca

Chain Of Custody Record

Page 1 of 2

INVOICE TO:		Report Information		Project Information		Laboratory Use Only	
Company Name	#163 GHD Limited	Company Name	Airesse MacPhee	Quotation #	B70472	Maxxam Job #	Bottle Order #
Contact Name	Airesse MacPhee	Contact Name	Airesse MacPhee	P.O. #	73506861-1		
Address	651 COLBY DRIVE	Address		Project #	56484-02		
	WATERLOO ON N2V 1C2			Project Name	Campbell River (Phase 02)-Quart.	Chain Of Custody Record	Project Manager
Phone	(519) 884-0510	Phone		Site #			Nahed Amer
Fax	(519) 725-1394	Fax		Sampled By	C. Ragan + N. Tur		
Email	airesse.macphee@ghd.com; NationalEDDSupport@ma	Email	amacphee@craworld.com				

Regulatory Criteria	Special Instructions	ANALYSIS REQUESTED (PLEASE BE SPECIFIC)										Turnaround Time (TAT) Required:			
☐ CSR ☐ CCME ☐ BC Water Quality ☐ Other		Metal: Field Filtered ? (Y/N)	Alkalinity, pH, Conductivity (Speciated)	HIGH LEVEL ANIONS (Cl, F, SO ₄ , NO ₂ , NO ₃)	Ammonia-N (Preserved)	CSR Dissolved Metals in Water with CV Hg (including Sulfur)	Total Dissolved Solids (Filt. Residue)	Diss. Hardness							
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	Metal: Field Filtered ? (Y/N)	Alkalinity, pH, Conductivity (Speciated)	HIGH LEVEL ANIONS (Cl, F, SO ₄ , NO ₂ , NO ₃)	Ammonia-N (Preserved)	CSR Dissolved Metals in Water with CV Hg (including Sulfur)	Total Dissolved Solids (Filt. Residue)	Diss. Hardness		
WG-56484-191118-NF01		Nov 19 2018	12:00	WG	Y	X	X	X	X	X	X	5	Short holding times. Metals FF + preserved
	-02		13:30										
	-03		13:10										
	-04		14:30										
	-05		14:40										
	-06		15:30										
WG-56484-201118-NF07		Nov 20 2018	8:10										
	-08		8:30										
	-09		8:45										
	-10		10:00										

RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# Jars used and not submitted	Time Sensitive	Temperature (°C) on Receipt	Custody Seal Intact on Cooler?
C. Ragan	18/11/20	16:30	Michelle	18/11/20	16:30		☐	35.5/5.4/5	NA
							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.

Appendix G

Validation Memorandum



Memorandum

May 11, 2018

To: Michaela Dyck, Cassandra Ragan, Natasha Turl

Ref. No.: 056484-02
Campbell River

From: Airesse MacPhee/bar/69

Tel: 604-248-3661

CC:

Subject: Data Quality Assessment and Validation

Laboratory: Maxxam Analytics International Corporation

Date(s) Sampled: March 5-6, 2018

Lab Job No.: B817204, B817212

Sampled By: Natasha Turl, Michaela Dyck

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 exceedances:

Lab Report #	Sample Date (mm/dd/yyyy)	Sample ID	Analyte	Result	Qualifier	Units
B817204	03/06/2018	WS-56484-060318-NT-01	pH	6.98	J	s.u.
B817204	03/06/2018	WS-56484-060318-NT-02	pH	6.95	J	s.u.
B817204	03/06/2018	WS-56484-060318-NT-03	pH	6.88	J	s.u.
B817212	03/05/2018	WG-56484-050318-MD-01	pH	7.64	J	s.u.
B817212	03/05/2018	WG-56484-050318-MD-02	pH	8.07	J	s.u.
B817212	03/05/2018	WG-56484-050318-MD-03	pH	8.21	J	s.u.
B817212	03/05/2018	WG-56484-050318-MD-04	pH	7.71	J	s.u.
B817212	03/05/2018	WG-56484-050318-MD-05	pH	7.80	J	s.u.
B817212	03/05/2018	WG-56484-050318-MD-06	pH	8.12	J	s.u.
B817212	03/06/2018	WG-56484-060318-MD-07	pH	7.94	J	s.u.
B817212	03/06/2018	WG-56484-060318-MD-08	pH	8.06	J	s.u.
B817212	03/06/2018	WG-56484-060318-MD-09	pH	7.89	J	s.u.
B817212	03/06/2018	WG-56484-060318-MD-10	pH	7.79	J	s.u.
B817212	03/06/2018	WG-56484-060318-MD-11	pH	7.88	J	s.u.



Lab Report #	Sample Date (mm/dd/yyyy)	Sample ID	Analyte	Result	Qualifier	Units
B817212	03/06/2018	WG-56484-060318-MD-12	pH	7.96	J	s.u.
B817212	03/06/2018	WG-56484-060318-MD-13	pH	8.20	J	s.u.
B817212	03/06/2018	WG-56484-060318-MD-14	pH	8.15	J	s.u.
B817212	03/06/2018	WG-56484-060318-MD-15	pH	8.13	J	s.u.
B817212	03/06/2018	WG-56484-060318-MD-16	pH	8.04	J	s.u.
B817212	03/06/2018	WG-56484-060318-MD-17	pH	7.96	J	s.u.
B817212	03/06/2018	WG-56484-060318-MD-18	pH	7.89	J	s.u.
B817212	03/06/2018	WG-56484-060318-MD-19	pH	7.95	J	s.u.

The following results are qualified based on field duplicate variability:

Lab Report #	Sample Date (mm/dd/yyyy)	Sample ID	Analyte	Result	Qualifier	Units
B817204	03/06/2018	WS-56484-060318-NT-01	Iron	117	J	ug/L
B817204	03/06/2018	WS-56484-060318-NT-02	Iron	94.6	J	ug/L
B817204	03/06/2018	WS-56484-060318-NT-01	Lead	0.0790	J	ug/L
B817204	03/06/2018	WS-56484-060318-NT-02	Lead	0.0591	J	ug/L
B817204	03/06/2018	WS-56484-060318-NT-01	Titanium	2.16	J	ug/L
B817204	03/06/2018	WS-56484-060318-NT-02	Titanium	1.45	J	ug/L

Notes:

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

**Summary of Field Duplicate Sample Data
And Evaluation of Duplicate Results
Tahsis Landfill Monitoring
Comox Valley Regional District
Vancouver Island, British Columbia
April 2018**

Lab Report #	Sample Date	Analyte	Investigative Sample Result	Investigative Reporting Limit	Duplicate Result	Duplicate Reporting Limit	Units	RPD/ Difference ⁽¹⁾	Comparison Criteria
			WG-56484-040418-NT-12	WG-56484-040418-NT-12	WG-56484-040418-NT-13	WG-56484-040418-NT-13			
B825402	4/4/2018	Nitrite (N)	<0.10	0.10	<0.10	0.10	mg/L	NA	NA
B825402	4/4/2018	Nitrate (N)	0.14	0.10	0.14	0.10	mg/L	NA	NA
B825402	4/4/2018	Fluoride (F)	0.12	0.10	0.12	0.10	mg/L	NA	NA
B825402	4/4/2018	Alkalinity (Total as CaCO3)	99.3	1.0	97.3	1.0	mg/L	2 %	RPD > 20%
B825402	4/4/2018	Alkalinity (PP as CaCO3)	<1.0	1.0	<1.0	1.0	mg/L	NA	NA
B825402	4/4/2018	Bicarbonate (HCO3)	121	1.0	119	1.0	mg/L	2 %	RPD > 20%
B825402	4/4/2018	Carbonate (CO3)	<1.0	1.0	<1.0	1.0	mg/L	NA	NA
B825402	4/4/2018	Hydroxide (OH)	<1.0	1.0	<1.0	1.0	mg/L	NA	NA
B825402	4/4/2018	Dissolved Sulphate (SO4)	2.0	1.0	2.7	1.0	mg/L	0.7	Diff < 1 x RL
B825402	4/4/2018	Dissolved Chloride (Cl)	2.4	1.0	2.5	1.0	mg/L	0.1	Diff < 1 x RL
B825402	4/4/2018	Total Ammonia (N)	<0.020	0.020	<0.020	0.020	mg/L	NA	NA
B825402	4/4/2018	Nitrate plus Nitrite (N)	0.14	0.10	0.14	0.10	mg/L	NA	NA
B825402	4/4/2018	Conductivity	198	2.0	196	2.0	µS/cm	1 %	RPD > 20%
B825402	4/4/2018	pH	8.01	N/A	7.94	N/A	s.u.	NA	NA
B825402	4/4/2018	Dissolved Hardness (CaCO3)	95.1	0.50	93.8	0.50	mg/L	1 %	RPD > 20%
B825402	4/4/2018	Dissolved Mercury (Hg)	<0.0020	0.0020	<0.0020	0.0020	µg/L	NA	NA
B825402	4/4/2018	Dissolved Aluminum (Al)	10.0	3.0	9.7	3.0	µg/L	0.3	Diff < 1 x RL
B825402	4/4/2018	Dissolved Antimony (Sb)	<0.50	0.50	<0.50	0.50	µg/L	NA	NA
B825402	4/4/2018	Dissolved Arsenic (As)	<0.10	0.10	<0.10	0.10	µg/L	NA	NA
B825402	4/4/2018	Dissolved Barium (Ba)	<1.0	1.0	<1.0	1.0	µg/L	NA	NA
B825402	4/4/2018	Dissolved Beryllium (Be)	<0.10	0.10	<0.10	0.10	µg/L	NA	NA
B825402	4/4/2018	Dissolved Bismuth (Bi)	<1.0	1.0	<1.0	1.0	µg/L	NA	NA
B825402	4/4/2018	Dissolved Boron (B)	<50	50	<50	50	µg/L	NA	NA
B825402	4/4/2018	Dissolved Cadmium (Cd)	<0.010	0.010	<0.010	0.010	µg/L	NA	NA
B825402	4/4/2018	Dissolved Chromium (Cr)	<1.0	1.0	<1.0	1.0	µg/L	NA	NA
B825402	4/4/2018	Dissolved Cobalt (Co)	<0.20	0.20	<0.20	0.20	µg/L	NA	NA
B825402	4/4/2018	Dissolved Copper (Cu)	0.23	0.20	0.21	0.20	µg/L	0.02	Diff < 1 x RL
B825402	4/4/2018	Dissolved Iron (Fe)	<5.0	5.0	<5.0	5.0	µg/L	NA	NA
B825402	4/4/2018	Dissolved Lead (Pb)	<0.20	0.20	<0.20	0.20	µg/L	NA	NA
B825402	4/4/2018	Dissolved Lithium (Li)	<2.0	2.0	<2.0	2.0	µg/L	NA	NA
B825402	4/4/2018	Dissolved Manganese (Mn)	<1.0	1.0	<1.0	1.0	µg/L	NA	NA
B825402	4/4/2018	Dissolved Molybdenum (Mo)	<1.0	1.0	<1.0	1.0	µg/L	NA	NA
B825402	4/4/2018	Dissolved Nickel (Ni)	<1.0	1.0	<1.0	1.0	µg/L	NA	NA
B825402	4/4/2018	Dissolved Phosphorus (P)	<10	10	<10	10	µg/L	NA	NA
B825402	4/4/2018	Dissolved Selenium (Se)	<0.10	0.10	<0.10	0.10	µg/L	NA	NA
B825402	4/4/2018	Dissolved Silicon (Si)	740	100	738	100	µg/L	NA	NA
B825402	4/4/2018	Dissolved Silver (Ag)	<0.020	0.020	<0.020	0.020	µg/L	NA	NA
B825402	4/4/2018	Dissolved Strontium (Sr)	50.6	1.0	51.9	1.0	µg/L	3 %	RPD > 20%
B825402	4/4/2018	Dissolved Thallium (Tl)	<0.010	0.010	<0.010	0.010	µg/L	NA	NA
B825402	4/4/2018	Dissolved Tin (Sn)	<5.0	5.0	<5.0	5.0	µg/L	NA	NA
B825402	4/4/2018	Dissolved Titanium (Ti)	<5.0	5.0	<5.0	5.0	µg/L	NA	NA
B825402	4/4/2018	Dissolved Uranium (U)	0.22	0.10	0.22	0.10	µg/L	NA	NA
B825402	4/4/2018	Dissolved Vanadium (V)	<5.0	5.0	<5.0	5.0	µg/L	NA	NA
B825402	4/4/2018	Dissolved Zinc (Zn)	<5.0	5.0	<5.0	5.0	µg/L	NA	NA
B825402	4/4/2018	Dissolved Zirconium (Zr)	<0.10	0.10	<0.10	0.10	µg/L	NA	NA
B825402	4/4/2018	Dissolved Calcium (Ca)	34.3	0.050	33.9	0.050	mg/L	1 %	RPD > 20%
B825402	4/4/2018	Dissolved Magnesium (Mg)	2.30	0.050	2.22	0.050	mg/L	4 %	RPD < 20%
B825402	4/4/2018	Dissolved Potassium (K)	0.115	0.050	0.102	0.050	mg/L	0.013	Diff < 1 x RL
B825402	4/4/2018	Dissolved Sodium (Na)	0.981	0.050	0.976	0.050	mg/L	1 %	RPD > 20%
B825402	4/4/2018	Dissolved Sulphur (S)	<3.0	3.0	<3.0	3.0	mg/L	NA	NA
B825402	4/4/2018	Dissolved Sulphur (S)	<3000	3000	<3000	3000	µg/L	NA	NA

Notes:

⁽¹⁾ RPDs greater than 20%/Diff greater than 1 x RL (water) have been bolded in the table above.

Field duplicate results are qualified based on the RPD if both sample results are greater than 5 times the RL. Otherwise they are assessed based on the difference between the two results. Non-detect results are not qualified on this basis.

RPD - Relative Percent Difference

RL - Reporting Limit

Diff - Difference

s.u. - Standard pH Units

N - Nitrogen

NA - Not Applicable

CaCO3 - Calcium carbonate



Memorandum

August 28, 2018

To: Michaela Dyck, Cassandra Ragan, Natasha Turl

Ref. No.: 056484-02
Campbell River

From: Airesse MacPhee/sz/71

Tel: 604-248-3661

CC:

Subject: Data Quality Assessment and Validation

Laboratory: Maxxam Analytics International Corporation

Date(s) Sampled: April 30-May 1, 2018

Lab Job No.: B832950, B832956

Sampled By: Natasha Turl

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 exceedances:

Lab Report #	Sample Date (mm/dd/yyyy)	Sample ID	Analyte	Result	Qualifier	Units
B832950	05/01/2018	WS-56484-010518-NT-01	pH	6.97	J	s.u.
B832950	05/01/2018	WS-56484-010518-NT-02	pH	6.88	J	s.u.
B832956	04/30/2018	WG-56484-300418-NT-01	Nitrate (as N)	0.10	UJ	mg/L
B832956	04/30/2018	WG-56484-300418-NT-02	Nitrate (as N)	0.82	J	mg/L
B832956	04/30/2018	WG-56484-300418-NT-03	Nitrate (as N)	0.82	J	mg/L
B832956	04/30/2018	WG-56484-300418-NT-04	Nitrate (as N)	0.82	J	mg/L
B832956	04/30/2018	WG-56484-300418-NT-05	Nitrate (as N)	0.19	J	mg/L
B832956	04/30/2018	WG-56484-300418-NT-07	Nitrate (as N)	0.10	UJ	mg/L
B832956	04/30/2018	WG-56484-300418-NT-08	Nitrate (as N)	0.18	J	mg/L
B832956	04/30/2018	WG-56484-300418-NT-09	Nitrate (as N)	0.38	J	mg/L
B832956	04/30/2018	WG-56484-300418-NT-10	Nitrate (as N)	0.10	UJ	mg/L
B832956	04/30/2018	WG-56484-300418-NT-11	Nitrate (as N)	0.70	J	mg/L
B832956	04/30/2018	WG-56484-300418-NT-01	Nitrite (as N)	0.10	UJ	mg/L



Lab Report #	Sample Date (mm/dd/yyyy)	Sample ID	Analyte	Result	Qualifier	Units
B832956	04/30/2018	WG-56484-300418-NT-02	Nitrite (as N)	0.10	UJ	mg/L
B832956	04/30/2018	WG-56484-300418-NT-03	Nitrite (as N)	0.10	UJ	mg/L
B832956	04/30/2018	WG-56484-300418-NT-04	Nitrite (as N)	0.10	UJ	mg/L
B832956	04/30/2018	WG-56484-300418-NT-05	Nitrite (as N)	0.10	UJ	mg/L
B832956	04/30/2018	WG-56484-300418-NT-07	Nitrite (as N)	0.10	UJ	mg/L
B832956	04/30/2018	WG-56484-300418-NT-08	Nitrite (as N)	0.10	UJ	mg/L
B832956	04/30/2018	WG-56484-300418-NT-09	Nitrite (as N)	0.10	UJ	mg/L
B832956	04/30/2018	WG-56484-300418-NT-10	Nitrite (as N)	0.17	J	mg/L
B832956	04/30/2018	WG-56484-300418-NT-11	Nitrite (as N)	0.10	UJ	mg/L
B832956	04/30/2018	WG-56484-300418-NT-01	Nitrite/Nitrate	0.10	UJ	mg/L
B832956	04/30/2018	WG-56484-300418-NT-02	Nitrite/Nitrate	0.82	J	mg/L
B832956	04/30/2018	WG-56484-300418-NT-03	Nitrite/Nitrate	0.82	J	mg/L
B832956	04/30/2018	WG-56484-300418-NT-04	Nitrite/Nitrate	0.82	J	mg/L
B832956	04/30/2018	WG-56484-300418-NT-05	Nitrite/Nitrate	0.19	J	mg/L
B832956	04/30/2018	WG-56484-300418-NT-07	Nitrite/Nitrate	0.10	UJ	mg/L
B832956	04/30/2018	WG-56484-300418-NT-08	Nitrite/Nitrate	0.18	J	mg/L
B832956	04/30/2018	WG-56484-300418-NT-09	Nitrite/Nitrate	0.38	J	mg/L
B832956	04/30/2018	WG-56484-300418-NT-10	Nitrite/Nitrate	0.11	J	mg/L
B832956	04/30/2018	WG-56484-300418-NT-11	Nitrite/Nitrate	0.70	J	mg/L
B832956	04/30/2018	WG-56484-300418-NT-01	pH	7.65	J	s.u.
B832956	04/30/2018	WG-56484-300418-NT-02	pH	8.07	J	s.u.
B832956	04/30/2018	WG-56484-300418-NT-03	pH	8.10	J	s.u.
B832956	04/30/2018	WG-56484-300418-NT-04	pH	8.20	J	s.u.
B832956	04/30/2018	WG-56484-300418-NT-05	pH	8.08	J	s.u.
B832956	04/30/2018	WG-56484-300418-NT-07	pH	7.81	J	s.u.
B832956	04/30/2018	WG-56484-300418-NT-08	pH	7.89	J	s.u.
B832956	04/30/2018	WG-56484-300418-NT-09	pH	7.73	J	s.u.
B832956	04/30/2018	WG-56484-300418-NT-10	pH	7.77	J	s.u.
B832956	04/30/2018	WG-56484-300418-NT-11	pH	8.08	J	s.u.
B832956	05/01/2018	WG-56484-010518-NT-12	pH	8.19	J	s.u.
B832956	05/01/2018	WG-56484-010518-NT-13	pH	8.10	J	s.u.
B832956	05/01/2018	WG-56484-010518-NT-14	pH	8.20	J	s.u.
B832956	05/01/2018	WG-56484-010518-NT-15	pH	8.04	J	s.u.
B832956	05/01/2018	WG-56484-010518-NT-16	pH	8.13	J	s.u.
B832956	05/01/2018	WG-56484-010518-NT-17	pH	7.82	J	s.u.
B832956	05/01/2018	WG-56484-010518-NT-18	pH	8.02	J	s.u.
B832956	05/01/2018	WG-56484-010518-NT-19	pH	7.86	J	s.u.
B832956	04/30/2018	WG-56484-300418-NT-01	Total dissolved solids (TDS)	66	J	mg/L
B832956	04/30/2018	WG-56484-300418-NT-02	Total dissolved solids (TDS)	122	J	mg/L
B832956	04/30/2018	WG-56484-300418-NT-03	Total dissolved solids (TDS)	444	J	mg/L
B832956	04/30/2018	WG-56484-300418-NT-04	Total dissolved solids (TDS)	436	J	mg/L



Lab Report #	Sample Date (mm/dd/yyyy)	Sample ID	Analyte	Result	Qualifier	Units
B832956	04/30/2018	WG-56484-300418-NT-05	Total dissolved solids (TDS)	122	J	mg/L
B832956	04/30/2018	WG-56484-300418-NT-07	Total dissolved solids (TDS)	40	UJ	mg/L
B832956	04/30/2018	WG-56484-300418-NT-08	Total dissolved solids (TDS)	84	J	mg/L
B832956	04/30/2018	WG-56484-300418-NT-09	Total dissolved solids (TDS)	248	J	mg/L
B832956	04/30/2018	WG-56484-300418-NT-10	Total dissolved solids (TDS)	72	J	mg/L
B832956	04/30/2018	WG-56484-300418-NT-11	Total dissolved solids (TDS)	122	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
B832956	04/30/2018	WG-56484-300418-NT-07	Total dissolved solids (TDS)	40	UJ	mg/L

The following results are qualified based on field duplicate variability:

Lab Report #	Sample Date (mm/dd/yyyy)	Sample ID	Analyte	Result	Qualifier	Units
B832956	04/30/2018	WG-56484-300418-NT-03	Ammonia-N	0.020	UJ	mg/L
B832956	04/30/2018	WG-56484-300418-NT-04	Ammonia-N	0.053	J	mg/L
B832956	05/01/2018	WG-56484-010518-NT-12	Nitrate (as N)	3.92	J	mg/L
B832956	05/01/2018	WG-56484-010518-NT-13	Nitrate (as N)	2.20	J	mg/L
B832956	05/01/2018	WG-56484-010518-NT-12	Nitrite/Nitrate	3.92	J	mg/L
B832956	05/01/2018	WG-56484-010518-NT-13	Nitrite/Nitrate	2.20	J	mg/L

The following results are qualified based on dissolved results that are significantly higher than the total results:

Lab Report #	Sample Date (mm/dd/yyyy)	Sample ID	Analyte	Result	Qualifier	Units
B832950	05/01/2018	WS-56484-010518-NT-01	Phosphorus	2.0	J	ug/L
B832950	05/01/2018	WS-56484-010518-NT-01	Phosphorus (dissolved)	2.0	J	ug/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
B832956	04/30/2018	WG-56484-300418-NT-04	Nitrite/Nitrate	0.82	J	mg/L
B832956	04/30/2018	WG-56484-300418-NT-05	Nitrite/Nitrate	0.19	J	mg/L
B832956	04/30/2018	WG-56484-300418-NT-09	Nitrite/Nitrate	0.38	J	mg/L



Lab Report #	Sample Date (mm/dd/yyyy)	Sample ID	Analyte	Result	Qualifier	Units
B832956	04/30/2018	WG-56484-300418-NT-11	Nitrite/Nitrate	0.70	J	mg/L
B832956	05/01/2018	WG-56484-010518-NT-13	Nitrite/Nitrate	2.20	J	mg/L
B832956	05/01/2018	WG-56484-010518-NT-14	Nitrite/Nitrate	1.96	J	mg/L
B832956	05/01/2018	WG-56484-010518-NT-16	Nitrite/Nitrate	0.16	J	mg/L
B832956	04/30/2018	WG-56484-300418-NT-01	Sulfate (dissolved)	3.3	J	mg/L
B832956	04/30/2018	WG-56484-300418-NT-03	Sulfate (dissolved)	10.9	J	mg/L
B832956	04/30/2018	WG-56484-300418-NT-08	Sulfate (dissolved)	2.9	J	mg/L
B832956	04/30/2018	WG-56484-300418-NT-10	Sulfate (dissolved)	3.0	J	mg/L
B832956	04/30/2018	WG-56484-300418-NT-11	Sulfate (dissolved)	10.6	J	mg/L
B832956	05/01/2018	WG-56484-010518-NT-12	Sulfate (dissolved)	12.2	J	mg/L
B832956	05/01/2018	WG-56484-010518-NT-15	Sulfate (dissolved)	3.2	J	mg/L

Notes:

J Estimated concentration
UJ Non-detect with an Estimated Report Limit
s.u. Standard pH Units
N Nitrogen



Memorandum

October 17, 2018

To: Michaela Dyck, Cassandra Ragan, Natasha Turl Ref. No.: 056484-02
Campbell River

From: Airesse MacPhee/sz/02 Tel: 604 248 3661

CC:

Subject: Data Quality Assessment and Validation

Laboratory: Maxxam Analytics International Date(s) Sampled: September 17-18, 2018
Corporation
Lab Job No.: B880711, B880896
Sampled By: Michaela Dyck
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 exceedances:

Lab Report #	Sample Date (mm/dd/yyyy)	Sample ID	Analyte	Result	Qualifier	Units
B880711	09/17/2018	WS-56484-170918-MND-01	pH	7.05	J	s.u.
B880711	09/17/2018	WS-56484-170918-MND-02	pH	6.88	J	s.u.
B880896	09/17/2018	WG-56484-170918-MND-06	Nitrate (as N)	0.52	J	mg/L
B880896	09/17/2018	WG-56484-170918-MND-07	Nitrate (as N)	0.39	J	mg/L
B880896	09/17/2018	WG-56484-170918-MND-08	Nitrate (as N)	0.10	UJ	mg/L
B880896	09/17/2018	WG-56484-170918-MND-09	Nitrate (as N)	0.10	UJ	mg/L



Lab Report #	Sample Date (mm/dd/yyyy)	Sample ID	Analyte	Result	Qualifier	Units
B880896	09/17/2018	WG-56484-170918-MND-06	Nitrite (as N)	0.10	UJ	mg/L
B880896	09/17/2018	WG-56484-170918-MND-07	Nitrite (as N)	0.10	UJ	mg/L
B880896	09/17/2018	WG-56484-170918-MND-08	Nitrite (as N)	0.10	UJ	mg/L
B880896	09/17/2018	WG-56484-170918-MND-09	Nitrite (as N)	0.10	UJ	mg/L
B880896	09/17/2018	WG-56484-170918-MND-06	Nitrite/Nitrate	0.52	J	mg/L
B880896	09/17/2018	WG-56484-170918-MND-07	Nitrite/Nitrate	0.39	J	mg/L
B880896	09/17/2018	WG-56484-170918-MND-08	Nitrite/Nitrate	0.10	UJ	mg/L
B880896	09/17/2018	WG-56484-170918-MND-09	Nitrite/Nitrate	0.10	UJ	mg/L
B880896	09/17/2018	WG-56484-170918-MND-01	pH	7.74	J	s.u.
B880896	09/17/2018	WG-56484-170918-MND-02	pH	7.89	J	s.u.
B880896	09/17/2018	WG-56484-170918-MND-03	pH	7.93	J	s.u.
B880896	09/17/2018	WG-56484-170918-MND-05	pH	7.61	J	s.u.
B880896	09/17/2018	WG-56484-170918-MND-06	pH	8.11	J	s.u.
B880896	09/17/2018	WG-56484-170918-MND-07	pH	7.87	J	s.u.
B880896	09/17/2018	WG-56484-170918-MND-08	pH	7.63	J	s.u.
B880896	09/17/2018	WG-56484-170918-MND-09	pH	7.99	J	s.u.
B880896	09/17/2018	WG-56484-170918-MND-10	pH	7.33	J	s.u.
B880896	09/18/2018	WG-56484-180918-MND-11	pH	7.90	J	s.u.
B880896	09/18/2018	WG-56484-180918-MND-12	pH	7.85	J	s.u.
B880896	09/18/2018	WG-56484-180918-MND-13	pH	8.01	J	s.u.
B880896	09/18/2018	WG-56484-180918-MND-14	pH	8.03	J	s.u.
B880896	09/18/2018	WG-56484-180918-MND-15	pH	7.74	J	s.u.
B880896	09/18/2018	WG-56484-180918-MND-16	pH	7.82	J	s.u.



Lab Report #	Sample Date (mm/dd/yyyy)	Sample ID	Analyte	Result	Qualifier	Units
B880896	09/18/2018	WG-56484-180918-MND-17	pH	7.73	J	s.u.
B880896	09/18/2018	WG-56484-180918-MND-18	pH	8.00	J	s.u.
B880896	09/18/2018	WG-56484-180918-MND-19	pH	8.04	J	s.u.
B880896	09/18/2018	WG-56484-180918-MND-20	pH	8.01	J	s.u.

Notes:

J - Estimated concentration

UJ - Non-detect with an Estimated Report Limit

s.u. - Standard pH Units

N - Nitrogen



Memorandum

December 19, 2018

To: Michaela Dyck, Cassandra Ragan, Natasha Turl

Ref. No.: 056484-02
Campbell River

From: Airesse MacPhee/cs/06

Tel: 604-248-3661

Subject: Data Quality Assessment and Validation

Laboratory: Maxxam Analytics International
Corporation

Date(s) Sampled: November 19-20, 2018

Lab Job No.: B8A2228, B8A2250

Sampled By: Natasha Turl

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 exceedances:

Lab Report #	Sample Date (mm/dd/yyyy)	Sample ID	Analyte	Result	Qualifier	Units
B8A2228	11/20/2018	WS-56484-201118-NT-01	pH	6.82	J	s.u.
B8A2228	11/20/2018	WS-56484-201118-NT-02	pH	7.06	J	s.u.
B8A2250	11/19/2018	WG-56484-191118-NT-01	pH	7.62	J	s.u.
B8A2250	11/19/2018	WG-56484-191118-NT-02	pH	7.98	J	s.u.
B8A2250	11/19/2018	WG-56484-191118-NT-03	pH	7.68	J	s.u.
B8A2250	11/19/2018	WG-56484-191118-NT-04	pH	7.95	J	s.u.
B8A2250	11/19/2018	WG-56484-191118-NT-05	pH	8.05	J	s.u.
B8A2250	11/19/2018	WG-56484-191118-NT-06	pH	7.45	J	s.u.
B8A2250	11/20/2018	WG-56484-201118-NT-07	pH	7.75	J	s.u.
B8A2250	11/20/2018	WG-56484-201118-NT-08	pH	7.78	J	s.u.
B8A2250	11/20/2018	WG-56484-201118-NT-09	pH	7.72	J	s.u.
B8A2250	11/20/2018	WG-56484-201118-NT-10	pH	8.01	J	s.u.



Lab Report #	Sample Date (mm/dd/yyyy)	Sample ID	Analyte	Result	Qualifier	Units
B8A2250	11/20/2018	WG-56484-201118-NT-11	pH	7.99	J	s.u.
B8A2250	11/20/2018	WG-56484-201118-NT-12	pH	7.56	J	s.u.
B8A2250	11/20/2018	WG-56484-201118-NT-13	pH	7.98	J	s.u.
B8A2250	11/20/2018	WG-56484-201118-NT-15	pH	7.85	J	s.u.
B8A2250	11/20/2018	WG-56484-201118-NT-16	pH	7.92	J	s.u.
B8A2250	11/20/2018	WG-56484-201118-NT-17	pH	7.79	J	s.u.
B8A2250	11/20/2018	WG-56484-201118-NT-18	pH	7.93	J	s.u.
B8A2250	11/20/2018	WG-56484-201118-NT-19	pH	7.85	J	s.u.
B8A2250	11/20/2018	WG-56484-201118-NT-20	pH	7.61	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
B8A2228	11/20/2018	WS-56484-201118-NT-01	Titanium	0.97	J	ug/L
B8A2228	11/20/2018	WS-56484-201118-NT-01	Titanium (dissolved)	1.69	J	ug/L

The following results are qualified based on field duplicate variability:

Lab Report #	Sample Date (mm/dd/yyyy)	Sample ID	Analyte	Result	Qualifier	Units
B8A2250	11/19/2018	WG-56484-191118-NT-04	Ammonia-N	0.022	J	mg/L
B8A2250	11/19/2018	WG-56484-191118-NT-05	Ammonia-N	0.079	J	mg/L

Notes:

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

Appendix H

Historical Water Quality Data

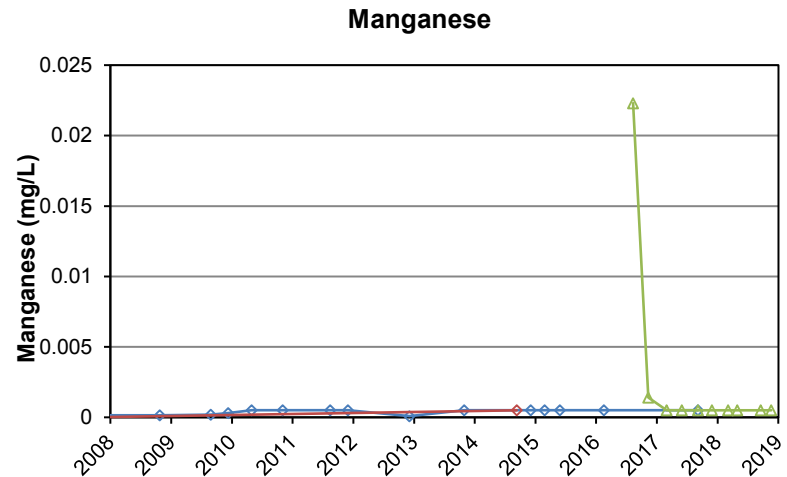
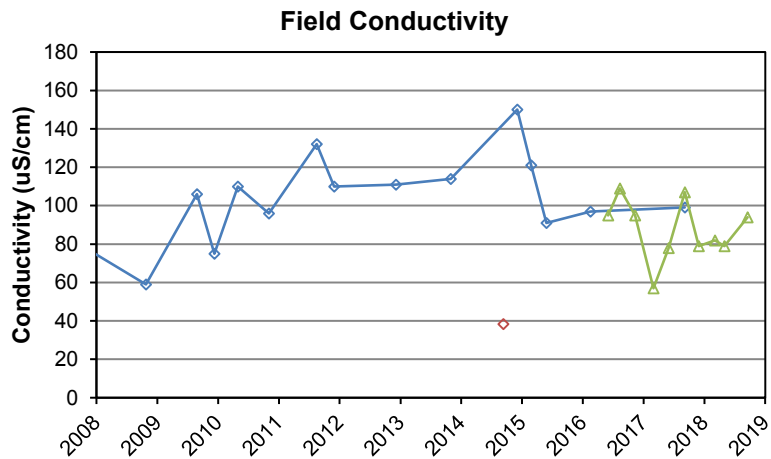
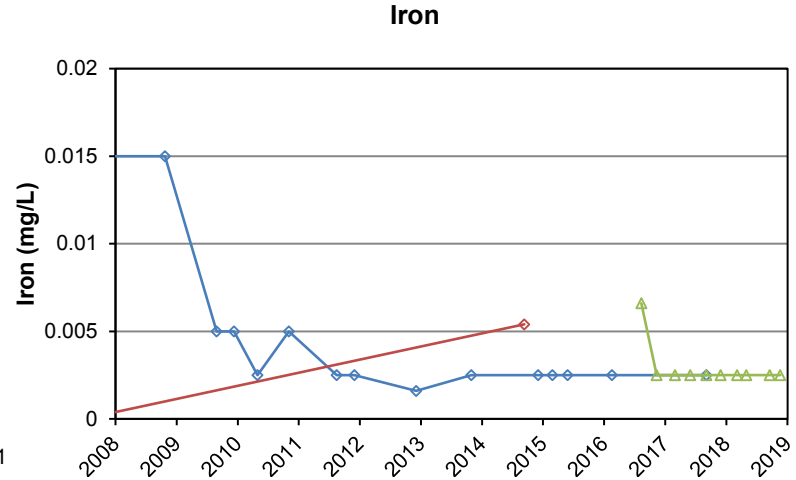
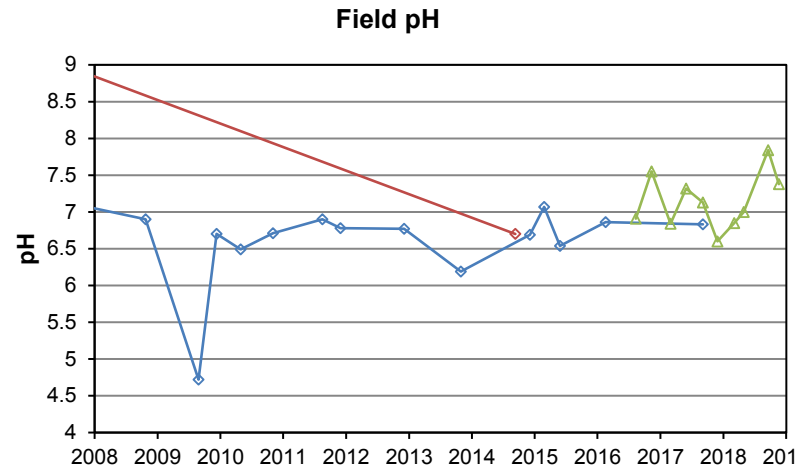
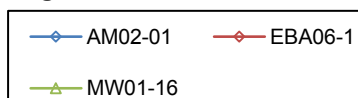
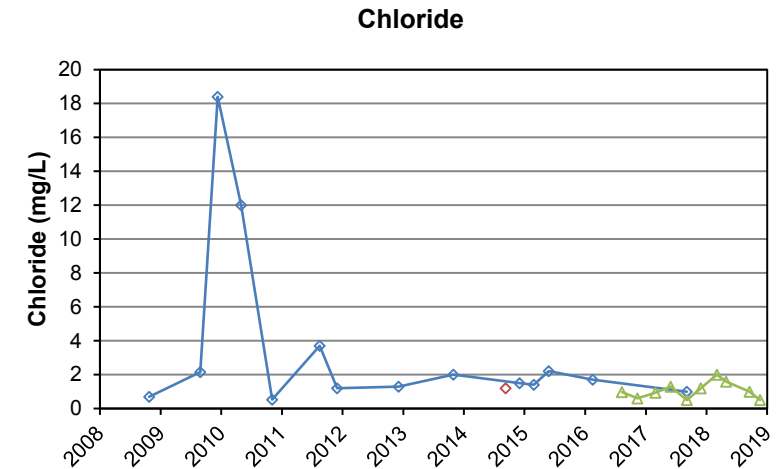
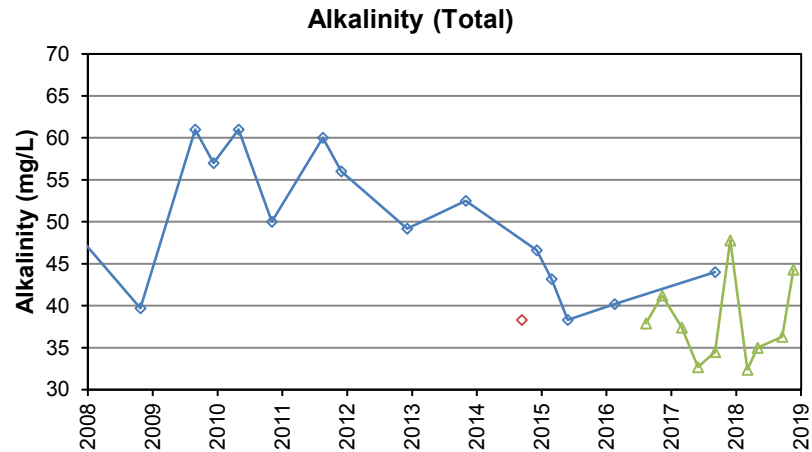
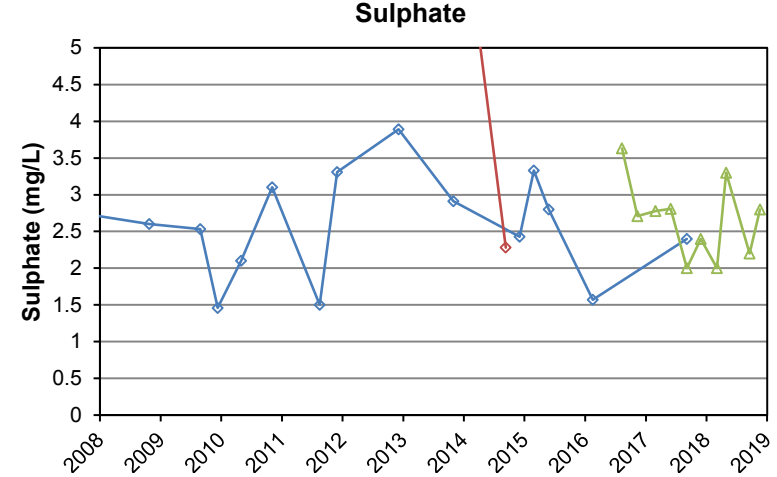
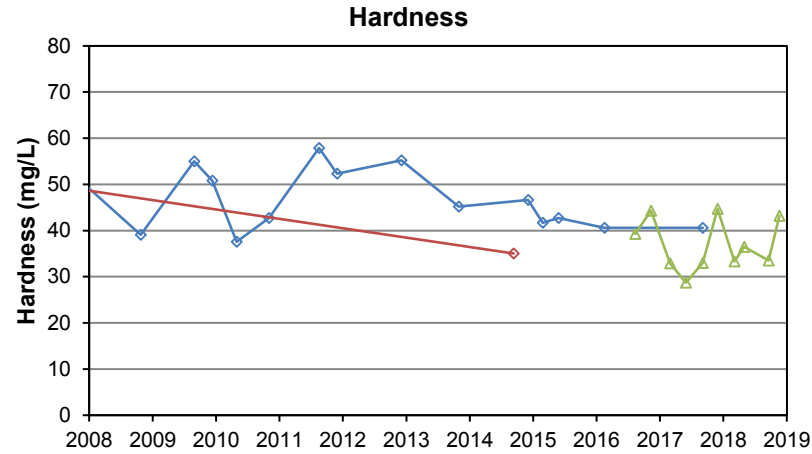


figure H-1

BACKGROUND WELLS HISTORICAL GROUNDWATER DATA
 (Field and Lab pH, Iron, and Manganese)
 2018 OPERATIONS AND MONITORING REPORT
 CAMPBELL RIVER WASTE MANAGEMENT CENTRE
 Comox Strathcona Waste Management

Legend





Legend

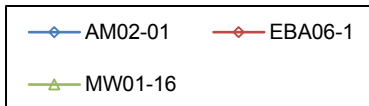
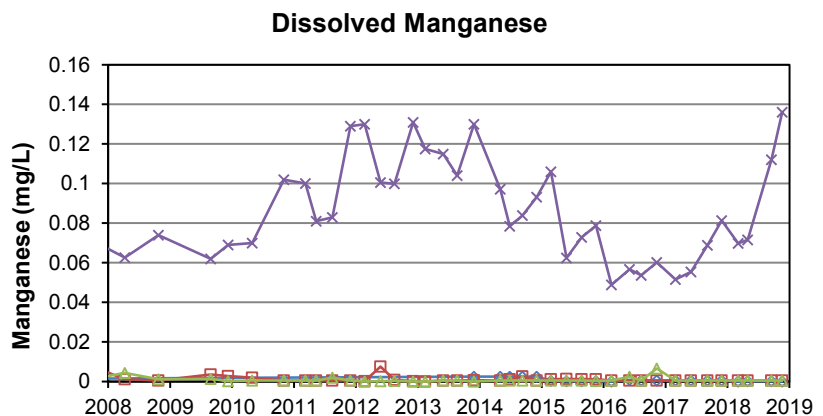
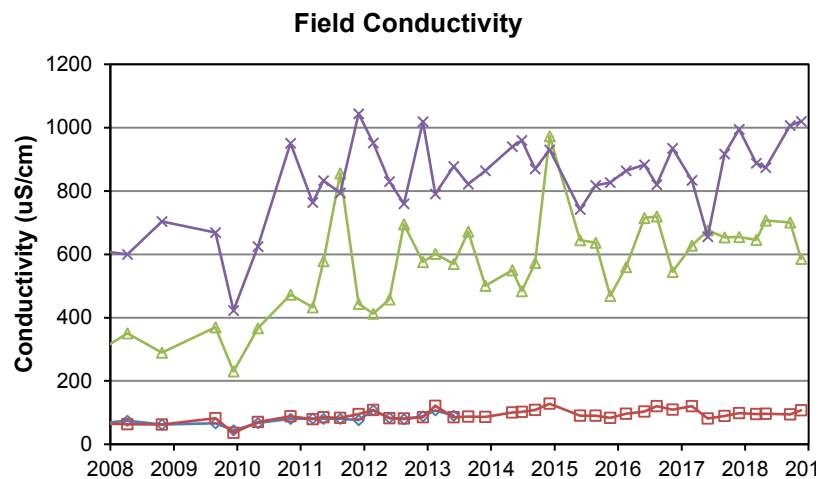
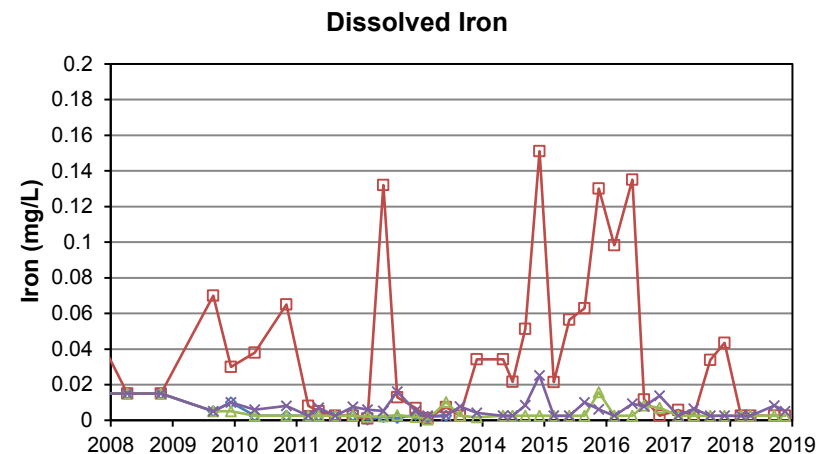
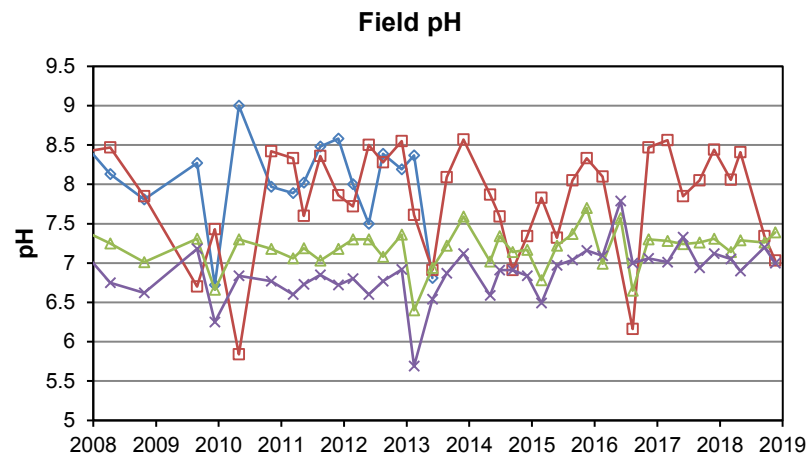


figure H-2
 BACKGROUND WELLS HISTORICAL GROUNDWATER DATA
 (Hardness, Sulphate, Alkalinity)
 2018 OPERATIONS AND MONITORING REPORT
 CAMPBELL RIVER WASTE MANAGEMENT CENTRE
 Comox Strathcona Waste Management

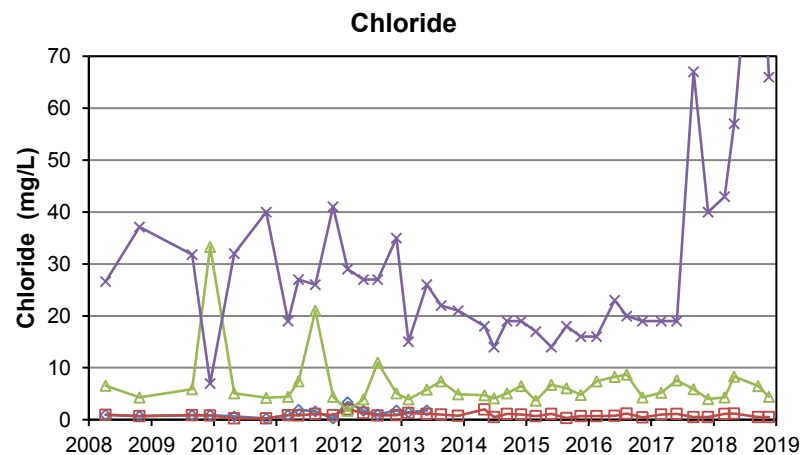
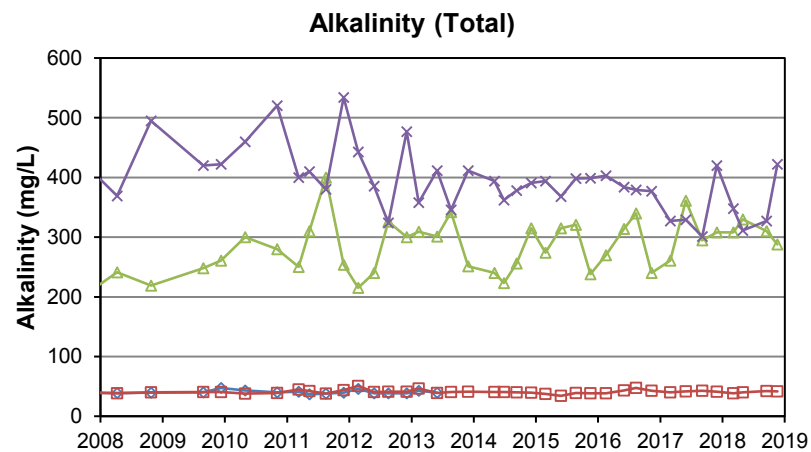
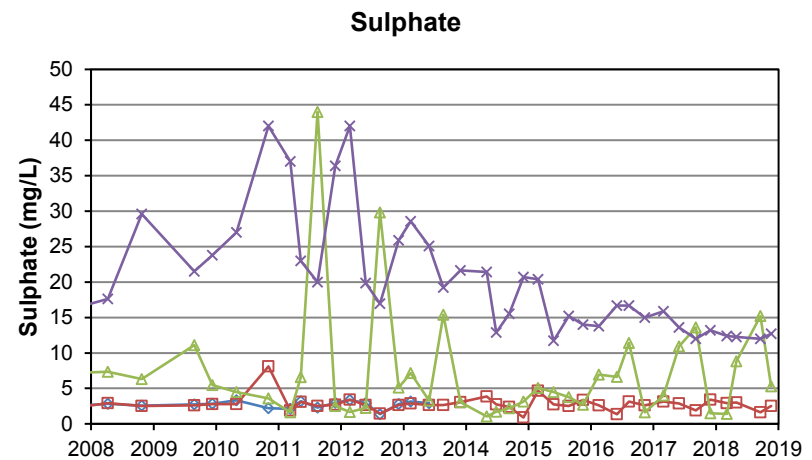
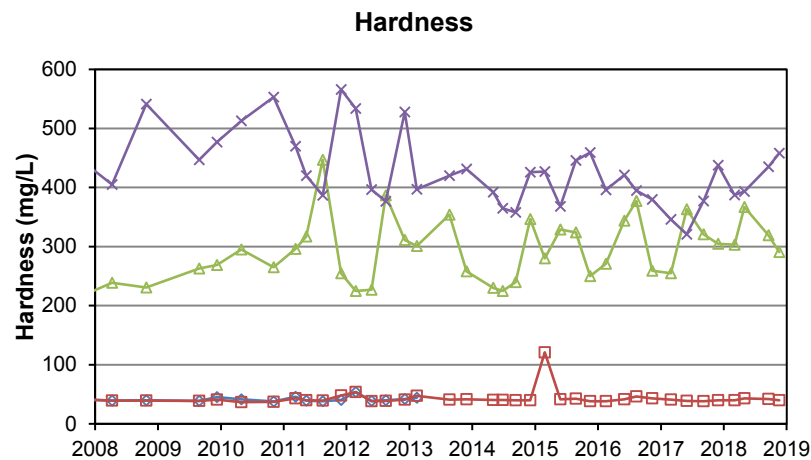


Legend



figure H-3

LANDFILL WELLS HISTORICAL GROUNDWATER DATA
 (Field and Lab pH, Iron, and Manganese)
2018 OPERATIONS AND MONITORING REPORT
CAMPBELL RIVER WASTE MANAGEMENT CENTRE
Comox Strathcona Waste Management



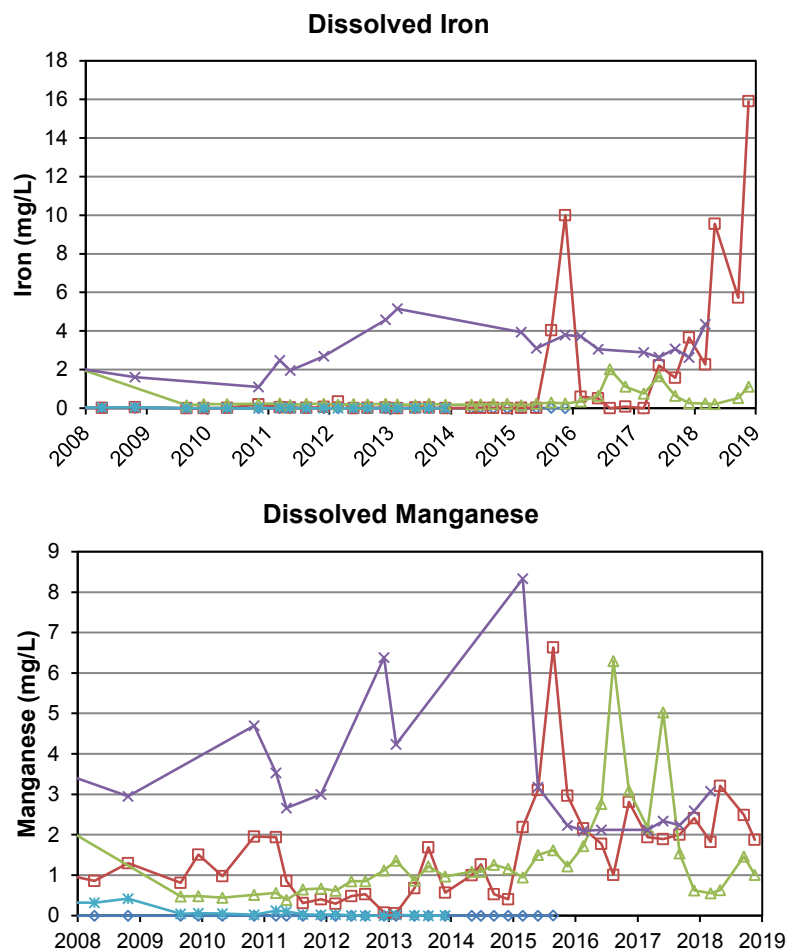
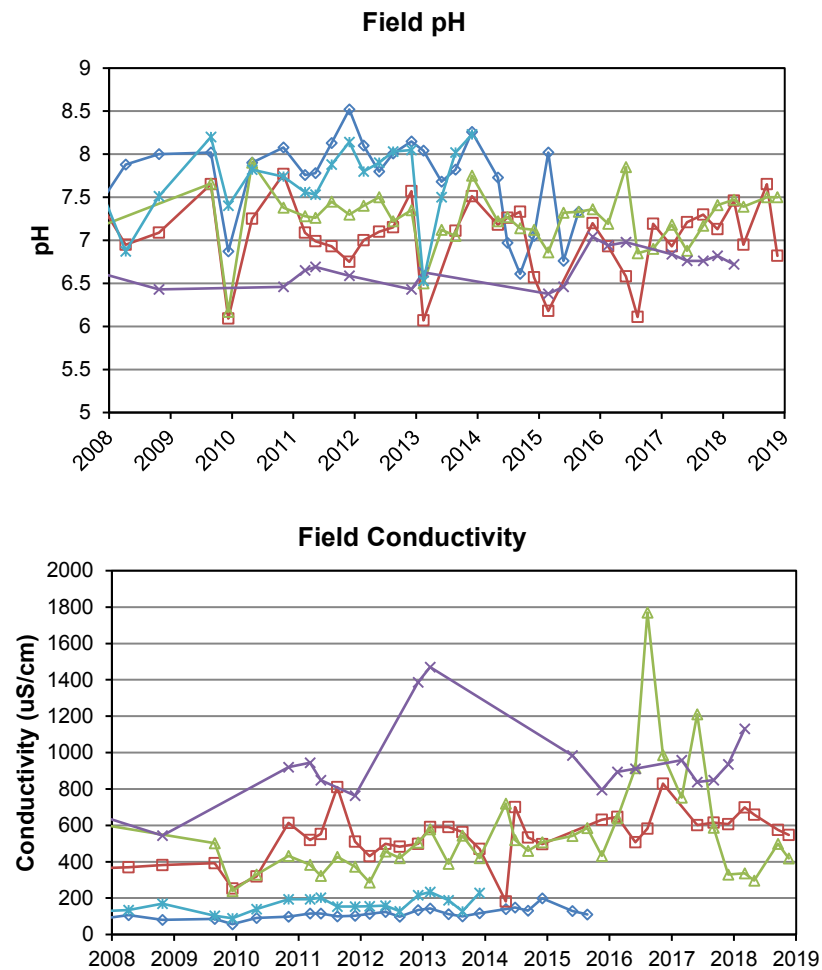
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figure H-4

LANDFILL WELLS HISTORICAL GROUNDWATER DATA
 (Hardness, Sulphate, Alkalinity)
 2018 OPERATIONS AND MONITORING REPORT
 CAMPBELL RIVER WASTE MANAGEMENT CENTRE
 Comox Strathcona Waste Management





Legend

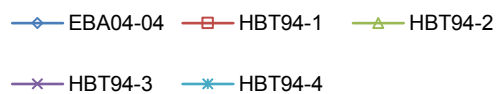
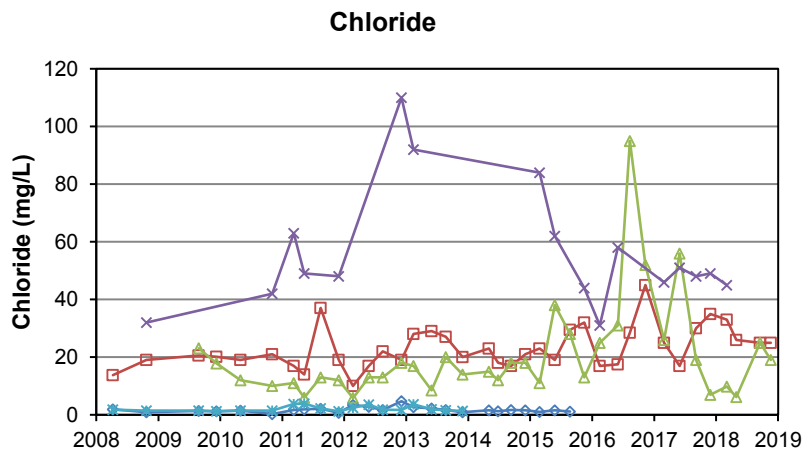
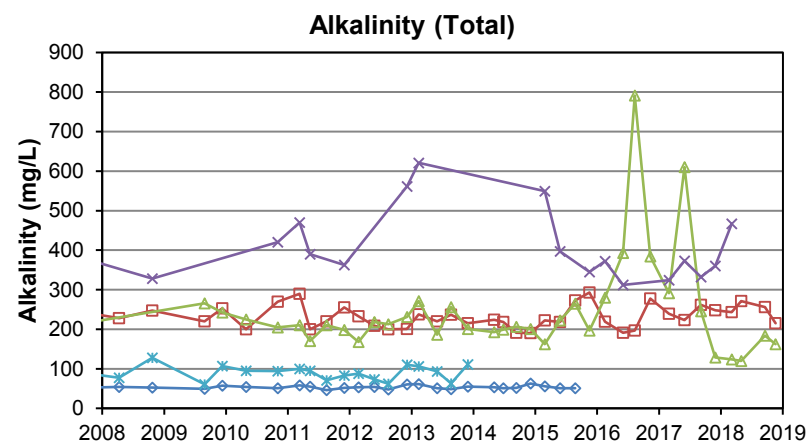
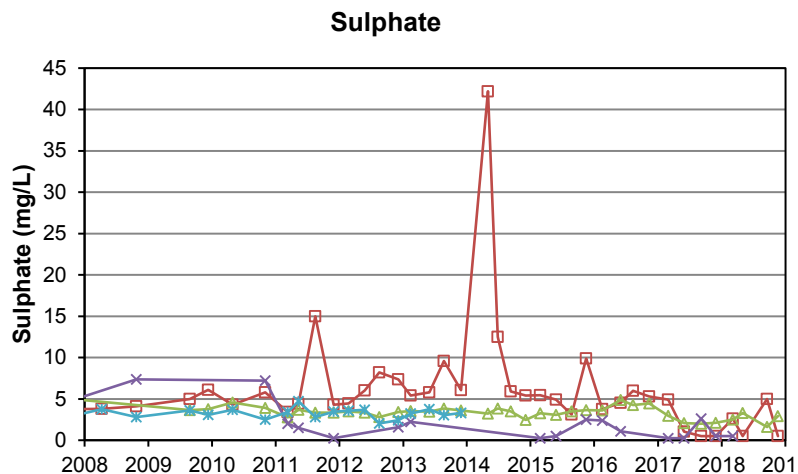
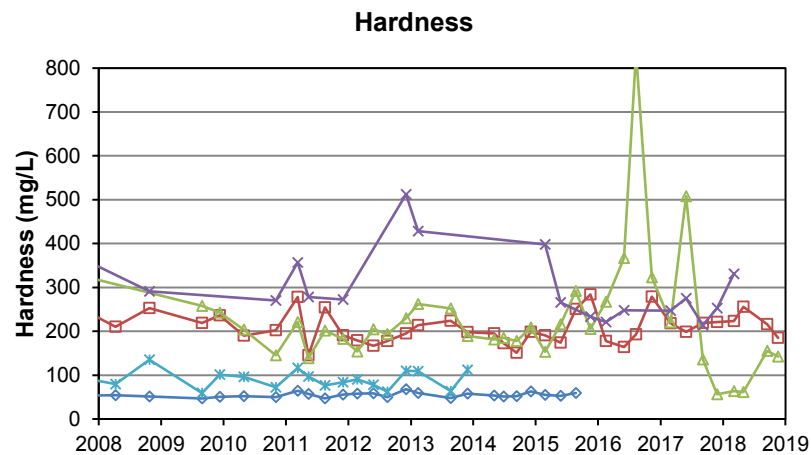


figure H-5

LANDFILL WELLS HISTORICAL GROUNDWATER DATA
(Field and Lab pH, Iron, and Manganese)
2018 OPERATIONS AND MONITORING REPORT
CAMPBELL RIVER WASTE MANAGEMENT CENTRE
Comox Strathcona Waste Management



Legend



figure H-6

LANDFILL WELLS HISTORICAL GROUNDWATER DATA
(Hardness, Sulphate, Alkalinity)
2018 OPERATIONS AND MONITORING REPORT
CAMPBELL RIVER WASTE MANAGEMENT CENTRE
Comox Strathcona Waste Management



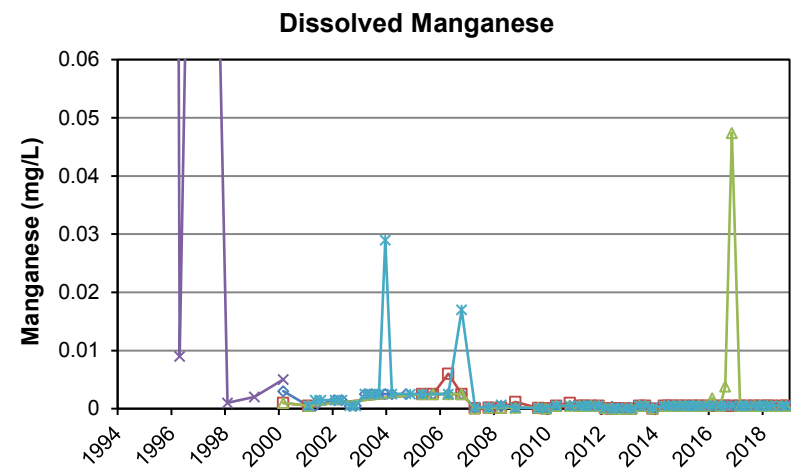
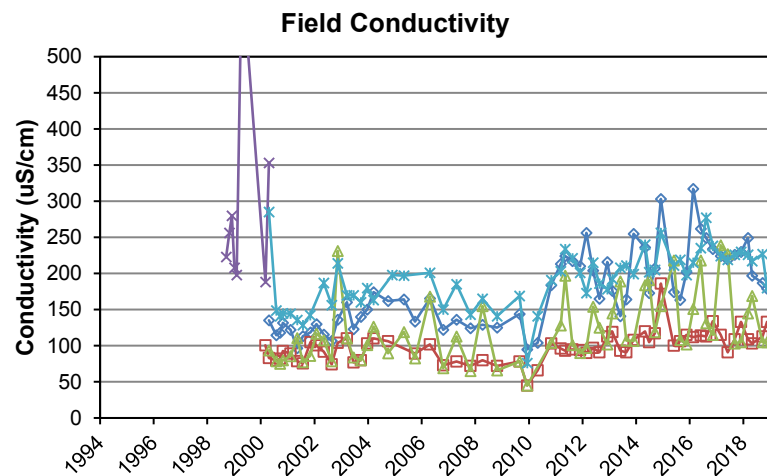
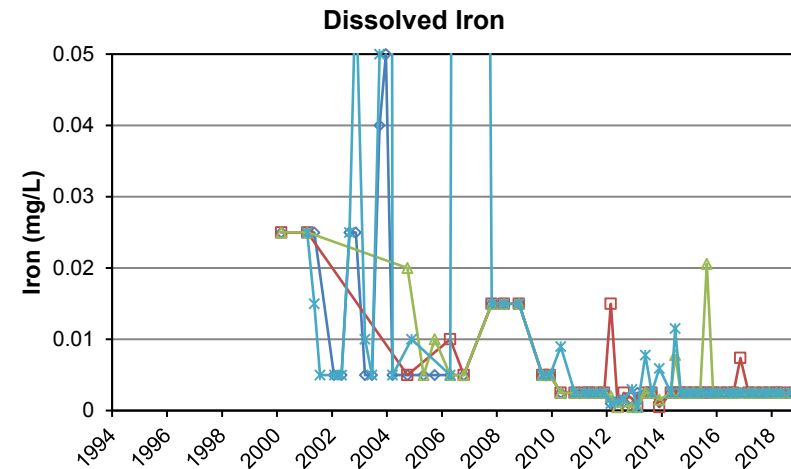
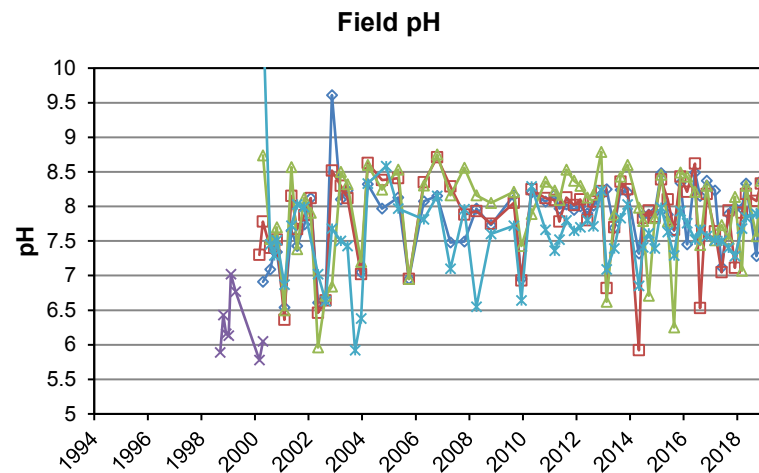
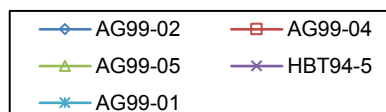


figure H-7

SOUTHEAST DOWNGRADIENT WELLS HISTORICAL GROUNDWATER DATA
(Field and Lab pH, Iron, and Manganese)

2018 OPERATIONS AND MONITORING REPORT
CAMPBELL RIVER WASTE MANAGEMENT CENTRE
Comox Strathcona Waste Management

Legend



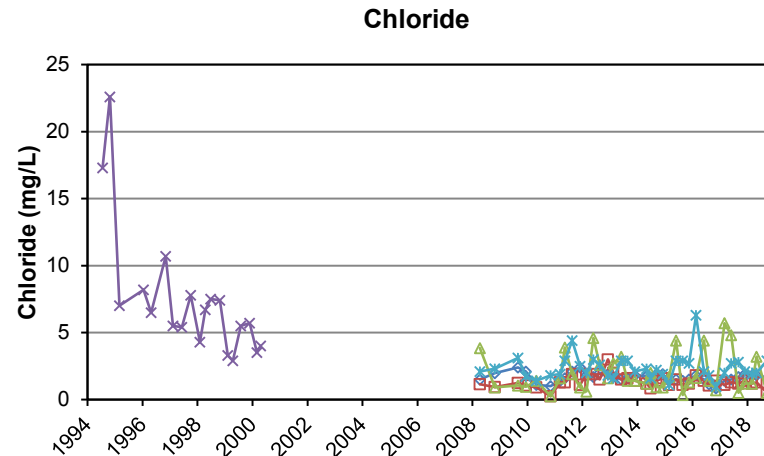
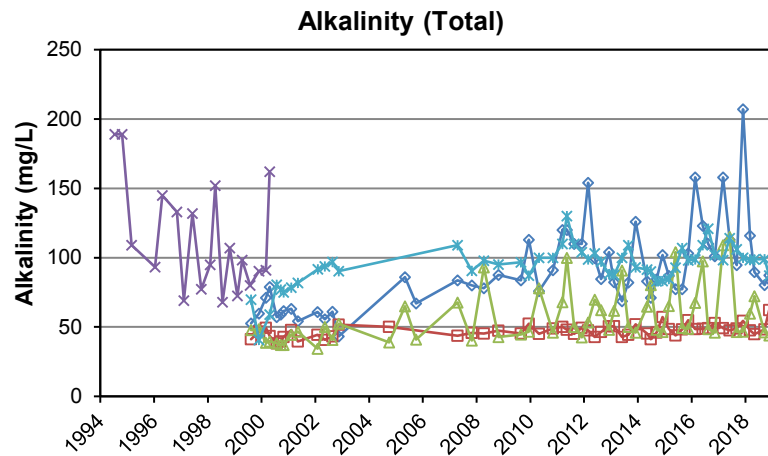
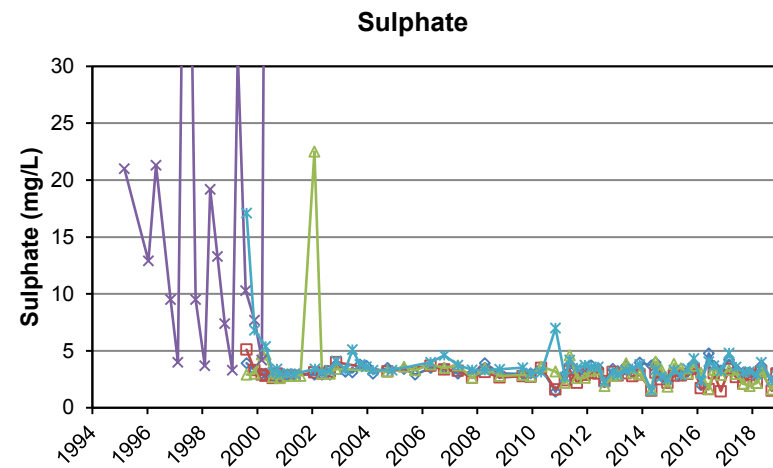
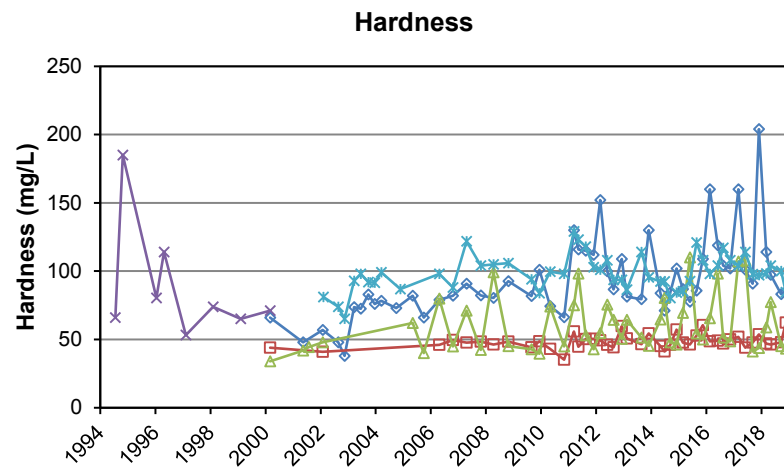
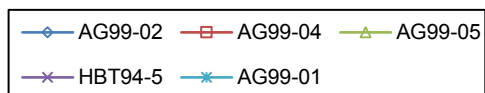


figure H-8

SOUTHEAST DOWNGRAIDENT WELLS HISTORICAL GROUNDWATER DATA (Hardness, Sulphate, Alkalinity)

2018 OPERATIONS AND MONITORING REPORT
CAMPBELL RIVER WASTE MANAGEMENT CENTRE
Comox Strathcona Waste Management

Legend



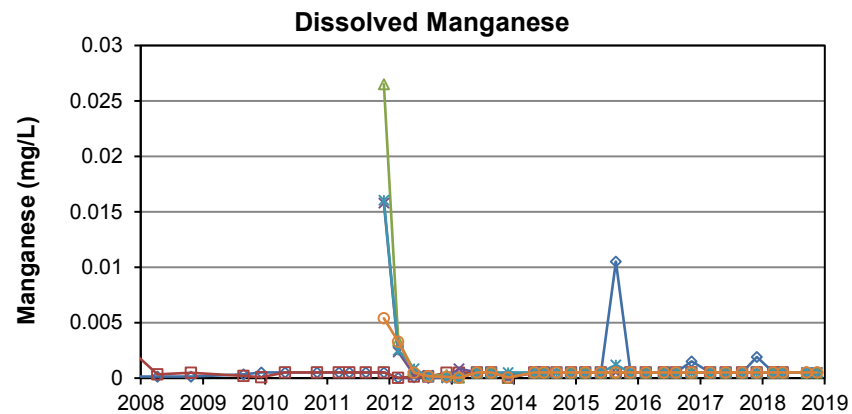
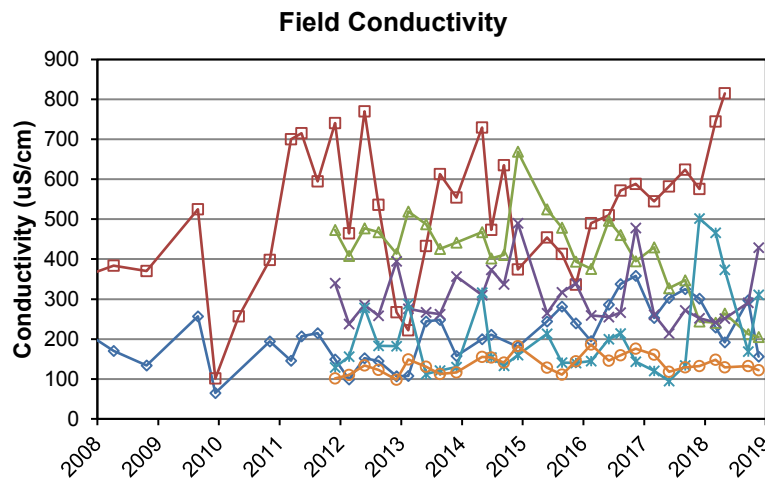
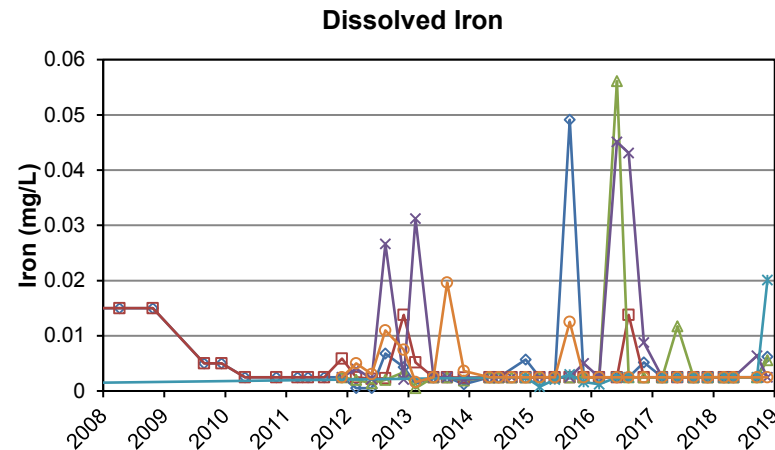
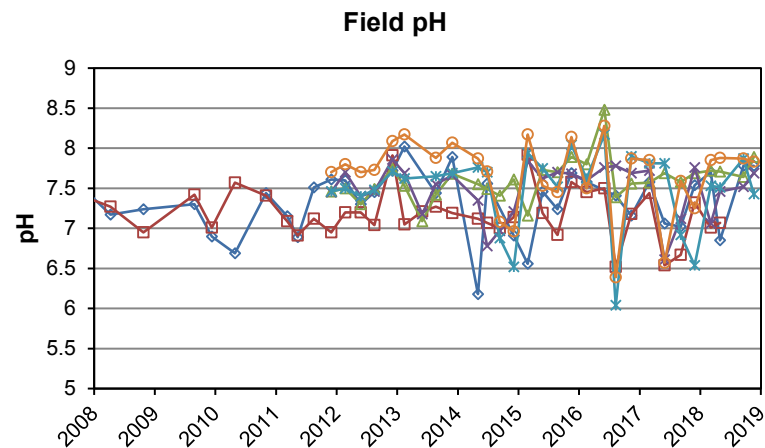
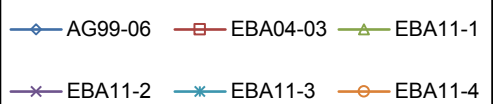


figure H-9

NORTHEAST DOWNGRADIENT WELLS HISTORICAL GROUNDWATER DATA (Field and Lab pH, Iron, and Manganese)

2018 OPERATIONS AND MONITORING REPORT
CAMPBELL RIVER WASTE MANAGEMENT CENTRE
Comox Strathcona Waste Management

Legend



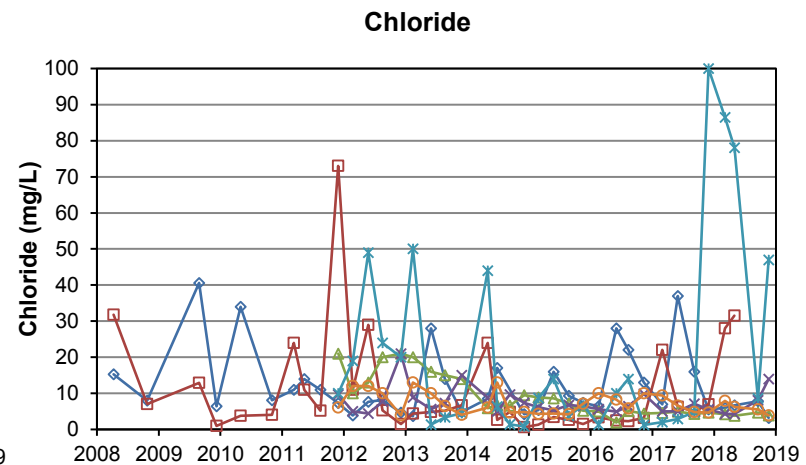
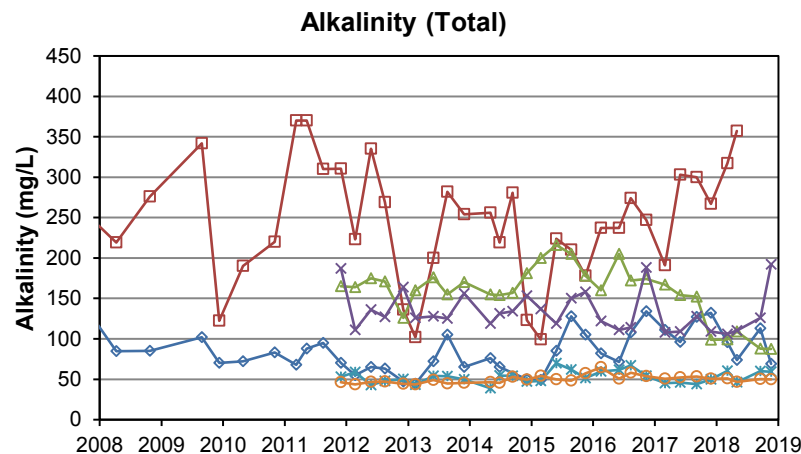
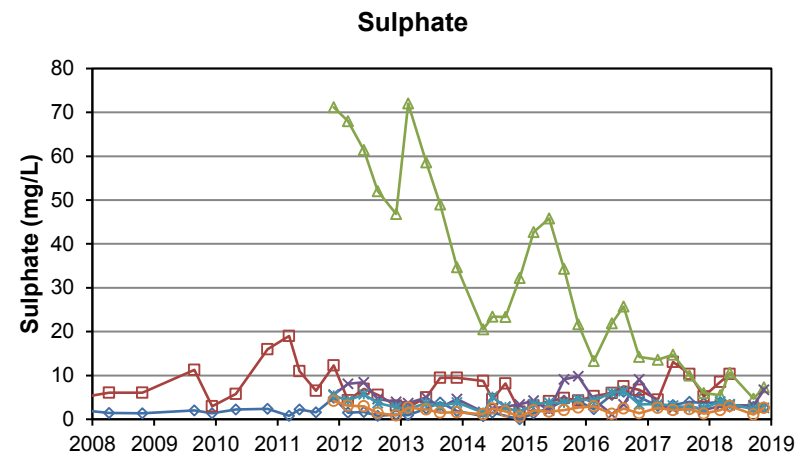
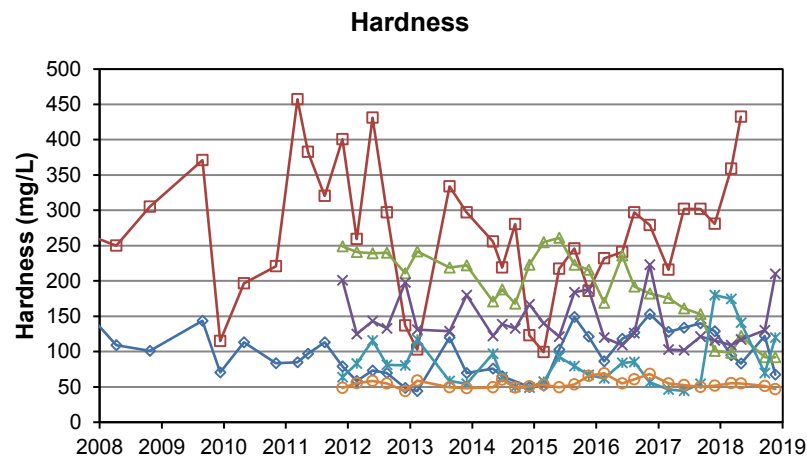
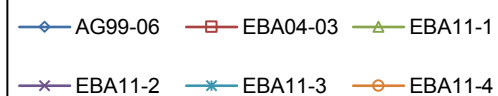


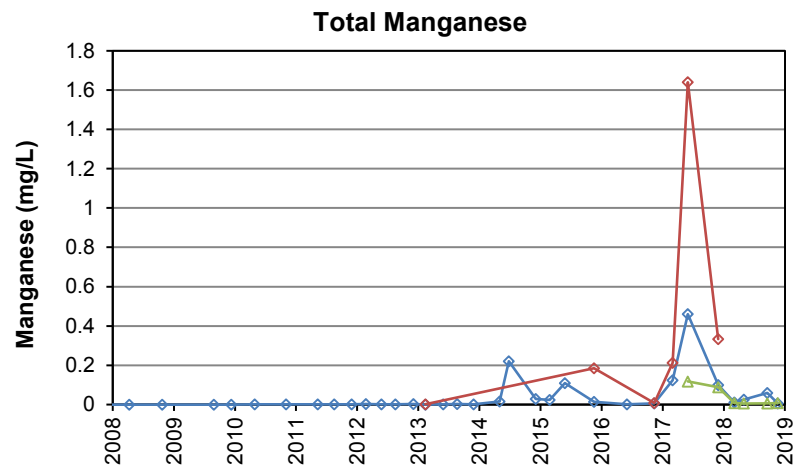
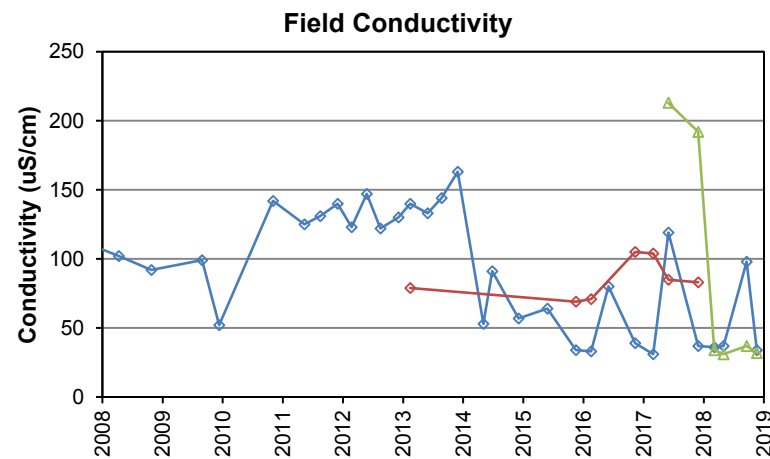
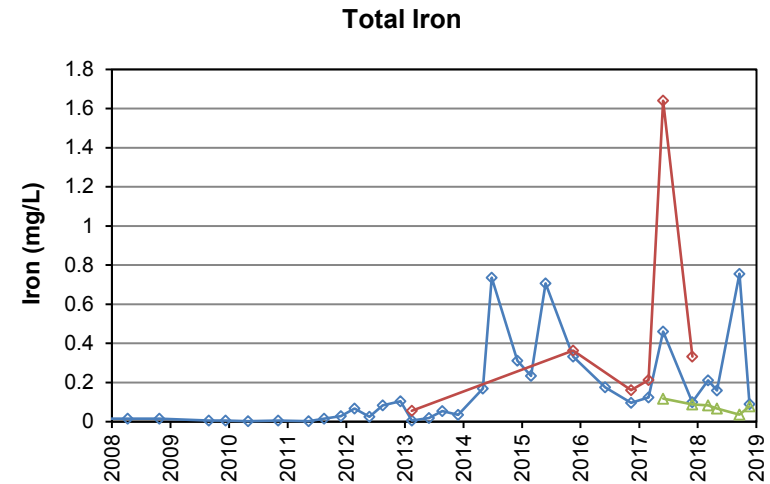
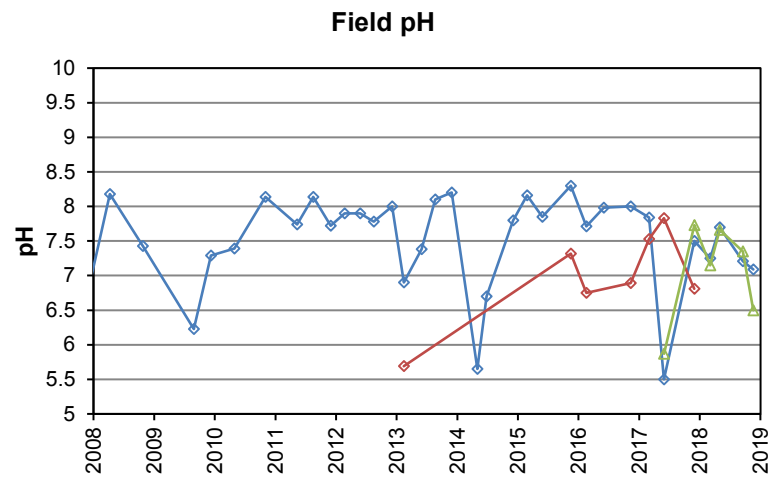
figure H-10

NORTHEAST DOWNGRAIDENT WELLS HISTORICAL GROUNDWATER DATA (Hardness, Sulphate, Alkalinity)

2018 OPERATIONS AND MONITORING REPORT CAMPBELL RIVER WASTE MANAGEMENT CENTRE Comox Strathcona Waste Management

Legend





Legend

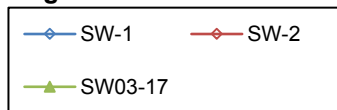


figure H-11

HISTORICAL SURFACE WATER DATA
 (Field and Lab pH, Iron, and Manganese)
 2018 OPERATIONS AND MONITORING REPORT
 CAMPBELL RIVER WASTE MANAGEMENT CENTRE
 Comox Strathcona Waste Management



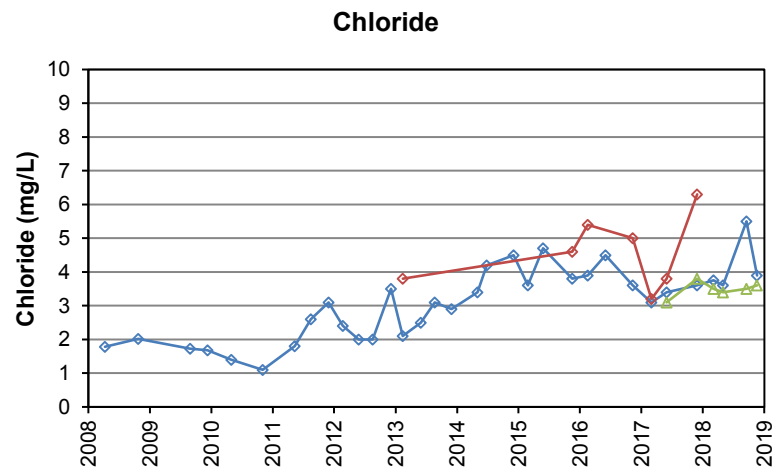
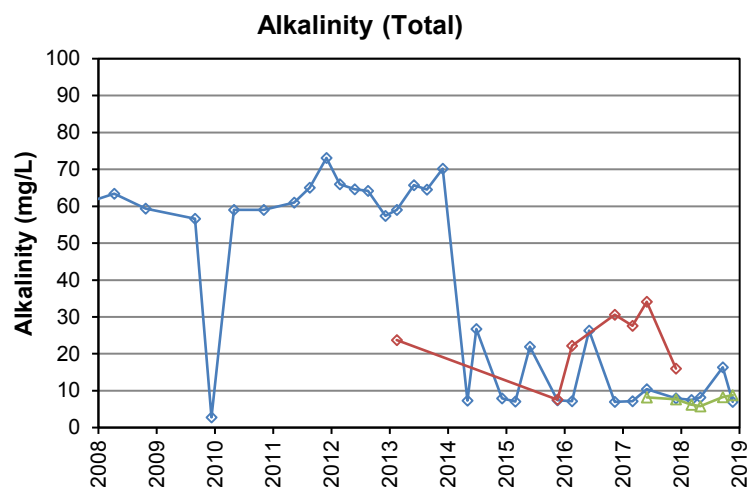
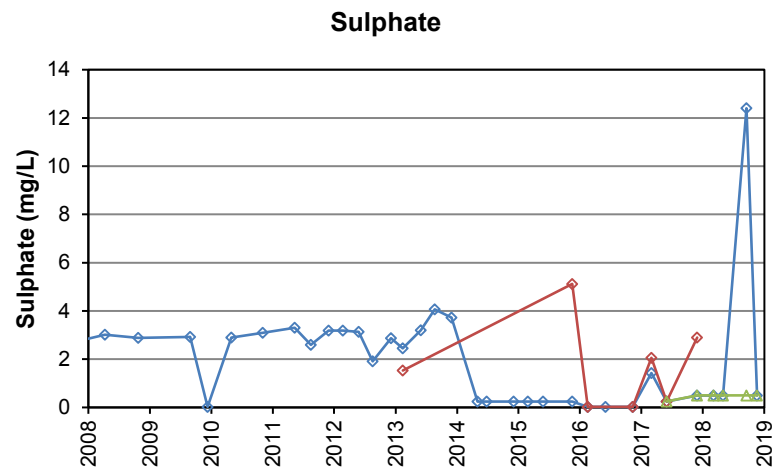
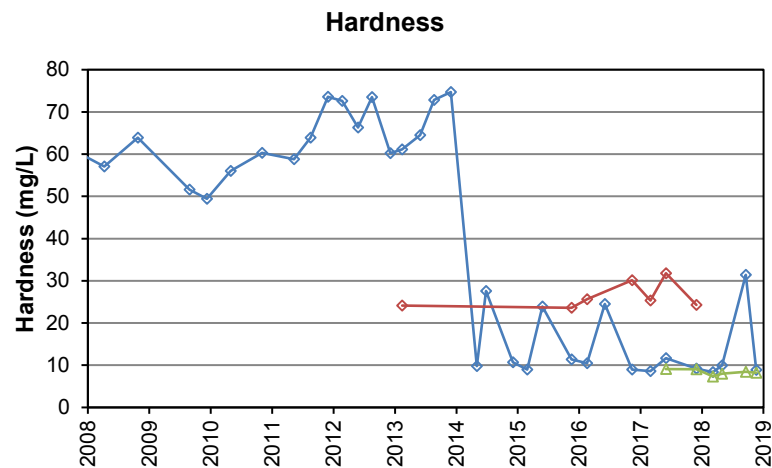
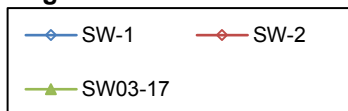


figure H-12

HISTORICAL SURFACE WATER DATA
(Hardness, Sulphate, Alkalinity)
2018 OPERATIONS AND MONITORING REPORT
CAMPBELL RIVER WASTE MANAGEMENT CENTRE
Comox Strathcona Waste Management

Legend



Appendix I

Historical Water Quality Data HBT94-5

APPENDIX I: HISTORICAL WATER QUALITY DATABASE, CAMPBELL RIVER WASTE MANAGEMENT CENTRE

Parameter	Units	BC.AWQG.AL	BC.AWQG.DW	CDWG	HB194-5 19-Jul-94	HB194-5 26-Oct-94	HB194-5 2-Mar-95	HB194-5 22-Jun-95	HB194-5 20-Jul-95	HB194-5 16-Jan-96	HB194-5 28-Feb-96	HB194-5 23-Apr-96	HB194-5 5-Nov-96	HB194-5 9-Jan-97	HB194-5 10-Feb-97	HB194-5 6-Mar-97	HB194-5 7-May-97	HB194-5 5-Jun-97	HB194-5 31-Jul-97	HB194-5 2-Oct-97	HB194-5 8-Dec-97	HB194-5 12-Jan-98	HB194-5 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	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphate (Lab)	mg/L	1.5	1.5	1.5	-	-	21	-	-	12.9	-	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	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	0.025	0.01	0.013	0.019	-	-	-	0.011	-	<0.01	-	-	<0.01	-	-	-	-	-	-	-	0.004
Beryllium: Dissolved	mg/L	5	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	-	-	<0.005	-	-	-	-	-	-	-	<0.001
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	37.1	-	16.1	-	-	-	-	-	-	-	22.5
Chromium: Dissolved	mg/L	no guideline	no guideline	no guideline	<0.015	<0.015	-	-	-	<0.015	-	<0.01	-	-	<0.001	-	-	-	-	-	-	-	<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	-	-	-	-	-	-	-	<0.001
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	-	-	-	-	-	-	-	-	-	-	<0.001
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	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0005
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 I: 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	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	-	-	-	-	-	-	-	-	-	-	-	-	-	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	1	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	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
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	no guideline	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
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: Nitrate (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 I: 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	-	-	6.67	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: Nitrate (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	61.9
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	0.005	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	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
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	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:

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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 I: HISTORICAL WATER QUALITY DATABASE, CAMPBELL RIVER WASTE MANAGEMENT CENTRE

Parameter	Units	BC.AWQG.AL	BC.AWQG.DW	CDWG	HB194-5 5-Mar-98	HB194-5 13-Apr-98	HB194-5 20-May-98	HB194-5 25-Jun-98	HB194-5 21-Jul-98	HB194-5 14-Sep-98	HB194-5 26-Oct-98	HB194-5 2-Dec-98	HB194-5 5-Jan-99	HB194-5 5-Feb-99	HB194-5 14-Apr-99	HB194-5 29-Jul-99	HB194-5 25-Nov-99	HB194-5 1-Mar-00	HB194-5 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	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
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	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
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	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	-	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	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
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	no guideline	-	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	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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.



about GHD

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

Michaela Dyck
Michaela.dyck@ghd.com
604.248.3928

Gregory Ferraro
Greg.ferraro@ghd.com
604.248.3670

www.ghd.com