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March 31, 2023

**2022 ANNUAL REPORT
SECHELT LANDFILL
SECHELT, BRITISH COLUMBIA**

Prepared for:

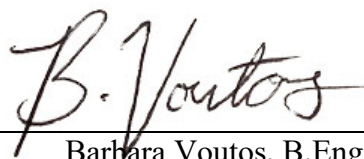
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1. INTRODUCTION

1.1 General

XCG Consulting Limited (XCG) was retained by the Sunshine Coast Regional District (SCRD) to prepare the 2022 Annual Report (Annual Report) for the Sechelt Landfill (Site). The objective of the Annual Report is to summarize Site operations and development, compile, analyze, and discuss the groundwater, surface water, and landfill gas monitoring data for the period of January 1, 2022, to December 31, 2022 (reporting period) and provide recommendations on future monitoring.

This Annual Report fulfills the annual environmental reporting requirements outlined in Operational Certificate No. 106060 (the OC) issued by the British Columbia Ministry of Environment and Climate Change Strategy (BCMECCS) on July 8, 2014, and is in accordance with Section 10.6 of the British Columbia (BC) Landfill Criteria for Municipal Solid Waste (June 2016).

1.2 Site Description

The Site is located at 4901 Dusty Road in Sechelt, BC approximately 6.5 kilometres northeast of the District of Sechelt. The Site is located on Crown Land under License of Occupation No. 237204. The legal description of the Site is Block C, District Lot 7613, Group 1, New Westminster District.

The Site property is bounded to the north, east, and west by Kwilkwil Ltd. (DL 7613), and to the south by Northcote Properties (DL 2464). Further, it is noted that Lehigh Materials Limited owns the mineral rights and currently operates its Sechelt Mine on the land south and west of the Site, with future expansion options for the Crown Land east and north of the Site. The landfill encompasses an area of approximately 7 hectares, within an overall Site area of approximately 9.5 hectares. A site location map is shown on Figure 1.

The Site operates under the OC and comprises a non-hazardous solid waste landfill that accepts municipal solid waste from the District of Sechelt, Town of Gibsons, Sechelt Indian Government District, and all the electoral areas in the SCR. In addition, as of July 20, 2015, solid waste received at the Pender Harbour Transfer Station is landfilled at the Site.

A fish composting operation was formerly located immediately east of the landfill, and it was in operation until 1992.

Existing facilities located at the Site are shown on Figure 2, and include the following:

- Scale house and weigh scale;
- Office building;
- Recycling area;
- Contact water pond;
- Public tipping area; and
- Maintenance shed.



As of late summer, early fall of 2021, the special waste storage building and power shed were demolished, and the share shed, that accepted take it or leave it items, was removed from the Site due to the construction of the new on-Site public drop off area. It should be noted that there are no plans to re-construct these buildings in the near future.

Environmental controls were constructed in 2013 consisting of final cover over the north, east, and southeast slopes of the landfill, along with surface water controls for the Site. Surface water controls consisted of surface water ditching around the perimeter of the landfill, culverts leading to Dusty Road from the closed northeast portion of the Site, the addition of a stormwater pipe alignment discharging into Dusty Road Ditch on the west side of Site, and improvements to the contact water detention pond and forebay on the west side of Site.

Geosynthetic tarps were also placed over the east portion of the top plateau of the landfill in 2013 (south tarp) and 2017 (north tarp) as shown on Figure 2.

The above noted environmental controls will aid in reducing leachate generation and the potential for leachate mounding within the landfill.

1.3 Regulatory Setting

The following section provides an overview of the regulatory environment which governs environmental monitoring of the Site.

1.3.1 Provincial Regulations

The general requirements of the Annual Report are outlined in the following documentation issued by the BCMECCS:

- Landfill Criteria for Municipal Solid Waste (June 2016); and
- Guidelines for Environmental Monitoring at Municipal Solid Waste Landfills (January 1996).

Key elements of these documents, addressed in the Environmental Monitoring Plan (EMP) (XCG, April 2018a), are as follows.

Landfill Criteria for Municipal Solid Waste

The Landfill Criteria for Municipal Solid Waste published by the BCMECCS, formerly the BC Ministry of the Environment (BCMOE) regulates environmental monitoring at landfills. This document applies to all landfills on public and private land in BC that receive municipal solid waste and include all new landfills, both lateral and/or vertical expansions of existing landfills, new landfill phases, and existing landfills. Key elements of the criteria which are applicable to this Annual Report are as follows:

- Current and planned future uses of groundwater and surface water shall be identified within 1.00 kilometre of the landfill footprint. After considering the identified uses of groundwater and surface water, a Qualified Professional must recommend the appropriate water quality criteria, compliance locations, and provide related rationale and justification.



- Water quality criteria to be considered include:
 - The BC Approved and Working Water Quality Guidelines;
 - BC Water Quality objectives;
 - The Contaminated Sites Regulation, Generic Numerical Water Standards for the applicable water use(s) as defined in Protocol 21 “Water Use Determination” under the Contaminated Sites Regulation;
 - The Canadian Drinking Water Quality Guidelines; and
 - Other water quality criteria for parameters not addressed by the preceding water quality criteria.
- The appropriate water quality criteria and compliance monitoring locations are subject to the approval of the Director in writing.
- As a minimum, the appropriate water quality criteria must be satisfied at and beyond the landfill site boundary, or 150 metres from the landfill footprint, whichever is closer. More stringent requirements may be set by the Director. Any discharges to surface water considered as potential fish habitat must also comply with the requirements of the federal Fisheries Act.
- A landfill shall be operated and maintained so as not to create a “nuisance” including but not limited to dust, noise, litter, odour, vectors and/or wildlife attraction.
- A detailed EMP for leachate, groundwater, surface water, and landfill gas must be prepared and implemented during landfill construction and landfill operation, closure, and post-closure. The EMP shall:
 - Demonstrate compliance with the performance criteria;
 - Demonstrate that monitoring results are consistent with the applicable plans and reports, listed in Section 10 of the Landfill Criteria for Municipal Solid Waste, including the groundwater and surface water impact assessment; and
 - Address the need for monitoring within 1 km of the landfill footprint.
- The EMP shall be developed in accordance with the “Guidelines for Environmental Monitoring at Municipal Solid Waste Landfills” for groundwater, surface water, leachate, and soils and vegetation or its approved replacement.
- The EMP shall be included in the Design, Operations and Closure Plan (DOCP) as per Section 10.3 of the Landfill Criteria for Municipal Solid Waste.
- Leachate monitoring is required to establish site specific leachate chemistry and contaminants and to ensure these contaminants are included in the groundwater and surface water monitoring. Monitoring of leachate levels within the landfill shall be conducted to ensure that landfill gas extraction wells (or horizontals) are not flooding, the solid waste is not becoming saturated, and excessive pore pressures are not developing to trigger slope instability.
- Leachate chemistry monitoring is also required to assist with determining the contaminating lifespan of the landfill at the time of closure.



- At no time shall combustible gas concentrations exceed the lower explosive limit (LEL) (5% methane, on a volumetric basis) in soils at the property boundary, or 20% of the LEL (1% methane, on a volumetric basis) in any on-site structure or facility.
- The EMP for groundwater shall be developed based on the Hydrogeology and Hydrology Characterization Report, the Groundwater and Surface Water Impact Assessment, and the expected landfill performance. The EMP for surface water shall be developed to monitor the performance of the surface water control works constructed and operated on a landfill site. The groundwater and surface water monitoring results are to be assessed for compliance with the applicable criteria as stipulated in Section 4.1 of the Landfill Criteria for Municipal Solid Waste.
- An annual Operations and Monitoring Report is to be submitted to the Director in a timely fashion as specified by the Director. The Annual Report should contain two essential components:
 - The Annual Environmental Monitoring Report; and
 - The Annual Operations Report.

Both reports shall assess the performance of and report on the operational status of the landfill for a specified year period.

- The Annual Environmental Monitoring Report shall include:
 - Results of the environmental monitoring program;
 - Data tabulation, comparison to the performance criteria, interpretation, trend analysis, graphs, etc.;
 - Identification of any current or predicted future non-compliance with performance criteria; and
 - Conclusions, recommendations, and proposed changes to the environmental monitoring program.
- The Annual Operations Report should include at a minimum:
 - Total volume, tonnage, and types of solid waste discharged into the landfill for the year;
 - Types and tonnages of solid waste that were not directly disposed of into the landfill such as open burned, recycled, composted, etc.;
 - Leachate quantities collected, treated, and discharged;
 - Landfill gas quantities collected, flared, and utilized. If applicable, an Annual Report should be done in the format required by the Landfill Gas Management Regulation and submitted either separately or as a part of the Annual Report;
 - Operational plan for the next 12 months;
 - Remaining site life and capacity;
 - Closure works completed;



- Results of regular inspection for cover integrity, health of vegetation, undesirable plant species, burrowing animals, erosion, settlement, etc.;
 - Any changes from approved reports, plans and specifications;
 - Any complaints received, and the action taken because of a complaint;
 - Financial Security Plan update (if applicable);
 - Identification of any non-compliance with the Solid Waste Management Plan, operational certificate or permit, and a proposed action plan and schedule to achieve compliance. The plan should include a monitoring program to measure the performance of the proposed actions in achieving compliance; and
 - Where applicable, progress report on efforts to resolve previously determined non-compliance conditions.
- In addition, landfill owners are encouraged to track and report the following parameters to assess the overall operational efficiency of their landfill:
 - Compaction, solid waste to cover ratio, solid waste to road ratio, and airspace utilization factor; and
 - Operation and maintenance expenditures.

By tracking these parameters and comparing results to best practices, the landfill owner or a Qualified Professional can identify areas where operations can be made more efficient, adding to the landfill lifespan, contributing additional revenue, and reducing per-tonne operating costs.

Guidelines for Environmental Monitoring at Municipal Solid Waste Landfills

These guidelines are intended to assist landfill owners and operators to design and implement an EMP as required by the “Landfill Criteria for Municipal Solid Waste.” Key elements of the criteria which are applicable to this Annual Report are as follows:

Groundwater:

Groundwater monitoring should include the following items:

- The location and installation of groundwater monitoring wells should address both existing and anticipated site development, including any predicted changes in groundwater flow;
- Up-gradient and down-gradient groundwater monitoring wells should be sampled at quarterly intervals as a minimum;
- The routine parameters monitored in groundwater include pH, redox potential, dissolved oxygen (DO), specific conductivity, metals, ammoniacal nitrogen, chloride, and chemical oxygen demand (COD); and

For the monitoring of metals, the Environmental Protection Agency (EPA) recommends the following be monitored regularly; antimony, arsenic, barium, beryllium, cadmium, chromium, cobalt, copper, lead, nickel, selenium, silver, thallium, vanadium, and zinc.

**Surface Water:**

- Surface water monitoring locations should include the following locations:
 - Upstream to establish background water quality;
 - Immediately downstream to determine leachate impacts on water quality; and
 - Downstream to document the extent of the mixing zone and distance required for the surface water to assimilate leachate and for water quality to recover to background levels.
- Surface water should be monitored for pH, redox potential, specific conductivity, temperature, and DO concentration.

Landfill Gas:

- The frequency of monitoring should be sufficient to detect landfill gas migration based on subsurface conditions.
- Gas probes should be installed in the more permeable strata, between the landfill unit and either the property boundary or structures where gas migration may pose a problem. Multiple or nested probes are useful in defining the vertical configuration of the migration pathway.

1.3.2 Landfill Operational Certificate

The Site is currently approved to operate the OC issued by the BCMECSS on July 8, 2014. Key elements of the OC which are applicable to this Annual Report are as follows:

Ground and Surface Water Quality Impairment

- The landfill must be operated in a manner such that groundwater or surface water quality does not degrade beyond that specified by the BC Water Quality Guidelines, or other appropriate criteria as may be specified by the Director, at or beyond the landfill property boundary.
- If exceedances to the specified water quality criteria occur because of landfill operations, the Director may require that control measures or works be undertaken.

Inspections

- The OC holder must inspect the authorized works regularly and maintain them in good working order. The Manager must be immediately notified of any malfunction of these works.
- The OC holder must inspect the property boundaries regularly and notify the Manager of any visual evidence of environmental impacts on adjacent properties.

Landfill Gas Management

- The landfill must not cause combustible gas concentrations to exceed the lower explosive limit in soils at the property boundary or 25 % of the LEL at or in on-site or off-site structures.

**Monitoring**

- The OC holder must implement an EMP. The OP holder must maintain records of all monitoring program data and analyses available for inspection. Based on the information submitted in the annual report, or any other information relevant to the site, the Director may vary the frequency, location, and analyses of environmental monitoring as warranted.

Sampling Procedures

- Sampling is to be carried out in accordance with the procedures described in the “BC Field Sampling Manual for Continuous Monitoring and the Collection of Air, Air-Emission, Water, Wastewater, Soil, Sediment, and Biological Samples” (2003 Edition), or the most recent edition, or by suitable alternative procedures as authorized by the Director.

Analytical Procedures

- Analyses are to be carried out in accordance with procedures described in the “BC Environmental Laboratory Manual” (2015 Edition), or the most recent edition, or by suitable alternative procedures as authorized by the Director.

Reporting

- The OC holder must prepare an Annual Report which must include, but is not limited to, the following:
 - A review and interpretation of the analytical data from receiving environment monitoring for the calendar year;
 - Summaries of solid waste and recyclable material records, with the amount of solid waste landfilled reported as a volume and tonnage;
 - Summary of recyclable material and household hazardous wastes shipped offsite including the name of the company and location the recyclable material and household hazardous waste is sent;
 - Summary of amount of commercial quality soil brought on-site;
 - Updated estimates for the remaining capacity, closure date for the current phase, and closure date for the current landfill footprint;
 - Results of the annual survey;
 - An evaluation of leachate generation control measures;
 - Results of the landfill gas monitoring;
 - Revised closure/post closure costs, confirmation of sufficient funds available, and a statement of the current dollar value of the Closure Fund and the amount earmarked for the Sechelt Landfill site;
 - Revised design and operating plan and planned improvements if applicable for minor revisions;
 - Revised EMP;
 - Identification of operating problems and corrective actions taken;



- An evaluation of the recycling programs including solid waste diversion;
 - Summary of public complaint/resolution for the landfill;
 - In the event of any non-compliance with the conditions of the OC, an action plan and schedule to achieve compliance;
 - The results of all monitoring programs as specified in this OC. Data interpretation and comparison to the performance criteria in the Landfill Criteria for Municipal Solid Waste, the Guidelines for Environmental Monitoring and Municipal Solid Waste Landfills. Trend analyses, as well as an evaluation of the impacts of the discharges on the receiving environment in the previous year must be carried out by a qualified professional; and
 - Monitoring data must be entered into EMS – Environmental Monitoring System electronically and submitted in electronic and printed format satisfactory to the Regional Director.
- The Annual Report for the preceding 12-month period from January 1 to December 31 must be submitted to the Regional Manager, Environmental Protection, by March 31 of each year.

A copy of the OC is included as Appendix A.



2. SETTING

2.1 Topography and Drainage

The Site is in the physiographic region referred to as the Georgia Lowlands, which comprises the west coast of mainland BC (Holland, 1976). The Site is located approximately 3 kilometres east of the Salish Sea and Sechelt Inlet.

The Site is located on the north edge of a plateau at an approximate elevation of 200 metres above mean sea level (amsl). Most of the plateau is used for aggregate extraction. From the plateau, the topography slopes steeply upward to the east toward the Coast Mountains.

The plateau is located on the drainage divide between the Irgens Creek watershed to the north and the Chapman Creek watershed to the south. As shown on Figure 1, the Site is located primarily within the Irgens Creek watershed.

Stormwater runoff from areas of the Site completed with final cover, as shown on Figure 2, is routed to the north and west by a series of ditches, pipes, and culverts which discharge directly to the Dusty Road roadside ditch, which conveys water westward eventually draining into Irgens Creek. Irgens Creek runs in a westerly direction, eventually discharging to Porpoise Bay.

Stormwater run-off from active areas and interim covered areas of the landfill is routed to the contact water pond, where it infiltrates into the ground.

2.2 Geology

The Georgia Lowlands is underlain by granitic rocks as well as by inliers of older formations (Holland, 1976). Geologic mapping indicates that locally the Site is underlain by a granodiorite intrusive rock (BCGS, 2013).

According to the Geological Survey of Canada Surficial Materials of Canada Map 1880A, the Site is located on the boundary between surficial deposits consisting of till veneer (thin and discontinuous till, may include extensive areas of rock outcrop) to the north, and lag (sand, gravel, and pockets of finer sediment) to the south (Fulton, 1995).

Greater detail is provided by “Surficial Geology and Sand and Gravel Deposits of Sunshine Coast, Powell River, and Campbell River Areas, Bulletin 65” which indicates that:

- Surficial deposits on and south of the Site are comprised of cobbles, gravel, sand, and silt (Capilano Sediments fluvial deltaic fan and channel deposits). The Capilano deposits are the sites of most of the aggregate pits in the area;
- Surficial deposits on and north of the Site are comprised of till which extends for approximately 1,000 metres (Vachon Drift ground moraine deposits); and
- Surficial deposits north of the till consist of bare rock with thin patches of overburden (McCammon, 1977).



Records for water wells nearest the Site indicate that overburden, consisting of sand and gravel with cobbles, with a layer of till or compact to dense silt (at various depths), extends to depths between approximately 60 and 120 metres below ground surface (bgs).

A generalized geologic cross-section through the Site based on the installation of approximately 20 boreholes to construct groundwater monitoring wells is shown on Figure B1 in Appendix B. Historic cross-sections are also included in Appendix B, as part of groundwater monitoring well installation reports as shown on Figures 3 and 4. As shown on the geologic cross-section, the overburden at the Site is comprised of silty sand and gravel to a maximum depth of approximately 32 metres bgs. A dense silt (bouldery) till layer of varying thickness is present in most deep boreholes from approximately 14 metres to 23 metres bgs. The dense silt till layer was not present, or was not noted, at deep boreholes located in the southeast portion of the Site (MW99-9, MW13-1, and MW9) (XCG, 2015a).

2.3 Hydrogeology

Regionally, the Site is located within an area that has not been mapped or classified in the BC aquifer classification system. This is likely due to the low population/low usage of groundwater for potable purposes, and the large area being used for aggregate mining.

The area approximately 2 kilometres northwest of the Site is a classified aquifer as shown on Figure 3. The aquifer is #566 and is classified as IIIA (lightly developed, high vulnerability) and ranked for hydrogeologic and water use as a 9 in a range of 1 to 25.

According to BC water well records obtained from iMapBC database, the nearest water wells to the Site are located approximately 1.7 kilometres west of, and cross-gradient to, the Site. The locations of water wells near the Site are shown on Figure 3. The records for water wells near the Site indicate that the wells are completed in overburden at depths ranging from approximately 20 metres to 100 metres bgs, and groundwater is located at a depth of approximately 30 metres bgs as shown in Table 1.

A search of the Oil and Gas Commission records available through the iMapBC database found no petroleum-related wells within 1 kilometre of the Site boundaries.

Groundwater levels in the on-Site groundwater monitoring wells are monitored on a quarterly basis as part of the EMP to determine the depth to the water table/water table elevation, and the approximate direction of groundwater flow. Historic groundwater elevations are provided in Appendix C and on the groundwater hydrograph on Figure C1.

Based on the Site geology and the observed groundwater levels, perched groundwater appears to be present at the Site on top of the dense silt till layer from a depth of approximately 1 metre to 14 metres bgs (Piteau, 1999). The perched groundwater is reflected in the water levels observed in groundwater monitoring wells where a confining layer is present, or groundwater monitoring wells screened above the confining layer. The elevation of the perched groundwater during the 2022 monitoring



period ranged from approximately 209 metres amsl at the north end of the Site, to approximately 215 metres amsl at the south end of the Site.

Deep overburden groundwater monitoring wells MW13-01 and MW13-02 are screened in the deep gravelly sediments which are interpreted to be hydraulically connected to underlying bedrock aquifer. The bedrock hydraulic conditions are reflected in the water levels for these deep groundwater monitoring wells where the confining layer is not present, or groundwater monitoring wells are screened below the confining layer. During the 2022 monitoring period the interpreted bedrock groundwater elevation at the Site ranges from approximately 192 metres to 200 metres amsl.

As illustrated on the groundwater hydrograph on Figure C1, historic groundwater elevations indicate seasonal fluctuations which are more pronounced in groundwater monitoring wells instrumented in the perched groundwater.

Groundwater levels measured as part of the EMP indicate that the perched groundwater beneath the Site flows in a dominantly south to south-westerly direction towards the Chapman Creek watershed. It is anticipated that as perched groundwater migrates to the south it will percolate down to the bedrock aquifer. According to Ecoplans Ltd. (2010), vertical gradients between groundwater monitoring wells screened in the shallow (perched) groundwater and deep groundwater indicate a strong downward gradient.

2.4 Receptors

Receptors are generally defined and grouped based upon risk type. The primary environmental receptors include potential downstream users of either surface water or groundwater, and the on-Site buildings and adjacent property owners with respect to landfill gas.

2.4.1 Surface Water

As noted previously, surface watercourses located down-gradient of the Site include:

- Chapman Creek, located approximately 550 metres south of the Site, which drains into Trail Bay; and
- Irgens Creek located approximately 100 metres north of the Site, which drains into Porpoise Bay.

According to the District of Sechelt Official Community Plan (SCRD, 2009), both Chapman Creek and Irgens Creek provide habitat for fish populations and Chapman Creek provides most of the water for the SCR D water supply system as shown in Appendix D. Water intake locations along Chapman Creek are indicated on Figure 4. Several other water intake licenses exist for Chapman Creek and Irgens Creek; however, these licenses have been deemed inactive and abandoned by the SCR D. Furthermore, these licenses are located up-gradient of the Site and are not considered potential receptors. Summaries of the licenses for Chapman Creek and Irgens Creek are provided in Tables 2 and 3, respectively.



According to the BC Water Resources Atlas, Sechelt Spring is located north of the Site. A surface water intake license (C007970) from 1925 exists for irrigation and domestic purposes along Sechelt Spring as shown on Figure 4 under licensee name “Sechelt Indian Band” and appears to supply water to a series of buildings in the southwest part of the town of Sechelt on the Sechelt Band Lands. However, the SCRCD reviewed the properties in this area, and they appear to be using SCRCD water services. The BC Water Resources Atlas also shows some line work running to the southwest through the Sechelt Landfill towards the town of Sechelt, which would have had to be abandoned or decommissioned at some point due to landfill development. On March 14, 2019, the SCRCD conducted reconnaissance on the Sechelt Spring. The Sechelt Spring appears to be part of Irgens Creek which is intermittent at this point. The SCRCD was able to locate what appeared to be an old man-made conveyance ditch that would have diverted water from the Sechelt Spring/Irgens Creek. It originates at Irgens Creek and ends at Dusty Road just east of groundwater monitoring wells MW4 and MW4A as shown on Figure 2. Water was present in the first half (northern portion) of the conveyance ditch but was dry farther south, likely due to the increase in ground elevation and the natural topography in the area sloping back toward Irgens Creek. This intake license (which is suspected to be inactive) is located up-gradient of the Site and therefore is not considered a potential receptor.

2.4.2 Groundwater

The characteristics of the nearby down-gradient groundwater monitoring wells are summarized in Table 1. As indicated in Table 1, the majority of the nearby off-Site groundwater monitoring wells are owned by Construction Aggregates Ltd. and are located on the Lehigh Hanson Materials Ltd. mine property west of the Site. Several down-gradient groundwater monitoring wells are completed in the bedrock aquifer. According to Sylvis Environmental Services, quarterly surface water and groundwater quality monitoring has been ongoing at the mine since 1999. The 2022 EMP has demonstrated that surface water and groundwater quality have remained consistent with Sylvis Environmental Services data.

Based on the foregoing, it is apparent that the primary receptor for the Site is the bedrock aquifer. As indicated above, the shallow perched groundwater is believed to flow in a dominantly south to south-westerly direction, and percolate down to the deep overburden and ultimately to the bedrock aquifer.

Groundwater in the bedrock aquifer is anticipated to flow in the direction of the top of the bedrock surface. For this reason, any groundwater monitoring wells completed in the bedrock aquifer along the southern property boundary of the Site are down-gradient of the Site and represent compliance groundwater monitoring locations.

2.4.3 Potential Use of Groundwater for Municipal Water Supplies

As part of a multi-phase regional groundwater investigation implemented by the SCRCD, in October 2018, Associated Environmental Consultants Inc. (Associated) conducted a pumping test evaluation on a test production well (WIN54929) located approximately 2 kilometers west of the Site, as shown on Figure 3.



This test production well, referred to as the Dusty Road Well, was reportedly installed to a depth of 83.5 metres bgs in an unconfined sand and gravel unit.

Associated issued the summary report to the SCRD in January 2019, and the reported pumping test analysis indicated the Dusty Road Well had a high sustainable yield of approximately 300 gallons per minute. However, due to its unconfined aquifer setting, the proximity of the adjacent quarry and the resultant low source protection score, the SCRD determined that the Dusty Road site would not be developed for municipal water supplies at that time. These findings were outlined in the SCRD Infrastructure Committee Meeting of January 24, 2019. It should be noted that recently, the SCRD has revisited utilizing this well for short term drinking water use.

2.4.4 Landfill Gas

With respect to landfill gas these risks can broadly be categorized as: exposure to combustible gases, asphyxiation potential, and ecotoxicity. The on-Site buildings were the only receptor type identified which could potentially be adversely impacted by landfill gas migration.

There are currently four on-Site buildings located at the Site as shown on Figure 2. These include the scale house, office trailer, waste supervisors hut, and maintenance shed.

The Sites neighbouring properties to the north, east, and west are currently forested areas. There is also an aggregate mine south of the Site. There are no structures within the immediate vicinity (i.e., within 300 metres) of the Site on the surrounding properties.

The potential for landfill gas to displace oxygen can result in health and safety issues with respect to accessing confined spaces such as manholes, subsurface utility/valve boxes, or septic tanks.

The ability of landfill gas to displace oxygen in the soil matrix in the vadose zone can result in vegetative stress which can adversely affect agricultural lands, landfill cover systems, and screening vegetation.



3. ENVIRONMENTAL MONITORING PROGRAM

The following provides a description of the EMP conducted by SCRCD staff for the Site.

3.1 Historical Environmental Monitoring Program

The following outlines a history of environmental monitoring and infrastructure at the Sechelt Landfill (Piteau Associates Engineering Ltd., 2012):

1993

- Semi-annual EMP commences with groundwater monitoring wells MW-1 through MW-6.

1996

- Piteau Associates Engineering Ltd. (Piteau) installed groundwater monitoring wells MW-7, MW-8, and MW-9 and added these to the EMP.

1999

- Piteau installed groundwater monitoring wells MW99-7, MW99-8, and MW99-9 and added these to the EMP. These groundwater monitoring wells were installed to replace groundwater monitoring wells MW-7, MW-8, and MW-9, which were destroyed shortly after their construction.

2002

- Samples from two groundwater monitoring wells at the Lehigh Materials facility were submitted for basic parameters six times between 2002 and 2011. Groundwater monitoring well WP5 and the Sound Berm Well are situated approximately 2.2 kilometres west and approximately 2.5 kilometres west-southwest of the Site, respectively.

2013

- XCG decommissioned groundwater monitoring wells MW99-7, MW99-8, and MW99-9 as part of the Phase 1 Final Closure project and replaced them with groundwater monitoring wells MW13-3, MW13-2, and MW13-1, respectively. In addition, background groundwater monitoring wells MW13-4 and MW13-5 were installed on the north side of Dusty Road to characterize shallow and deep up-gradient groundwater quality, as recommended in the “2012 Environmental Monitoring Report” (XCG, November 2013).
- Two soil gas probes, GP13-01 and GP13-02, were installed near the scale house, respectively, as recommended in the “Draft Environmental Monitoring Plan” (XCG, March 2013).

2017

- XCG decommissioned groundwater monitoring wells MW13-5 and MW-5. XCG installed groundwater monitoring well MW17-01 to monitor groundwater east of the landfill and to replace groundwater monitoring well MW-5 which was located off-Site in a wet area. XCG installed groundwater monitoring well MW17-02 to



replace MW13-5, as MW13-5 had historically been dry. These groundwater monitoring wells were added to the EMP.

- XCG installed an additional soil gas probe GP17-01 near the maintenance shed, as recommended in the “Draft Environmental Monitoring Plan” (XCG, March 2013).
- A landfill gas monitoring program was implemented at the Site using soil gas probes GP13-01 and GP13-02 installed in 2013 and GP17-01 installed in 2017.

2018

- Indoor air monitoring of six on-Site buildings commenced as recommended in the 2017 Annual Report (XCG, March 2018).

2019

- Groundwater monitoring well MW-1A was removed from the EMP. It was installed in 1993 and has never been sampled due to insufficient water. The groundwater monitoring well has also been damaged for several years. It was therefore recommended that this groundwater monitoring well be removed from the EMP. Groundwater monitoring well MW-1 provides sufficient groundwater quality data in this area of the Site.

2021

- Groundwater monitoring well MW-2 was decommissioned and removed from the EMP and was to be replaced in upcoming reporting periods.
- Gas probes GP13-01 and GP13-02 were decommissioned and re-installed, however they were constructed in a manner that renders them unusable.

2022

- Groundwater monitoring well MW2 was replaced in the EMP with monitoring well MW2-21.
- Three additional groundwater monitoring wells were installed in the deep groundwater throughout the Site. Monitoring well MW22-01 was installed north and up-gradient of the landfill. Monitoring well MW22-02 was installed northeast of the landfill and north of Dusty Road to characterize deep groundwater up-gradient of the Site. Monitoring well MW22-03 was installed east and cross-gradient of the landfill.

3.2 Groundwater Monitoring

The groundwater monitoring events were completed at the Site in March, July, September, and December of 2022, and involved sampling 15 on-Site groundwater monitoring wells, including, MW-1, MW-2A, MW-3, MW-4, MW-4A, MW-13-1, MW-13-2, MW-13-3, MW-13-4, MW2-21, MW22-01, MW22-02 and MW22-03. All groundwater sampling activities were conducted by SCRD staff.

It is noted that groundwater analytical data is not available for the following groundwater monitoring wells:

- All monitoring events: MW17-01 and MW17-02 due to insufficient water;



- March, July, September, and December monitoring events: MW-4A due to insufficient water;
- March, September, and December monitoring events: MW-2A due to insufficient water and due to the well being on a slant and inability to obtain a water sample.

Groundwater monitoring well MW-2A has been difficult to sample since the well is at a slant and the bailers do not fit through. This well also does not seem to be producing a lot of water but that may be because the tubing does not go down far enough due to the well slant. Groundwater monitoring well MW-2 was decommissioned in December 2021. A new monitoring well, MW2-21, was installed in 2022, in the vicinity of the former well MW-2, as its replacement.

A summary of the on-Site groundwater monitoring wells and completion details are presented in Table 4. Groundwater monitoring well locations are illustrated on Figure 2. Stratigraphic logs are provided in Appendix B.

The 2022 groundwater monitoring program consisted of hydraulic (water level) monitoring, the measurement of field parameters (pH, conductivity, temperature, DO, and redox potential), and the collection and laboratory analyses of groundwater samples at all groundwater monitoring locations for the following chemical parameters:

- COD;
- Dissolved organic carbon (DOC);
- Electrical conductivity (EC);
- pH;
- Alkalinity, bicarbonate, carbonate, and hydroxide;
- Turbidity;
- Hardness;
- Ammonia;
- Nitrate;
- Nitrite;
- Total phosphorous;
- Nitrate plus nitrite;
- Total nitrogen;
- Total Kjeldahl Nitrogen (TKN);
- Dissolved chloride;
- Dissolved sulfate;
- Detailed dissolved metals scan; and
- Volatile organic compounds (VOCs).

3.2.1 Groundwater Monitoring Protocols

To ensure that representative groundwater samples were obtained from the groundwater monitoring wells and that no contamination of the collected samples occurred, the following protocols were adhered to during each monitoring event:

- Prior to groundwater sample collection, each groundwater monitoring well was purged of stagnant water. The objective of purging is to pump groundwater from the well until a representative sample of the formation groundwater is obtained.



This is generally achieved by the removal of three to five times the volume of standing water in the well. In general, purging is considered complete once sediment-free groundwater is obtained and the specific conductance, temperature, and pH of the groundwater stabilize within prescribed ranges.

- Groundwater samples were collected in the appropriate laboratory-supplied sample containers and preserved as required. Groundwater samples designated for dissolved metals analysis were lab filtered. All samples were packaged in a cooler, stored at a temperature of approximately 4°C and delivered to the laboratory within a 24-hour period.
- Groundwater samples were submitted, under chain-of-custody protocol, to Element Materials Technology Canada in Surrey, BC for analysis.

During each monitoring event, the following field data was measured and recorded:

- Water level;
- Purge volumes; and
- Field parameters (pH, conductivity, temperature, DO, and redox potential).

3.2.2 Groundwater Elevations

Groundwater levels were measured in March, July, September, and December 2022, to determine the depth to the water table, water table elevation, and the approximate direction of groundwater flow. Table 5 provides a summary of the groundwater elevations measured at the Site. Historic groundwater elevations are provided in Appendix C.

As illustrated on the groundwater hydrograph on Figure C1, historic groundwater elevations indicate seasonal fluctuations, with overall groundwater elevations remaining relatively consistent at each groundwater monitoring well location.

3.2.3 Regulatory Criteria

The groundwater quality laboratory analytical data was assessed with respect to the BC Approved and Working Water Quality Guidelines, 2019 and 2017 editions respectively, for drinking water quality and freshwater aquatic life. The freshwater aquatic life (FWAL) criteria are deemed most applicable due to the presence of Irgens Creek north of the landfill and Chapman Creek south-west of the Site, which are primary receptors for contaminants migrating in groundwater. The drinking water quality (DWQ) criteria are also applicable due to the water intakes along Chapman Creek, supplying drinking water to the residents of the SCR D, and water licenses along Irgens Creek.

As presented above, the groundwater monitoring wells completed in the bedrock aquifer along the southern property boundary of the Site are considered to represent compliance groundwater monitoring locations. Site compliance is established by comparing analytical results from these groundwater monitoring wells to the DWQ criteria. FWAL criteria are not deemed applicable at these groundwater monitoring locations as groundwater is anticipated to discharge to surface water but much farther downstream (towards Chapman Creek located approximately 550 metres south of the



Site), hence the FWAL criteria are applicable for comparison purposes but not for determining compliance at the property boundary.

It is noted that groundwater samples were not compared to the FWAL criteria for turbidity as it is not deemed to be applicable for groundwater, as the FWAL criteria applies to high flow or turbid waters. It is noted that groundwater samples were not compared to the FWAL criteria for dissolved oxygen and temperature as they are not deemed to be applicable for groundwater as the FWAL criteria applies to water bodies.

As per the Environmental Monitoring Plan (XCG, April 2018a), groundwater samples from the groundwater monitoring wells are analyzed for dissolved metals concentrations. It is noted that water quality for both the DWQ and FWAL criteria are stated as dissolved metal concentrations. Results from the dissolved metals analysis are still assessed with regards to the total metals criteria presented in the DWQ and the FWAL criteria, as a point of comparison. The analytical results are further compared to historical and background results to form an opinion regarding Site compliance and attenuation.

3.2.4 Leachate Indicator Parameters

3.2.4.1 General

The objective of considering leachate indicator parameters is to assist with differentiating landfill impacts from impacts associated with other sources. Indications of impact from the landfill will be used to determine the performance of the landfill and the need for additional monitoring and/or remedial measures.

The primary consideration in determining leachate indicator parameters is that the concentration of the key leachate indicator parameters must be significantly higher in concentration in comparison to either background or native groundwater quality and exceed the FWAL and DWQ criteria.

Typically, chloride is a key parameter in determining landfill-related impacts to groundwater. Chloride is a conservative ion, as it does not enter into reactions, adsorb significantly onto mineral surfaces, form complexes with other ions, or undergo transformations that remove the ions from the solution. Conservative ions, such as chloride, are the first parameters to break through when a contaminant plume moves through a porous medium and so should be the first to be detected at the leading edges of the moving plume.

In contrast, non-conservative parameters, such as nitrate, sulfate, bicarbonate, phosphate, ammonium, calcium, magnesium, and potassium undergo chemical reactions in solutions and are adsorbed onto the aquifer material or are biologically transformed. These non-conservative parameters move slower than the conservative species and are usually detected later than the conservative parameters, or closer to the pollution source.

In addition to chloride, manganese and iron can be good leachate indicator parameters. Manganese and iron are common elements in soil that occur in oxidized form and are used as indicators of contaminant impact. Increased concentration of dissolved manganese and iron in groundwater are an indicator of anaerobic conditions. In



anaerobic or anoxic conditions, organic carbon in leachate can be oxidized by groundwater bacteria, which will increase the consumption of available electron acceptors used for respiration. Groundwater bacteria will preferentially respire and chemically reduce dissolved oxygen, nitrate, geologic manganese and iron oxide minerals, sulfate, and carbon in that order. Once the dissolved oxygen and nitrate are depleted, the reduction of manganese and iron oxides in the soil releases soluble metal ions into the groundwater increasing the concentration of dissolved iron and manganese.

Ammonia and other forms of nitrogen in water, principally nitrate, can also be good indicators of anthropogenic impacts to groundwater due to discharge of landfill leachate, sewage, fertilizer, nitrogenous aerosols, plastics, and drugs. Since conditions within a landfill are typically anaerobic, the concentration of ammonia is typically high, and the concentration of nitrite and nitrate are typically low. Ammonia and organic nitrogen, collectively detected as TKN, represent a high percentage of the total soluble nitrogen compounds in leachate. Accordingly, high concentrations of TKN can be used as an indicator of leachate impact, while high concentrations of nitrate and nitrite are typically indicative of other anthropogenic impacts.

The amount of organic material in groundwater can also be a good indicator of anthropogenic impacts. The content of organic material in groundwater is measured through one or a combination of biological oxygen demand (BOD), COD, total organic carbon (TOC), or DOC.

3.2.4.2 Site

Comparison of the historic data from groundwater monitoring wells MW-4, MW-4A, MW13-4 (deep background groundwater quality), and MW13-5 (shallow background groundwater quality), and MW-3 (closest approximation of leachate quality at the landfill) indicate that the primary leachate indicator parameters for the Site include chloride, COD, DOC, ammonia, and TKN.

As indicated above, chloride is a key parameter in determining landfill impact, including impact migration and attenuation capacity. The nitrogen compounds (ammonia, nitrate, nitrite, and TKN) and COD are toxic to aquatic life, and important indicators of contaminant attenuation down-gradient of the Site and potential risk to Chapman Creek and Irgens Creek.

The concentrations of cadmium and manganese have historically exceeded the FWAL criteria at groundwater monitoring locations MW-4 and MW-4A, and upstream surface water monitoring location Site A. As such, the high concentrations of cadmium and manganese detected at other groundwater and surface water monitoring locations are not due to leachate but are believed to be naturally occurring in the area.

The results for dissolved metals indicate multiple exceedances of the DWQ and FWAL criteria during the reporting period. These exceedances may be the result of suspended sediment in the water samples. The presence of particulate matter in the water samples is evidenced by high turbidity results and by the variability of iron concentrations. It is recommended that the monitoring of dissolved metals be



continued, with special consideration to monitoring protocols and minimizing particulate matter in the water samples.

3.2.5 Groundwater Quality Results

Groundwater quality analytical results for the 2022 reporting period are presented in Tables 7 to 21. Historic groundwater water quality data are included as Appendix E. Concentration versus time graphs were prepared using the historic monitoring data for key leachate indicator parameters including chloride, COD, and ammonia and are included in Appendix E. Laboratory certificates of analyses are included as Appendix F. Please note that due to errors made during the sample collection, various groundwater samples were labelled with incorrect sample IDs/sample location. Analytical data discussed in this report, as well as the results presented in Tables 7 to 21 have been corrected to reflect the actual sample IDs/sampling locations. XCG has not received the updated laboratory reports showing the correct sample IDs. As such, the laboratory certificates included in Appendix F have been manually marked up to show the correct sample IDs.

It is noted that field pH was outside of the FWAL criteria acceptable range for some of the monitoring events during the reporting period at groundwater monitoring wells MW-4, MW-2A, MW-3, MW 13-1, MW13-2, MW13-3, and MW13-4 MW22-02 and MW22-03, which is inconsistent with the pH recorded by the laboratory and is therefore not discussed further in this report. pH in water is dependent on a variety of factors (carbon dioxide, dissolved minerals, temperature) and the difference between the field and laboratory pH is likely due to one or more of these factors.

3.2.5.1 Shallow Groundwater

On-Site groundwater monitoring wells that are completed in shallow groundwater include MW-1, MW-2, MW-2A, MW-3, MW-4, MW-4A, MW17-01, and MW17-02. As previously discussed in Section 3.2, groundwater monitoring wells MW17-01 and MW17-02 were dry during all sampling events, groundwater monitoring wells MW-4A and MW-2A were dry at various times or could not be sampled.

These groundwater monitoring wells are located up-gradient and cross-gradient from the landfill to detect landfill impacts as they migrate down to deeper groundwater.

Background Water Quality

Groundwater monitoring wells MW-4, MW-4A, and MW17-02 located north and up-gradient of the landfill, are considered to represent background groundwater quality for shallow groundwater.

Historical monitoring results for background groundwater monitoring wells MW-4 and MW-4A indicate that these groundwater monitoring wells have not been significantly impacted by the landfill. However, these groundwater monitoring wells are located within approximately 20 metres of the landfill (limit of waste), and as a result these groundwater monitoring wells may not be truly representative of background groundwater quality for shallow groundwater. This will be of greater importance as the landfill increases in elevation and the potential for radial flow of leachate increases due to the increasing leachate head within the landfill. Therefore,



groundwater monitoring well MW13-5, a new shallow background groundwater monitoring well, was installed north of Dusty Road in August of 2013. However, groundwater monitoring well MW13-5 was typically dry and in August 2017, groundwater monitoring well MW13-5 was decommissioned and groundwater monitoring well MW17-02 was installed in its place.

It is noted that groundwater analytical data is not available for groundwater monitoring well MW-4A during the March, July, September, and December monitoring events and MW17-02 during all monitoring events due to insufficient water. For the purposes of this report, groundwater monitoring well MW-4 are used as background groundwater quality for shallow groundwater.

Groundwater Monitoring Well MW-4

Groundwater monitoring well MW-4 analytical data for the 2022 reporting period indicated the following:

- Total phosphorous exceeded the DWQ aesthetic objective of 0.01 mg/L during the December monitoring events with a concentration of 0.04 mg/L;
- Total phosphorous exceeded the DWQ aesthetic objective of 0.01 mg/L with a concentration of 0.033 mg/L during the September;
- Iron exceeded the DWQ aesthetic objective of 0.3 mg/L during the September monitoring event with a concentration of 0.33 mg/L;
- Iron exceeded the DWQ aesthetic objective of 0.3 mg/L and FWAL criterion of 0.35 mg/L during the March monitoring event with a concentration of 1.2 mg/L; and
- Manganese exceeded the DWQ aesthetic objective of 0.05 mg/L and the FWAL hardness-dependent maximum acceptable concentration during the March monitoring event with concentrations of 3.5 mg/L.

Metal exceedances are possibly indicative of the presence of suspended sediment in the groundwater monitoring well, further evidenced by elevated turbidity results at other groundwater monitoring wells.

As indicated above, elevated concentrations of manganese are believed to be naturally occurring in the area. It is noted that the DWQ criteria exceedances for total phosphorus are for the aesthetic objectives and not health-based criteria.

The analytical results for samples collected from groundwater monitoring well MW-4 are summarized in Table 7. The analytical laboratory results are included in Appendix F.

The concentration versus time graphs for groundwater monitoring well MW-4 are provided in Appendix E, and indicate the following trends:

- Chloride concentrations ranged from 5.4 mg/L to 6.2 mg/L in 2022. Chloride concentration was relatively constant at approximately 2 mg/L until May 2006 when it spiked to 32 mg/L. Subsequently, chloride concentration increased to approximately 15 mg/L in December 2010. Chloride concentrations have remained below 10 mg/L since July 2011;



- COD concentration ranged from 9 to 30 mg/L in 2022. COD concentration has been variable, from below the laboratory RDL to 48 mg/L; and
- Ammonia concentrations were below the detection limit in 2022. Ammonia concentration has been variable, from below the laboratory RDL to 0.15 mg/L, with spikes in May 2006 (4.66 mg/L), April and December 2014 (0.46 mg/L and 1.6 mg/L, respectively), and December 2017 (0.31 mg/L).

Based on the change in chloride concentrations, this groundwater monitoring location has been slightly impacted by the landfill, likely due to the proximity to the limit of waste and the radial flow from mounded leachate.

Groundwater Monitoring Well MW-4A

As indicated above, there are no results for groundwater monitoring well MW17-02 for the reporting period as this well was dry during the reporting period.

Groundwater Monitoring Well MW17-02

As indicated above, there are no results for groundwater monitoring well MW17-02 for the reporting period as this well was dry during the reporting period.

Cross-Gradient Groundwater Monitoring Wells

Groundwater monitoring wells MW-1, MW-2A, MW-3, and MW17-01 are located cross-gradient of the landfill.

It is noted that groundwater analytical data is not available for groundwater monitoring well MW17-01 during all monitoring events due to insufficient water. Groundwater analytical data is also not available for groundwater monitoring well MW-2A during the March, September, and December monitoring events because of insufficient water and inability to obtain and sample.

Groundwater Monitoring Well MW17-01

As indicated above, there are no results for groundwater monitoring well MW17-01 for the reporting period as this monitoring well was dry and could not be sampled.

Groundwater Monitoring Well MW-1

Groundwater monitoring well MW-1 is located at the northwest corner of the landfill, near the former gypsum solid waste disposal area and current public tipping area. Gypsum is high in sulfate content which can result in the production of hydrogen sulfide gas.

Groundwater monitoring well MW-1 analytical data for the 2022 reporting period indicated the following:

- Turbidity exceeded the DWQ maximum acceptable increase from background during with recorded values of 6.4 NTU, 48.10 NTU, and 28.80 NTU during the July, September, and December monitoring events, respectively.
- Aluminum exceeded the FWAL criterion of 0.1 mg/L during the December monitoring event with a concentration of 0.27 mg/L.



- Total phosphorous exceeded the DWQ aesthetic objective of 0.01 mg/L during the March, September, and December monitoring events with concentrations ranging of 0.017 mg/L, 0.294 mg/L, and 0.067 mg/L, respectively.

Turbidity results have been variable at the Site including at shallow background groundwater monitoring wells MW-4 and MW-4A. It is believed that high turbidity values are indicative of suspended sediment in the groundwater monitoring wells.

Metal exceedances are possibly indicative of the presence of suspended sediment in the groundwater monitoring well, further evidenced by elevated turbidity results.

As indicated above, elevated concentrations of total phosphorous were also recorded at shallow background groundwater monitoring wells MW-4 and MW-4A. It is noted that the DWQ criteria exceedances for total phosphorus are for the aesthetic objectives and not health-based criteria.

The analytical results for samples collected from groundwater monitoring well MW-1 are summarized in Table 11. The analytical laboratory results are included in Appendix F.

The concentration versus time graphs for groundwater monitoring well MW-1 are provided in Appendix E, and indicate the following trends:

- Chloride concentrations range from 3.9 mg/L to 39.8 mg/L in 2022. Chloride concentrations are exhibiting an increasing trend, with a maximum peak recorded in March 2020 (87 mg/L);
- COD concentrations ranged from 5.0 mg/L to 50 mg/L in 2022. COD concentration was variable, from below the laboratory RDL to 34 mg/L until December 2012. Since then, COD concentrations have been variable, with a maximum concentration of 45 mg/L recorded in April 2017; and
- Ammonia concentrations were below the detection limit 2022. Ammonia concentration has been variable, from below the laboratory RDL to 4.4 mg/L. No trends are apparent.

Elevated concentrations of chloride (above background levels) could potentially be attributed to the application of road salt along Dusty Road or in the public tipping area. Conversely, these impacts could be the result of historic waste operations in the vicinity of groundwater monitoring well MW-1, or radial flow of impacted water from the contact water pond.

Groundwater Monitoring Well MW2-21

Groundwater monitoring well MW2-21 is located along the western property boundary, west of the stockpile area.

MW-2 was decommissioned as part of the public drop off construction. Original plans had MW-2 being re-installed as close to the original location as possible; however, it was moved far enough away from that location that the name was changed.

Groundwater monitoring well MW2-21 analytical data for the 2022 reporting period (March and July only) indicated the following:



- Turbidity exceeded the DWQ maximum acceptable increase from background during the March and July monitoring events with recorded values of 203 NTU and 145 NTU, respectively;
- Total phosphorous exceeded the DWQ aesthetic objective of 0.01 mg/L during the March and July monitoring events with concentrations of 3.9 mg/L and 2.9 mg/L, respectively;
- Aluminum exceeded the FWAL criterion of 0.1 mg/L during the March, July, and September monitoring events with a concentration of 1.1 mg/L, 0.19 mg/L, and 0.1 mg/L, respectively;
- Iron exceeded the FWAL criterion of 0.35 mg/L and the DWQ aesthetic objective of 0.3 mg/L during the March and July monitoring events with concentrations of 18 mg/L and 11 mg/L, respectively; and
- Manganese exceeded the DWQ aesthetic objective of 0.05 mg/L during the March and July monitoring events with concentrations of 1.9 mg/L and 5.5 mg/L, respectively.

Turbidity results have been variable at the Site including at shallow background groundwater monitoring well MW-4 and MW-4A. It is believed that high turbidity values are indicative of suspended sediment in the groundwater monitoring wells.

Metal exceedances are possibly indicative of the presence of suspended sediment in the groundwater monitoring well, further evidenced by elevated turbidity results.

As indicated above, elevated concentrations of manganese are believed to be naturally occurring in the area. Elevated concentrations of total phosphorous were also recorded at shallow background groundwater monitoring wells MW-4 and MW-4A. It is noted that the DWQ criteria exceedances for total phosphorus and sulfate are for the aesthetic objectives and not health-based criteria.

The analytical results for samples collected from groundwater monitoring well MW-2-21 are summarized in Table 18. The analytical laboratory results are included in Appendix F.

The concentration versus time graphs for groundwater monitoring well MW-2-21 are provided in Appendix E, and indicate the following trends:

- Chloride concentration was measured as 99 mg/L in March 2022. Chloride concentrations exhibited an increasing trend until 2010, when a peak of 190 mg/L was recorded in July 2015. Since then, concentrations have been variable, from 24 mg/L to 210 mg/L;
- COD concentration was measured as 10 mg/L in March 2022. COD concentration has been variable, from below the laboratory RDL to 113 mg/L. Since 2015, several spikes have been recorded, with a maximum of 113 mg/L in December 2018; and
- Ammonia concentration was below the detection limit in 2022. Ammonia concentrations have remained consistent, below approximately 0.05 mg/L until July 2016. Since then, several spikes have been recorded, with maximums in



September 2016 (0.36 mg/L), July 2018 (0.24 mg/L), March 2020 (9.78 mg/L), and July 2020 (0.33 mg/L).

Elevated concentrations of chloride (above background levels) could potentially be attributed to the application of road salt in the public tipping area. Conversely, these impacts could be the result of historic waste operations in the vicinity of groundwater monitoring well MW-2, or radial flow of impacted water from the contact water pond.

Groundwater Monitoring Well MW-2A

Groundwater monitoring well MW-2A is located along the western property boundary, west of the contact water pond.

Groundwater monitoring well MW-2A has been difficult to sample since the well is at a slant and the bailers do not fit through. This well also does not seem to be producing a lot of water but that may be because the tubing does not go down far enough due to the well slant.

Analytical data for the 2022 (July only) reporting period indicated the following:

- Turbidity exceeded the DWQ maximum acceptable increase from background during the July monitoring event with a recorded value 23.4 NTU.
- Total phosphorous exceeded the DWQ aesthetic objective of 0.01 mg/L with concentrations of 0.720 mg/L.
- Iron exceeded the FWAL criterion of 0.35 mg/L and the DWQ aesthetic objective of 0.3 mg/L with concentration of 5.40 mg/L.
- Manganese exceeded the DWQ aesthetic objective of 0.05 mg/L with a concentration of 0.67 mg/L.

Turbidity results have been variable at the Site including at shallow background groundwater monitoring wells MW-4 and MW-4A. It is believed that high turbidity values are indicative of suspended sediment in the groundwater monitoring wells.

Metal exceedances are possibly indicative of the presence of suspended sediment in the groundwater monitoring well, further evidenced by elevated turbidity results.

As indicated above, elevated concentrations of manganese are believed to be naturally occurring in the area. Elevated concentrations of total phosphorous were also recorded at shallow background groundwater monitoring wells MW-4 and MW-4A. It is noted that the DWQ criteria exceedances for total phosphorus and manganese are for the aesthetic objectives and not health-based criteria.

The analytical results for samples collected from groundwater monitoring well MW-2A are summarized in Table 12. The analytical laboratory results are included in Appendix F.

The concentration versus time graphs for groundwater monitoring well MW-2A are provided in Appendix E, and indicate the following trends:

- The chloride concentration was 99.2 mg/L in 2022. Chloride concentration exhibited an increasing trend with a peak of 76 mg/L in June 2013. Since then,



concentrations drastically dropped, but have demonstrated an increasing trend with a new peak of 99.2 mg/L in July 2022;

- The COD concentration was 100 mg/L in 2022. COD concentrations were variable, from below the laboratory RDL to 30 mg/L until December 2013. Since 2013, COD has demonstrated an increasing trend, with a maximum in March 2018 of 687 mg/L. Since 2018, concentrations of COD have been variable ranging from 166 mg/L in December 2018 to 100 mg/L in 2022; and
- The ammonia concentration was 26.90 mg/L in 2022. Ammonia concentration remained below 0.077 mg/L until December 2008. Since 2008, it has demonstrated an increasing trend, with a maximum of 26.90 mg/L recorded in July 2022.

Based on a comparison of the leachate indicator parameters at groundwater monitoring well MW-2A, particularly chloride and COD, to concentrations at groundwater monitoring well MW-3 (closest approximation of leachate quality at the Site), groundwater monitoring MW-2A, appears to be slightly impacted by the landfill. These impacts could be the result of historic waste operations in the vicinity of this well, and/or radial flow of impacted groundwater migrating from the contact water pond.

Groundwater Monitoring Well MW-3

Groundwater monitoring well MW-3 is located at the southwestern corner of the landfill, near the former sludge disposal pits. Groundwater monitoring well MW-3 represents leachate quality at the Site and is the most down-gradient shallow groundwater monitoring well.

Groundwater monitoring well MW-3 analytical data for the 2022 reporting period indicated the following:

- Turbidity exceeded the DWQ maximum acceptable increase from background during all monitoring events with recorded values ranging from 11.9 NTU to 54 NTU;
- Ammonia exceeded the FWAL temperature and pH-dependent maximum acceptable concentration of 1.87 mg/L, 1.79 mg/L, 1.66 mg/L, and 1.87 mg/L for all monitoring events with concentrations ranging from 12.8 mg/L to 24.8 mg/L;
- Total phosphorous exceeded the DWQ aesthetic objective of 0.01 mg/L during all monitoring events with concentrations ranging from 0.023 mg/L to 0.058 mg/L;
- Aluminum exceeded the FWAL criterion of 0.1 mg/L during the March monitoring event with a concentration of 0.16 mg/L;
- Iron exceeded the FWAL criterion of 0.35 mg/L and the DWQ aesthetic objective of 0.3 mg/L during the March, July and September monitoring events with concentrations of 5.2 mg/L, 3.2 and 4.9 mg/L, respectively; and
- Manganese exceeded the DWQ aesthetic objective of 0.05 mg/L during all monitoring events with concentrations ranging from 0.79 mg/L to 1.2 mg/L.



Turbidity results have been variable at the Site including at shallow background groundwater monitoring wells MW-4 and MW-4A. It is believed that high turbidity values are indicative of suspended sediment in the groundwater monitoring wells.

Metal exceedances are possibly indicative of the presence of suspended sediment in the groundwater monitoring well, further evidenced by elevated turbidity results.

As indicated above, elevated concentrations of manganese are believed to be naturally occurring in the area. Elevated concentrations of total phosphorous were also recorded at shallow background groundwater monitoring wells MW-4 and MW-4A. It is noted that the DWQ criteria exceedances for total phosphorus and manganese are for the aesthetic objectives and not health-based criteria.

The analytical results for samples collected from groundwater monitoring well MW-3 are summarized in Table 13. The analytical laboratory results are included in Appendix F.

The concentration versus time graphs for groundwater monitoring well MW-3 are provided in Appendix E, and indicate the following trends:

- Chloride concentrations ranged from 72 mg/L to 105 mg/L in 2022. Chloride concentrations exhibit an increasing trend, peaking in August 2012 with a concentration of 210 mg/L. Since April 2014 concentrations have varied from approximately 25 mg/L to approximately 120 mg/L;
- COD concentrations ranged from 44 mg/L to 80 mg/L in 2022. COD concentration has remained relatively consistent, averaging approximately 3 mg/L, except for two spikes in December 2008 (187 mg/L) and August 2010 (241 mg/L); and
- Ammonia concentrations ranged from 12.8 mg/L to 24.8 mg/L in 2022. Ammonia concentration exhibited a decreasing trend until December 2004, from 40.9 mg/L to below 3.29 mg/L. A shallower increasing trend continued until August 2010, with a peak of 21 mg/L. Concentrations have been gradually increasing overall since March 2016 with a peak of 24.8 mg/L in December 2022.

Based on a comparison of the leachate indicator parameters at groundwater monitoring well MW-3, particularly chloride, COD, DOC, ammonia, and TKN, to concentrations at shallow background groundwater monitoring wells MW-4 and MW-4A, this groundwater monitoring location appears to be impacted by the landfill.

3.2.5.2 Deep Groundwater

Groundwater monitoring wells located at the Site which are completed in deep groundwater include MW13-1, MW13-2, MW13-3, and MW13-4. In 2022, three new deep groundwater monitoring wells, were installed at the Site, including MW22-01, MW22-02 and MW22-03.

Groundwater monitoring well MW13-4 was installed north of Dusty Road to characterize deep groundwater up-gradient of the Site.

Background Groundwater Quality

Groundwater monitoring well MW13-4 is located north (up-gradient) of the landfill and is considered to represent deep background groundwater quality.



Groundwater Monitoring Well MW13-4

Groundwater monitoring well MW13-4 analytical data for the 2022 reporting period indicated the following:

- Laboratory measured pH was outside of the FWAL criterion acceptable range of 6.5 to 9.0 s.u. during the September monitoring event with a value of 6.32 s.u.;
- Alkalinity exceeded the FWAL dissolved calcium-dependant concentration of 10 to 20 mg/L during the July monitoring events with a concentration of 29 mg/L and 25 mg/L during the December monitoring event;
- Aluminum exceeded the FWAL criterion of 0.1 mg/L during the July and September monitoring events with a concentration of 0.82 mg/L and 2.2 mg/L respectively;
- Total phosphorous exceeded the DWQ aesthetic objective of 0.01 mg/L during all monitoring events with concentrations ranging from 0.08 mg/L to 0.347 mg/L;
- Iron exceeded the FWAL criterion of 0.35 mg/L and the DWQ aesthetic objective of 0.3 mg/L during the July and September monitoring events with concentrations of 0.85 mg/L and 2.04 mg/L, respectively; and
- Manganese exceeded the DWQ aesthetic objective of 0.05 mg/L during the September monitoring events with concentrations of 0.074 mg/L.

The analytical results for samples collected from groundwater monitoring well MW13-4 are summarized in Table 14. The analytical laboratory results are included in Appendix F.

The concentration versus time graphs for groundwater monitoring well MW13-4 are provided in Appendix E, and indicate the following trends:

- Chloride concentrations ranged from 1.37 mg/L to 2.0 mg/L in 2022. Chloride concentrations have been consistently below 4 mg/L since December 2013 where a peak of 7.8 mg/L was observed;
- COD concentrations ranged from values below the detection limit to 30 mg/L in 2022. COD concentration has exhibited an overall decreasing trend since December 2013, indicating the groundwater monitoring well is stabilizing over time; and
- Ammonia concentrations were below the detection limit in 2022. Ammonia concentration has been variable, ranging from below the detection limit to 0.31 mg/L.

Down-Gradient Groundwater Monitoring Wells

Groundwater Monitoring Well MW13-1

Groundwater monitoring well MW13-1 is located at the east end of the southern landfill boundary and replaced groundwater monitoring well MW99-9 in August of 2013.

Groundwater monitoring well MW13-1 analytical data for the 2022 reporting period indicated the following:



- Ammonia exceeded the FWAL temperature and pH-dependent maximum acceptable concentration of 1.82 mg/L, 1.79 mg/L, 1.81 mg/L, and 1.97 mg/L, during all monitoring events with concentrations ranging from 16.2 mg/L to 70.7 mg/L;
- Total phosphorous exceeded the DWQ aesthetic objective of 0.01 mg/L during all monitoring events with concentrations ranging from 0.125 mg/L to 0.2 mg/L;
- Arsenic exceeded the FWAL criterion of 0.005 mg/L during the July and September monitoring events with concentrations of 0.0094 mg/L and 0.0088 mg/L respectively;
- Iron exceeded the FWAL criterion of 0.35 mg/L and the DWQ aesthetic objective of 0.3 mg/L during the March, July and September monitoring events with concentrations of 9.5 mg/L, 19.1 mg/L, and 14.2 mg/L, respectively; and
- Manganese exceeded the DWQ aesthetic objective of 0.05 mg/L and the FWAL hardness-dependent criterion during the March, July and September monitoring events with concentrations 4.5 mg/L, 6.4 mg/L and 4.5 mg/L, respectively, and exceeded the DWQ aesthetic objective during the December monitoring event with a concentration of 2.4 mg/L.

Metal exceedances are possibly indicative of the presence of suspended sediment in the groundwater monitoring well, further evidenced by elevated turbidity results.

Total phosphorus values measured are within the historic range of the deep background groundwater monitoring well MW13-4.

As indicated above, elevated concentrations of manganese are believed to be naturally occurring in the area. Elevated concentrations of total phosphorous were also recorded at deep background groundwater monitoring well MW13-4. Water quality should improve as the groundwater monitoring well continues to be developed and eventually stabilizes.

As mentioned previously, FWAL criteria are not deemed applicable at these groundwater monitoring locations as groundwater is anticipated to discharge to surface water, but much farther downstream (towards Chapman Creek located approximately 550 metres south of the Site), hence the FWAL criteria are used for comparison purposes and not for determining compliance at the property boundary.

The analytical results for samples collected from groundwater monitoring well MW13-1 are summarized in Table 15. The analytical laboratory results are included in Appendix F.

The concentration versus time graphs for groundwater monitoring well MW13-1 are provided in Appendix E, and indicate the following trends:

- Chloride concentrations ranged from 7.5 mg/L to 39.7 mg/L in 2022. Chloride concentrations have exhibited a decreasing trend since June 2000 with a spike of 39.7 mg/L in July 2022;
- COD concentrations ranged from 17 mg/L to 40 mg/L in 2022. COD concentration has remained relatively consistent at approximately 50 mg/L, except for a spike of



216 mg/L in November 2007. The elevated COD concentrations recorded in December 2013 (254 mg/L) and April and June 2014 (164 mg/L and 157 mg/L) were likely a result of the new groundwater monitoring well MW13-1 installation not yet having stabilized. COD concentrations since December 2014 have returned to approximately 70 mg/L or less; and

- Ammonia concentrations ranged from 16.2 mg/L to 70.7 mg/L in 2022. Ammonia concentration has remained relatively consistent at approximately 100 mg/L until December 2014, except for a spike in February 2006 of 763 mg/L. After 2014, ammonia concentration reduced to approximately 60 mg/L.

Based on a comparison of the leachate indicator parameters at groundwater monitoring well MW13-1, particularly chloride, COD, DOC, ammonia, and TKN, to the concentrations at deep background groundwater monitoring well MW13-4, this groundwater monitoring well has been moderately impacted by the landfill as well as the historic fish composting operation.

Based on the concentration versus time graph for chloride, it appears that these impacts are decreasing with time.

It is important to note that the recent construction of final cover and interim cover over the east end of the landfill, along with surface water controls along the south side of the Site, will continue to improve groundwater quality in the vicinity of groundwater monitoring well MW13-1 by reducing infiltration and leachate generation.

Groundwater Monitoring Well MW13-2

Groundwater monitoring well MW13-2 is located at the centre of the southern landfill boundary and replaced groundwater monitoring well MW99-8 in August of 2013.

Groundwater monitoring well MW13-2 analytical data for the July, September and December 2022 monitoring events indicated the following:

- Turbidity exceeded the DWQ maximum acceptable increase from background during all monitoring events with recorded values ranging from 56 NTU to 103 NTU;
- Ammonia exceeded the FWAL pH and temperature-dependent concentrations of 1.78 mg/L, 1.77 mg/L, 1.97 mg/L, during the July, September and December monitoring events with concentrations ranging from 6.6 mg/L to 11.4 mg/L;
- Total phosphorous exceeded the DWQ aesthetic objective of 0.01 mg/L during all monitoring events with concentrations ranging from 0.1043 mg/L to 0.347 mg/L;
- Aluminum exceeded the FWAL criterion of 0.1 mg/L during the September monitoring event with a concentration of 0.177 mg/L;
- Arsenic exceeded the FWAL criterion of 0.005 mg/L during the September monitoring event with concentrations of .0077 mg/L, respectively;
- Iron exceeded the FWAL criterion of 0.35 mg/L and the DWQ aesthetic objective of 0.3 mg/L during the July and September monitoring events with concentrations of 42 mg/L and 32 mg/L, respectively; and



- Manganese exceeded the DWQ aesthetic objective of 0.05 mg/L and the FWAL hardness-dependent concentration during all monitoring events with concentrations ranging from 7.9 mg/L to 8.3 mg/L.

Turbidity results have been variable at the Site including at deep background groundwater monitoring well MW13-4. It is believed that high turbidity values are indicative of suspended sediment in the groundwater monitoring wells.

Metal exceedances are possibly indicative of the presence of suspended sediment in the groundwater monitoring well, further evidenced by elevated turbidity results.

It is noted that the DWQ exceedances for total phosphorus are for the aesthetic objectives and not health-based criteria. Water quality should improve as the groundwater monitoring well continues to be developed and eventually stabilizes.

Total phosphorus values measured are within the historic range of the deep background groundwater monitoring well MW13-4.

As indicated above, elevated concentrations of manganese are believed to be naturally occurring in the area. Elevated concentrations of total phosphorus were also recorded at deep background groundwater monitoring well MW13-4. Water quality should improve as the groundwater monitoring well continues to be developed and eventually stabilizes.

As mentioned previously, FWAL criteria are not deemed applicable for the purpose of assessing compliance at these groundwater monitoring locations, as groundwater is anticipated to discharge to surface water but much farther downstream (towards Chapman Creek located approximately 550 metres south of the Site), hence the FWAL criteria are used for comparison purposes only, and not for determining compliance at the property boundary.

The analytical results for samples collected from groundwater monitoring well MW13-2 are summarized in Table 16. The analytical laboratory results are included in Appendix F.

The concentration versus time graphs for groundwater monitoring well MW13-2 are provided in Appendix E, and indicate the following trends:

- Chloride concentrations ranged from 18.2 mg/L to 36.8 mg/L in 2022. Chloride concentrations have exhibited an overall decreasing trend since June 2000, with a minimum concentration of 3.8 mg/L in December 2019, however, since March 2020 chloride concentrations have been generally increasing;
- COD concentrations ranged from 17 mg/L to 40 mg/L in 2022. COD concentration was variable, ranging from below the laboratory RDL to 71 mg/L until December 2013. The elevated COD concentrations recorded in December 2013 (127 mg/L) and June 2014 (174 mg/L) were likely a result of the new groundwater monitoring well installation (MW13-2) not yet having stabilized. COD concentration since December 2014 has remained consistent at approximately 50 mg/L except for a spike of 154 mg/L in September 2018; and



- Ammonia concentrations ranged from 6.6 mg/L to 11.0 mg/L in 2022. Ammonia concentration has been exhibiting a general increasing trend since 2000, with a maximum concentration of 24 mg/L in September 2016.

Based on a comparison of the leachate indicator parameters at groundwater monitoring well MW13-2, particularly, chloride, COD, DOC, ammonia, and TKN, to the concentrations at deep background monitoring well MW13-4, this groundwater monitoring well appears to be moderately impacted by the landfill.

Based on the concentration versus time graph for chloride, it appears that these impacts are decreasing with time; however, ammonia concentrations have been generally increasing with time.

It is important to note that the recent construction of surface water controls along the south side of the Site will continue to improve groundwater quality in the vicinity of groundwater monitoring well MW13-2 by reducing infiltration and leachate generation.

Groundwater Monitoring Well MW13-3

Groundwater monitoring well MW13-3 is located at the west end of the southern landfill boundary and replaced groundwater monitoring well MW99-7 in August of 2013.

Groundwater monitoring well MW13-3 analytical data for the 2022 reporting period indicated the following:

- Turbidity exceeded the DWQ maximum acceptable increase from background during all monitoring events with recorded values ranging from 119 NTU to 199 NTU;
- Ammonia exceeded the FWAL pH and temperature-dependent concentration of 1.8 mg/L, 1.78 mg/L, and 1.64 mg/L during the March, July, and September monitoring events with concentrations ranging from 2.01 mg/L to 6.07 mg/L;
- Total phosphorous exceeded the DWQ aesthetic objective of 0.01 mg/L during all monitoring events with concentrations ranging from 0.077 mg/L to 0.375 mg/L;
- Aluminum exceeded the FWAL criterion of 0.1 mg/L during the March, July, and September monitoring events with a concentration of 1.1 mg/L, 0.19 mg/L and 0.1 mg/L, respectively;
- Arsenic exceeded DWQ aesthetic objective of 0.01 mg/L during the July monitoring event with a concentration of 0.02 mg/L and the FWAL criterion of 0.005 mg/L during September monitoring event with concentration of 0.0097 mg/L;
- Iron exceeded the FWAL criterion of 0.35 mg/L and the DWQ aesthetic objective of 0.3 mg/L during the March, July, and September monitoring events with concentrations of 50 mg/L, 56 mg/L, and 22 mg/L, respectively;
- Manganese exceeded the DWQ aesthetic objective of 0.05 mg/L and the FWAL hardness-dependent concentration during all monitoring events with



concentrations of 6.8 mg/L, 8.3 mg/L, 4.8 mg/L, and 3.6 mg/L mg/L, respectively; and

- Zinc exceeded the FWAL hardness-dependent criterion of 0.115 mg/L with a concentration of 0.35 mg/L during the March monitoring event, and the FWAL hardness-dependent criterion of 0.059 mg/L with a concentration of 0.124 mg/L during the September monitoring event.

Turbidity results have been variable at the Site including at deep background groundwater monitoring well MW13-4. It is believed that high turbidity values are indicative of suspended sediment in the groundwater monitoring wells.

Metal exceedances are possibly indicative of the presence of suspended sediment in the groundwater monitoring well, further evidenced by elevated turbidity results and variability of iron concentrations.

It is noted that the DWQ exceedances for total phosphorus are for the aesthetic objectives and not health-based criteria. Water quality should improve as the monitoring well continues to be developed and eventually stabilizes. Total phosphorus values measured are within the historic range of the deep background groundwater monitoring well MW13-4.

As indicated above, elevated concentrations of manganese are believed to be naturally occurring in the area. As mentioned previously, FWAL criteria are not deemed applicable at these groundwater monitoring locations as groundwater is anticipated to discharge to surface water but much farther downstream (towards Chapman Creek located approximately 550 metres south of the Site), hence the FWAL criteria are used for comparison purposes only, and not for determining compliance at the property boundary.

The analytical results for samples collected from groundwater monitoring well MW13-3 are summarized in Table 17. The analytical laboratory results are included in Appendix F.

The concentration versus time graphs for groundwater monitoring well MW13-3 are provided in Appendix E, and indicate the following trends:

- Chloride concentrations ranged from 13 mg/L to 21.8 mg/L in 2022. Chloride concentration has exhibited a decreasing trend since June 2000, with a minimum concentration of 8.5 mg/L in December 2014;
- COD concentrations ranged from 20 mg/L to 30 mg/L in 2022. COD concentration has been variable, but generally less than 150 mg/L with peaks in December 2013 (294 mg/L) and October 2015 (627 mg/L); and
- Ammonia concentrations ranged from 2.0 mg/L to 5 mg/L in 2022. Ammonia concentration was consistent at less than 3 mg/L until April 2017, with a spike in March 2003 of 13.4 mg/L. The elevated ammonia concentration recorded in April 2014 (110 mg/L) is likely a result of the well not yet having stabilized. Since 2017, ammonia concentrations have varied from approximately 2.5 mg/L to 7 mg/L, except for a spike in July 2020 (55.6 mg/L).



Based on a comparison of the leachate indicator parameters at groundwater monitoring well MW13-3, particularly, chloride, COD, DOC, ammonia, and TKN, to the concentrations at deep background monitoring well MW13-4, this groundwater monitoring appears to be moderately impacted by the landfill.

Based on the concentration versus time graph for chloride, it appears that these impacts are decreasing with time.

It is important to note that the recent construction of surface water controls along the south side of the Site will continue to improve groundwater quality in the vicinity of groundwater monitoring well MW13-3 by reducing infiltration and leachate generation.

Groundwater Monitoring Well MW22-01

Groundwater monitoring well MW22-01 analytical data for the 2022 reporting period indicated the following (July only):

- Turbidity exceeded the DWQ maximum acceptable increase from background during the July monitoring event with recorded value of 16.6 NTU;
- Iron exceeded the DWQ aesthetic objective of 0.3 mg/L and the FWAL criterion of 0.35 mg/L during the July monitoring event with a concentration of 0.33 mg/L;
- Manganese exceeded the DWQ aesthetic objective of 0.05 mg/L during the July monitoring event with a concentration of 0.056 mg/L; and
- Total phosphorous exceeded the DWQ aesthetic objective of 0.01 mg/L during the July monitoring event with concentration of 0.011 mg/L.

Metal exceedances are possibly indicative of the presence of suspended sediment in the groundwater monitoring well, further evidenced by elevated turbidity results in other groundwater monitoring wells.

As indicated above, elevated concentrations of manganese are believed to be naturally occurring in the area. It is noted that the DWQ criteria exceedances for total phosphorus are for the aesthetic objectives and not health-based criteria.

The analytical results for samples collected from groundwater monitoring well MW22-01 are summarized in Table 19. The analytical laboratory results are included in Appendix F.

Concentration versus time graphs for groundwater monitoring well MW22-01 were not generated as part of this annual report given that this was the first reporting period these wells were sampled.

Groundwater Monitoring Well MW22-02

Groundwater monitoring well MW22-02 analytical data for the 2022 reporting period (July, September, and December only) indicated the following:

- Turbidity exceeded the DWQ maximum acceptable increase from background during all monitoring events with recorded values ranging from 10.7 to 47 NTU;



- Total phosphorous exceeded the DWQ aesthetic objective of 0.01 mg/L during the September monitoring event with concentrations of 0.044 mg/L and 0.024 mg/L (duplicate sample);
- Aluminum exceeded the FWAL criterion of 0.1 mg/L during the September monitoring event with a concentration of 0.54 mg/L and 0.3 mg/L (duplicate sample);
- Iron exceeded the DWQ aesthetic objective of 0.3 mg/L and the FWAL criterion of 0.35 mg/L during the July and September monitoring event with concentrations of 5 mg/L and 0.54 mg/L. The duplicate sample taken during the September monitoring event exceeded the DWQ aesthetic objective only with a concentration of 0.32 mg/L; and
- Manganese exceeded the DWQ aesthetic objective of 0.05 mg/L and the FWAL hardness-dependent criterion of 2.63 mg/L during the July monitoring event with a concentration of 4.2 mg/L.

Metal exceedances are possibly indicative of the presence of suspended sediment in the groundwater monitoring well, further evidenced by elevated turbidity results in other groundwater monitoring wells.

As indicated above, elevated concentrations of manganese are believed to be naturally occurring in the area. It is noted that the DWQ criteria exceedances for total phosphorus are for the aesthetic objectives and not health-based criteria.

The analytical results for samples collected from groundwater monitoring well MW22-02 are summarized in Table 21. The analytical laboratory results are included in Appendix F.

Concentration versus time graphs for groundwater monitoring well MW22-02 were not generated as part of this annual report given that this was the first reporting period these wells were sampled.

Groundwater Monitoring Well MW22-03

Groundwater monitoring well MW22-03 analytical data for the 2022 reporting period (September and December only) indicated the following:

- Turbidity exceeded the DWQ maximum acceptable increase from background September and December monitoring events with recorded values ranging from 172 to 138 NTU;
- Total phosphorous exceeded the DWQ aesthetic objective of 0.01 mg/L during the September and December monitoring event with concentrations of 0.4 mg/L and 0.34 mg/L;
- Ammonia exceeded the FWAL pH and temperature-dependent concentration of 1.81 mg/L and 1.88 mg/L, during the September and December monitoring events with concentrations ranging from 96.7 mg/L to 92.9 mg/L;
- Aluminum exceeded the FWAL criterion of 0.1 mg/L during the September monitoring event with a concentration of 0.225 mg/L;



- Arsenic exceeded the FWAL criterion of 0.005 mg/L during the September monitoring event with a concentration of 0.0053 mg/L;
- Iron exceeded the DWQ aesthetic objective of 0.3 mg/L and the FWAL criterion of 0.35 mg/L during the September monitoring event with concentrations of 18 mg/L;
- Manganese exceeded the DWQ aesthetic objective of 0.05 mg/L and the FWAL hardness-dependent criterion of 2.43 mg/L and 2.42 mg/L during the September and December monitoring event with a concentration of 5.7 mg/L and 5.8 mg/L respectively.

Metal exceedances are possibly indicative of the presence of suspended sediment in the groundwater monitoring well, further evidenced by elevated turbidity results in other groundwater monitoring wells.

As indicated above, elevated concentrations of manganese are believed to be naturally occurring in the area. It is noted that the DWQ criteria exceedances for total phosphorus are for the aesthetic objectives and not health-based criteria.

The analytical results for samples collected from groundwater monitoring well MW22-03 are summarized in Table 21. The analytical laboratory results are included in Appendix F.

Concentration versus time graphs for groundwater monitoring well MW22-03 were not generated as part of this annual report given that this was the first reporting period these wells were sampled.

3.2.6 Summary

Varying degrees of impact, most likely attributable to the landfill and contact water pond, have been observed at all cross-gradient groundwater monitoring wells which are completed in the perched aquifer.

Groundwater monitoring wells MW-1 and MW-2 each exhibit impacts that may potentially be due to, or exacerbated by, the application of road salt to Dusty Road or to the public tipping area as well as the construction due to the construction of the new on-Site public drop off area.

Groundwater monitoring well MW13-1 exhibits impact likely related to the fish composting operation that historically took place at east of the Site just along the Sites property line. Impacts appear to be decreasing with time.

Historically, toluene has not been detected at elevated concentrations and has never exceeded the FWAL criterion at groundwater monitoring well MW-4. However, during 2020, toluene was detected at the same concentration in the adjacent groundwater monitoring well MW-4A. It is noted that the concentration of toluene in groundwater monitoring well MW-4A in 2022 was below the laboratory RDL. The source of toluene detected in groundwater monitoring well MW-4 during past monitoring events is currently unknown. In future environmental monitoring, the presence of toluene will be closely monitored in groundwater monitoring wells MW-4 and MW-4A to ensure there is not a specific cause for the elevated levels.



Historically, toluene has exceeded the FWAL criterion at groundwater monitoring well MW-2A. It is noted that the concentration of toluene in groundwater monitoring well MW-2A in 2022 was below the laboratory RDL. The source of toluene in this well is unknown.

Historically, toluene has exceeded the FWAL criterion at groundwater monitoring well MW-3 in 2013, 2014, and 2018. The source of toluene in this well is unknown.

The source of these volatile organic compounds is unknown and in future environmental monitoring, the presence of toluene but will be closely monitored at all three groundwater monitoring wells to ensure there is not a specific cause for the elevated levels.

Moderate landfill related impacts have been observed at all down-gradient groundwater monitoring wells completed in the bedrock aquifer. These impacts have shown a marked decrease over time except for ammonia at groundwater monitoring wells MW13-1 and MW13-2 and are expected to continue to decrease due to the recent construction of final cover, interim cover, and surface water management controls at the Site.

3.3 Surface Water Monitoring

The surface water monitoring events were completed at the Site in March, July, September, and December of 2022 and involved sampling five on-Site surface water monitoring locations (Site A, Site B, Site C, Site E). All surface water sampling activities conducted during the reporting period were completed by SCRD staff.

It is noted that surface water analytical data is not available for the surface water monitoring location Site E during the July, September, and December monitoring event due to insufficient water at the time of sampling and surface water monitoring location SW-01 was not sampled during the reporting period due to insufficient water.

Surface water monitoring locations are illustrated on Figure 4.

The 2022 surface water monitoring program consisted of the measurement of field parameter (pH, conductivity, temperature, DO, and redox potential) and the collection and laboratory analyses of surface water samples at all surface water monitoring locations for the following chemical parameters:

- COD;
- DOC;
- Electrical conductivity;
- pH;
- Hardness;
- Ammonia;
- Nitrate;
- Nitrite;
- Nitrate plus nitrite;
- Total nitrogen;
- TKN;
- Dissolved chloride; and



- Detailed total metals scan.

3.3.1 **Surface Water Monitoring Protocols**

To ensure that representative surface water quality samples were obtained from the watercourse and that no contamination of the collected samples occurred, the following sampling protocols were adhered to during the monitoring events:

- Surface water samples were collected in areas of the surface water body that were representative of the surface water body flow;
- Samples were collected approximately 15 centimetres below the surface of the water with the sample bottle completely submerged and pointing down-stream to prevent floating debris from entering the sample bottles;
- Surface water samples were collected in the appropriate laboratory-supplied sample containers and preserved as required; and
- Surface water samples were submitted under chain-of-custody protocol, to Element Materials Technology Canada in Surrey, BC for analysis.

During each monitoring event, the following field data was measured and recorded:

- Field measured parameters (pH, conductivity, temperature, DO, and redox potential).

3.3.2 **Regulatory Criteria**

The surface water quality laboratory analytical data was assessed with respect to the FWAL and DWQ criteria.

3.3.3 **Surface Water Quality Results**

Surface water quality analytical results for the 2022 reporting period are presented in Tables 22 to 25. Historic surface water quality data are included as Appendix E. Concentration versus time graphs were prepared using the historic monitoring data for key leachate indicator parameters including chloride, COD, and ammonia and are included in Appendix E. Laboratory certificates of analyses are included as Appendix F.

Historically, concentrations of cadmium exceeded the FWAL criterion at upstream surface water monitoring location Site A. As such, the high concentrations of cadmium detected at other surface water monitoring locations are not due to leachate but are believed to be naturally occurring in the area.

3.3.3.1 **Chapman Creek**

Chapman Creek is located approximately 550 metres south of the Site and flows southwest to eventually discharge into Trail Bay.

Surface Water Monitoring Location Site A

Surface water monitoring location Site A is located approximately 500 metres southeast of the landfill in the upper portion of Chapman Creek and is considered to represent background surface water quality at the Site.



Surface water monitoring location Site A analytical data for the 2022 reporting period indicated the following:

- Iron exceeded the DWQ aesthetic objective of 0.35 mg/L during the September monitoring event with a concentration of 0.867 mg/L (duplicate sample).

The analytical results for samples collected from Site A are summarized in Table 22. The analytical laboratory results are included in Appendix F.

The concentration versus time graphs for surface water monitoring location Site A are provided in Appendix E, and indicate the following trends:

- Chloride concentrations ranged from 0.23 mg/L to 0.77 mg/L in 2022. Chloride concentrations exhibited a decreasing trend from a maximum of 140 mg/L in June 2000 to 0.77 mg/L in July 2012. Since then, concentrations have remained below 2 mg/L;
- COD concentrations ranged from 20 mg/L to 30 mg/L in 2022. COD concentration was relatively consistent at approximately 10 mg/L until a spike in September 2007 of 215 mg/L. Since that time, COD has returned to historic concentrations; and
- Ammonia concentrations were below the detection limit in 2022. Ammonia concentration has been variable, from below the laboratory RDL to 0.079 mg/L, with a spike of 0.24 mg/L in December 2014.

Surface Water Monitoring Location Site B

Surface water monitoring location Site B is located approximately 2.5 kilometres downstream of surface water monitoring location Site A in the lower portion of Chapman Creek.

Surface water monitoring location Site B analytical data for the 2022 reporting period indicated no exceedances.

The analytical results for samples collected from Site B are summarized in Table 23. The analytical laboratory results are included in Appendix F.

The concentration versus time graphs for surface water monitoring location Site B are provided in Appendix E, and indicate the following trends:

- Chloride concentrations ranged from 0.24 mg/L to 0.9 mg/L in 2022. Chloride concentrations have remained consistently low, at less than 1.6 mg/L until October 2015. Concentrations increased slightly in October 2015, with a peak of 6.9 mg/L. Since then, chloride has returned to average historical concentrations;
- COD concentrations ranged from 10mg/L to 20 mg/L in 2022. COD concentration has been relatively consistent, varying from below the laboratory RDL to 42 mg/L; and
- Ammonia concentrations were below the laboratory RDL in 2022. Ammonia concentration has been variable, from below the laboratory RDL to 0.057 mg/L, with a spike of 0.17 mg/L in December 2014. It is noted that this spike was repeated at the upstream surface water monitoring location Site A.



Based on an analysis of the leachate indicator parameters at surface water monitoring location Site B, lower Chapman Creek does not appear to be impacted by the landfill. Moreover, the historic elevated chloride concentrations observed at upstream surface water monitoring location Site A were typically assimilated by the time water reached surface water monitoring location Site B.

3.3.3.2 Irgens Creek

Irgens Creek is located approximately 100 metres north of the Site and flows west to eventually discharge into Porpoise Bay.

Surface Water Monitoring Location Site E

Surface water monitoring location Site E is located approximately 200 metres northeast of the landfill in the upper portion of Irgens Creek and is considered to represent background surface water quality at the Site.

Surface water monitoring location Site E was not sampled during the July, September and December monitoring event due to insufficient water at the time of sampling. Surface water monitoring location Site E analytical data for the 2022 (March only) reporting period indicated no exceedances.

The analytical results for samples collected from Site E are summarized in Table 24. The analytical laboratory results are included in Appendix F.

The concentration versus time graphs for surface water monitoring location Site E are provided in Appendix E, and indicate the following trends:

- Chloride concentrations were 0.62 mg/L in 2022. Chloride concentrations remained consistently low, at less than 1.9 mg/L;
- COD concentration was 10 mg/L in March 2022. COD concentration has been relatively consistent, varying from below the laboratory RDL to 21 mg/L; and
- Ammonia concentrations were below the laboratory RDL in March 2022. Ammonia concentration has been variable, from below the laboratory RDL to 0.037 mg/L, with a spike of 0.21 mg/L in December 2014.

As stated above, elevated cadmium concentrations appeared to be naturally occurring in the area.

Surface Water Monitoring Location Site C

Surface water monitoring location Site C is located approximately 2 kilometres downstream of surface water monitoring location Site E in the lower portion of Irgens Creek.

Surface water monitoring location Site C analytical data for the 2022 reporting period indicated no exceedances.

The analytical results for samples collected from Site C are summarized in Table 25. The analytical laboratory results are included in Appendix F.

The concentration versus time graphs for surface water monitoring location Site C are provided in Appendix E, and indicate the following trends:



- Chloride concentrations ranged from 1.92 mg/L to 4.16 mg/L in 2022. Chloride concentration has been relatively consistent at less than 10 mg/L;
- COD concentrations ranged from below the detection limit to 10 mg/L in 2022. COD concentration has been relatively consistent, varying from below the laboratory RDL to 42 mg/L; and
- Ammonia concentrations were below detection limit in 2022. Ammonia concentration has been variable, from below the laboratory RDL to 0.116 mg/L, with a spike of 0.24 mg/L in December 2014 and a spike of 0.56 mg/L in November 2019. It is noted that the 2014 spike was repeated at surface water monitoring location Site E. It is noted that the 2019 spike was not mimicked in the duplicate sample which had a concentration of less than the detection limit of 0.01 mg/L.

Based on an analysis of the leachate indicator parameters at surface water monitoring location Site C, Irgens Creek does not appear to be impacted by the landfill.

3.3.3.3 Stormwater Outfall

Surface Water Monitoring Location SW-01

Surface water monitoring location SW-01 is located outside the landfill perimeter in the stormwater outfall.

Surface water monitoring location SW-01 was not sampled during the 2022 reporting period due to drought conditions.

It is noted that there is insufficient historical data to analyze the concentration versus time graphs for surface water monitoring location SW-01 since it was first sampled in 2020.

3.3.4 Summary

There is no evidence of landfill impacts at the surface water quality in Chapman Creek, Irgens Creek, or the stormwater discharging from the Site.

3.4 Landfill Gas Monitoring

3.4.1 Soil Gas Probes

As recommended in the EMP, soil gas probes were installed at the Site in 2013 and 2017. In 2013, two soil gas probes (GP13-01 and GP13-02) were installed near the scale house. In 2017, an additional soil gas probe (GP17-01) was installed near the maintenance shed. These installations were completed to address the risk of landfill gas migration to on-Site receptors. Monitoring of the soil gas probes commenced in 2017.

Each of the soil gas monitoring locations consists of a dedicated multi-level soil gas probe installation. The depth of each soil gas probe depends on the depth to groundwater and geological conditions encountered at each borehole. The nested soil gas probes allow monitoring of landfill gas migration at multiple depths from surface, down to the seasonal low water table. The soil gas probes are screened in areas of higher permeability unsaturated soil, (e.g., sand, if present, in the surficial



stratigraphy). By locating the screened intervals within specific permeable hydrogeologic units, it is possible to better delineate subsurface landfill gas migration point sources and determine risk to potential receptors if elevated methane concentrations are detected in the soil gas matrix. When possible, the soil gas probes are installed above the water table, as groundwater can inhibit the migration of landfill gas.

Each soil gas probe was constructed of an approximate 20-millimetre diameter, Schedule 40 PVC pipe. The lengths of PVC pipe were connected by threaded joints. The perforated pipe sections were backfilled with washed pea gravel and sealed with a concrete/bentonite seal at the ground surface. Each soil gas probe was equipped with a slip cap cover (greased with a non-petroleum-based lubricant) and a 6-millimetre PVC labcock valve fitted with a 6-millimetre hose barb and PVC end-cap.

A summary of the on-Site soil gas probes and completion details is presented in Table 27. Soil gas probe locations are illustrated on Figure 2. Stratigraphic logs are provided in Appendix B.

3.4.2 Historical Results

During the initial 2017 landfill gas monitoring events, the trigger level was exceeded at multiple soil gas probe locations. Contingency measures from Table G15 of the Emergency Response Plan included as part of the DOCP (XCG, 2017) were implemented as a result. Contingency measures included notifying the BCMECCS of regulatory exceedances, additional confirmatory monitoring, assessing the nature and risk of the problem, and identifying appropriate corrective actions.

Confirmatory monitoring of the soil gas probes was completed in February 2018, concentrations of methane gas again remained above the 25% LEL (1.25% gas by volume) limit in soil gas monitoring locations GP13-02S, GP17-01S, and GP17-01D. Additionally, as per XCG's recommendation, an RKI Eagle was used inside the on-Site (office building, scale house, and maintenance shed) buildings at both ground level and breathing level, to monitor indoor air quality. Methane concentrations measured inside of the on-Site buildings were well below the 10% LEL trigger level (0.5% by volume).

XCG assessed the risk of landfill gas migration into each on-Site building based on the construction and ventilation of each building, the results were included in the 2017 Annual Report (XCG, March 2018). The following was concluded:

- The office trailer and power shed are constructed on raised foundation with a ventilated space between the bottom of the building and the ground surface. As a result, the potential for landfill gas to enter these buildings is low, if continued ventilation is maintained. As of late summer, early fall 2021, the power shed was demolished due to the construction of the new on-Site public drop off area.
- The maintenance shed is a slab on grade with a metal frame and large bay doors. There are no utility connections to the maintenance shed. The slab on grade serves as a barrier; however, there is potential for landfill gas to migrate through cracks in the concrete. XCG recommended that the use of personal methane monitors be implemented to ensure safe air quality when opening the maintenance shed. This



option was selected since a fixed methane monitor would be difficult to implement because the buildings do not have power. During the operational hours of the Site, the bay doors of both buildings are left open which allows for sufficient ventilation of these buildings and reduces the risk of landfill gas accumulation.

- The special waste storage building (storage bunker) is a small concrete building with a slab on-grade foundation, with vents located at the top and the bottom of the front wall with double metal doors. XCG recommended that the use of personal methane monitors be implemented to ensure safe air quality when entering the special waste storage building (storage bunker). As of late summer, early fall 2021, the special waste storage was demolished due to the construction of the new on-Site public drop off area.
- The scale house is constructed with a below ground concrete foundation with a crawl space. XCG recommended that a fixed methane monitor be installed in the scale house to ensure staff safety on an ongoing basis. It is noted that caution should be taken when accessing the crawl space under the scale house as this is a confined space where landfill gas may accumulate. The concrete foundation of the scale house serves as a barrier; however, there is potential for landfill gas to migrate through cracks in the concrete into the crawl space. As the foundation is below ground there is an increased risk of migration. The landfill gas could then migrate from the crawl space into the scale house itself. The crawl space should only be accessed by appropriately trained staff wearing a personal gas monitor.
- As is typical at landfill sites, sources of ignition should be reduced and/or mitigated, and a no smoking policy should be enacted. XCG understands that smoking is not permitted at the Site.

Based on the results of the risk assessment, interior building monitoring was added to the monitoring program as a contingency measure as of February 2018.

Historic landfill gas monitoring results are included in Appendix G.

3.4.3 **Landfill Gas Monitoring**

The landfill gas monitoring events were completed at the Site in April and December of 2022 and involved sampling the shallow (S) and deep (D) soil gas probes nested at sampling location GP17-01 and indoor monitoring in four on-Site buildings, including the office building, scale house, and maintenance shed, and the staff metal paint container (April only) and contractor's metal container (April only).

It is noted that data was not collected from the share shed, special waste storage (storage bunker), and power shed because as of late summer, early fall in 2021 these structures were demolished due to the construction of the new on-Site public drop off area. In addition, no LFG monitoring was completed at the two nested gas probes GP13-01S/D and GP13-02S/D, as both of these probes were determined to be either installed incorrectly and/or were damaged during the construction activities completed on-site in the fall of 2021. The nested gas probes GP13-01S/D and GP13-02S/D will be replaced by new gas probes during 2023 monitoring period.



The landfill gas monitoring locations are shown on Figure 2. Monitoring of the soil gas probes and methane in on-Site buildings were completed by SCRD staff for all monitoring events.

The 2022 landfill gas monitoring program consisted of hydraulic (water level) monitoring and the measurement of field parameters (pressure, and concentrations of methane, carbon dioxide, and oxygen).

3.4.4 Soil Gas Probe Monitoring Protocols

To ensure that representative in-situ soil gas conditions were obtained from the soil gas probes, the following protocols were adhered to during each monitoring event:

- Standpipe wellhead pressure measurements were taken at each soil gas probe using a digital manometer;
- Prior to measuring gas composition with field measurements, each soil gas probe was purged of the standing volume of gas. The objective of purging is to pump gas from the probe until a representative sample of the soil gas is obtained. This was generally achieved by purging until stable readings were obtained;
- A CES-Landtec GEM 2000/GEM 5000 landfill gas analyzer was used to measure methane, carbon dioxide, and oxygen concentrations in the soil gas probes. Field measurements were recorded once readings had stabilized;
- Static water levels (below top of casing) were taken for each probe; and
- Sample ports were visually inspected prior to locking the wellhead protective cover to ensure that the sample port valve was in the closed position.

During each monitoring event, the following field data was measured and recorded:

- Date of sampling event;
- Probe wellhead pressure;
- Methane, carbon dioxide, and oxygen concentrations; and
- Static water level.

3.4.5 Indoor Building Monitoring Protocols

An RKI Eagle was used inside all on-Site buildings at both ground level and breathing level to monitor indoor air quality.

3.4.6 Trigger Levels and Regulatory Criteria

Landfill gas trigger levels are based on an exceedance of a specified concentration of combustible gas in soil. Typical landfill gas migration triggers or limits are based on the following parameters:

- Concentration of combustible gas at the property boundary;
- Concentration of combustible gas at on-Site buildings; and
- Concentration of combustible gas at off-Site buildings.



Site-specific trigger levels were developed as a component of the current EMP (XCG, April 2018a) as summarized in Table 29. A trigger level concentration of 10% LEL (0.5% gas by volume) was selected for all soil gas probes on-Site to reflect trigger values associated with landfill gas migrating to any on-Site structures. A trigger level concentration of 1% LEL (0.05% gas by volume) was selected for all on-Site buildings. Exceedance of trigger levels will necessitate the implementation of contingency measures. Regulatory criteria associated with landfill gas is also summarized in Table 29.

3.4.7 Soil Gas Probe Results

Soil gas probe results for the 2022 reporting period are presented in Table 29. Soil gas probe results were assessed with respect to the trigger levels and regulatory criteria presented above.

Groundwater level measurements for the current 2022 and past reporting periods are presented in Table G1 in Appendix G. A groundwater hydrograph for the soil gas probes is provided on Figure G1 in Appendix G. Groundwater levels are important to note as groundwater inhibits the movement of landfill gas, and an elevated groundwater table can decrease the overall risk of landfill gas migration at the Site. The groundwater table is interpreted to be just below the deep soil gas probes; therefore, the location of the soil gas probes within the stratigraphy are deemed sufficient to assess the landfill gas migration in the surrounding area.

Due to the limited data set no discussion can be made regarding groundwater elevation trends in the soil gas probes. Climate data in Table 30 indicates that local precipitation peaks in the months of October through March, while the months of April through September have relatively low precipitation.

As indicated in Table 29, the 2022 groundwater level measurements and soil gas probe results indicate the following:

Soil Gas Probe GP13-01S

Soil gas results were not obtained from this location during the 2022 reporting period. The field notes indicated there was damage from construction activities that occurred in the fall of 2021. Replacement wells were installed incorrectly, no further samples could be taken.

Soil Gas Probe GP13-01D

Soil gas results were not obtained from this location during the 2022 reporting period. The field notes indicated there was damage from construction activities that occurred in the fall of 2021. Replacement wells were installed incorrectly, no further samples could be taken.

Soil Gas Probe GP13-02S

Soil gas results were not obtained from this location during the 2022 reporting period. The field notes indicated there was damage from construction activities that occurred in the fall of 2021. Replacement wells were installed incorrectly, no further samples could be taken.



Soil Gas Probe GP13-02D

Soil gas results were not obtained from this location during the 2022 reporting period. The field notes indicated there was damage from construction activities that occurred in the fall of 2021. Replacement wells were installed incorrectly, no further samples could be taken.

Soil Gas Probe GP17-01S

Soil gas probe GP17-01S was dry during all monitoring events completed during the 2022 reporting period. This means that groundwater remained below the screened interval (2.7 metres bgs) at this location, allowing landfill gas to freely enter the probe. During both monitoring events, GP17-01S exceeded the trigger level concentration of 10% LEL (0.5% gas by volume) with concentrations ranging from 6% methane to 60.3% methane. This is also above the 25% LEL limit (1.25% gas by volume) stated in the OC.

Soil Gas Probe GP17-01D

Soil gas probe GP17-01D was dry during all monitoring events completed during the 2022 reporting period. This means that groundwater remained below the screened interval (approximately 4.6 metres bgs) at this location, allowing landfill gas to freely enter the probe. During both monitoring events GP17-01D exceeded the trigger level concentration of 10% LEL (0.5% gas by volume) with concentrations ranging from 7.6% methane to 54.3% methane. This is also above the 25% LEL limit (1.25% gas by volume) stated in the OC.

3.4.8 Interior Building Gas Results

Methane concentrations measured inside of the on-Site office building, scale house, power shed, maintenance shed, and the staff metal paint container and contractor's metal container during all 2022 monitoring events were well below the 1% LEL trigger level (0.05% by volume). The results from the interior building gas monitoring from 2022 are included in Table 29.

3.4.9 Summary

Based on the foregoing, all soil gas probes were dry during the 2022 reporting period and as such, there was potential for landfill gas migration. High concentrations of methane in gas probe GP17-01 are likely due to their relative proximity to solid waste and the highly permeable subsurface soil conditions on-Site (e.g., sand and gravel). It is noted that the highest concentration of methane is observed in GP17-01 which is located within 2 metres of the approximate historical limit of waste. Landfill gas related impacts were not observed in any of the on-Site buildings during the 2022 interior building gas monitoring.

Landfill gas monitoring of the soil gas probes and interior building methane monitoring in the on-Site buildings will continue to be completed on a quarterly basis.

3.5 Compliance and Impact to Receptors

As noted previously, the environmental receptors for Site-derived impacts are down-gradient surface water, groundwater, on-Site buildings, and adjacent property owners.



Surface watercourses located down-gradient of the Site include:

- Chapman Creek located approximately 550 metres south of the Site, which drains into Trail Bay; and
- Irgens Creek located approximately 100 metres north of the Site, which drains into Porpoise Bay.

Sechelt Spring (which appears to be part of Irgens Creek) is located north of the Site and is located up-gradient of the Site as show on Figure 4.

A search using the BC Water Resources Atlas indicated that the closest off-Site groundwater wells are located from approximately 1.6 to 2.5 kilometres west, northwest, and southwest of the Site as show on Figure 3.

As discussed above, the primary environmental receptor for the Site is the bedrock aquifer. The main compliance locations are the groundwater monitoring wells (MW13-1, MW13-2, and MW13-3) located along the south property boundary and completed in the bedrock aquifer. Analytical data from these groundwater monitoring wells are compared to the performance criteria, which for drinking water are the DWQ criteria, to establish Site compliance. FWAL criteria are not deemed applicable at groundwater monitoring well locations as groundwater is anticipated to discharge to surface water but much farther downstream (towards Chapman Creek located approximately 550 metres south of the Site), hence the FWAL criteria are used for comparison purposes and not for determining compliance at the property boundary.

3.5.1 Groundwater

Varying degrees of impact, most likely attributable to the landfill and contact water pond, have been observed at all cross-gradient groundwater monitoring wells which are completed in the shallow perched aquifer.

Historically, toluene has not been detected at elevated concentrations and has never exceeded the FWAL criterion at groundwater monitoring well MW-4. However, during 2020, toluene was detected at the same concertation in the adjacent groundwater monitoring well MW-4A. It is noted that the concentration of toluene in groundwater monitoring well MW-4A in 2022 was below the RDL.

Historically, toluene has exceeded the FWAL criterion at groundwater monitoring well MW-2A, as well as MW-3 in 2013, 2014, and 2018.

The source of these volatile organic compounds is unknown and in future environmental monitoring, the presence of toluene but will be closely monitored at all three groundwater monitoring wells to ensure there is not a specific cause for the elevated levels.

Results of the geophysical investigation completed at the Site by Worley Parsons Canada in 2011 delineated the attenuation zone for the landfill. It was noted that the attenuation zone may extend beyond the south boundary of the Site in the vicinity of groundwater monitoring well MW13-2.

As illustrated in the 2020 Updated Hydrogeologic Characterization and Impact Assessment (XCG, 2020), and based on the geophysical investigation indicated above,



it appears that impacted shallow groundwater primarily flows down toward the bedrock aquifer and not laterally out from the limit of waste. This supports the designation of the bedrock aquifer along the south limit of waste as the primary environmental receptor for the Site.

Results from the EMP have indicated that the Site is compliant based on the groundwater monitoring data collected from the three compliance groundwater monitoring wells (MW13-1, MW13-2, and MW13-3) when compared to the DWQ and FWAL criteria, except for the following exceedances:

- Well MW13-1 had exceedances of the FWAL criteria for ammonia and arsenic, exceedances of the DWQ aesthetic objective for turbidity, total phosphorous, and exceedances for both the criteria for iron and manganese;
- Well MW13-2 had exceedances of the FWAL criteria for ammonia, aluminum and arsenic, exceedances of the DWQ aesthetic objective for turbidity and total phosphorous, and exceedances of both criteria for iron and manganese; and
- Well MW13-3 had exceedances of the FWAL criteria for turbidity, total phosphorous and arsenic, exceedances of the DWQ criteria for ammonia, aluminum and arsenic, and exceedances of both criteria for iron and manganese.

Turbidity results have been variable at the Site including at the background groundwater monitoring well. It is believed that high turbidity values and metal exceedances are indicative of suspended sediment in the groundwater monitoring wells, further evidenced by the variability of iron concentrations. Total phosphorus values measured at the compliance groundwater monitoring wells in 2022 are within the historic range of the background groundwater monitoring well MW13-4. It is noted that the exceedances for total phosphorus, iron, and manganese are for the aesthetic objectives.

Slight to moderate landfill-related impacts have been observed at all down-gradient groundwater monitoring wells completed in the bedrock aquifer. It is noted that attenuation appears to be occurring as impacted water from the perched aquifer migrates down to the bedrock aquifer. As evidenced at groundwater monitoring wells MW13-1, MW13-2, and MW13-3, groundwater quality at these locations has been improving over time, except for ammonia, total phosphorus, iron, and manganese. These impacts are expected to continue to decrease due to the recent construction of final cover, interim cover, and surface water management controls at the Site.

It is noted that groundwater monitoring has been undertaken at the groundwater monitoring wells located at the Lehigh Hanson Materials Ltd. property west of the Site since 1999 (Sylvia Environmental Services). The EMP has demonstrated that groundwater quality has remained consistent since the inception of the EMP.

Based on the above, risk to off-Site groundwater users is deemed to be low.

3.5.2 Surface Water

Landfill-related impacts were not observed at the five surface water monitoring locations. Risk to surface water receptors is deemed to be low.

**3.5.3 Landfill Gas**

High concentrations (above regulatory criteria) of methane in nested soil gas probe GP17-01S and GP17-01D are likely due to their relative proximity to solid waste and the highly permeable subsurface soil conditions on-Site (e.g., sand and gravel). The potential for lateral landfill gas migration toward on-Site buildings is deemed moderate to high. Landfill gas related impacts were not observed in any of the on-Site buildings during the 2022 indoor monitoring despite the dry conditions.

Landfill gas monitoring of the soil gas probes and interior building methane monitoring in the on-Site buildings will continue to be completed on a quarterly basis.



4. LANDFILL OPERATION AND MANAGEMENT

4.1 Site Operations

The Site comprises a non-hazardous solid waste landfill that accepts municipal solid waste from the District of Sechelt, Town of Gibsons, Sechelt Indian Government District, and all the electoral areas in the SCRD. In addition, as of July 20, 2015, solid waste received at the Pender Harbour Transfer Station is landfilled at the Site. The Site's hours of operation are from 9:00 AM to 5:00 PM Tuesday to Sunday. The Site is closed on statutory holidays from National Day of Reconciliation to Easter weekend and closes at 3:30 PM on Christmas Eve.

As per the OC, solid wastes that are prohibited from the landfill stream include the following:

- Hazardous solid waste (excluding asbestos), liquids, semi-solid waste, and biomedical waste;
- Special wastes, semi-solid wastes, and organic sludges;
- Recyclable materials, including:
 - Used white goods;
 - Auto hulks and other large metallic waste;
 - Used tires;
 - Used lead acid batteries;
 - Gypsum wallboard; and
 - Corrugated cardboard.
- Any other solid waste and/or recyclable material regulated under the Ministry's Recycling Regulation when alternate disposal options become available;
- Other material banned by the SCRD in implementing the SCRD's solid waste management plan or bylaws; and
- Other materials which may be designated by the Director when alternative disposal becomes available.

4.2 Site Facilities

An electric chain-link fence exists along the entire perimeter of the Site. Access to the Site is controlled by two gates along Dusty Road. The gates are locked outside of normal operating hours to prohibit vehicles from entering and uncontrolled disposal when the Site is closed. There is one service gate located at the southwest corner of the property. This gate is always locked except when in use. The chain-link fence has been retrofitted with a minimum of four strands of electrified wires to prevent bears from entering the Site.

A two-way truck weigh scale is located at the main Site entrance. The weigh scale is used to measure the mass of all solid waste hauling vehicles entering and leaving the



Site. The weigh scale consists of a 50-tonne capacity computerized weigh scale, a fabricated metal scale, and building structure.

In addition to the scale house and weigh scale, the following facilities are also maintained at the Site:

- Office building;
- Recycling area;
- Contact water pond;
- Public tipping area; and
- Maintenance shed.

As of late summer, early fall of 2021 the special waste storage (storage bunker) and power shed were demolished, and the share shed that accepted “take it or leave it” items was removed from the Site due to the construction of the new on-Site public drop off area. Guard rails were installed in the public tipping area along the bin wall during the summer of 2015 to ensure public safety and compliance with safety and building codes.

4.3 Solid Waste Disposal

The quantity of solid waste received at the Site is weighed at the scale house and recorded by the attendant. A summary of the mass of solid waste received at the Site in 2022 is provided in Table 30. According to SCRD records, the total mass of solid waste received at the Site during the 2022 reporting period was approximately 14,111 tonnes, with approximately 12,308 tonnes of solid waste landfilled and the remaining approximately 1,803 tonnes of solid waste sent to various recycling facilities for processing as described in the next section.

4.4 Solid Waste Diversion Activities

A summary of the types and quantities of solid waste collected for reuse or recycling are provided in Table 30. Of the 14,111 tonnes of materials received at the Site during the 2022 reporting period, approximately 1,803 tonnes of solid waste were diverted from the landfill and sent to the following facilities for processing:

- Gypsum: New West Gypsum in New Westminster;
- Tires: Tire Stewardship BC;
- Clean and contaminated wood waste: Salish Soils in Sechelt;
- Cardboard: Waste Management in Sechelt;
- Scrap metal (including refrigerators/freezers and propane tanks): Richmond Steel and ABC Metal Recycling in Richmond, and Schnitzer Steel in Surrey. It is noted that valves are removed from the propane tanks by a certified technician before the propane tanks are consolidated with scrap metal and shipped for recycling. Freon and ammonia are removed from freon and ammonia-containing items and sent for recycling by a certified technician before the items are consolidated with the scrap metal and sent for recycling;



- Mattresses: Mattress Recycling in Richmond;
- Paint and special waste: Product Care Stewardship Program in Vancouver. It is noted that Sechelt Landfill hosts a Product Care Plus Depot that accepts paint and special waste. Scale tickets for each outbound load from the depot are created and tracked by date, material, and number of totes for each product that is shipped (i.e., paint, flammable, aerosol); and

4.5 **Per Capita Solid Waste Disposal Rates**

Based on the population of approximately 32,823 (BC Statistics, 2022) in the Site service area, the average annual mass of solid waste disposed per capita was approximately 375 kilograms in 2022. In 2021 the annual mass of solid waste landfilled at the Site per capita was 413 kilograms which shows a significant decrease in the amount of solid waste sent to landfill per capita in 2022.

4.6 **Landfill Volume Consumed**

As indicated in Section 4.3, the total amount of solid waste received was approximately 14,111 tonnes in 2022. Excluding soil used for cover material and all materials diverted from the landfill the amount of solid waste landfilled was approximately 12,308 tonnes in 2022.

The 2022 airspace consumption estimate is based upon a comparison of the December 16, 2021 and December 14, 2022, contours from topographic surveys completed from aerial photographs, generated by Bennett Land Surveying (Coastal) Ltd. Based upon a comparison of the 2021 and 2022 contours, a total airspace consumption of approximately 20,050 cubic metres was calculated. This air space was consumed by new waste, daily cover, and interim cover.

The apparent solid waste density was calculated by comparing the solid waste tonnage and airspace consumed during the 2022 reporting period. Based on this information, and the approximately 12,308 tonnes of solid waste landfilled at the Site in 2022, an apparent density of 0.61 tonnes per cubic metre (12,308 tonnes / 20,050 cubic metres) was calculated for the 2022 reporting period.

The apparent waste density is not a true density, but rather an indication of the average mass of solid waste that was disposed in each cubic metre of landfill air space in 2022. The apparent waste density is based on the comparison of the solid waste tonnage landfilled versus the air space consumed (soil used as cover is excluded from the waste tonnage).

Efficient landfill compaction techniques employed at well-operated landfill sites can typically attain an apparent waste density of 0.5 to 1 tonnes of solid waste per cubic metre of air space consumed depending on the size of the landfill. A landfill like the Sechelt Landfill would be anticipated to achieve an apparent solid waste density of 0.6 tonnes per cubic metre.

Efforts have been made to increase the apparent solid waste density by increasing compaction and minimizing daily cover. The use of steel plates as alternative daily cover was implemented as of February 2018 to further extend the Site life.



4.7 Approved Design Volume

The DOCP for the Site includes a detailed filling plan for developing the landfill through to final contours within the existing limit of waste. As presented in the DOCP, the total airspace available from December 2016 through to final contours is approximately 172,800 cubic metres of airspace.

4.8 Remaining Capacity and Site Life

Based on the final contours, revised to reflect the changes from the Non-Conformance Report, presented in the Plan and shown on Figure 5 as well as the December 2022 survey, the total airspace available from December 14, 2022, through to final contours is approximately 70,700 cubic metres of airspace.

The estimated remaining Site life is based upon the following assumptions [from the 2022 Year End Closure/Post-Closure Liability Letter (XCG, 2023)]:

- Per capita solid waste disposal (2022) calculated to be 0.37 tonnes per year;
- Apparent density of 0.61 tonnes per cubic metre as per the DOCP; and

Based upon these assumptions, the estimated remaining Site life is approximately 3.5 years (mid 2026) as of December 14, 2022, as shown in Tables 28 and 29. As of December 2022, the landfill is at Stage I of development outlined in the DOCP. The estimated life for each stage is outlined in Table 29. The implementation of curbside organics in 2019 in the Town of Gibsons, 2020 for the SCRD and 2021 for the District of Sechelt in combination with the pending 2022 landfill disposal ban on organics and continuing good compaction practices, will help to extend landfill life.

4.9 Operations Plan

In 2021, the existing on-Site public drop-off area was relocated and reconstructed further southeast on the Site. There were no changes to the operations plan and operations remained the same although several buildings were demolished, removed, or relocated as shown on Figure 2.

The special waste storage (storage bunker) and power shed were demolished, and the share shed that accepted “take it or leave it” items was removed from the Site. And lastly, the office building was moved further southeast on the Site and the scale and scale house were moved slight south on the Site.

4.10 Operation and Maintenance Expenditures

The annual operation and maintenance expenditures for the Sechelt Landfill was \$3,408,803 for 2022. These costs include the Site operator, labour, and other ancillary expenses.

A financial summary for the Sechelt Landfill for the reporting period is presented in Table 34. A detailed summary is included as Appendix H.

4.11 Closure Costs

The closure cost for the remaining Site life of the landfill, based on the development sequence presented in the DOCP, is estimated to be approximately \$6,767,150 in 2022



dollars (including contractor administration and execution requirements as well as engineering). A detailed cost breakdown for the above items is presented in Tables 34 through 37.

Annual post-closure monitoring and maintenance costs are estimated to be \$31,757 and \$26,385, respectively during the 2022 reporting period.

4.12 Leachate Management

The Site is operated as a natural control (attenuation) landfill, and as such there are no engineered controls for leachate. Leachate is managed by progressively closing the landfill and covering landfill waste with appropriate cover materials (soil/tarps).

4.13 Fire Emergency Response

One fire was reported during the 2022 reporting period on August 31, 2022. The following information was provided by SCRD regarding the landfill fire incident:

- Smoke was detected after spreading three loads that were dumped on the active face from local contractors. The loads were dumped on the tipping pad and spread down the face to prepare for compacting. The fire was noticed after it was spread and compacted. It was about 24 inches round with a short 4-inch flame on the surface of the garbage. The contractor controlled the fire with dirt and then put it out completely with water.
- The fire was completely out and investigated further by digging around the area to ensure nothing below the surface is smouldering.
- The contractor spread a final layer of dirt over the area to ensure the area remains contained.
- There were no further signs of re-ignition.
- The load that provoked the fire is unknown of the three that were dumped. The three businesses that dumped the loads are Salish Soils, Sunshine Bins, and Coast Bin Rentals. The material source of the fire is unknown, but a battery is suspected.

Follow-up and preventative measures discussed by SCRD are as follows:

- Short Term Options:
 - Outreach – Continue dialogue with commercial haulers about fires and request their ongoing assistance with screening loads for hot materials, especially for flares from marinas, cigarettes, BBQ coals from parks, lithium batteries, and oily rags.
 - Communication – The SCRD has preplanned social media posts for each of the long weekends from May to September regarding how to prevent landfill fires.
- Mid Term Options:
 - Improved Screening – Continue to work with commercial haulers to improve load screening for problematic materials.



- Longer Term Options:
 - Bylaw Amendment – requested clear bags for all waste delivered to the Islands clean-up events.
 - Enforcement – consider Source Control Program for waste management companies.

4.14 Public Complaints and Resolutions

During the 2022 reporting period, there were no written public complaints related to the landfill.



5. SUMMARY, CONCLUSION, AND RECOMMENDATIONS

5.1 Summary

The following provides a summary of the environmental monitoring carried out during the 2022 reporting period, as well as applicable results:

5.1.1 Groundwater

- The EMP included four monitoring events (March, July, September, and December) of 16 on-Site groundwater monitoring wells;
- Groundwater monitoring wells MW17-01 and MW17-02 could not be sampled at all monitoring events and MW-4A during the March, September, and December monitoring events during the 2022 reporting period due to insufficient water;
- Groundwater monitoring well MW-2A could not be sampled during the March, September and December monitoring event due to insufficient water.
- Perched groundwater conditions exist at the Site. Based on groundwater flow mapping, the perched groundwater is interpreted to flow in a dominantly south to south-westerly direction and percolate downward to the deep overburden aquifer. Groundwater is anticipated to flow in the direction of the slope of the bedrock surface;
- Groundwater monitoring wells MW13-01 and MW13-02 are completed in the deep overburden along the southern property boundary of the Site and are interpreted to be hydraulically connected to the bedrock aquifer, and are considered to represent compliance groundwater monitoring locations;
- Groundwater monitoring well MW13-03 is completed in the intermediate depth overburden along the southern property boundary of the Site and is interpreted to represent perched groundwater conditions and is considered to represent a compliance monitoring location; and
- As per the OC, the Site is required to update to the EMP in 2023 and at that point, the EMP will be re-evaluated.

5.1.2 Surface Water

- The EMP included four monitoring events (March, July, September, and December) of four surface water locations; and
- Surface water monitoring location E was not sampled during the July, September, and December monitoring events due to insufficient water. Surface water monitoring location C was not sampled during the September monitoring event due to insufficient water.

5.1.3 Landfill Gas

- Two nested soil gas probes (GP17-01S and GP17-01D) were sampled during the April and December monitoring events;



SUMMARY, CONCLUSION, AND RECOMMENDATIONS

- Soil gas results were not obtained from soil gas probes GP13-01S, GP13-01D, GP13-02S, and GP13-02D during the 2022 reporting period due to maintenance issues and damage from construction activities that occurred in the fall of 2021.
- Six on-Site buildings were sampled during the April monitoring event and three on-site buildings were sampled during the December monitoring event; and
- No landfill gas-related impacts were observed in any of the on-Site buildings during the 2022 reporting period.

5.2 Conclusion

5.2.1 Groundwater

- Slight to moderate landfill related impacts have been observed at all down-gradient groundwater monitoring wells completed in the bedrock aquifer. It is noted that attenuation appears to be occurring as impacted water from the perched aquifer migrates down to the bedrock aquifer. As evidenced at groundwater monitoring wells MW13-1, MW13-2, and MW13-3, groundwater quality at these locations has been improving over time, except for ammonia, total phosphorus, iron, and manganese. These impacts are expected to continue to decrease due to the recent construction of final cover, interim cover, and surface water management controls at the Site;
- Turbidity results have been variable at the Site including at the background groundwater monitoring well. It is believed that high turbidity values and metal exceedances are indicative of suspended sediment in the groundwater monitoring wells, further evidenced by the variability of iron concentrations. Total phosphorus values measured at the compliance groundwater monitoring wells in 2022 are within the historic range of the background groundwater monitoring well MW13-4. It is noted that the exceedances for total phosphorus, iron, and manganese are for the aesthetic objectives and not health-based criteria. As mentioned previously, FWAL criteria are not deemed applicable for the purpose of determining compliance at these groundwater monitoring locations (i.e., the property boundary), as groundwater is anticipated to discharge to surface water approximately 550 metres downstream from the Site (towards Chapman Creek), hence the FWAL criteria are used only for comparison purposes and not for the purpose of determining Site compliance; and
- Risk to off-Site groundwater users is deemed to be low.

5.2.2 Surface Water

- There is no evidence of landfill impacts at the surface water quality in Chapman Creek, Irgens Creek, or the stormwater discharging from the Site; and
- Risk to surface water environmental receptors is deemed to be low.

5.2.3 Landfill Gas

- High concentrations (above regulatory criteria) of methane that were measured in nested soil gas probes GP17-01S and GP17-01D are likely due to their relative



proximity to waste and the highly permeable subsurface soil conditions on-Site (e.g., sand and gravel).

5.3 Recommendations

The following section presents recommendations for revisions to the EMP for the Site:

- It is recommended that the SCRD field meter be serviced annually and calibrated prior to each environmental monitoring event;
- It is recommended that GPS coordinates be obtained for all groundwater and surface water monitoring locations, as well as the soil gas monitoring locations.
- It is recommended that the EMP be continued with special consideration to following prescribed monitoring protocols and minimizing particulate matter (turbidity) in the water samples;
- It is recommended that the EMP be re-evaluated in 2023 as per the OC requirement;
- pH levels for groundwater monitoring wells MW13-4 should be closely monitored for exceedances;
- Landfill gas monitoring should continue to be completed quarterly and it is recommended that personal monitors and a fixed gas monitor are used within the scale house to aid in mitigating the risk to on-Site staff and public; and
- It is recommended that all soil gas probes that were damaged by on-site construction and therefore not accessible for sampling be replaced and/or repaired.



6. REFERENCES

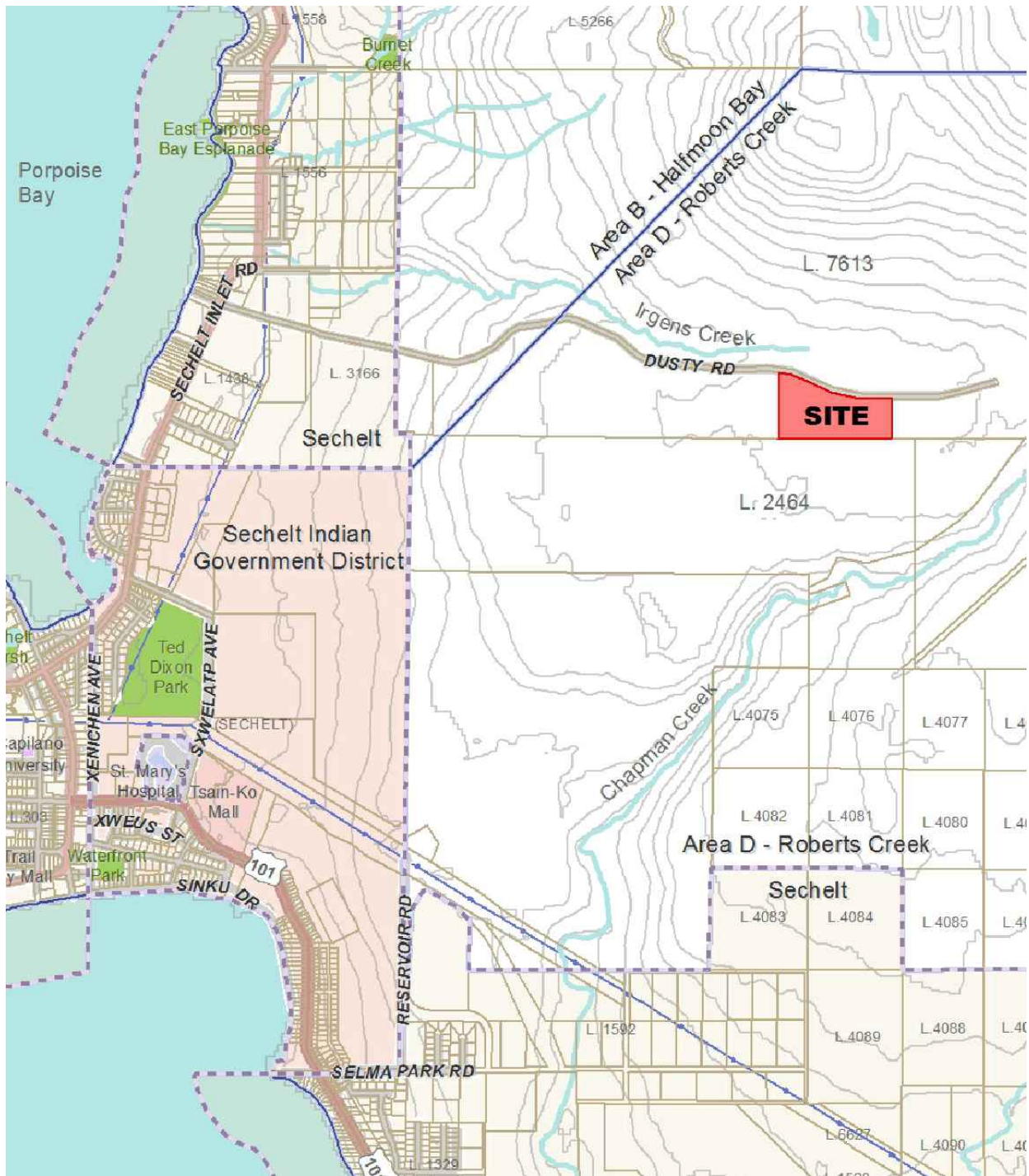
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FIGURES



0 500 1000 m



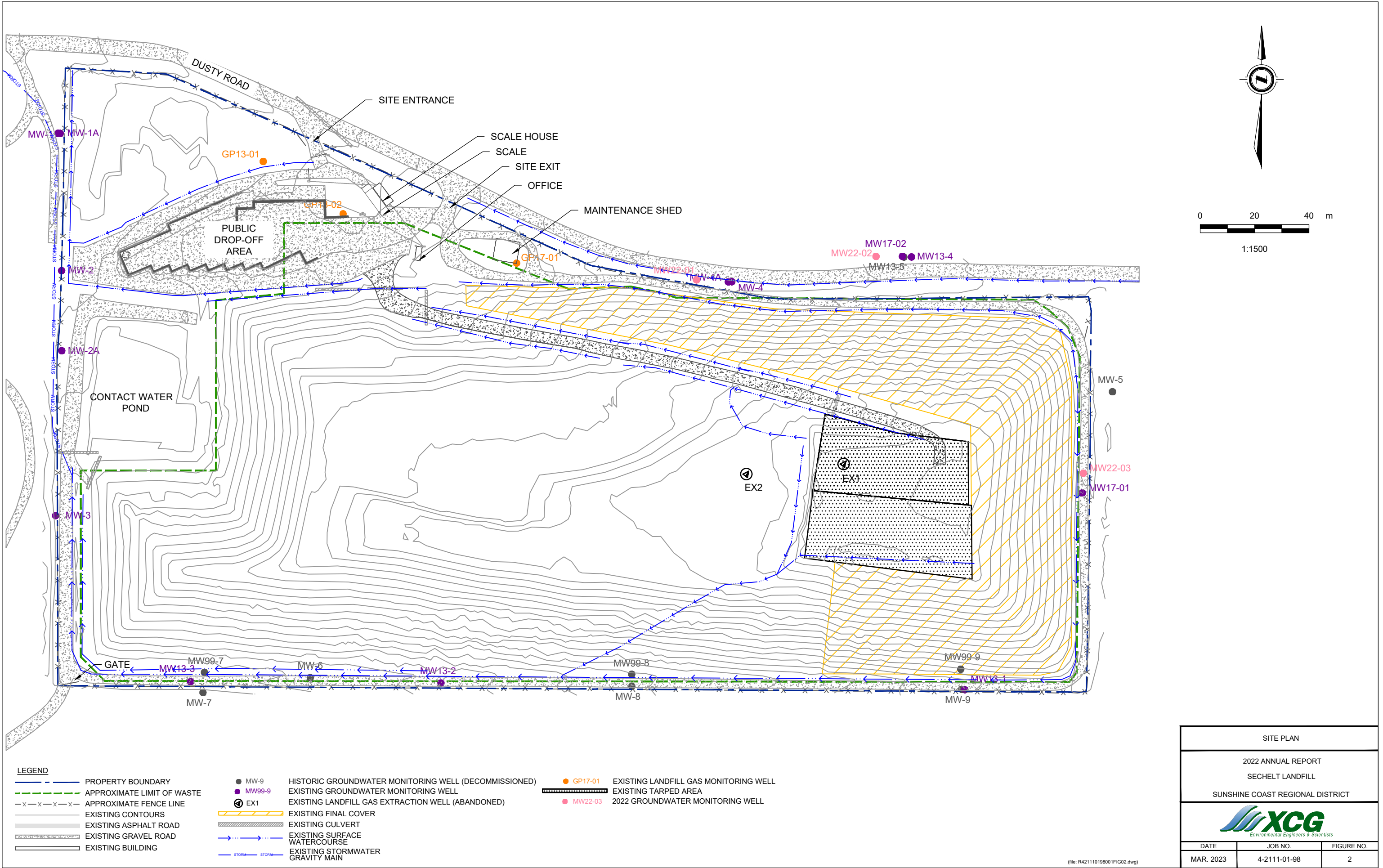
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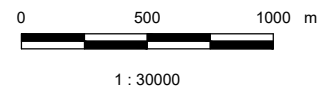
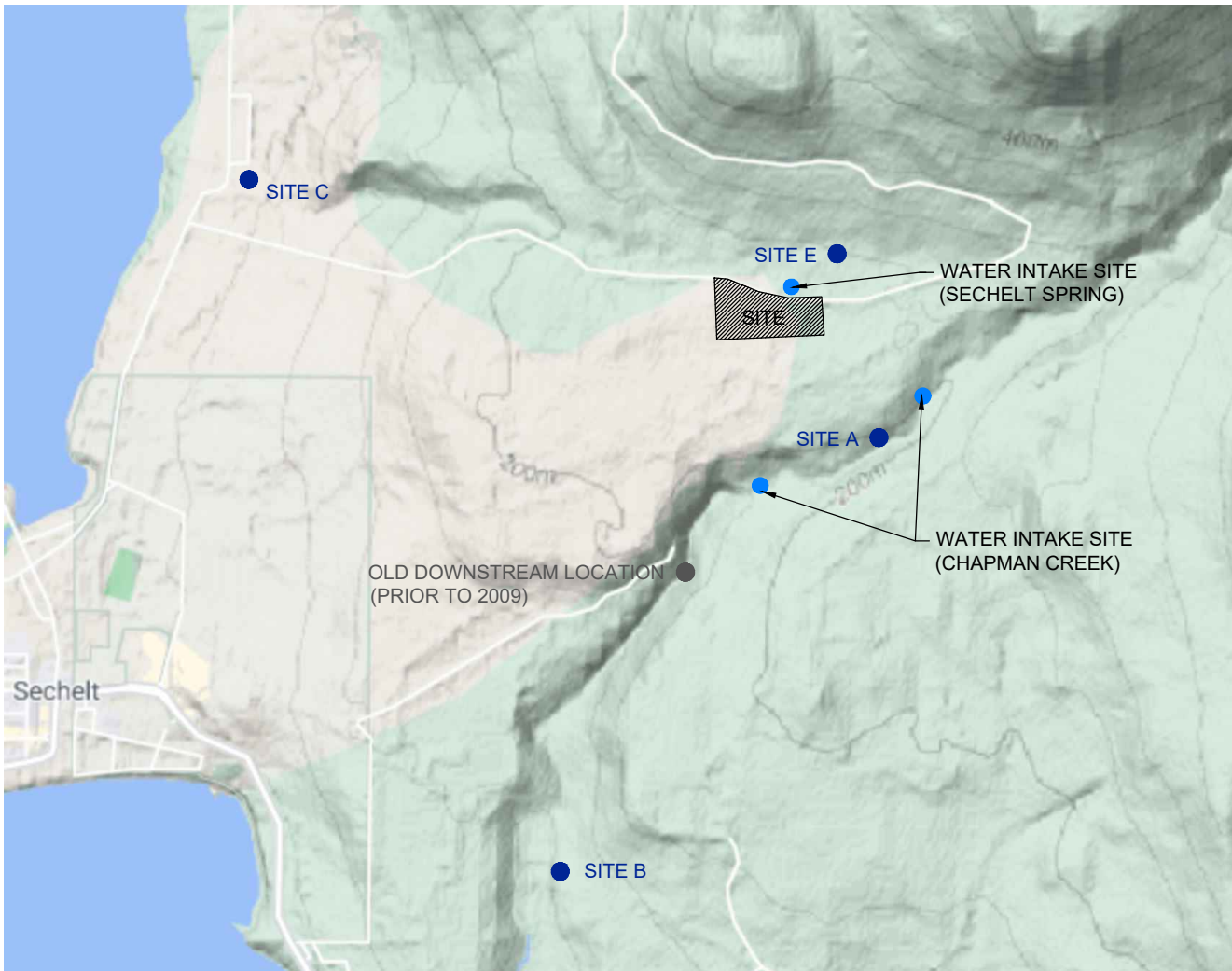
SITE LOCATION MAP

2022 ANNUAL REPORT
SECHelt LANDFILL
SUNSHINE COAST REGIONAL DISTRICT



DATE	JOB NO.	FIGURE NO.
MAR. 2023	4-2111-01-98	1





LEGEND

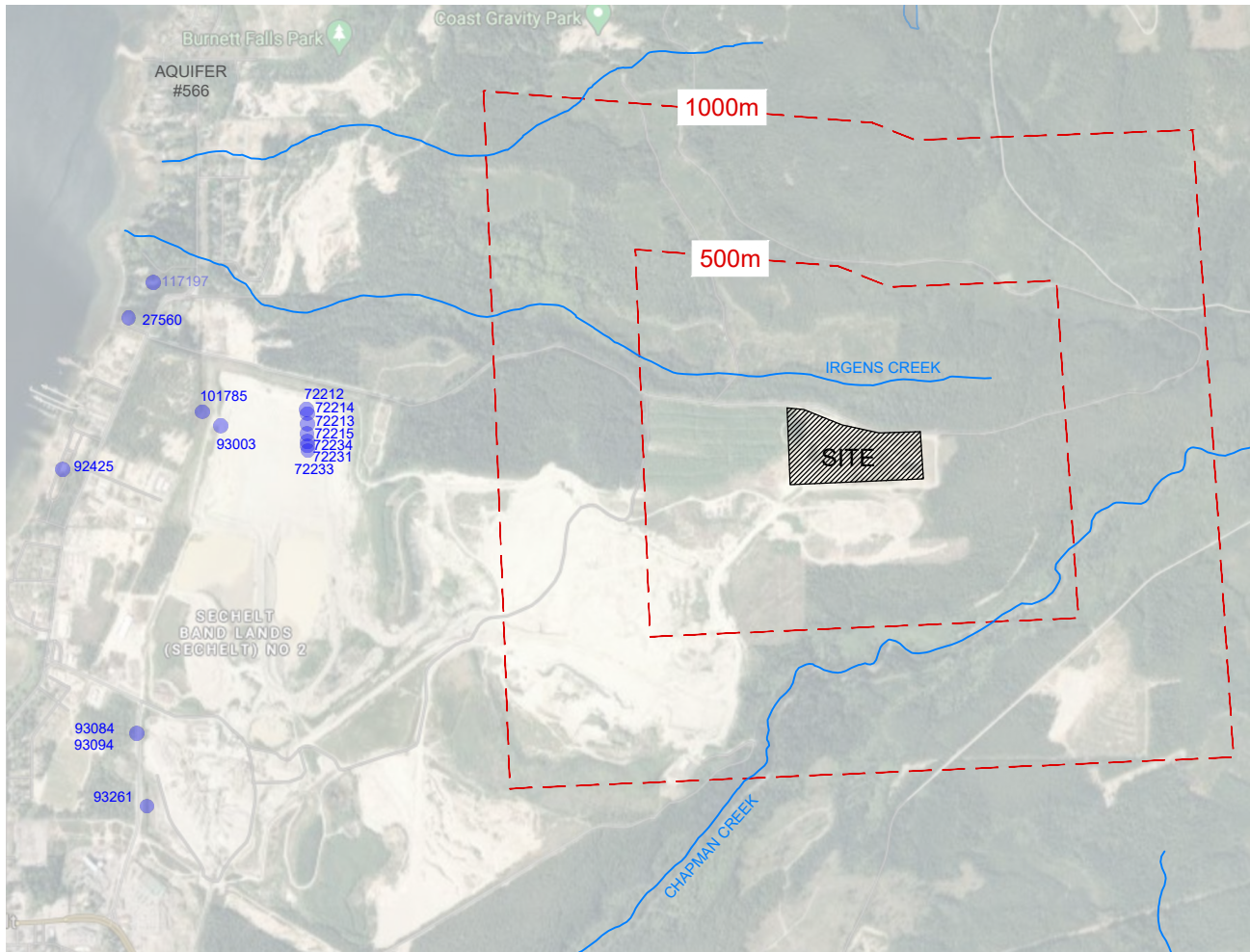
- SITE A SURFACE WATER SAMPLING LOCATION
- HISTORIC SURFACE WATER SAMPLING LOCATION
- WATERSHED BOUNDARIES

SITE AND SURROUNDING AREA

2022 ANNUAL REPORT
SECHELT LANDFILL
SUNSHINE COAST REGIONAL DISTRICT



DATE	JOB NO.	FIGURE NO.
MAR. 2023	4-2111-01-98	3



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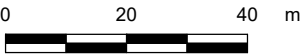
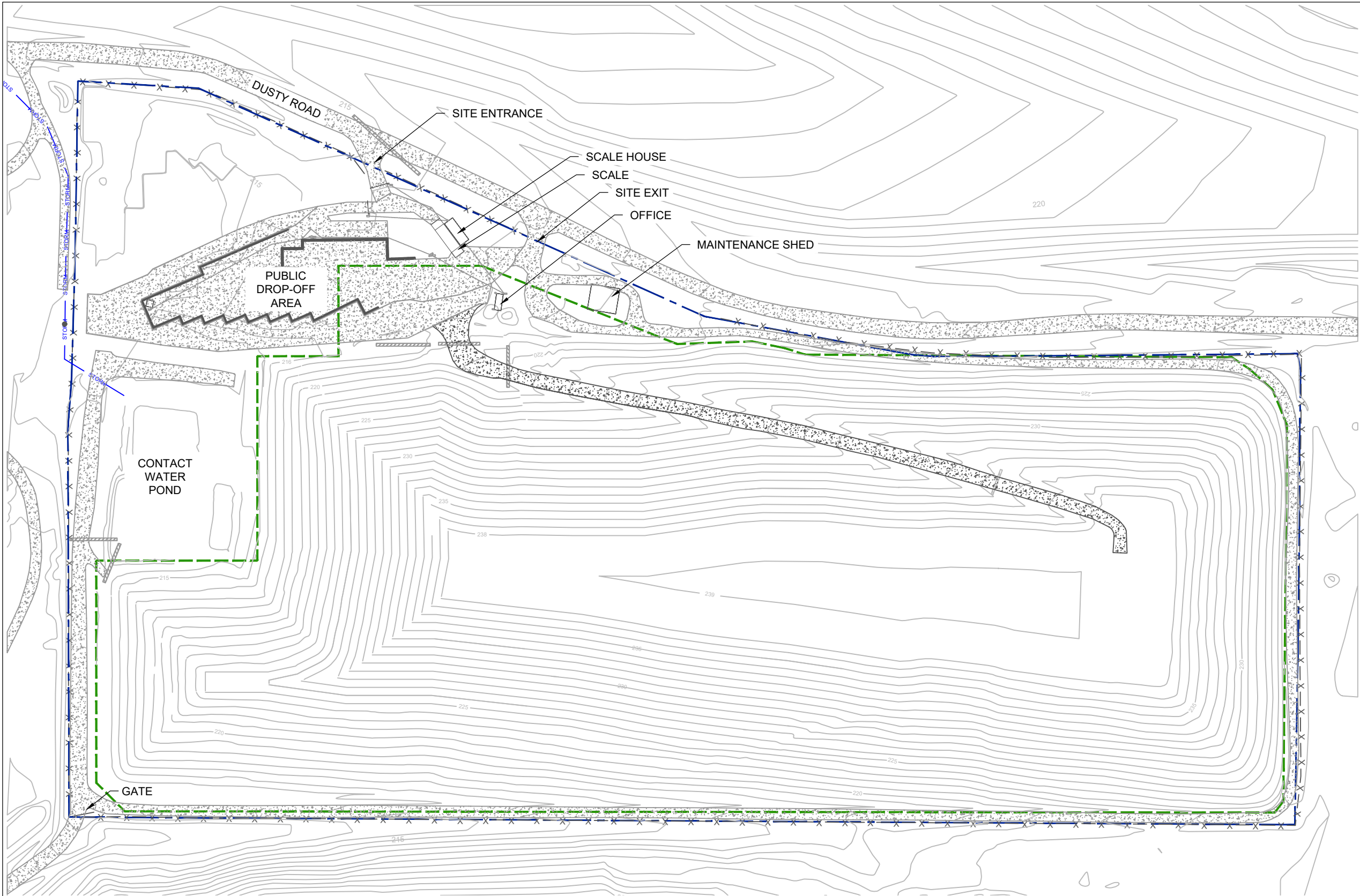
- DISTANCE FROM SITE
- AQUIFER BOUNDARY
- 74684 WATER WELLS
- WATERCOURSE

WATER WELLS AND AQUIFER BOUNDARIES

2022 ANNUAL REPORT
SECHELT LANDFILL
SUNSHINE COAST REGIONAL DISTRICT



DATE	JOB NO.	FIGURE NO.
MAR. 2023	4-2111-01-98	4



1:1500

- LEGEND**
- PROPERTY BOUNDARY
 - APPROXIMATE LIMIT OF WASTE
 - APPROXIMATE FENCE LINE
 - PROPOSED CONTOURS
 - EXISTING ASPHALT ROAD
 - EXISTING GRAVEL ROAD
 - EXISTING BUILDING
 - EXISTING STORMWATER GRAVITY MAIN
 - EXISTING CATCHBASIN
 - EXISTING CULVERT

FINAL CONTOURS		
2022 ANNUAL REPORT		
SECHULT LANDFILL		
SUNSHINE COAST REGIONAL DISTRICT		
		
DATE	JOB NO.	FIGURE NO.
MAR. 2023	4-2111-01-98	5

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TABLES



Table 1 Water Well Summary

Well ID	Owner	Location	Well Use	Completion Date	2022-12-13	Water Depth (mbgs)	Diameter (Metres)	Yield (Gallons/Minute)	Screened Interval (mbgs)	Screened Lithology
72212	Construction Aggregates Ltd.	Approximately 1.6 km west of Site	-	1994	101	72	2.4	400	0.6 - 97	-
72214	Construction Aggregates Ltd.	Approximately 1.6 km west of Site	-	1994	88	-	2.4	-	-	-
72213	Construction Aggregates Ltd.	Approximately 1.6 km west of Site	-	1994	87	-	2.4	-	0.9 - 50	-
72215	Construction Aggregates Ltd.	Approximately 1.6 km west of Site	-	1994	105	-	1.8	-	0.8 - 97	-
72234	Construction Aggregates Ltd.	Approximately 1.6 km west of Site	-	1996	75	28	2.4	30	0.8 - 68	-
72231	Construction Aggregates Ltd.	Approximately 1.6 km west of Site	-	1996	98	-	-	-	-	-
72233	Construction Aggregates Ltd.	Approximately 1.6 km west of Site	-	1996	73	-	2.4	-	0.6 - 68	-
93003	Construction Aggregates Ltd.	Approximately 1.9 km west of Site	Private Domestic	2004	-	36	-	100	-	-
101785	Construction Aggregates Ltd.	Approximately 2.0 km west of Site	Private Domestic	2001	77	-	-	50	-	-
93084	Construction Aggregates Ltd.	Approximately 2.4 km southwest of Site	Private Domestic	2003	-	30	-	-	41 - 50	-
93094	Construction Aggregates Ltd.	Approximately 2.4 km southwest of Site	Private Domestic	2003	-	30	-	400	41 - 50	-
93261	Construction Aggregates Ltd.	Approximately 2.5 km southwest of Site	Private Domestic	2002	-	30	-	10	-	-
92425	Choquer & Sons Ltd.	Approximately 2.5 km west of Site	Private Domestic	1996	30	8	-	-	20 - 23	-
27560	Harry Chin	Approximately 2.3 km northwest of Site	-	1973	12	11	1.8	10	-	-
117197	Geoff White & Carolyn Pinchin	Approximately 2.3 km northwest of Site	Private Domestic	2016	24.00	13.00	1.8	-	-	-
Notes: Well information taken from iMapBC. Entries that are N/A or Unknown in the database are represented by a "-" mbgs - metres below ground surface										

Table 2 Water Licenses for Chapman Creek

License No.	Stream Name	Purpose	Quantity	Units	2022-12-13	License Status
C016599	Chapman Creek	Waterworks Local Authority	8296.61	MY	Sunshine Coast	Current
C022345	Chapman Creek	Waterworks Local Authority	33186.46	MY	Sunshine Coast	Current
C065258	Chapman Creek	Waterworks Local Authority	2986781.13	MY	Sunshine Coast	Current
C069217	Chapman Creek	Waterworks Local Authority	497796.86	MY	Sunshine Coast	Current
C069999	Chapman Creek	Waterworks Local Authority	2986781.13	MY	Sunshine Coast	Current
C107474	Chapman Creek	Waterworks Local Authority	9955593.71	MY	Sunshine Coast	Current
C114222	Chapman Creek	Conserv. - Construct. Works	0.17	MS	Forests, Lands &	Current
C129269	Chapman Creek	Ponds	0.28	MS	Sunshine Coast	Current

Table 3 Water Licenses for Irgens Creek

License No.	Stream Name	Purpose	Quantity	Units	2022-12-13	License Status
C025134	Irgens Creek	Domestic	2.27	MD	0889507 B.C. Ltd.	Current
C025433	Irgens Creek	Domestic	4.55	MD	Deacon Gregory W	Current
C025434	Irgens Creek	Domestic	2.27	MD	Deacon Gregory W	Current
C025435	Irgens Creek	Domestic	2.27	MD	Buckingham Sandra	Current
C111440	Irgens Creek	Irrigation	2466.96	MY	Alvarez John	Current

Table 4 Groundwater Monitoring Well Completion Details and Locations

Groundwater Monitoring Well	Top of Well Casing (mAMSL)	Ground Elevation (mAMSL)	Completion Depth (mbgs)	Screened Interval (mbgs)	2022-12-13	Depth	Location
MW-1	213.36	212.32	11.2	approx. 3 - 4.5	Silty sand	Shallow	Northwestern corner of landfill, near former gypsum waste disposal area
MW-1A	213.42	212.32	5.03	approx. 9.5 - 11	Silty sand	Shallow	Northwestern corner of landfill. Has not been sampled due to insufficient water. Damaged, removed from program.
MW-2	213.94	212.22	5.77	approx. 3.3 - 5.8	Silty sand	Shallow	Northwestern corner of landfill
MW-2A	214.02	213.62	7.06	approx. 5.7 - 7.2	Medium sand	Shallow	Western landfill boundary
MW-3	214.47*	213.47	4.27	approx. 2.8 - 4.3	Silty sand	Shallow	Southwestern corner of landfill by the former sludge disposal pits
MW-4	219.85	219.04	11.5	approx. 9 - 11.5	Compact sandy silt	Shallow	Northern landfill boundary. Considered to represent background groundwater quality
MW-4A	219.79	219.04	4.04	approx. 2.5 - 4	Silty sand	Shallow	Northern landfill boundary. Considered to represent background groundwater quality
MW-5	223.200	222.12	14.3	approx. 11 - 14	Sandy silt	Shallow	Decommissioned in 2017
MW6	212.82	212.20	8.38	approx. 4.4 - 7.4	Silty sand	Shallow	Not monitored
MW7	211.01	211.04	18.3	16.8 - 18.3	Gravel, sandy silt	Deep	Decommissioned in 1999
MW8	215.77	215.85	29.9	28.3 - 29.9	Gravel, silt and sand	Deep	Decommissioned in 1999
MW9	220.49	220.55	26	24.5 - 26	Sand, sandy gravel	Deep	Decommissioned in 1999
MW99-7	212.33	approx. 211.50	19.5	18 - 19.5	Sand, sandy silt, till	Deep	Decommissioned in 2013
MW99-8	216.93	approx. 216.00	29	27.5 - 29	Sand and gravel	Deep	Decommissioned in 2013
MW99-9	approx. 220.9	approx. 220.00	25.9	24.4 - 25.9	Gravelly sand	Deep	Decommissioned in 2013
MW13-1	221.913	221.91	25.9	22.9 - 25.9	Gravelly Sand	Deep	West end of southern landfill boundary
MW13-2	215.232	215.23	32.3	26.2 - 32.3	Silty Sand and	Deep	Middle of southern landfill boundary
MW13-3	213.807	213.81	17.1	14 - 17.1	Silty Sand	Deep	East end of southern landfill boundary
MW13-4	221.667	approx. 220.667	20.1	17.1 - 20.1	Sand, Silty Sand	Deep	Northeast of landfill. Considered to represent background groundwater quality
MW13-5	221.521	approx. 220.521	10.36	7.3 - 10.4	Sandy Gravel, Sand	Shallow	Decommissioned in 2017
MW17-01	224.787	224	14.9	11.9 - 14.9	Gravel and	Shallow	Eastern landfill boundary
MW17-02	222.196	221.37	9.8	6.8 - 9.8	Sandy Gravel/Sand	Shallow	Northeast of landfill. Considered to represent background groundwater quality. Has not been sampled due to insufficient water
MW22-01	NM	NM	37.2	34-37.2	Silty sand/sandy gravel	Deep	Northern landfill boundary. Considered to represent background groundwater quality
MW22-02	NM	NM	30.8	27.5-30.8	Silty sand/sandy gravel	Deep	Northeast of landfill. Considered to represent background groundwater quality. Has not been sampled due to insufficient water
MW22-03	NM	NM	30.8	27.5-30.8	Silty sand/sandy gravel	Deep	Eastern landfill boundary
MW2-21	NM	NM	5.77	approx. 3.3 - 5.8	Silty sand	Shallow	Northwestern corner of landfill. Installed to replace MW2.

Notes:

- 1. Monitoring well completion details for MW-1 to MW-6 obtained from Dayton & Knight (1993)
- 2. Monitoring well completion details for MW7 to MW9 obtained from Piteau Associates (1996)
- 3. Monitoring well completion details for MW99-7 to MW99-9 obtained from Piteau Associates (1999)
- 4. Monitoring well completion details for MW13-01 to MW13-05 provided by Strait Land Surveying Inc. (2013)
- 5. Monitoring well completion details for MW17-01 to MW17-02 provided by Strait Land Surveying Inc. (2017)

mAMSL - Metres above mean sea level
mbgs - Metres below ground surface

Table 5 Groundwater Elevations

Groundwater Monitoring Location	Date	Static Water Level (mbtoc)	Top of Casing Elevation (mAMSL)	Groundwater Elevation (mAMSL)
MW-1	28-Mar-22	3.61	213.36	209.75
	13-Jul-22	4.88	213.36	208.48
	27-Sep-22	6.18	213.36	207.2
	13-Dec-22	-	213.36	-
MW-2A	28-Mar-22	5	214.02	209.0
	13-Jul-22	6.25	214.02	-
	27-Sep-22	Dry	214.02	DRY
	13-Dec-22	-	214.02	-
MW-3	28-Mar-22	4.1	214.47	210.37
	13-Jul-22	4.82	214.47	209.65
	27-Sep-22	5.7	214.47	208.80
	13-Dec-22	-	214.47	-
MW-4	28-Mar-22	6.23	219.85	213.62
	13-Jul-22	12.85	219.85	207.00
	27-Sep-22	11.14	219.85	208.71
	13-Dec-22	-	219.85	-
MW-4A	28-Mar-22	Dry	219.79	-
	13-Jul-22	Dry	219.79	-
	27-Sep-22	Dry	219.79	-
	13-Dec-22	Dry	219.79	-
MW13-1	28-Mar-22	22.79	221.91	199.12
	13-Jul-22	21.7	221.91	200.26
	27-Sep-22	29.0	221.91	192.95
	13-Dec-22	-	221.91	-
MW13-2	28-Mar-22	-	215.23	-
	13-Jul-22	15.9	215.23	199.31
	27-Sep-22	17	215.23	197.79
	13-Dec-22	-	215.23	-
MW13-3	28-Mar-22	12.21	213.81	201.60
	13-Jul-22	15.0	213.81	198.86
	27-Sep-22	-	213.81	-
	13-Dec-22	-	213.81	-
MW13-4	28-Mar-22	11.8	221.67	209.91
	13-Jul-22	20.32	221.67	201.35
	27-Sep-22	20	221.67	201.30
	13-Dec-22	-	221.67	-
MW17-01	28-Mar-22	DRY	224.79	-
	13-Jul-22	DRY	224.79	-
	27-Sep-22	DRY	224.79	-
	13-Dec-22	DRY	224.79	-
MW17-02	28-Mar-22	DRY	222.2	-
	13-Jul-22	DRY	222.2	-
	27-Sep-22	DRY	222.2	-
	13-Dec-22	DRY	222.2	-
MW22-01	28-Mar-22	-	-	-
	13-Jul-22	15.92	-	-
	27-Sep-22	17.44	-	-
	13-Dec-22	-	-	-
MW22-02	28-Mar-22	-	-	-
	13-Jul-22	15.92	-	-
	27-Sep-22	17.44	-	-
	13-Dec-22	-	-	-
MW22-03	28-Mar-22	-	-	-
	13-Jul-22	-	-	-
	27-Sep-22	17.44	-	-
	13-Dec-22	-	-	-
MW2-21	28-Mar-22	-	-	-
	13-Jul-22	5.42	-	-
	27-Sep-22	-	-	-
	13-Dec-22	-	-	-
Notes:				
mAMSL - metres above sea level				
mbtoc - metres below top of casing				

Table 6 2022 Field Parameter Results

Monitoring Location	Date	Static Water Level (mbtoc)	Purge Volume (L)	pH	2022-12-13	Temperature (°C)	Redox Potential (mV)	Dissolved Oxygen (mg/L)
March Sampling Event								
MW-1	28-Mar-22	3.61	12	6.61	0.431	8.48	122	8.3
MW-2A	28-Mar-22	5	12	-	-	-	-	-
MW-3	28-Mar-22	4.1	15	7.3	0.89	8.84	172	6.71
MW-4	28-Mar-22	6.23	30	5.34	0.515	9.5	210	4.07
MW-4A	28-Mar-22	DRY	DRY	DRY	DRY	DRY	DRY	DRY
MW13-1	28-Mar-22	22.79	16	6.27	0.678	12.29	47	5.62
MW13-2	28-Mar-22	-	48	-	-	-	-	-
MW13-3	28-Mar-22	12.21	24	6.23	0.443	13.6	86	7.65
MW13-4	28-Mar-22	11.8	60	7.71	0.09	8.45	109	10.39
MW17-01	28-Mar-22	DRY	DRY	DRY	DRY	DRY	DRY	DRY
MW17-02	28-Mar-22	DRY	DRY	DRY	DRY	DRY	DRY	DRY
MW2-21	28-Mar-22	-	-	-	-	-	-	-
Site A	28-Mar-22	-	-	7.06	0.014	4.96	257	17.49
Site B	28-Mar-22	-	-	6.79	0.013	5.06	240	16.9
Site C	28-Mar-22	-	-	6.32	0.041	6.87	273	15.93
Site E	28-Mar-22	-	-	7.62	0.023	6.1	247	14.67
July Sampling Event								
MW-1	13-Jul-22	4.88	10	6.38	0.594	14.08	87	6.02
MW-2A	13-Jul-22	6.25	4.5	DRY	DRY	DRY	DRY	DRY
MW-3	13-Jul-22	4.82	12	6.79	0.954	13.97	46	4.83
MW-4	13-Jul-22	12.85	30	NM	NM	NM	NM	NM
MW-4A	13-Jul-22	DRY	DRY	DRY	DRY	DRY	DRY	DRY
MW13-1	13-Jul-22	21.7	30	6.56	1.14	14.38	128	10
MW13-2	13-Jul-22	15.9	36	6.51	0.765	14.7	-30	5.5
MW13-3	13-Jul-22	15.0	15	5.93	0.797	14.81	19	3.47
MW13-4	13-Jul-22	20.32	43	7.24	0.071	12.62	89	9.6
MW17-01	13-Jul-22	DRY	DRY	DRY	DRY	DRY	DRY	DRY
MW17-02	13-Jul-22	DRY	DRY	DRY	DRY	DRY	DRY	DRY
MW22-01	13-Jul-22	15.92	92.00	7.12	0.118	12.99	119	13.30
MW22-02	13-Jul-22	-	92	6.05	0.436	13.67	160	3.45
MW22-03	13-Jul-22	-	-	-	-	-	-	-
MW2-21	13-Jul-22	5.42	10.00	7.05	1.550	13.89	62	5.20
Site A	13-Jul-22	-	-	9.39	0.019	14.18	115	15.57
Site B	13-Jul-22	-	-	6.6	0.016	14.1	252	14.65
Site C	13-Jul-22	-	-	7.53	0.077	16.01	221	9.52
Site E	13-Jul-22	DRY	DRY	DRY	DRY	DRY	DRY	DRY
September Sampling Event								
MW-1	27-Sep-22	6.18	DRY	7.3	0.476	18.66	102	5.67
MW-2A	27-Sep-22	DRY	DRY	DRY	DRY	DRY	DRY	DRY
MW-3	27-Sep-22	5.7	4.5	6.33	1	16.39	8	3.38
MW-4	27-Sep-22	11.14	11	6.19	0.431	16.62	114	5.12
MW-4A	27-Sep-22	DRY	DRY	DRY	DRY	DRY	DRY	DRY
MW13-1	27-Sep-22	29.0	20	6.84	1.1	13.39	-66	8.26
MW13-2	27-Sep-22	17	20	6.53	0.999	15.12	-14	8.64
MW13-3	27-Sep-22	-	-	6.54	0.593	16.39	-6	10.23
MW13-4	27-Sep-22	-	30	6.32	0.056	11.45	150	6.94
MW17-01	27-Sep-22	DRY	DRY	DRY	DRY	DRY	DRY	DRY
MW17-02	27-Sep-22	DRY	DRY	DRY	DRY	DRY	DRY	DRY
MW22-01	27-Sep-22	17.44	83	NM	NM	NM	NM	NM
MW22-02	27-Sep-22	17.44	83	7.46	0.107	13.28	109	12.88
MW22-03	27-Sep-22	17.44	83	6.34	1.32	13.22	-37	2.12
MW2-21	27-Sep-22	DRY	DRY	DRY	DRY	DRY	DRY	DRY
Site A	27-Sep-22	-	-	7.67	0.04	12.27	195	15.74
Site B	27-Sep-22	-	-	6.8	0.036	13.13	224	14.44
Site C	27-Sep-22	DRY	DRY	DRY	DRY	DRY	DRY	DRY
Site E	27-Sep-22	DRY	DRY	DRY	DRY	DRY	DRY	DRY
December Sampling Event								
MW-1	13-Dec-22	-	-	7.83	0.22	9.78	-33	33
MW-2A	13-Dec-22	-	-	-	-	-	-	-
MW-3	13-Dec-22	-	-	6.6	1.3	9.97	16.2	12.5
MW-4	13-Dec-22	-	-	6.03	0.003	6.93	174	50.1
MW-4A	13-Dec-22	DRY	DRY	DRY	DRY	DRY	DRY	DRY
MW13-1	13-Dec-22	-	-	6.85	1.2	4.3	8	44.42
MW13-2	13-Dec-22	-	-	6.7	0.594	4.74	30	5
MW13-3	13-Dec-22	-	-	7.48	0.321	10.22	120	48.78
MW13-4	13-Dec-22	-	-	6.99	1.4	5.29	78	46.98
MW17-01	13-Dec-22	DRY	DRY	DRY	DRY	DRY	DRY	DRY
MW17-02	13-Dec-22	DRY	DRY	DRY	DRY	DRY	DRY	DRY
MW22-01	13-Dec-22	NM	NM	NM	NM	NM	NM	NM
MW22-02	13-Dec-22	-	-	6.99	1.4	5.29	268	50
MW22-03	13-Dec-22	-	-	9.67	0.111	8.01	103	21.1
MW2-21	13-Dec-22	DRY	DRY	DRY	DRY	DRY	DRY	DRY
Site A	13-Dec-22	-	-	7.25	0.034	1.07	228	50
Site B	13-Dec-22	-	-	7.45	0.038	3.34	185	50
Site C	13-Dec-22	-	-	6.74	0.082	3.53	217	33.02
Site E	13-Dec-22	DRY	DRY	DRY	DRY	DRY	DRY	DRY
Notes: mbtoc - metres below top of casing N/A - not applicable - no data available								

Table 7 2022 Groundwater Quality Results - MW-4

Sample Date:	Units	BCMECCS Criteria ⁽¹⁾		Mar-22	Jul-22	Sep-22	Dec-22
Parameters:		DWQ ⁽²⁾	FWAL ⁽³⁾				
Lab Sample ID:				7999169	-	1479584-1	8424792
Field Parameters							
pH	s.u.	---	6.5-9.0	6.19	-	-	6.0
Conductivity, Electrical	µS/cm	---	---	0.431	-	-	0.003
Temperature	°C	15 (AO)	---	16.62	-	-	6.9
Dissolved Oxygen	mg/L	---	---	5.12	-	-	50.1
Redox Potential	(mV)	---	---	114	-	-	174
General							
Chemical Oxygen Demand (COD)	mg/L	---	---	9	-	30.0	10
Dissolved Organic Carbon (DOC)	mg/L	---	---	-	-	-	-
Conductivity, Electrical	µS/cm	---	---	487	-	450	443
pH	s.u.	---	6.5-9.0	7.00	-	7	6.86
Alkalinity (Total as CaCO3)	mg/L	---	(o) ^(w)	249	-	218	215
Alkalinity (PP as CaCO3)	mg/L	---	---	ND (5)	-	ND (5)	ND (5)
Bicarbonate (HCO ₃)	mg/L	---	---	303	-	266	262
Carbonate (as CaCO ₃)	mg/L	---	---	ND(6)	-	ND(6)	ND(6)
Hydroxide (OH)	mg/L	---	---	ND (5)	-	ND (5)	ND (5)
Turbidity	NTU	(a)	---	3.35	-	2	0.86
Hardness (as CaCO ₃)	mg/L	---	---	220	-	170	200
Nutrients							
Ammonia	mg/L	---	0.681-28.7 ^(b)	ND (0.025)	-	ND (0.025)	ND (0.025)
Dissolved Nitrate (N)	mg/L	10	32.8	ND (0.1)	-	ND (0.1)	ND (1.0)
Dissolved Nitrite (N)	mg/L	1.0	0.06-0.6 ^(c)	ND (0.1)	-	ND (0.1)	ND (0.01)
Total Phosphorus (P)	mg/L	0.01 (AO)	---	0.008	-	0.033	0.04
Nitrate plus Nitrite (N)	mg/L	10	---	ND (0.2)	-	ND (0.020)	ND (1.0)
Total Nitrogen (N)	mg/L	---	---	0.13	-	0.17	0.10
Total Kjeldahl Nitrogen (TKN)	mg/L	---	---	0.11	-	ND (0.07)	ND (0.07)
Anions							
Chloride	mg/L	250 (AO)	600	6	-	6.2	5.4
Sulfate	mg/L	500 (AO)	(l)	6	-	10	11
Dissolved Metals							
Aluminum	mg/L	9.5	0.1 ^(d)	0.060	-	0.19	0.001
Antimony	mg/L	---	0.009 ^(w)	0.00010	-	ND (0.0002)	0.00005
Arsenic	mg/L	0.01	0.005	0.0003	-	ND (0.00002)	0.0002
Barium	mg/L	---	1 ^(w)	0.061	-	0.047	0.04300
Beryllium	mg/L	---	0.00013 ^(w)	ND (0.00005)	-	ND (0.0001)	ND (0.00005)
Bismuth	mg/L	---	---	ND (0.0001)	-	ND (0.0005)	ND (0.0001)
Boron	mg/L	5.0	1.2	0.023	-	0.022	0.023
Cadmium	mg/L	0.005	(e)	0.00034	-	0.00006	0.00003
Calcium	mg/L	---	---	70	-	-	63
Chromium	mg/L	---	---	0.00011	-	0.0009	0.00095
Cobalt	mg/L	---	0.11	0.009	-	0.0003	0.000
Copper	mg/L	1.0	(f)	0.0016	-	0.001	0.00090
Iron	mg/L	0.3 (AO)	0.35	1.2	-	0.33	ND (0.002)
Lead	mg/L	0.01	0.003 ^(g)	0.0001	-	0.0002	ND 0.00001
Lithium	mg/L	---	---	0.0048	-	0.004	0.0039
Magnesium	mg/L	---	---	11	-	10.7	11
Manganese	mg/L	0.05 (AO)	(h)	3.5		0.04	0.002
Mercury	mg/L	0.001	---	ND (0.00001)		ND(0.000005)	ND (0.00001)
Molybdenum	mg/L	0.25	2	ND (0.00002)		ND (0.001)	0.00004
Nickel	mg/L	---	0.025-0.15 ^{(i)(w)}	0.0021		0.0006	0.0003
Phosphorus	mg/L	---	---	0.01	-	0.033	0.0
Potassium	mg/L	---	---	5.3	-	5.1	5.6
Selenium	mg/L	0.01	0.002	ND (0.0002)	-	ND (0.0002)	ND (0.0002)
Silicon	mg/L	---	---	13	-	12.7	13
Silver	mg/L	---	0.0001-0.003 ^(j)	0.000010	-	0.00001	0.000010
Sodium	mg/L	---	---	14	-	14	15
Strontium	mg/L	---	---	0.68	-	0.65	0.56
Sulfur	mg/L	---	---	2.9	-	-	4.2
Tellurium	mg/L	---	---		-	-	-
Thallium	mg/L	---	---	ND (0.00001)	-	ND (0.00005)	ND (0.00001)
Thorium	mg/L	---	---	ND (0.00005)	-	-	ND (0.00005)
Tin	mg/L	---	---	ND (0.0001)	-	ND (0.001)	ND (0.00001)
Titanium	mg/L	---	---	0.0026	-	0.0133	ND (0.00001)
Tungsten	mg/L	---	---	-	-	-	-
Uranium	mg/L	---	0.0085 ^(w)	0.00026	-	ND (0.0005)	0.00026
Vanadium	mg/L	---	---	0.00006	-	0.0005	ND (0.00001)
Zinc	mg/L	5.0 (AO)	(k)	0.014	-	0.006	0.003
Zirconium	mg/L	---	---	ND (0.0001)	-	ND (0.001)	ND (0.00001)
Volatile Organic Compounds							-
1,1,1,2-tetrachloroethane	mg/L	---	---	ND (0.0001)	-	ND (0.0001)	ND (0.0001)
1,1,1-trichloroethane	mg/L	---	---	ND (0.0001)	-	ND (0.0001)	ND (0.0001)
1,1,2,2-tetrachloroethane	mg/L	---	---	ND (0.0001)	-	ND (0.0001)	ND (0.0001)
1,1,2-trichloro-1,2,2-trifluoroethane	mg/L	---	---	-	-	-	-
1,1,2-trichloroethane	mg/L	---	---	ND (0.0001)	-	ND (0.0001)	ND (0.0001)
1,1-dichloroethane	mg/L	---	---	ND (0.0001)	-	ND (0.0001)	ND (0.0001)
1,1-dichloroethene	mg/L	---	---	ND (0.0005)	-	ND (0.0005)	ND (0.0005)

Table 7 2022 Groundwater Quality Results - MW-4

Sample Date:	Units	BCMECCS Criteria ⁽¹⁾		Mar-22	Jul-22	Sep-22	Dec-22
Parameters:		DWQ ⁽²⁾	FWAL ⁽³⁾				
Lab Sample ID:				7999169	-	1479584-1	8424792
1,2,3-trichlorobenzene	mg/L	---	0.008 ^(w)	ND (0.0001)	-	ND (0.0001)	ND (0.0001)
1,2,4-trichlorobenzene	mg/L	---	0.024 ^(w)	ND (0.0001)	-	ND (0.0001)	ND (0.0001)
1,2-dibromoethane	mg/L	---	---	ND (0.0001)	-	ND (0.0001)	ND (0.0001)
1,2-dichlorobenzene	mg/L	---	0.0007 ^(w)	ND (0.0001)	-	ND (0.0001)	ND (0.0001)
1,2-dichloroethane	mg/L	---	0.100 ^(w)	ND (0.0005)	-	ND (0.0005)	ND (0.0005)
1,2-dichloropropane	mg/L	---	---	ND (0.0001)	-	ND (0.0001)	ND (0.0001)
1,3,5-trimethylbenzene	mg/L	---	---	ND (0.0001)	-	ND (0.0001)	ND (0.0001)
1,3-dichlorobenzene	mg/L	---	0.150 ^(w)	ND (0.0001)	-	ND (0.0001)	ND (0.0001)
1,3-dichloropropane	mg/L	---	---	ND (0.0001)	-	ND (0.0001)	ND (0.0001)
1,4-dichlorobenzene	mg/L	---	0.026 ^(w)	0.0003	-	ND (0.0001)	ND (0.0001)
Benzene	mg/L	0.005	0.04 ^(m)	0.0004	-	ND (0.0001)	ND (0.0001)
Bromobenzene	mg/L	---	---	ND (0.0001)	-	ND (0.0001)	ND (0.0001)
Bromodichloromethane	mg/L	---	---	ND (0.0001)	-	ND (0.0001)	ND (0.0001)
Bromoform	mg/L	---	---	ND (0.0001)	-	ND (0.0001)	ND (0.0001)
Bromomethane	mg/L	---	---	ND (0.001)	-	ND (0.001)	ND (0.0001)
Dibromomethane	mg/L	---	---	ND (0.0001)	-	ND (0.0001)	ND (0.0001)
Carbon Tetrachloride	mg/L	---	0.0133 ^(w)	ND (0.0005)	-	ND (0.0005)	ND (0.0005)
Chlorobenzene	mg/L	---	---	0.0043	-	ND (0.0001)	ND (0.0001)
Chlorodibromomethane	mg/L	---	---	-	-	-	-
Chloroethane	mg/L	---	---	ND (0.001)	-	ND (0.001)	ND (0.001)
Chloroform	mg/L	---	0.0018 ^(w)	ND (0.0001)	-	ND (0.0001)	ND (0.0001)
Chloromethane	mg/L	---	---	ND (0.001)	-	<0.001	ND (0.001)
cis-1,2-dichloroethene	mg/L	---	---	ND (0.0001)	-	ND (0.0001)	ND (0.0001)
cis-1,3-dichloropropene	mg/L	---	---	ND (0.0001)	-	ND (0.0001)	ND (0.0001)
Dichlorodifluoromethane	mg/L	---	---	ND (0.001)	-	ND (0.001)	ND (0.001)
Ethylbenzene	mg/L	0.14/0.0016 (AO)	0.20 ^(m)	ND (0.0001)	-	ND (0.0001)	ND (0.0001)
Hexachlorobutadiene	mg/L	---	0.0013 ^(w)	ND (0.0001)	-	ND (0.0001)	ND (0.0001)
Isopropylbenzene	mg/L	---	---	ND (0.0001)	-	ND (0.0001)	ND (0.0001)
m & p-Xylene	mg/L	---	---	ND (0.0001)	-	ND (0.0001)	ND (0.0001)
Methyl-tert-butylether (MTBE)	mg/L	0.015 (AO)	3.4	0.0021	-	0.0011	0.0014
o-Xylene	mg/L	---	---	ND (0.0001)	-	0.0011	ND (0.0001)
Styrene	mg/L	---	0.072 ^(w)	ND (0.0001)	-	ND (0.0001)	ND (0.0001)
Tetrachloroethene	mg/L	---	---	ND (0.0005)	-	ND (0.0001)	ND (0.0005)
Toluene	mg/L	0.06/0.024 (AO)	0.0005	ND (0.0001)	-	ND (0.0005)	ND (0.0001)
trans-1,2-dichloroethene	mg/L	---	---	ND (0.0001)	-	ND (0.0001)	ND (0.0001)
trans-1,3-dichloropropene	mg/L	---	---	ND (0.0001)	-	ND (0.0001)	ND (0.0001)
Trichloroethene	mg/L	---	---	ND (0.0005)	-	ND (0.0001)	ND (0.0005)
Trichlorofluoromethane	mg/L	---	---	ND (0.0001)	-	ND (0.0005)	ND (0.0001)
VH C6-C10	mg/L	---	---	ND (0.05)	-	ND (0.0001)	ND (0.05)
Vinyl Chloride	mg/L	---	---	ND (0.0005)	-	ND (0.05)	ND (0.0005)
VPH (VHW6 to 10 - BTEX)	mg/L	---	---	ND (0.05)	-	ND (0.0005)	ND (0.05)
Xylenes (total)	mg/L	0.09/0.02 (AO)	0.03	ND (0.0001)	-	ND (0.05)	ND (0.0001)
Notes: 1. Values reported from BCMECCS - British Columbia Water Quality Guidelines, 2019 Edition, unless otherwise stated. 2. Drinking Water Criteria (DWQ): Metal guidelines are for total concentrations. 3. Freshwater Aquatic Life Criteria (FWAL): All criteria for metals are for total metals except criteria for aluminum and iron, which are for dissolved. 0.500 - Exceeds Drinking Water Criteria 0.500 - Exceeds Freshwater Aquatic Life Criteria 0.500 - Exceeds Drinking Water Criteria and Freshwater Aquatic Life Criteria a. Turbidity: BCMECCS Source Drinking Water Quality Guidelines, Guidelines Summary Table 2. Decreases compared to background concentrations are not interpreted as exceedances. b. Ammonia-N: BCMECCS Approved Water Quality Guidelines, Summary Report Table 26C. Temperature and pH dependent. c. Nitrite: BCMECCS Approved Water Quality Guidelines. Chloride dependent. d. Aluminum: criteria specified for dissolved species not total. Criteria pH dependent. If pH<6.5: $e^{(1.209-2.426 \cdot \text{pH}+0.286 \cdot \text{pH}^2)}$ e. Cadmium (mg/L) = $(e^{(1.03 \cdot \text{LN}(\text{HARDNESS})-5.274)})/1000$, valid for Hardness (as CaCO₃) of 7 to 455 mg/L. f. Copper guidelines calculated using BCMECCS Biotic Ligand Model (BLM) software. Dependent on multiple other parameters. g. Lead: hardness dependent. For Hardness (as CaCO₃) > 8 mg/L: $(e^{(1.273 \cdot \text{Ln}(\text{HARDNESS})-1.460)})/1000$. If hardness is < or equal to 8 mg/L: 0.003 mg/L. h. Manganese (mg/L) = (0.01102*HARDNESS)+0.54. i. Nickel: BCMECCS Working Water Quality Guidelines, Table 1. j. Silver: hardness <= 100 mg/L = 0.0001 mg/L, hardness > 100 mg/L = 0.003 mg/L k. Zinc (mg/L) = 0.033 for Hardness < or equal to 90 mg/L, $(33+(0.75 \cdot (\text{HARDNESS}-90)))/1000$ for Hardness > 90 mg/L l. Sulphate: BCMECCS Approved Water Quality Guidelines, Summary Report Table 40. Hardness dependent. m. Interim guideline n. Temperature: Streams with Bull Trout and/or Dolly Varden = 15, unknown fish distribution = 19 o. Alkalinity (Total as CaCO3): BCMECCS Working Water Quality Guidelines, Table 1. w. Values reported from BCMECCS - Working Water Quality Guidelines for British Columbia (2017). Values are long-term (i.e., average) concentrations unless identified as a short-term maximum. AO - Aesthetic Objective - No data available --- Currently no Standard/Criteria ND - Not detected above the laboratory Reportable Detection Limit (RDL)							

Table 8 2022 Groundwater Quality Results - MW-4A

Sample Date:	Units	BCMECCS Criteria ⁽¹⁾		Mar-22	Jul-22	Sep-22	Dec-22
Parameters:		DWQ ⁽²⁾	FWAL ⁽³⁾				
Lab Sample ID:				-	-	-	-
Field Parameters							
pH	s.u.	---	6.5-9.0	DRY	DRY	DRY	DRY
Conductivity, Electrical	µS/cm	---	---	DRY	DRY	DRY	DRY
Temperature	°C	15 (AO)	---	DRY	DRY	DRY	DRY
Dissolved Oxygen	mg/L	---	---	DRY	DRY	DRY	DRY
Redox Potential	(mV)	---	---	DRY	DRY	DRY	DRY
General							
Chemical Oxygen Demand (COD)	mg/L	---	---	DRY	DRY	DRY	DRY
Dissolved Organic Carbon (DOC)	mg/L	---	---	DRY	DRY	DRY	DRY
Conductivity, Electrical	µS/cm	---	---	DRY	DRY	DRY	DRY
pH	s.u.	---	6.5-9.0	DRY	DRY	DRY	DRY
Alkalinity (Total as CaCO3)	mg/L	---	(o) ^(w)	DRY	DRY	DRY	DRY
Alkalinity (PP as CaCO3)	mg/L	---	---	DRY	DRY	DRY	DRY
Bicarbonate (HCO ₃)	mg/L	---	---	DRY	DRY	DRY	DRY
Carbonate (as CaCO ₃)	mg/L	---	---	DRY	DRY	DRY	DRY
Hydroxide (OH)	mg/L	---	---	DRY	DRY	DRY	DRY
Turbidity	NTU	(a)	---	DRY	DRY	DRY	DRY
Hardness (as CaCO ₃)	mg/L	---	---	DRY	DRY	DRY	DRY
Nutrients							
Ammonia	mg/L	---	0.681-28.7 ^(b)	DRY	DRY	DRY	DRY
Dissolved Nitrate (N)	mg/L	10	32.8	DRY	DRY	DRY	DRY
Dissolved Nitrite (N)	mg/L	1.0	0.06-0.6 ^(c)	DRY	DRY	DRY	DRY
Total Phosphorus (P)	mg/L	0.01 (AO)	---	DRY	DRY	DRY	DRY
Nitrate plus Nitrite (N)	mg/L	10	---	DRY	DRY	DRY	DRY
Total Nitrogen (N)	mg/L	---	---	DRY	DRY	DRY	DRY
Total Kjeldahl Nitrogen (TKN)	mg/L	---	---	DRY	DRY	DRY	DRY
Anions							
Chloride	mg/L	250 (AO)	600	DRY	DRY	DRY	DRY
Sulfate	mg/L	500 (AO)	(l)	DRY	DRY	DRY	DRY
Dissolved Metals							
Aluminum	mg/L	9.5	0.1 ^(d)	DRY	DRY	DRY	DRY
Antimony	mg/L	---	0.009 ^(w)	DRY	DRY	DRY	DRY
Arsenic	mg/L	0.01	0.005	DRY	DRY	DRY	DRY
Barium	mg/L	---	1 ^(w)	DRY	DRY	DRY	DRY
Beryllium	mg/L	---	0.00013 ^(w)	DRY	DRY	DRY	DRY
Bismuth	mg/L	---	---	DRY	DRY	DRY	DRY
Boron	mg/L	5.0	1.2	DRY	DRY	DRY	DRY
Cadmium	mg/L	0.005	(e)	DRY	DRY	DRY	DRY
Calcium	mg/L	---	---	DRY	DRY	DRY	DRY
Chromium	mg/L	---	---	DRY	DRY	DRY	DRY
Cobalt	mg/L	---	0.11	DRY	DRY	DRY	DRY
Copper	mg/L	1.0	(f)	DRY	DRY	DRY	DRY
Iron	mg/L	0.3 (AO)	0.35	DRY	DRY	DRY	DRY
Lead	mg/L	0.01	0.003 ^(g)	DRY	DRY	DRY	DRY
Lithium	mg/L	---	---	DRY	DRY	DRY	DRY
Magnesium	mg/L	---	---	DRY	DRY	DRY	DRY
Manganese	mg/L	0.05 (AO)	(h)	DRY	DRY	DRY	DRY
Mercury	mg/L	0.001	---	DRY	DRY	DRY	DRY
Molybdenum	mg/L	0.25	2	DRY	DRY	DRY	DRY
Nickel	mg/L	---	0.025-0.15 ^{(i)(w)}	DRY	DRY	DRY	DRY
Phosphorus	mg/L	---	---	DRY	DRY	DRY	DRY
Potassium	mg/L	---	---	DRY	DRY	DRY	DRY
Selenium	mg/L	0.01	0.002	DRY	DRY	DRY	DRY
Silicon	mg/L	---	---	DRY	DRY	DRY	DRY
Silver	mg/L	---	0.0001-0.003 ^(j)	DRY	DRY	DRY	DRY
Sodium	mg/L	---	---	DRY	DRY	DRY	DRY
Strontium	mg/L	---	---	DRY	DRY	DRY	DRY
Sulfur	mg/L	---	---	DRY	DRY	DRY	DRY
Tellurium	mg/L	---	---	DRY	DRY	DRY	DRY
Thallium	mg/L	---	---	DRY	DRY	DRY	DRY
Thorium	mg/L	---	---	DRY	DRY	DRY	DRY
Tin	mg/L	---	---	DRY	DRY	DRY	DRY
Titanium	mg/L	---	---	DRY	DRY	DRY	DRY
Tungsten	mg/L	---	---	DRY	DRY	DRY	DRY
Uranium	mg/L	---	0.0085 ^(w)	DRY	DRY	DRY	DRY
Vanadium	mg/L	---	---	DRY	DRY	DRY	DRY
Zinc	mg/L	5.0 (AO)	(k)	DRY	DRY	DRY	DRY
Zirconium	mg/L	---	---	DRY	DRY	DRY	DRY
Volatile Organic Compounds				-	-	-	-
1,1,1,2-tetrachloroethane	mg/L	---	---	DRY	DRY	DRY	DRY
1,1,1-trichloroethane	mg/L	---	---	DRY	DRY	DRY	DRY
1,1,2,2-tetrachloroethane	mg/L	---	---	DRY	DRY	DRY	DRY
1,1,2Trichloro-1,2,2Trifluoroethane	mg/L	---	---	DRY	DRY	DRY	DRY
1,1,2-trichloroethane	mg/L	---	---	DRY	DRY	DRY	DRY
1,1-dichloroethane	mg/L	---	---	DRY	DRY	DRY	DRY
1,1-dichloroethene	mg/L	---	---	DRY	DRY	DRY	DRY
1,2,3-trichlorobenzene	mg/L	---	0.008 ^(w)	DRY	DRY	DRY	DRY
1,2,4-trichlorobenzene	mg/L	---	0.024 ^(w)	DRY	DRY	DRY	DRY

Table 8 2022 Groundwater Quality Results - MW-4A

Sample Date:	Units	BCMECCS Criteria ⁽¹⁾		Mar-22	Jul-22	Sep-22	Dec-22
Parameters:		DWQ ⁽²⁾	FWAL ⁽³⁾				
Lab Sample ID:				-	-	-	-
1,2-dibromoethane	mg/L	---	---	DRY	DRY	DRY	DRY
1,2-dichlorobenzene	mg/L	---	0.0007 ^(w)	DRY	DRY	DRY	DRY
1,2-dichloroethane	mg/L	---	0.100 ^(w)	DRY	DRY	DRY	DRY
1,2-dichloropropane	mg/L	---	---	DRY	DRY	DRY	DRY
1,3,5-trimethylbenzene	mg/L	---	---	DRY	DRY	DRY	DRY
1,3-dichlorobenzene	mg/L	---	0.150 ^(w)	DRY	DRY	DRY	DRY
1,3-dichloropropane	mg/L	---	---	DRY	DRY	DRY	DRY
1,4-dichlorobenzene	mg/L	---	0.026 ^(w)	DRY	DRY	DRY	DRY
Benzene	mg/L	0.005	0.04 ^(m)	DRY	DRY	DRY	DRY
Bromobenzene	mg/L	---	---	DRY	DRY	DRY	DRY
Bromodichloromethane	mg/L	---	---	DRY	DRY	DRY	DRY
Bromoform	mg/L	---	---	DRY	DRY	DRY	DRY
Bromomethane	mg/L	---	---	DRY	DRY	DRY	DRY
Dibromomethane	mg/L	---	---	DRY	DRY	DRY	DRY
Carbon Tetrachloride	mg/L	---	0.0133 ^(w)	DRY	DRY	DRY	DRY
Chlorobenzene	mg/L	---	---	DRY	DRY	DRY	DRY
Chlorodibromomethane	mg/L	---	---	DRY	DRY	DRY	DRY
Chloroethane	mg/L	---	---	DRY	DRY	DRY	DRY
Chloroform	mg/L	---	0.0018 ^(w)	DRY	DRY	DRY	DRY
Chloromethane	mg/L	---	---	DRY	DRY	DRY	DRY
cis-1,2-dichloroethene	mg/L	---	---	DRY	DRY	DRY	DRY
cis-1,3-dichloropropene	mg/L	---	---	DRY	DRY	DRY	DRY
Dichlorodifluoromethane	mg/L	---	---	DRY	DRY	DRY	DRY
Dichloromethane	mg/L	---	0.0981 ^(w)	DRY	DRY	DRY	DRY
Ethylbenzene	mg/L	0.14/0.0016 (AO)	0.20 ^(m)	DRY	DRY	DRY	DRY
Hexachlorobutadiene	mg/L	---	0.0013 ^(w)	DRY	DRY	DRY	DRY
Isopropylbenzene	mg/L	---	---	DRY	DRY	DRY	DRY
m & p-Xylene	mg/L	---	---	DRY	DRY	DRY	DRY
Methyl-tert-butylether (MTBE)	mg/L	0.015 (AO)	3.4	DRY	DRY	DRY	DRY
o-Xylene	mg/L	---	---	DRY	DRY	DRY	DRY
Styrene	mg/L	---	0.072 ^(w)	DRY	DRY	DRY	DRY
Tetrachloroethene	mg/L	---	---	DRY	DRY	DRY	DRY
Toluene	mg/L	0.06/0.024 (AO)	0.0005	DRY	DRY	DRY	DRY
trans-1,2-dichloroethene	mg/L	---	---	DRY	DRY	DRY	DRY
trans-1,3-dichloropropene	mg/L	---	---	DRY	DRY	DRY	DRY
Trichloroethene	mg/L	---	---	DRY	DRY	DRY	DRY
Trichlorofluoromethane	mg/L	---	---	DRY	DRY	DRY	DRY
VH C6-C10	mg/L	---	---	DRY	DRY	DRY	DRY
Vinyl Chloride	mg/L	---	---	DRY	DRY	DRY	DRY
VPH (VHW6 to 10 - BTEX)	mg/L	---	---	DRY	DRY	DRY	DRY
Xylenes (total)	mg/L	0.09/0.02 (AO)	0.03	DRY	DRY	DRY	DRY
Notes: 1. Values reported from BCMECCS - British Columbia Water Quality Guidelines, 2019 Edition, unless otherwise stated. 2. Drinking Water Criteria (DWQ): Metal guidelines are for total concentrations. 3. Freshwater Aquatic Life Criteria (FWAL): All criteria for metals are for total metals except criteria for aluminum and iron, which are for dissolved. 0.500 - Exceeds Drinking Water Criteria 0.500 - Exceeds Freshwater Aquatic Life Criteria 0.500 - Exceeds Drinking Water Criteria and Freshwater Aquatic Life Criteria a. Turbidity: BCMECCS Source Drinking Water Quality Guidelines, Guidelines Summary Table 2. Decreases compared to background concentrations are not interpreted as exceedances. b. Ammonia-N: BCMECCS Approved Water Quality Guidelines, Summary Report Table 26C. Temperature and pH dependent. c. Nitrite: BCMECCS Approved Water Quality Guidelines. Chloride dependent. d. Aluminum: criteria specified for dissolved species not total. Criteria pH dependent. If pH<6.5: e^(1.209- e. Cadmium (mg/L) = (e^(1.03*LN(HARDNESS)-5.274))/1000, valid for Hardness (as CaCO₃) of 7 to 455 mg/L. f. Copper guidelines calculated using BCMECCS Biotic Ligand Model (BLM) software. Dependent on multiple other parameters. g. Lead: hardness dependent. For Hardness (as CaCO₃) > 8 mg/L: (e^(1.273*ln(HARDNESS)-1.460))/1000 . If hardness is < or equal to 8 mg/L: 0.003 mg/L. h. Manganese (mg/L) = (0.01102*HARDNESS)+0.54. i. Nickel: BCMECCS Working Water Quality Guidelines, Table 1. j. Silver: hardness <= 100 mg/L = 0.0001 mg/L, hardness > 100 mg/L = 0.003 mg/L k. Zinc (mg/L) = 0.033 for Hardness < or equal to 90 mg/L, (33+(0.75*(HARDNESS-90)))/1000 for Hardness > 90 mg/L l. Sulphate: BCMECCS Approved Water Quality Guidelines, Summary Report Table 40. Hardness dependent. m. Interim guideline n. Temperature: Streams with Bull Trout and/or Dolly Varden = 15, unknown fish distribution = 19 o. Alkalinity (Total as CaCO₃): BCMECCS Working Water Quality Guidelines, Table 1. w. Values reported fromBCMECCS - Working Water Quality Guidelines for British Columbia (2017). Values are long-term (i.e., average) concentrations unless identified as a short-term maximum. AO - Aesthetic Objective - No data available --- Currently no Standard/Criteria ND - Not detected above the laboratory Reportable Detection Limit (RDL)							

Table 9 2022 Groundwater Quality Results - MW17-01

Sample Date:	Units	BCMECCS Criteria ⁽¹⁾		Mar-22	Jul-22	Sep-22	Dec-22
Parameters:		DWQ ⁽²⁾	FWAL ⁽³⁾				
Lab Sample ID:				-	-	-	-
Field Parameters							
pH	s.u.	---	6.5-9.0	DRY	DRY	DRY	DRY
Conductivity, Electrical	µS/cm	---	---	DRY	DRY	DRY	DRY
Temperature	°C	15 (AO)	---	DRY	DRY	DRY	DRY
Dissolved Oxygen	mg/L	---	---	DRY	DRY	DRY	DRY
Redox Potential	(mV)	---	---	DRY	DRY	DRY	DRY
General							
Chemical Oxygen Demand (COD)	mg/L	---	---	DRY	DRY	DRY	DRY
Dissolved Organic Carbon (DOC)	mg/L	---	---	DRY	DRY	DRY	DRY
Conductivity, Electrical	µS/cm	---	---	DRY	DRY	DRY	DRY
pH	s.u.	---	6.5-9.0	DRY	DRY	DRY	DRY
Alkalinity (Total as CaCO3)	mg/L	---	(o) ^(w)	DRY	DRY	DRY	DRY
Alkalinity (PP as CaCO3)	mg/L	---	---	DRY	DRY	DRY	DRY
Bicarbonate (HCO ₃)	mg/L	---	---	DRY	DRY	DRY	DRY
Carbonate (as CaCO ₃)	mg/L	---	---	DRY	DRY	DRY	DRY
Hydroxide (OH)	mg/L	---	---	DRY	DRY	DRY	DRY
Turbidity	NTU	(a)	---	DRY	DRY	DRY	DRY
Hardness (as CaCO ₃)	mg/L	---	---	DRY	DRY	DRY	DRY
Nutrients							
Ammonia	mg/L	---	0.681-28.7 ^(b)	DRY	DRY	DRY	DRY
Dissolved Nitrate (N)	mg/L	10	32.8	DRY	DRY	DRY	DRY
Dissolved Nitrite (N)	mg/L	1.0	0.06-0.6 ^(c)	DRY	DRY	DRY	DRY
Total Phosphorus (P)	mg/L	0.01 (AO)	---	DRY	DRY	DRY	DRY
Nitrate plus Nitrite (N)	mg/L	10	---	DRY	DRY	DRY	DRY
Total Nitrogen (N)	mg/L	---	---	DRY	DRY	DRY	DRY
Total Kjeldahl Nitrogen (TKN)	mg/L	---	---	DRY	DRY	DRY	DRY
Anions							
Chloride	mg/L	250 (AO)	600	DRY	DRY	DRY	DRY
Sulfate	mg/L	500 (AO)	(l)	DRY	DRY	DRY	DRY
Dissolved Metals							
Aluminum	mg/L	9.5	0.1 ^(d)	DRY	DRY	DRY	DRY
Antimony	mg/L	---	0.009 ^(w)	DRY	DRY	DRY	DRY
Arsenic	mg/L	0.01	0.005	DRY	DRY	DRY	DRY
Barium	mg/L	---	1 ^(w)	DRY	DRY	DRY	DRY
Beryllium	mg/L	---	0.00013 ^(w)	DRY	DRY	DRY	DRY
Bismuth	mg/L	---	---	DRY	DRY	DRY	DRY
Boron	mg/L	5.0	1.2	DRY	DRY	DRY	DRY
Cadmium	mg/L	0.005	(e)	DRY	DRY	DRY	DRY
Calcium	mg/L	---	---	DRY	DRY	DRY	DRY
Chromium	mg/L	---	---	DRY	DRY	DRY	DRY
Cobalt	mg/L	---	0.11	DRY	DRY	DRY	DRY
Copper	mg/L	1.0	(f)	DRY	DRY	DRY	DRY
Iron	mg/L	0.3 (AO)	0.35	DRY	DRY	DRY	DRY
Lead	mg/L	0.01	0.003 ^(g)	DRY	DRY	DRY	DRY
Lithium	mg/L	---	---	DRY	DRY	DRY	DRY
Magnesium	mg/L	---	---	DRY	DRY	DRY	DRY
Manganese	mg/L	0.05 (AO)	(h)	DRY	DRY	DRY	DRY
Mercury	mg/L	0.001	---	DRY	DRY	DRY	DRY
Molybdenum	mg/L	0.25	2	DRY	DRY	DRY	DRY
Nickel	mg/L	---	0.025-0.15 ^{(i)(w)}	DRY	DRY	DRY	DRY
Phosphorus	mg/L	---	---	DRY	DRY	DRY	DRY
Potassium	mg/L	---	---	DRY	DRY	DRY	DRY
Selenium	mg/L	0.01	0.002	DRY	DRY	DRY	DRY
Silicon	mg/L	---	---	DRY	DRY	DRY	DRY
Silver	mg/L	---	0.0001-0.003 ^(j)	DRY	DRY	DRY	DRY
Sodium	mg/L	---	---	DRY	DRY	DRY	DRY
Strontium	mg/L	---	---	DRY	DRY	DRY	DRY
Sulfur	mg/L	---	---	DRY	DRY	DRY	DRY
Tellurium	mg/L	---	---	DRY	DRY	DRY	DRY
Thallium	mg/L	---	---	DRY	DRY	DRY	DRY
Thorium	mg/L	---	---	DRY	DRY	DRY	DRY
Tin	mg/L	---	---	DRY	DRY	DRY	DRY
Titanium	mg/L	---	---	DRY	DRY	DRY	DRY
Tungsten	mg/L	---	---	DRY	DRY	DRY	DRY
Uranium	mg/L	---	0.0085 ^(w)	DRY	DRY	DRY	DRY
Vanadium	mg/L	---	---	DRY	DRY	DRY	DRY
Zinc	mg/L	5.0 (AO)	(k)	DRY	DRY	DRY	DRY
Zirconium	mg/L	---	---	DRY	DRY	DRY	DRY

Table 9 2022 Groundwater Quality Results - MW17-01

Sample Date:	Units	BCMECCS Criteria ⁽¹⁾		Mar-22	Jul-22	Sep-22	Dec-22
Parameters:		DWQ ⁽²⁾	FWAL ⁽³⁾				
Lab Sample ID:				-	-	-	-
Volatile Organic Compounds				-	-	-	-
1,1,1,2-tetrachloroethane	mg/L	---	---	DRY	DRY	DRY	DRY
1,1,1-trichloroethane	mg/L	---	---	DRY	DRY	DRY	DRY
1,1,2,2-tetrachloroethane	mg/L	---	---	DRY	DRY	DRY	DRY
1,1,2Trichloro-1,2,2Trifluoroethane	mg/L	---	---	DRY	DRY	DRY	DRY
1,1,2-trichloroethane	mg/L	---	---	DRY	DRY	DRY	DRY
1,1-dichloroethane	mg/L	---	---	DRY	DRY	DRY	DRY
1,1-dichloroethene	mg/L	---	---	DRY	DRY	DRY	DRY
1,2,3-trichlorobenzene	mg/L	---	0.008 ^(w)	DRY	DRY	DRY	DRY
1,2,4-trichlorobenzene	mg/L	---	0.024 ^(w)	DRY	DRY	DRY	DRY
1,2-dibromoethane	mg/L	---	---	DRY	DRY	DRY	DRY
1,2-dichlorobenzene	mg/L	---	0.0007 ^(w)	DRY	DRY	DRY	DRY
1,2-dichloroethane	mg/L	---	0.100 ^(w)	DRY	DRY	DRY	DRY
1,2-dichloropropane	mg/L	---	---	DRY	DRY	DRY	DRY
1,3,5-trimethylbenzene	mg/L	---	---	DRY	DRY	DRY	DRY
1,3-dichlorobenzene	mg/L	---	0.150 ^(w)	DRY	DRY	DRY	DRY
1,3-dichloropropane	mg/L	---	---	DRY	DRY	DRY	DRY
1,4-dichlorobenzene	mg/L	---	0.026 ^(w)	DRY	DRY	DRY	DRY
Benzene	mg/L	0.005	0.04 ^(m)	DRY	DRY	DRY	DRY
Bromobenzene	mg/L	---	---	DRY	DRY	DRY	DRY
Bromodichloromethane	mg/L	---	---	DRY	DRY	DRY	DRY
Bromoform	mg/L	---	---	DRY	DRY	DRY	DRY
Bromomethane	mg/L	---	---	DRY	DRY	DRY	DRY
Dibromomethane	mg/L	---	---	DRY	DRY	DRY	DRY
Carbon Tetrachloride	mg/L	---	0.0133 ^(w)	DRY	DRY	DRY	DRY
Chlorobenzene	mg/L	---	---	DRY	DRY	DRY	DRY
Chlorodibromomethane	mg/L	---	---	DRY	DRY	DRY	DRY
Chloroethane	mg/L	---	---	DRY	DRY	DRY	DRY
Chloroform	mg/L	---	0.0018 ^(w)	DRY	DRY	DRY	DRY
Chloromethane	mg/L	---	---	DRY	DRY	DRY	DRY
cis-1,2-dichloroethene	mg/L	---	---	DRY	DRY	DRY	DRY
cis-1,3-dichloropropene	mg/L	---	---	DRY	DRY	DRY	DRY
Dichlorodifluoromethane	mg/L	---	---	DRY	DRY	DRY	DRY
Dichloromethane	mg/L	---	0.0981 ^(w)	DRY	DRY	DRY	DRY
Ethylbenzene	mg/L	0.14/0.0016 (AO)	0.20 ^(m)	DRY	DRY	DRY	DRY
Hexachlorobutadiene	mg/L	---	0.0013 ^(w)	DRY	DRY	DRY	DRY
Isopropylbenzene	mg/L	---	---	DRY	DRY	DRY	DRY
m & p-Xylene	mg/L	---	---	DRY	DRY	DRY	DRY
Methyl-tert-butylether (MTBE)	mg/L	0.015 (AO)	3.4	DRY	DRY	DRY	DRY
o-Xylene	mg/L	---	---	DRY	DRY	DRY	DRY
Styrene	mg/L	---	0.072 ^(w)	DRY	DRY	DRY	DRY
Tetrachloroethene	mg/L	---	---	DRY	DRY	DRY	DRY
Toluene	mg/L	0.06/0.024 (AO)	0.0005	DRY	DRY	DRY	DRY
trans-1,2-dichloroethene	mg/L	---	---	DRY	DRY	DRY	DRY
trans-1,3-dichloropropene	mg/L	---	---	DRY	DRY	DRY	DRY
Trichloroethene	mg/L	---	---	DRY	DRY	DRY	DRY
Trichlorofluoromethane	mg/L	---	---	DRY	DRY	DRY	DRY
VH C6-C10	mg/L	---	---	DRY	DRY	DRY	DRY
Vinyl Chloride	mg/L	---	---	DRY	DRY	DRY	DRY
VPH (VHW6 to 10 - BTEX)	mg/L	---	---	DRY	DRY	DRY	DRY
Xylenes (total)	mg/L	0.09/0.02 (AO)	0.03	DRY	DRY	DRY	DRY
Notes: 1. Values reported from BCMECCS - British Columbia Water Quality Guidelines, 2019 Edition, unless otherwise stated. 2. Drinking Water Criteria (DWQ): Metal guidelines are for total concentrations. 3. Freshwater Aquatic Life Criteria (FWAL): All criteria for metals are for total metals except criteria for aluminum and iron, which are for dissolved. 0.500 - Exceeds Drinking Water Criteria 0.500 - Exceeds Freshwater Aquatic Life Criteria 0.500 - Exceeds Drinking Water Criteria and Freshwater Aquatic Life Criteria a. Turbidity: BCMECCS Source Drinking Water Quality Guidelines, Guidelines Summary Table 2. Decreases compared to background concentrations are not interpreted as exceedances. b. Ammonia-N: BCMECCS Approved Water Quality Guidelines, Summary Report Table 26C. Temperature and pH dependent. c. Nitrite: BCMECCS Approved Water Quality Guidelines. Chloride dependent. d. Aluminum: criteria specified for dissolved species not total. Criteria pH dependent. If pH<6.5: e^(1.209-2.426*pH+0.286*pH²) e. Cadmium (mg/L) = (e^(1.03*LN(HARDNESS)-5.274))/1000, valid for Hardness (as CaCO₃) of 7 to 455 mg/L. f. Copper guidelines calculated using BC MOE Biotic Ligand Model (BLM) software. Dependent on multiple other parameters. g. Lead: hardness dependent. For Hardness (as CaCO₃) > 8 mg/L: (e^(1.273*ln(HARDNESS)-1.460))/1000 . If hardness is < or equal to 8 mg/L: 0.003 mg/L. h. Manganese (mg/L) = (0.01102*HARDNESS)+0.54. i. Nickel: BCMECCS Working Water Quality Guidelines, Table 1. j. Silver: hardness <= 100 mg/L = 0.0001 mg/L, hardness > 100 mg/L = 0.003 mg/L k. Zinc (mg/L) = 0.033 for Hardness < or equal to 90 mg/L, (33+(0.75*(HARDNESS-90)))/1000 for Hardness > 90 mg/L l. Sulphate: BCMECCS Approved Water Quality Guidelines, Summary Report Table 40. Hardness dependent. m. Interim guideline n. Temperature: Streams with Bull Trout and/or Dolly Varden = 15, unknown fish distribution = 19 o. Alkalinity (Total as CaCO3): BCMECCS Working Water Quality Guidelines, Table 1. w. Values reported from BCMECCS - Working Water Quality Guidelines for British Columbia (2017). Values are long-term (i.e., average) concentrations unless identified as a short-term maximum. AO - Aesthetic Objective - No data available --- Currently no Standard/Criteria ND - Not detected above the laboratory Reportable Detection Limit (RDL)							

Table 10 2022 Groundwater Quality Results - MW17-02

Sample Date:	Units	BCMECCS Criteria ⁽¹⁾		Mar-22	Jul-22	Sep-22	Dec-22
Parameters:		DWQ ⁽²⁾	FWAL ⁽³⁾				
Lab Sample ID:				-	-	-	-
Field Parameters							
pH	s.u.	---	6.5-9.0	DRY	DRY	DRY	DRY
Conductivity, Electrical	µS/cm	---	---	DRY	DRY	DRY	DRY
Temperature	°C	15 (AO)	---	DRY	DRY	DRY	DRY
Dissolved Oxygen	mg/L	---	---	DRY	DRY	DRY	DRY
Redox Potential	(mV)	---	---	DRY	DRY	DRY	DRY
General							
Chemical Oxygen Demand (COD)	mg/L	---	---	DRY	DRY	DRY	DRY
Dissolved Organic Carbon (DOC)	mg/L	---	---	DRY	DRY	DRY	DRY
Conductivity, Electrical	µS/cm	---	---	DRY	DRY	DRY	DRY
pH	s.u.	---	6.5-9.0	DRY	DRY	DRY	DRY
Alkalinity (Total as CaCO3)	mg/L	---	(o) ^(w)	DRY	DRY	DRY	DRY
Alkalinity (PP as CaCO3)	mg/L	---	---	DRY	DRY	DRY	DRY
Bicarbonate (HCO ₃)	mg/L	---	---	DRY	DRY	DRY	DRY
Carbonate (as CaCO ₃)	mg/L	---	---	DRY	DRY	DRY	DRY
Hydroxide (OH)	mg/L	---	---	DRY	DRY	DRY	DRY
Turbidity	NTU	(a)	---	DRY	DRY	DRY	DRY
Hardness (as CaCO ₃)	mg/L	---	---	DRY	DRY	DRY	DRY
Nutrients							
Ammonia	mg/L	---	0.681-28.7 ^(b)	DRY	DRY	DRY	DRY
Dissolved Nitrate (N)	mg/L	10	32.8	DRY	DRY	DRY	DRY
Dissolved Nitrite (N)	mg/L	1.0	0.06-0.6 ^(c)	DRY	DRY	DRY	DRY
Total Phosphorus (P)	mg/L	0.01 (AO)	---	DRY	DRY	DRY	DRY
Nitrate plus Nitrite (N)	mg/L	10	---	DRY	DRY	DRY	DRY
Total Nitrogen (N)	mg/L	---	---	DRY	DRY	DRY	DRY
Total Kjeldahl Nitrogen (TKN)	mg/L	---	---	DRY	DRY	DRY	DRY
Anions							
Chloride	mg/L	250 (AO)	600	DRY	DRY	DRY	DRY
Sulfate	mg/L	500 (AO)	(l)	DRY	DRY	DRY	DRY
Dissolved Metals							
Aluminum	mg/L	9.5	0.1 ^(d)	DRY	DRY	DRY	DRY
Antimony	mg/L	---	0.009 ^(w)	DRY	DRY	DRY	DRY
Arsenic	mg/L	0.01	0.005	DRY	DRY	DRY	DRY
Barium	mg/L	---	1 ^(w)	DRY	DRY	DRY	DRY
Beryllium	mg/L	---	0.00013 ^(w)	DRY	DRY	DRY	DRY
Bismuth	mg/L	---	---	DRY	DRY	DRY	DRY
Boron	mg/L	5.0	1.2	DRY	DRY	DRY	DRY
Cadmium	mg/L	0.005	(e)	DRY	DRY	DRY	DRY
Calcium	mg/L	---	---	DRY	DRY	DRY	DRY
Chromium	mg/L	---	---	DRY	DRY	DRY	DRY
Cobalt	mg/L	---	0.11	DRY	DRY	DRY	DRY
Copper	mg/L	1.0	(f)	DRY	DRY	DRY	DRY
Iron	mg/L	0.3 (AO)	0.35	DRY	DRY	DRY	DRY
Lead	mg/L	0.01	0.003 ^(g)	DRY	DRY	DRY	DRY
Lithium	mg/L	---	---	DRY	DRY	DRY	DRY
Magnesium	mg/L	---	---	DRY	DRY	DRY	DRY
Manganese	mg/L	0.05 (AO)	(h)	DRY	DRY	DRY	DRY
Mercury	mg/L	0.001	---	DRY	DRY	DRY	DRY
Molybdenum	mg/L	0.25	2	DRY	DRY	DRY	DRY
Nickel	mg/L	---	0.025-0.15 ^{(i)(w)}	DRY	DRY	DRY	DRY
Phosphorus	mg/L	---	---	DRY	DRY	DRY	DRY
Potassium	mg/L	---	---	DRY	DRY	DRY	DRY
Selenium	mg/L	0.01	0.002	DRY	DRY	DRY	DRY
Silicon	mg/L	---	---	DRY	DRY	DRY	DRY
Silver	mg/L	---	0.0001-0.003 ^(j)	DRY	DRY	DRY	DRY
Sodium	mg/L	---	---	DRY	DRY	DRY	DRY
Strontium	mg/L	---	---	DRY	DRY	DRY	DRY
Sulfur	mg/L	---	---	DRY	DRY	DRY	DRY
Tellurium	mg/L	---	---	DRY	DRY	DRY	DRY
Thallium	mg/L	---	---	DRY	DRY	DRY	DRY
Thorium	mg/L	---	---	DRY	DRY	DRY	DRY
Tin	mg/L	---	---	DRY	DRY	DRY	DRY
Titanium	mg/L	---	---	DRY	DRY	DRY	DRY
Tungsten	mg/L	---	---	DRY	DRY	DRY	DRY
Uranium	mg/L	---	0.0085 ^(w)	DRY	DRY	DRY	DRY
Vanadium	mg/L	---	---	DRY	DRY	DRY	DRY
Zinc	mg/L	5.0 (AO)	(k)	DRY	DRY	DRY	DRY
Zirconium	mg/L	---	---	DRY	DRY	DRY	DRY

Table 10 2022 Groundwater Quality Results - MW17-02

Sample Date:	Units	BCMECCS Criteria ⁽¹⁾		Mar-22	Jul-22	Sep-22	Dec-22
Parameters:		DWQ ⁽²⁾	FWAL ⁽³⁾				
Lab Sample ID:				-	-	-	-
Volatile Organic Compounds				-	-	-	-
1,1,1,2-tetrachloroethane	mg/L	---	---	DRY	DRY	DRY	DRY
1,1,1-trichloroethane	mg/L	---	---	DRY	DRY	DRY	DRY
1,1,2,2-tetrachloroethane	mg/L	---	---	DRY	DRY	DRY	DRY
1,1,2Trichloro-1,2,2Trifluoroethane	mg/L	---	---	DRY	DRY	DRY	DRY
1,1,2-trichloroethane	mg/L	---	---	DRY	DRY	DRY	DRY
1,1-dichloroethane	mg/L	---	---	DRY	DRY	DRY	DRY
1,1-dichloroethene	mg/L	---	---	DRY	DRY	DRY	DRY
1,2,3-trichlorobenzene	mg/L	---	0.008 ^(w)	DRY	DRY	DRY	DRY
1,2,4-trichlorobenzene	mg/L	---	0.024 ^(w)	DRY	DRY	DRY	DRY
1,2-dibromoethane	mg/L	---	---	DRY	DRY	DRY	DRY
1,2-dichlorobenzene	mg/L	---	0.0007 ^(w)	DRY	DRY	DRY	DRY
1,2-dichloroethane	mg/L	---	0.100 ^(w)	DRY	DRY	DRY	DRY
1,2-dichloropropane	mg/L	---	---	DRY	DRY	DRY	DRY
1,3,5-trimethylbenzene	mg/L	---	---	DRY	DRY	DRY	DRY
1,3-dichlorobenzene	mg/L	---	0.150 ^(w)	DRY	DRY	DRY	DRY
1,3-dichloropropane	mg/L	---	---	DRY	DRY	DRY	DRY
1,4-dichlorobenzene	mg/L	---	0.026 ^(w)	DRY	DRY	DRY	DRY
Benzene	mg/L	0.005	0.04 ^(m)	DRY	DRY	DRY	DRY
Bromobenzene	mg/L	---	---	DRY	DRY	DRY	DRY
Bromodichloromethane	mg/L	---	---	DRY	DRY	DRY	DRY
Bromoform	mg/L	---	---	DRY	DRY	DRY	DRY
Bromomethane	mg/L	---	---	DRY	DRY	DRY	DRY
Dibromomethane	mg/L	---	---	DRY	DRY	DRY	DRY
Carbon Tetrachloride	mg/L	---	0.0133 ^(w)	DRY	DRY	DRY	DRY
Chlorobenzene	mg/L	---	---	DRY	DRY	DRY	DRY
Chlorodibromomethane	mg/L	---	---	DRY	DRY	DRY	DRY
Chloroethane	mg/L	---	---	DRY	DRY	DRY	DRY
Chloroform	mg/L	---	0.0018 ^(w)	DRY	DRY	DRY	DRY
Chloromethane	mg/L	---	---	DRY	DRY	DRY	DRY
cis-1,2-dichloroethene	mg/L	---	---	DRY	DRY	DRY	DRY
cis-1,3-dichloropropene	mg/L	---	---	DRY	DRY	DRY	DRY
Dichlorodifluoromethane	mg/L	---	---	DRY	DRY	DRY	DRY
Dichloromethane	mg/L	---	0.0981 ^(w)	DRY	DRY	DRY	DRY
Ethylbenzene	mg/L	0.14/0.0016 (AO)	0.20 ^(m)	DRY	DRY	DRY	DRY
Hexachlorobutadiene	mg/L	---	0.0013 ^(w)	DRY	DRY	DRY	DRY
Isopropylbenzene	mg/L	---	---	DRY	DRY	DRY	DRY
m & p-Xylene	mg/L	---	---	DRY	DRY	DRY	DRY
Methyl-tert-butylether (MTBE)	mg/L	0.015 (AO)	3.4	DRY	DRY	DRY	DRY
o-Xylene	mg/L	---	---	DRY	DRY	DRY	DRY
Styrene	mg/L	---	0.072 ^(w)	DRY	DRY	DRY	DRY
Tetrachloroethene	mg/L	---	---	DRY	DRY	DRY	DRY
Toluene	mg/L	0.06/0.024 (AO)	0.0005	DRY	DRY	DRY	DRY
trans-1,2-dichloroethene	mg/L	---	---	DRY	DRY	DRY	DRY
trans-1,3-dichloropropene	mg/L	---	---	DRY	DRY	DRY	DRY
Trichloroethene	mg/L	---	---	DRY	DRY	DRY	DRY
Trichlorofluoromethane	mg/L	---	---	DRY	DRY	DRY	DRY
VH C6-C10	mg/L	---	---	DRY	DRY	DRY	DRY
Vinyl Chloride	mg/L	---	---	DRY	DRY	DRY	DRY
VPH (VHW6 to 10 - BTEX)	mg/L	---	---	DRY	DRY	DRY	DRY
Xylenes (total)	mg/L	0.09/0.02 (AO)	0.03	DRY	DRY	DRY	DRY
Notes: 1. Values reported from BCMECCS - British Columbia Water Quality Guidelines, 2019 Edition, unless otherwise stated. 2. Drinking Water Criteria (DWQ): Metal guidelines are for total concentrations. 3. Freshwater Aquatic Life Criteria (FWAL): All criteria for metals are for total metals except criteria for aluminum and iron, which are for dissolved. 0.500 - Exceeds Drinking Water Criteria 0.500 - Exceeds Freshwater Aquatic Life Criteria 0.500 - Exceeds Drinking Water Criteria and Freshwater Aquatic Life Criteria a. Turbidity: BCMECCS Source Drinking Water Quality Guidelines, Guidelines Summary Table 2. Decreases compared to background concentrations are not interpreted as exceedances. b. Ammonia-N: BCMECCS Approved Water Quality Guidelines, Summary Report Table 26C. Temperature and pH dependent. c. Nitrite: BCMECCS Approved Water Quality Guidelines. Chloride dependent. d. Aluminum: criteria specified for dissolved species not total. Criteria pH dependent. If pH<6.5: $e^{(1.209-2.426 \cdot \text{pH} + 0.286 \cdot \text{pH}^2)}$ e. Cadmium (mg/L) = $(e^{(1.03 \cdot \text{LN}(\text{HARDNESS}) - 5.274)})/1000$, valid for Hardness (as CaCO₃) of 7 to 455 mg/L. f. Copper guidelines calculated using BC MOE Biotic Ligand Model (BLM) software. Dependent on multiple other parameters. g. Lead: hardness dependent. For Hardness (as CaCO₃) > 8 mg/L: $(e^{(1.273 \cdot \text{ln}(\text{HARDNESS}) - 1.460)})/1000$. If hardness is < or equal to 8 mg/L: 0.003 mg/L. h. Manganese (mg/L) = $(0.01102 \cdot \text{HARDNESS}) + 0.54$. i. Nickel: BCMECCS Working Water Quality Guidelines, Table 1. j. Silver: hardness <= 100 mg/L = 0.0001 mg/L, hardness > 100 mg/L = 0.003 mg/L k. Zinc (mg/L) = 0.033 for Hardness < or equal to 90 mg/L, $(33 + (0.75 \cdot (\text{HARDNESS} - 90))) / 1000$ for Hardness > 90 mg/L l. Sulphate: BCMECCS Approved Water Quality Guidelines, Summary Report Table 40. Hardness dependent. m. Interim guideline n. Temperature: Streams with Bull Trout and/or Dolly Varden = 15, unknown fish distribution = 19 o. Alkalinity (Total as CaCO₃): BCMECCS Working Water Quality Guidelines, Table 1. w. Values reported from BCMECCS - Working Water Quality Guidelines for British Columbia (2017). Values are long-term (i.e., average) concentrations unless identified as a short-term maximum. AO - Aesthetic Objective - No data available --- Currently no Standard/Criteria ND - Not detected above the laboratory Reportable Detection Limit (RDL)							

Table 11 2022 Groundwater Quality Results - MW-1

Sample Date:	Units	BCMECCS Criteria ⁽¹⁾		Mar-22	Jul-22	Sep-22	Dec-22
Parameters:		DWQ ⁽²⁾	FWAL ⁽³⁾				
Lab Sample ID:				7999170	8143116	8288627	8424789
Field Parameters							
pH	s.u.	---	6.5-9.0	6.61	-	-	7.83
Conductivity, Electrical	µS/cm	---	---	0.431	-	-	0.218
Temperature	°C	15 (AO)	---	8.48	-	-	9.78
Dissolved Oxygen	mg/L	---	---	8.30	-	-	33.40
Redox Potential	(mV)	---	---	122	-	-	-33
General							
Chemical Oxygen Demand (COD)	mg/L	---	---	5.00	30.0	50	20
Dissolved Organic Carbon (DOC)	mg/L	---	---	-	-	-	-
Conductivity, Electrical	µS/cm	---	---	190	764	508	306
pH	s.u.	---	6.5-9.0	6.70	6.71	-	6.70
Alkalinity (Total as CaCO3)	mg/L	---	(o) ^(w)	29	60	46	51
Alkalinity (PP as CaCO3)	mg/L	---	---	<5	<5	<5	<5
Bicarbonate (HCO ₃)	mg/L	---	---	35	73	56	62
Carbonate (as CaCO ₃)	mg/L	---	---	<6	<6	<6	<6
Hydroxide (OH)	mg/L	---	---	<5	<5	<5	<5
Turbidity	NTU	(a)	---	3.3	6.4	48.10	28.80
Hardness (as CaCO ₃)	mg/L	---	---	78	280	-	130
Nutrients							
Ammonia	mg/L	---	0.681-28.7 ^(b)	ND (0.025)	ND (0.025)	0.05	ND (0.025)
Dissolved Nitrate (N)	mg/L	10	32.8	0.4	0.5	0.6	0.5
Dissolved Nitrite (N)	mg/L	1.0	0.06-0.6 ^(c)	ND (0.01)	ND (0.1)	ND(0.10)	ND (0.01)
Total Phosphorus (P)	mg/L	0.01 (AO)	---	0.017	0.007	0.294	0.067
Nitrate plus Nitrite (N)	mg/L	10	---	0.4	0.5	0.6	0.5
Total Nitrogen (N)	mg/L	---	---	0.68	0.73	0.87	0.54
Total Kjeldahl Nitrogen (TKN)	mg/L	---	---	0.12	<0.07	0.20	<0.07
Anions							
Chloride	mg/L	250 (AO)	600	3.9	39.8	25.0	6.5
Sulfate	mg/L	500 (AO)	(l)	50	292	162	84
Dissolved Metals							
Aluminum	mg/L	9.5	0.1 ^(d)	0.27	0.24	2.55	ND (0.001)
Antimony	mg/L	---	0.009 ^(w)	0.00005	0.00006	ND (0.002)	0.00018
Arsenic	mg/L	0.01	0.005	0.0001	0.0004	0.0011	ND0.0001
Barium	mg/L	---	1 ^(w)	0.011	0.024	0.085	0.017
Beryllium	mg/L	---	0.00013 ^(w)	0.00007	ND (0.00005)	0.0001	ND0.00005
Bismuth	mg/L	---	---	ND (0.0001)	ND (0.0001)	ND(0.0005)	ND (0.0001)
Boron	mg/L	5.0	1.2	0.075	0.18	0.2	0.1
Cadmium	mg/L	0.005	(e)	0.00003	0.00004	0.00022	0.00004
Calcium	mg/L	---	---	27	98	-	46
Chromium	mg/L	---	---	0.00023	0.0003	0.0026	0.00007
Cobalt	mg/L	---	0.11	0.00018	0.00018	0.0016	0.00005
Copper	mg/L	1.0	(f)	0.0012	0.0009	0.013	0.0006
Iron	mg/L	0.3 (AO)	0.35	0.25	0.25	2.76	0.002
Lead	mg/L	0.01	0.003 ^(g)	0.00025	0.00019	0.0046	0.00007
Lithium	mg/L	---	---	ND(0.0005)	0.0006	0.002	ND(0.0005)
Magnesium	mg/L	---	---	3	8	-	4.1
Manganese	mg/L	0.05 (AO)	(h)	0.02	0.024	0.15	0.012
Mercury	mg/L	0.001	---	ND (0.00001)	ND (0.00001)	ND (0.000005)	ND (0.00001)
Molybdenum	mg/L	0.25	2	0.00006	0.00008	<0.001	0.00006
Nickel	mg/L	---	0.025-0.15 ^{(i)(w)}	0.0004	0.0004	0.0022	0.0004
Phosphorus	mg/L	---	---	0.017	0.007	0.294	0.04
Potassium	mg/L	---	---	0.9	1.5	-	1.5
Selenium	mg/L	0.01	0.002	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
Silicon	mg/L	---	---	7.1	7.0	8.1	8.9
Silver	mg/L	---	0.0001-0.003 ^(j)	0.00001	0.00002	0.00002	ND (0.00001)
Sodium	mg/L	---	---	5	7	-	6.7
Strontium	mg/L	---	---	0.2	0.7	0.653	0.33
Sulfur	mg/L	---	---	15	67	64	29
Tellurium	mg/L	---	---	-	-	-	-
Thallium	mg/L	---	---	ND (0.00001)	0.00001	ND (0.00005)	ND (0.00001)
Thorium	mg/L	---	---	ND (0.00005)	ND (0.00005)	-	0.00005
Tin	mg/L	---	---	ND (0.0001)	0.0001	ND (0.001)	0.0000001
Titanium	mg/L	---	---	0.015	0.013	0.122	0.0001
Tungsten	mg/L	---	---	-	-	-	ND (0.0002)
Uranium	mg/L	---	0.0085 ^(w)	0.00008	0.00012	0.0008	0.00005
Vanadium	mg/L	---	---	0.00026	0.00057	0.0108	0.00015
Zinc	mg/L	5.0 (AO)	(k)	0.0064	0.0039	0.031	0.0058
Zirconium	mg/L	---	---	ND (0.0001)	ND (0.0001)	ND (0.001)	ND (0.00001)
Volatile Organic Compounds							
1,1,1,2-tetrachloroethane	mg/L	---	---	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
1,1,1-trichloroethane	mg/L	---	---	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
1,1,2,2-tetrachloroethane	mg/L	---	---	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
1,1,2Trichloro-1,2,2Trifluoroethane	mg/L	---	---	-	-	-	-
1,1,2-trichloroethane	mg/L	---	---	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
1,1-dichloroethane	mg/L	---	---	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
1,1-dichloroethene	mg/L	---	---	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)
1,2,3-trichlorobenzene	mg/L	---	0.008 ^(w)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)

Table 11 2022 Groundwater Quality Results - MW-1

Sample Date:	Units	BCMECCS Criteria ⁽¹⁾		Mar-22	Jul-22	Sep-22	Dec-22
Parameters:		DWQ ⁽²⁾	FWAL ⁽³⁾				
Lab Sample ID:				7999170	8143116	8288627	8424789
1,2,4-trichlorobenzene	mg/L	---	0.024 ^(w)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
1,2-dibromoethane	mg/L	---	---	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
1,2-dichlorobenzene	mg/L	---	0.0007 ^(w)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
1,2-dichloroethane	mg/L	---	0.100 ^(w)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)
1,2-dichloropropane	mg/L	---	---	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
1,3,5-trimethylbenzene	mg/L	---	---	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
1,3-dichlorobenzene	mg/L	---	0.150 ^(w)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
1,3-dichloropropane	mg/L	---	---	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
1,4-dichlorobenzene	mg/L	---	0.026 ^(w)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
Benzene	mg/L	0.005	0.04 ^(m)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
Bromobenzene	mg/L	---	---	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
Bromodichloromethane	mg/L	---	---	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
Bromoform	mg/L	---	---	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
Bromomethane	mg/L	---	---	ND (0.001)	ND (0.001)	ND (0.001)	ND (0.001)
Dibromomethane	mg/L	---	---	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
Carbon Tetrachloride	mg/L	---	0.0133 ^(w)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)
Chlorobenzene	mg/L	---	---	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
Chlorodibromomethane	mg/L	---	---	-	-	-	-
Chloroethane	mg/L	---	---	ND (0.001)	ND (0.001)	ND (0.001)	ND (0.001)
Chloroform	mg/L	---	0.0018 ^(w)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
Chloromethane	mg/L	---	---	ND (0.001)	ND (0.001)	ND (0.001)	ND (0.001)
cis-1,2-dichloroethene	mg/L	---	---	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
cis-1,3-dichloropropene	mg/L	---	---	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
Dichlorodifluoromethane	mg/L	---	---	ND (0.001)	ND (0.001)	ND (0.001)	ND (0.001)
Dichloromethane	mg/L	---	0.0981 ^(w)	-	-	-	-
Ethylbenzene	mg/L	0.14/0.0016 (AO)	0.20 ^(m)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
Hexachlorobutadiene	mg/L	---	0.0013 ^(w)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
Isopropylbenzene	mg/L	---	---	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
m & p-Xylene	mg/L	---	---	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
Methyl-tert-butylether (MTBE)	mg/L	0.015 (AO)	3.4	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
o-Xylene	mg/L	---	---	-	-	ND (0.0001)	ND (0.0001)
Styrene	mg/L	---	0.072 ^(w)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
Tetrachloroethene	mg/L	---	---	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)
Toluene	mg/L	0.06/0.024 (AO)	0.0005	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
trans-1,2-dichloroethene	mg/L	---	---	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
trans-1,3-dichloropropene	mg/L	---	---	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
Trichloroethene	mg/L	---	---	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)
Trichlorofluoromethane	mg/L	---	---	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
VH C6-C10	mg/L	---	---	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Vinyl Chloride	mg/L	---	---	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)
VPH (VHW6 to 10 - BTEX)	mg/L	---	---	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Xylenes (total)	mg/L	0.09/0.02 (AO)	0.03	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
Notes: 1. Values reported from BCMECCS - British Columbia Water Quality Guidelines, 2019 Edition, unless otherwise stated. 2. Drinking Water Criteria (DWQ): Metal guidelines are for total concentrations. 3. Freshwater Aquatic Life Criteria (FWAL): All criteria for metals are for total metals except criteria for aluminum and iron, which are for dissolved. 0.500 - Exceeds Drinking Water Criteria 0.500 - Exceeds Freshwater Aquatic Life Criteria 0.500 - Exceeds Drinking Water Criteria and Freshwater Aquatic Life Criteria a. Turbidity: BCMECCS Source Drinking Water Quality Guidelines, Guidelines Summary Table 2. Decreases compared to background concentrations are not interpreted as exceedances. b. Ammonia-N: BCMECCS Approved Water Quality Guidelines, Summary Report Table 26C. Temperature and pH dependent. c. Nitrite: BCMECCS Approved Water Quality Guidelines. Chloride dependent. d. Aluminum: criteria specified for dissolved species not total. Criteria pH dependent. If pH<6.5: $e^{(1.209-2.426 \cdot \text{pH}+0.286 \cdot \text{pH}^2)}$ e. Cadmium (mg/L) = $(e^{(1.03 \cdot \text{LN}(\text{HARDNESS})-5.274)})/1000$, valid for Hardness (as CaCO₃) of 7 to 455 mg/L. f. Copper guidelines calculated using BCMECCS Biotic Ligand Model (BLM) software. Dependent on multiple other parameters. g. Lead: hardness dependent. For Hardness (as CaCO₃) > 8 mg/L: $(e^{(1.273 \cdot \ln(\text{HARDNESS})-1.460)})/1000$. If hardness is < or equal to 8 mg/L: 0.003 mg/L. h. Manganese (mg/L) = (0.01102*HARDNESS)+0.54. i. Nickel: BCMECCS Working Water Quality Guidelines, Table 1. j. Silver: hardness <= 100 mg/L = 0.0001 mg/L, hardness > 100 mg/L = 0.003 mg/L k. Zinc (mg/L) = 0.033 for Hardness < or equal to 90 mg/L, $(33+(0.75 \cdot (\text{HARDNESS}-90)))/1000$ for Hardness > 90 mg/L l. Sulphate: BCMECCS Approved Water Quality Guidelines, Summary Report Table 40. Hardness dependent. m. Interim guideline n. Temperature: Streams with Bull Trout and/or Dolly Varden = 15, unknown fish distribution = 19 o. Alkalinity (Total as CaCO3): BCMECCS Working Water Quality Guidelines, Table 1. w. Values reported from BCMECCS - Working Water Quality Guidelines for British Columbia (2017). Values are long-term (i.e., average) concentrations unless identified as a short-term maximum. AO - Aesthetic Objective - No data available --- Currently no Standard/Criteria ND - Not detected above the laboratory Reportable Detection Limit (RDL)							

Table 12 2022 Groundwater Quality Results - MW-2A

Sample Date:	Units	BCMECCS Criteria ⁽¹⁾		Mar-22	Jul-22	Sep-22	Dec-22
Parameters:		DWQ ⁽²⁾	FWAL ⁽³⁾				
Lab Sample ID:				-	8143114	-	-
Field Parameters							
pH	s.u.	---	6.5-9.0	NM	NM	DRY	DRY
Conductivity, Electrical	µS/cm	---	---	NM	NM	DRY	DRY
Temperature	°C	15 (AO)	---	NM	NM	DRY	DRY
Dissolved Oxygen	mg/L	---	---	NM	NM	DRY	DRY
Redox Potential	(mV)	---	---	NM	NM	DRY	DRY
General							
Chemical Oxygen Demand (COD)	mg/L	---	---	-	100.0	DRY	DRY
Dissolved Organic Carbon (DOC)	mg/L	---	---	-	-	DRY	DRY
Conductivity, Electrical	µS/cm	---	---	-	1010	DRY	DRY
pH	s.u.	---	6.5-9.0	-	7.62	DRY	DRY
Alkalinity (Total as CaCO3)	mg/L	---	(o) ^(w)	-	357	DRY	DRY
Alkalinity (PP as CaCO3)	mg/L	---	---	-	ND (5)	DRY	DRY
Bicarbonate (HCO ₃)	mg/L	---	---	-	435	DRY	DRY
Carbonate (as CaCO ₃)	mg/L	---	---	-	ND (6)	DRY	DRY
Hydroxide (OH)	mg/L	---	---	-	ND (5)	DRY	DRY
Turbidity	NTU	(a)	---	-	23.4	DRY	DRY
Hardness (as CaCO ₃)	mg/L	---	---	-	190	DRY	DRY
Nutrients							
Ammonia	mg/L	---	0.681-28.7 ^(b)	-	26.90	DRY	DRY
Dissolved Nitrate (N)	mg/L	10	32.8	-	ND (0.1)	DRY	DRY
Dissolved Nitrite (N)	mg/L	1.0	0.06-0.6 ^(c)	-	ND (0.1)	DRY	DRY
Total Phosphorus (P)	mg/L	0.01 (AO)	---	-	0.720	DRY	DRY
Nitrate plus Nitrite (N)	mg/L	10	---	-	ND (0.20)	DRY	DRY
Total Nitrogen (N)	mg/L	---	---	-	34.6	DRY	DRY
Total Kjeldahl Nitrogen (TKN)	mg/L	---	---	-	34.6	DRY	DRY
Anions							
Chloride	mg/L	250 (AO)	600	-	99.20	DRY	DRY
Sulfate	mg/L	500 (AO)	(l)	-	ND (1)	DRY	DRY
Dissolved Metals							
Aluminum	mg/L	9.5	0.1 ^(d)	-	0.05	DRY	DRY
Antimony	mg/L	---	0.009 ^(w)	-	0.00052	DRY	DRY
Arsenic	mg/L	0.01	0.005	-	0.011	DRY	DRY
Barium	mg/L	---	1 ^(w)	-	0.160	DRY	DRY
Beryllium	mg/L	---	0.00013 ^(w)	-	ND (0.00005)	DRY	DRY
Bismuth	mg/L	---	---	-	ND (0.001)	DRY	DRY
Boron	mg/L	5.0	1.2	-	1.10	DRY	DRY
Cadmium	mg/L	0.005	(e)	-	0.00007	DRY	DRY
Calcium	mg/L	---	---	-	57	DRY	DRY
Chromium	mg/L	---	---	-	0.0032	DRY	DRY
Cobalt	mg/L	---	0.11	-	0.0021	DRY	DRY
Copper	mg/L	1.0	(f)	-	0.0035	DRY	DRY
Iron	mg/L	0.3 (AO)	0.35	-	5.40	DRY	DRY
Lead	mg/L	0.01	0.003 ^(g)	-	0.00	DRY	DRY
Lithium	mg/L	---	---	-	0.00	DRY	DRY
Magnesium	mg/L	---	---	-	11	DRY	DRY
Manganese	mg/L	0.05 (AO)	(h)	-	0.67	DRY	DRY
Mercury	mg/L	0.001	---	-	ND (0.00001)	DRY	DRY
Molybdenum	mg/L	0.25	2	-	0.0012	DRY	DRY
Nickel	mg/L	---	0.025-0.15 ^{(i)(w)}	-	0.0078	DRY	DRY
Phosphorus	mg/L	---	---	-	0.720	DRY	DRY
Potassium	mg/L	---	---	-	37	DRY	DRY
Selenium	mg/L	0.01	0.002	-	ND (0.0002)	DRY	DRY
Silicon	mg/L	---	---	-	6	DRY	DRY
Silver	mg/L	---	0.0001-0.003 ^(j)	-	ND (0.00001)	DRY	DRY
Sodium	mg/L	---	---	-	74	DRY	DRY
Strontium	mg/L	---	---	-	0.35	DRY	DRY
Sulfur	mg/L	---	---	-	1.4	DRY	DRY
Tellurium	mg/L	---	---	-	-	DRY	DRY
Thallium	mg/L	---	---	-	ND (0.00001)	DRY	DRY
Thorium	mg/L	---	---	-	ND(0.00005)	DRY	DRY
Tin	mg/L	---	---	-	0.0002	DRY	DRY
Titanium	mg/L	---	---	-	0.005	DRY	DRY
Tungsten	mg/L	---	---	-	-	DRY	DRY
Uranium	mg/L	---	0.0085 ^(w)	-	0.00006	DRY	DRY
Vanadium	mg/L	---	---	-	0.012	DRY	DRY
Zinc	mg/L	5.0 (AO)	(k)	-	0.018	DRY	DRY
Zirconium	mg/L	---	---	-	0.0003	DRY	DRY

Table 12 2022 Groundwater Quality Results - MW-2A

Sample Date:	Units	BCMECCS Criteria ⁽¹⁾		Mar-22	Jul-22	Sep-22	Dec-22
Parameters:		DWQ ⁽²⁾	FWAL ⁽³⁾				
Lab Sample ID:				-	8143114	-	-
Volatile Organic Compounds							
1,1,1,2-tetrachloroethane	mg/L	---	---	-	ND (0.0001)	DRY	DRY
1,1,1-trichloroethane	mg/L	---	---	-	ND (0.0001)	DRY	DRY
1,1,2,2-tetrachloroethane	mg/L	---	---	-	ND (0.0001)	DRY	DRY
1,1,2Trichloro-1,2,2Trifluoroethane	mg/L	---	---	-		DRY	DRY
1,1,2-trichloroethane	mg/L	---	---	-	ND (0.0001)	DRY	DRY
1,1-dichloroethane	mg/L	---	---	-	ND (0.0001)	DRY	DRY
1,1-dichloroethene	mg/L	---	---	-	ND(0.0005)	DRY	DRY
1,2,3-trichlorobenzene	mg/L	---	0.008 ^(w)	-	ND (0.0001)	DRY	DRY
1,2,4-trichlorobenzene	mg/L	---	0.024 ^(w)	-	ND (0.0001)	DRY	DRY
1,2-dibromoethane	mg/L	---	---	-	ND (0.0001)	DRY	DRY
1,2-dichlorobenzene	mg/L	---	0.0007 ^(w)	-	ND (0.0001)	DRY	DRY
1,2-dichloroethane	mg/L	---	0.100 ^(w)	-	ND(0.0005)	DRY	DRY
1,2-dichloropropane	mg/L	---	---	-	ND (0.0001)	DRY	DRY
1,3,5-trimethylbenzene	mg/L	---	---	-	ND (0.0001)	DRY	DRY
1,3-dichlorobenzene	mg/L	---	0.150 ^(w)	-	ND (0.0001)	DRY	DRY
1,3-dichloropropane	mg/L	---	---	-	ND (0.0001)	DRY	DRY
1,4-dichlorobenzene	mg/L	---	0.026 ^(w)	-	ND (0.0001)	DRY	DRY
Benzene	mg/L	0.005	0.04 ^(m)	-	ND (0.0001)	DRY	DRY
Bromobenzene	mg/L	---	---	-	ND (0.0001)	DRY	DRY
Bromodichloromethane	mg/L	---	---	-	ND (0.0001)	DRY	DRY
Bromoform	mg/L	---	---	-	ND (0.0001)	DRY	DRY
Bromomethane	mg/L	---	---	-	ND(0.001)	DRY	DRY
Dibromomethane	mg/L	---	---	-	ND (0.0001)	DRY	DRY
Carbon Tetrachloride	mg/L	---	0.0133 ^(w)	-	ND(0.0005)	DRY	DRY
Chlorobenzene	mg/L	---	---	-	ND(0.001)	DRY	DRY
Chlorodibromomethane	mg/L	---	---	-	ND(0.001)	DRY	DRY
Chloroethane	mg/L	---	---	-	ND(0.001)	DRY	DRY
Chloroform	mg/L	---	0.0018 ^(w)	-	ND (0.0001)	DRY	DRY
Chloromethane	mg/L	---	---	-	ND(0.001)	DRY	DRY
cis-1,2-dichloroethene	mg/L	---	---	-	ND (0.0001)	DRY	DRY
cis-1,3-dichloropropene	mg/L	---	---	-	ND (0.0001)	DRY	DRY
Dichlorodifluoromethane	mg/L	---	---	-	ND(0.001)	DRY	DRY
Dichloromethane	mg/L	---	0.0981 ^(w)	-	ND(0.001)	DRY	DRY
Ethylbenzene	mg/L	0.14/0.0016 (AO)	0.20 ^(m)	-	ND (0.0001)	DRY	DRY
Hexachlorobutadiene	mg/L	---	0.0013 ^(w)	-	ND (0.0001)	DRY	DRY
Isopropylbenzene	mg/L	---	---	-	ND(0.001)	DRY	DRY
m & p-Xylene	mg/L	---	---	-	ND (0.0001)	DRY	DRY
Methyl-tert-butylether (MTBE)	mg/L	0.015 (AO)	3.4	-	ND (0.0001)	DRY	DRY
o-Xylene	mg/L	---	---	-	ND (0.0001)	DRY	DRY
Styrene	mg/L	---	0.072 ^(w)	-	ND (0.0001)	DRY	DRY
Tetrachloroethene	mg/L	---	---	-	ND(0.0005)	DRY	DRY
Toluene	mg/L	0.06/0.024 (AO)	0.0005	-	ND (0.0001)	DRY	DRY
trans-1,2-dichloroethene	mg/L	---	---	-	ND (0.0001)	DRY	DRY
trans-1,3-dichloropropene	mg/L	---	---	-	ND (0.0001)	DRY	DRY
Trichloroethene	mg/L	---	---	-	ND(0.0005)	DRY	DRY
Trichlorofluoromethane	mg/L	---	---	-	ND (0.0001)	DRY	DRY
VH C6-C10	mg/L	---	---	-	ND(0.05)	DRY	DRY
Vinyl Chloride	mg/L	---	---	-	ND(0.0005)	DRY	DRY
VPH (VHW6 to 10 - BTEX)	mg/L	---	---	-	ND(0.05)	DRY	DRY
Xylenes (total)	mg/L	0.09/0.02 (AO)	0.03	-	ND (0.0001)	DRY	DRY
Notes: 1. Values reported from BCMECCS - British Columbia Water Quality Guidelines, 2019 Edition, unless otherwise stated. 2. Drinking Water Criteria (DWQ): Metal guidelines are for total concentrations. 3. Freshwater Aquatic Life Criteria (FWAL): All criteria for metals are for total metals except criteria for aluminum and iron, which are for dissolved. 0.500 - Exceeds Drinking Water Criteria 0.500 - Exceeds Freshwater Aquatic Life Criteria 0.500 - Exceeds Drinking Water Criteria and Freshwater Aquatic Life Criteria a. Turbidity: BCMECCS Source Drinking Water Quality Guidelines, Guidelines Summary Table 2. Decreases compared to background concentrations are not b. Ammonia-N: BCMECCS Approved Water Quality Guidelines, Summary Report Table 26D. Temperature and pH dependent. c. Nitrite: BCMECCS Approved Water Quality Guidelines. Chloride dependent. d. Aluminum: criteria specified for dissolved species not total. Criteria pH dependent. If pH<6.5: e^(1.209-2.426*pH+0.286*pH²) e. Cadmium (mg/L) = (e^(1.03*LN(HARDNESS)-5.274))/1000, valid for Hardness (as CaCO₃) of 7 to 455 mg/L. f. Copper guidelines calculated using BCMECCS Biotic Ligand Model (BLM) software. Dependent on multiple other parameters. g. Lead: hardness dependent. For Hardness (as CaCO₃) > 8 mg/L: (e^(1.273*ln(HARDNESS)-1.460))/1000 . If hardness is < or equal to 8 mg/L: 0.003 mg/L. h. Manganese (mg/L) = (0.01102*HARDNESS)+0.54. i. Nickel: BCMECCS Working Water Quality Guidelines, Table 1. j. Silver: hardness <= 100 mg/L = 0.0001 mg/L, hardness > 100 mg/L = 0.003 mg/L k. Zinc (mg/L) = 0.033 for Hardness < or equal to 90 mg/L, (33+(0.75*(HARDNESS-90)))/1000 for Hardness > 90 mg/L l. Sulphate: BCMECCS Approved Water Quality Guidelines, Summary Report Table 40. Hardness dependent. m. Interim guideline n. Temperature: Streams with Bull Trout and/or Dolly Varden = 15, unknown fish distribution = 19 o. Alkalinity (Total as CaCO₃): BCMECCS Working Water Quality Guidelines, Table 1. w. Values reported from BCMECCS - Working Water Quality Guidelines for British Columbia (2017). Values are long-term (i.e., average) concentrations unless identified as a short-term maximum. AO - Aesthetic Objective - No data available --- Currently no Standard/Criteria NM - not measured ND - Not detected above the laboratory Reportable Detection Limit (RDL)							

Table 13 2022 Groundwater Quality Results - MW-3

Sample Date:	Units	BCMECCS Criteria ⁽¹⁾		Mar-22	Jul-22	Sep-22	Dec-22	
Parameters:		DWQ ⁽²⁾	FWAL ⁽³⁾					Duplicate
Lab Sample ID:				7999171	8143113	8288626	8424788	8424837
Field Parameters								
pH	s.u.	---	6.5-9.0	7.30	6.8	<u>6.33</u>	6.60	-
Conductivity, Electrical	µS/cm	---	---	0.890	0.954	1.000	1.30	-
Temperature	°C	15 (AO)	---	8.8	14.0	16.39	9.97	-
Dissolved Oxygen	mg/L	---	---	6.71	4.83	3.38	13	-
Redox Potential	(mV)	---	---	172	46	8	16	-
General								
Chemical Oxygen Demand (COD)	mg/L	---	---	44	50	80.0	60.0	60
Dissolved Organic Carbon (DOC)	mg/L	---	---	-	-	-	-	15.8
Conductivity, Electrical	µS/cm	---	---	890	993	1019	1258	1268
pH	s.u.	---	6.5-9.0	7.7	7.45	7.64	7.38	6.6
Alkalinity (Total as CaCO3)	mg/L	---	(o) ^(w)	348	371	357	478	ND(5)
Alkalinity (PP as CaCO3)	mg/L	---	---	ND(5)	ND(5)	ND(5)	ND(5)	ND(5)
Bicarbonate (HCO ₃)	mg/L	---	---	425	453	435	583	588
Carbonate (as CaCO ₃)	mg/L	---	---	ND(6)	ND(6)	ND(6)	ND(6)	ND(6)
Hydroxide (OH)	mg/L	---	---	ND(5)	ND(5)	ND(5)	ND(5)	ND(5)
Turbidity	NTU	(a)	---	30.7	16.4	11.9	54	45.6
Hardness (as CaCO ₃)	mg/L	---	---	230	220	-	290	300
Nutrients								
Ammonia	mg/L	---	0.681-28.7 ^(b)	12.8	21.7	19.9	24.8	ND(0.025)
Dissolved Nitrate (N)	mg/L	10	32.8	ND(0.1)	ND(0.1)	ND(0.1)	ND(0.1)	ND(0.1)
Dissolved Nitrite (N)	mg/L	1.0	0.06-0.6 ^(c)	ND(0.1)	ND(0.1)	ND(0.1)	ND(0.1)	ND(0.01)
Total Phosphorus (P)	mg/L	0.01 (AO)	---	0.058	0.023	0.043	0.042	
Nitrate plus Nitrite (N)	mg/L	10	---	ND(0.20)	ND(0.20)	ND(0.20)	ND(0.20)	0.1
Total Nitrogen (N)	mg/L	---	---	14.8	23.4	20.9	29.2	0.15
Total Kjeldahl Nitrogen (TKN)	mg/L	---	---	14.7	23.4	20.9	29.2	ND(0.07)
Anions								
Chloride	mg/L	250 (AO)	600	72.0	88.7	94.1	105	0.91
Sulfate	mg/L	500 (AO)	(l)	1	ND(1)	1	ND(1)	1
Dissolved Metals								
Aluminum	mg/L	9.5	0.1 ^(d)	0.16	0.026	0.024	ND (0.001)	0.002
Antimony	mg/L	---	0.009 ^(w)	0.00024	0.0003	0.0003	0.00024	0.0002
Arsenic	mg/L	0.01	0.005	0.0011	0.0016	0.0015	0.0013	0.0013
Barium	mg/L	---	1 ^(w)	0.3	0.38	0.381	0.5	0.52
Beryllium	mg/L	---	0.00013 ^(w)	ND(0.00005)	ND(0.00005)	ND (0.0001)	0.00005	ND(0.00005)
Bismuth	mg/L	---	---	ND (0.0001)	ND (0.0001)	ND(0.0005)	0.0001	0.0001
Boron	mg/L	5.0	1.2	0.49	0.65	0.776	0.83	0.85
Cadmium	mg/L	0.005	(e)	0.00004	ND(0.00001)	ND(0.00001)	ND(0.00001)	ND(0.00001)
Calcium	mg/L	---	---	70	67	-	88	89
Chromium	mg/L	---	---	0.00064	0.00055	0.0006	0.00056	0.00053
Cobalt	mg/L	---	0.11	0.00021	0.00016	0.0002	0.00015	0.00015
Copper	mg/L	1.0	(f)	0.0007	<0.0005	ND(0.001)	0.0005	ND(0.0005)
Iron	mg/L	0.3 (AO)	0.35	5.200	3.200	4.9	0.029	0.031
Lead	mg/L	0.01	0.003 ^(g)	0.00035	0.00008	ND (0.0001)	0.00004	ND (0.0001)
Lithium	mg/L	---	---	ND(0.0005)	ND(0.0005)	ND(0.001)	ND(0.0005)	ND(0.001)
Magnesium	mg/L	---	---	14	13	-	18	
Manganese	mg/L	0.05 (AO)	(h)	0.89	0.79	0.9	1.2	1.1
Mercury	mg/L	0.001	---	ND(0.00001)	ND(0.00001)	-	ND(0.00001)	ND(0.00001)
Molybdenum	mg/L	0.25	2	0.00008	0.00014	ND(0.001)	0.0002	0.00021
Nickel	mg/L	---	0.025-0.15 ^{(i)(w)}	0.0027	0.0034	0.0042	0.0044	0.0045
Phosphorus	mg/L	---	---	0.058	0.023	0.043	ND(0.05)	0.053
Potassium	mg/L	---	---	24	30	-	38	40
Selenium	mg/L	0.01	0.002	ND(0.0002)	ND(0.0002)	ND(0.0002)	ND(0.0002)	ND(0.0002)
Silicon	mg/L	---	---	4	3	-	4.3	-
Silver	mg/L	---	0.0001-0.003 ^(j)	ND(0.00001)	ND(0.00001)	ND(0.00001)	ND(0.00001)	ND(0.00001)
Sodium	mg/L	---	---	68	71	-	96	98
Strontium	mg/L	---	---	0.41	0.45	0.49	0.58	0.61
Sulfur	mg/L	---	---	1.6	1.4	-	1.7	1.7
Tellurium	mg/L	---	---	-	-	-	-	-
Thallium	mg/L	---	---	ND(0.00001)	ND(0.00001)	ND(0.00005)	ND(0.00001)	ND(0.00001)
Thorium	mg/L	---	---	ND(0.00005)	ND(0.00005)	-	0.00005	ND(0.00005)
Tin	mg/L	---	---	0.0002	0.0002	ND(0.001)	0.0001	0.0001
Titanium	mg/L	---	---	0.0068	0.0009	0.001	0.0002	<0.0001
Tungsten	mg/L	---	---	-	-	-	ND(0.0002)	ND(0.0002)
Uranium	mg/L	---	0.0085 ^(w)	0.00001	0.00001	ND(0.0005)	0.00002	0.00002
Vanadium	mg/L	---	---	0.00066	0.00055	0.0008	0.00043	0.00047
Zinc	mg/L	5.0 (AO)	(k)	0.015	0.0049	0.004	0.004	0.0033
Zirconium	mg/L	---	---	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND(0.00001)	0.0003
Volatile Organic Compounds								
1,1,1,2-tetrachloroethane	mg/L	---	---	ND (0.0001)	ND (0.0001)	ND(0.001)	ND(0.001)	ND(0.001)
1,1,1-trichloroethane	mg/L	---	---	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
1,1,2,2-tetrachloroethane	mg/L	---	---	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
1,1,2Trichloro-1,2,2Trifluoroethane	mg/L	---	---					
1,1,2-trichloroethane	mg/L	---	---	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
1,1-dichloroethane	mg/L	---	---	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
1,1-dichloroethene	mg/L	---	---	ND(0.0005)	ND(0.0005)	ND(0.0005)	ND(0.0005)	ND(0.0005)
1,2,3-trichlorobenzene	mg/L	---	0.008 ^(w)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
1,2,4-trichlorobenzene	mg/L	---	0.024 ^(w)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
1,2-dibromoethane	mg/L	---	---	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
1,2-dichlorobenzene	mg/L	---	0.0007 ^(w)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
1,2-dichloroethane	mg/L	---	0.100 ^(w)	ND(0.0005)	ND(0.0005)	ND(0.0005)	ND(0.0005)	ND(0.0005)
1,2-dichloropropane	mg/L	---	---	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)

Table 13 2022 Groundwater Quality Results - MW-3

Sample Date:	Units	BCMECCS Criteria ⁽¹⁾		Mar-22	Jul-22	Sep-22	Dec-22	
Parameters:		DWQ ⁽²⁾	FWAL ⁽³⁾					Duplicate
Lab Sample ID:				7999171	8143113	8288626	8424788	8424837
1,3,5-trimethylbenzene	mg/L	---	---	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
1,3-dichlorobenzene	mg/L	---	0.150 ^(w)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
1,3-dichloropropane	mg/L	---	---	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
1,4-dichlorobenzene	mg/L	---	0.026 ^(w)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
Benzene	mg/L	0.005	0.04 ^(m)	0.0003	0.0001	0.0001	0.0004	0.0004
Bromobenzene	mg/L	---	---	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
Bromodichloromethane	mg/L	---	---	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
Bromoform	mg/L	---	---	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
Bromomethane	mg/L	---	---	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
Dibromomethane	mg/L	---	---	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
Carbon Tetrachloride	mg/L	---	0.0133 ^(w)	ND(0.0005)	ND(0.0005)	ND(0.0005)	ND(0.0005)	ND(0.0005)
Chlorobenzene	mg/L	---	---	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
Chlorodibromomethane	mg/L	---	---	-	-	-	-	-
Chloroethane	mg/L	---	---	ND(0.001)	ND(0.001)	ND(0.001)	ND(0.001)	ND(0.001)
Chloroform	mg/L	---	0.0018 ^(w)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
Chloromethane	mg/L	---	---	ND(0.001)	ND(0.001)	ND(0.001)	ND(0.001)	ND(0.001)
cis-1,2-dichloroethene	mg/L	---	---	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
cis-1,3-dichloropropene	mg/L	---	---	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
Dichlorodifluoromethane	mg/L	---	---	ND(0.001)	ND(0.001)	ND(0.001)	ND(0.001)	ND(0.001)
Dichloromethane	mg/L	---	0.0981 ^(w)	-	-	-	-	-
Ethylbenzene	mg/L	0.14/0.0016 (AO)	0.20 ^(m)	0.0001	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
Hexachlorobutadiene	mg/L	---	0.0013 ^(w)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
Isopropylbenzene	mg/L	---	---	-	-	-	-	-
m & p-Xylene	mg/L	---	---	0.0002	ND (0.0001)	ND (0.0001)	0.0022	0.0022
Methyl-tert-butylether (MTBE)	mg/L	0.015 (AO)	3.4	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
o-Xylene	mg/L	---	---	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
Styrene	mg/L	---	0.072 ^(w)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
Tetrachloroethene	mg/L	---	---	ND(0.0005)	ND(0.0005)	ND(0.0005)	ND(0.0005)	ND(0.0005)
Toluene	mg/L	0.06/0.024 (AO)	0.0005	ND (0.0001)	ND (0.0001)	0.0002	ND (0.0001)	ND (0.0001)
trans-1,2-dichloroethene	mg/L	---	---	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
trans-1,3-dichloropropene	mg/L	---	---	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
Trichloroethene	mg/L	---	---	ND(0.0005)	ND(0.0005)	ND(0.0005)	ND(0.0005)	ND(0.0005)
Trichlorofluoromethane	mg/L	---	---	ND (0.0001)	ND (0.0001)	ND (0.0001)	<0.0001	ND (0.0001)
VH C6-C10	mg/L	---	---	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)
Vinyl Chloride	mg/L	---	---	ND(0.0005)	ND(0.0005)	ND(0.0005)	ND(0.0005)	ND(0.0005)
VPH (VHW6 to 10 - BTEX)	mg/L	---	---	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)
Xylenes (total)	mg/L	0.09/0.02 (AO)	0.03	0.0002	ND (0.0001)	ND (0.0001)	0.0022	0.0022
Notes: 1. Values reported from BCMECCS - British Columbia Water Quality Guidelines, 2019 Edition, unless otherwise stated. 2. Drinking Water Criteria (DWQ): Metal guidelines are for total concentrations. 3. Freshwater Aquatic Life Criteria (FWAL): All criteria for metals are for total metals except criteria for aluminum and iron, which are for dissolved. 0.500 - Exceeds Drinking Water Criteria 0.500 - Exceeds Freshwater Aquatic Life Criteria 0.500 - Exceeds Drinking Water Criteria and Freshwater Aquatic Life Criteria a. Turbidity: BCMECCS Source Drinking Water Quality Guidelines, Guidelines Summary Table 2. Decreases compared to background concentrations are not interpreted as exceedances. b. Ammonia-N: BCMECCS Approved Water Quality Guidelines, Summary Report Table 26D. Temperature and pH dependent. c. Nitrite: BCMECCS Approved Water Quality Guidelines. Chloride dependent. d. Aluminum: criteria specified for dissolved species not total. Criteria pH dependent. If pH<6.5: e^(1.209-2.426*pH+0.286*pH²) e. Cadmium (mg/L) = (e^(1.03*LN(HARDNESS)-5.274))/1000, valid for Hardness (as CaCO₃) of 7 to 455 mg/L. f. Copper guidelines calculated using BCMECCS Biotic Ligand Model (BLM) software. Dependent on multiple other parameters. g. Lead: hardness dependent. For Hardness (as CaCO₃) > 8 mg/L: (e^(1.273*ln(HARDNESS)-1.460))/1000 . If hardness is < or equal to 8 mg/L: 0.003 mg/L. h. Manganese (mg/L) = (0.01102*HARDNESS)+0.54. i. Nickel: BCMECCS Working Water Quality Guidelines, Table 1. j. Silver: hardness <= 100 mg/L = 0.0001 mg/L, hardness > 100 mg/L = 0.003 mg/L k. Zinc (mg/L) = 0.033 for Hardness < or equal to 90 mg/L, (33+(0.75*(HARDNESS-90)))/1000 for Hardness > 90 mg/L l. Sulphate: BCMECCS Approved Water Quality Guidelines, Summary Report Table 40. Hardness dependent. m. Interim guideline n. Temperature: Streams with Bull Trout and/or Dolly Varden = 15, unknown fish distribution = 19 o. Alkalinity (Total as CaCO3): BCMECCS Working Water Quality Guidelines, Table 1. w. Values reported from BCMECCS - Working Water Quality Guidelines for British Columbia (2017). Values are long-term (i.e., average) concentrations unless identified as a short-term maximum. AO - Aesthetic Objective - No data available --- Currently no Standard/Criteria ND - Not detected above the laboratory Reportable Detection Limit (RDL)								

Table 14 2022 Groundwater Quality Results - MW13-4

Sample Date:	Units	BCMECCS Criteria ¹		Mar-22	Jul-22	Sep-22	Dec-22
Parameters:		DWQ ⁽²⁾	FWAL ⁽³⁾				
Lab Sample ID:				7999168	8143117	8288628	1622107-7
Field Parameters							
pH	s.u.	---	6.5-9.0	7.71	7.24	6.32	6.99
Conductivity, Electrical	µS/cm	---	---	0.09	0.071	0.056	1.4
Temperature	°C	15 (AO)	---	8.45	12.62	11.45	5.29
Dissolved Oxygen	mg/L	---	---	10.39	9.6	6.94	46.98
Redox Potential	(mV)	---	---	109	89	150	78
General							
Chemical Oxygen Demand (COD)	mg/L	---	---	30	ND (5)	30	30
Dissolved Organic Carbon (DOC)	mg/L	---	---	ND (0.5)	-	-	-
Conductivity, Electrical	µS/cm	---	---	65	65	53	60
pH	s.u.	---	6.5-9.0	6.96	6.96	6.96	6.2
Alkalinity (Total as CaCO3)	mg/L	---	(o) ^(w)	29	29	21	25
Alkalinity (PP as CaCO3)	mg/L	---	---	ND (5)	ND (5)	ND (5)	ND (5)
Bicarbonate (HCO ₃)	mg/L	---	---	35	35	25	31
Carbonate (as CaCO ₃)	mg/L	---	---	ND (6)	ND (6)	ND (6)	ND (6)
Hydroxide (OH)	mg/L	---	---	ND (5)	ND (5)	ND (5)	ND (5)
Turbidity	NTU	(a)	---	0.630	-	-	208
Hardness (as CaCO ₃)	mg/L	---	---	ND (5)	25	-	23
Nutrients							
Ammonia	mg/L	---	0.681-28.7 ^(b)	ND (0.025)	ND (0.025)	ND (0.025)	ND (0.025)
Dissolved Nitrate (N)	mg/L	10	32.8	0.09	0.1	0.09	0.08
Dissolved Nitrite (N)	mg/L	1.0	0.06-0.6 ^(c)	ND (0.01)	ND (0.01)	ND (0.01)	<0.01
Total Phosphorus (P)	mg/L	0.01 (AO)	---	0.015	0.347	0.327	0.08
Nitrate plus Nitrite (N)	mg/L	10	---	0.02	0.1	0.09	<0.10
Total Nitrogen (N)	mg/L	---	---	0.20	ND (0.20)	ND (0.20)	ND (010)
Total Kjeldahl Nitrogen (TKN)	mg/L	---	---	ND (0.07)	ND (0.07)	ND (0.07)	ND (0.07)
Anions							
Chloride	mg/L	250 (AO)	600	1.37	1.60	2.00	1.78
Sulfate	mg/L	500 (AO)	(l)	1.3	1.7	1.6	1.8
Dissolved Metals							
Aluminum	mg/L	9.5	0.1 ^(d)	0.053	0.82	2.22	0.003
Antimony	mg/L	---	0.009 ^(w)	0.00007	0.00005	ND (0.0002)	0.00011
Arsenic	mg/L	0.01	0.005	ND (0.0001)	0.0003	0.0004	0.0001
Barium	mg/L	---	1 ^(w)	0.0022	0.017	0.04	0.0011
Beryllium	mg/L	---	0.00013 ^(w)	ND (0.00005)	ND (0.00005)	ND(0.0001)	ND (0.00005)
Bismuth	mg/L	---	---	ND(0.0001)	ND(0.0001)	ND (0.005)	ND(0.0001)
Boron	mg/L	5.0	1.2	ND (0.002)	0.004	0.009	0.004
Cadmium	mg/L	0.005	(e)	ND (0.00001)	0.00002	0.00003	ND 0.00001
Calcium	mg/L	---	---	8.5	6.3	-	7.4
Chromium	mg/L	---	---	0.00015	0.00072	0.0016	0.00021
Cobalt	mg/L	---	0.11	0.00003	0.00047	0.0012	0.00002
Copper	mg/L	1.0	(f)	ND (0.0005)	0.002	0.006	ND (0.0005)
Iron	mg/L	0.3 (AO)	0.35	0.047	0.85	2.04	0.01
Lead	mg/L	0.01	0.003 ^(g)	0.00014	0.00099	0.0022	ND(0.00001)
Lithium	mg/L	---	---	ND (0.0005)	0.001	0.002	ND (0.0005)
Magnesium	mg/L	---	---	1.1	1.1		0.96
Manganese	mg/L	0.05 (AO)	(h)	0.003	0.032	0.074	0.001
Mercury	mg/L	0.001	---	ND (0.00001)	-	-	ND(0.00001)
Molybdenum	mg/L	0.25	2	ND (0.00002)	0.00007	ND (0.001)	0.00016
Nickel	mg/L	---	0.025-0.15 ^{(i)(w)}	ND (0.0002)	0.0003	0.001	ND (0.0002)
Phosphorus	mg/L	---	---	ND (0.0002)	0.347	-	0.5
Potassium	mg/L	---	---	0.6	0.64	-	0.56
Selenium	mg/L	0.01	0.002	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
Silicon	mg/L	---	---	8.6	9.9	-	9.3
Silver	mg/L	---	0.0001-0.003 ^(j)	0.00005	ND(0.00001)	ND(0.00001)	ND(0.00001)
Sodium	mg/L	---	---	3.3	3.2	-	3.7
Strontium	mg/L	---	---	0.053	0.047	0.064	0.047
Sulfur	mg/L	---	---	0.5	0.57	-	0.66
Tellurium	mg/L	---	---	-	-	-	-
Thallium	mg/L	---	---	ND (0.00001)	ND (0.00001)	ND (0.00005)	ND (0.00005)
Thorium	mg/L	---	---	ND (0.00005)	0.00021	-	ND (0.00005)
Tin	mg/L	---	---	ND (0.0001)	ND (0.0001)	ND (0.010)	ND (0.00001)
Titanium	mg/L	---	---	0.0015	0.023	0.0555	ND (0.00001)
Tungsten	mg/L	---	---	-	-		0.0003
Uranium	mg/L	---	0.0085 ^(w)	ND (0.00001)	0.00018	ND (0.0005)	0.00002
Vanadium	mg/L	---	---	0.001	0.002	0.005	0.0005
Zinc	mg/L	5.0 (AO)	(k)	0.0065	0.0076	0.014	0.0012
Zirconium	mg/L	---	---	ND (0.0001)	ND (0.0001)	ND (0.001)	ND (0.00001)
Volatile Organic Compounds							
1,1,1,2-tetrachloroethane	mg/L	---	---	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
1,1,1-trichloroethane	mg/L	---	---	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
1,1,2,2-tetrachloroethane	mg/L	---	---	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)

Table 14 2022 Groundwater Quality Results - MW13-4

Sample Date:	Units	BCMECCS Criteria ¹		Mar-22	Jul-22	Sep-22	Dec-22
Parameters:		DWQ ⁽²⁾	FWAL ⁽³⁾				
Lab Sample ID:				7999168	8143117	8288628	1622107-7
1,1,2Trichloro-1,2,2Trifluoroethane	mg/L	---	---	-	-	-	-
1,1,2-trichloroethane	mg/L	---	---	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
1,1-dichloroethane	mg/L	---	---	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
1,1-dichloroethene	mg/L	---	---	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)
1,2,3-trichlorobenzene	mg/L	---	0.008 ^(w)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
1,2,4-trichlorobenzene	mg/L	---	0.024 ^(w)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
1,2-dibromoethane	mg/L	---	---	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
1,2-dichlorobenzene	mg/L	---	0.0007 ^(w)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
1,2-dichloroethane	mg/L	---	0.100 ^(w)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)
1,2-dichloropropane	mg/L	---	---	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
1,3,5-trimethylbenzene	mg/L	---	---	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
1,3-dichlorobenzene	mg/L	---	0.150 ^(w)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
1,3-dichloropropane	mg/L	---	---	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
1,4-dichlorobenzene	mg/L	---	0.026 ^(w)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
Benzene	mg/L	0.005	0.04 ^(m)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
Bromobenzene	mg/L	---	---	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
Bromodichloromethane	mg/L	---	---	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
Bromoform	mg/L	---	---	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
Bromomethane	mg/L	---	---	ND (0.001)	ND (0.001)	ND (0.001)	ND (0.001)
Dibromomethane	mg/L	---	---	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
Carbon Tetrachloride	mg/L	---	0.0133 ^(w)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)
Chlorobenzene	mg/L	---	---	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
Chlorodibromomethane	mg/L	---	---	-	-	-	-
Chloroethane	mg/L	---	---	ND (0.001)	ND (0.001)	ND (0.001)	ND (0.001)
Chloroform	mg/L	---	0.0018 ^(w)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
Chloromethane	mg/L	---	---	ND (0.001)	ND (0.001)	ND (0.001)	ND (0.001)
cis-1,2-dichloroethene	mg/L	---	---	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
cis-1,3-dichloropropene	mg/L	---	---	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
Dichlorodifluoromethane	mg/L	---	---	ND (0.001)	ND (0.001)	ND (0.001)	ND (0.001)
Dichloromethane	mg/L	---	0.0981 ^(w)	-	-	-	-
Ethylbenzene	mg/L	0.14/0.0016 (AO)	0.20 ^(m)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
Hexachlorobutadiene	mg/L	---	0.0013 ^(w)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
Isopropylbenzene	mg/L	---	---	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
m & p-Xylene	mg/L	---	---	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
Methyl-tert-butylether (MTBE)	mg/L	0.015 (AO)	3.4	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
o-Xylene	mg/L	---	---	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
Styrene	mg/L	---	0.072 ^(w)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
Tetrachloroethene	mg/L	---	---	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)
Toluene	mg/L	0.06/0.024 (AO)	0.0005	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
trans-1,2-dichloroethene	mg/L	---	---	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
trans-1,3-dichloropropene	mg/L	---	---	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
Trichloroethene	mg/L	---	---	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)
Trichlorofluoromethane	mg/L	---	---	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
VH C6-C10	mg/L	---	---	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Vinyl Chloride	mg/L	---	---	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)
VPH (VHW6 to 10 - BTEX)	mg/L	---	---	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Xylenes (total)	mg/L	0.09/0.02 (AO)	0.03	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
Notes: 1. Values reported from BCMECCS - British Columbia Water Quality Guidelines, 2019 Edition, unless otherwise stated. 2. Drinking Water Criteria (DWQ): Metal guidelines are for total concentrations. 3. Freshwater Aquatic Life Criteria (FWAL): All criteria for metals are for total metals except criteria for aluminum and iron, which are for dissolved. 0.500 - Exceeds Drinking Water Criteria 0.500 - Exceeds Freshwater Aquatic Life Criteria 0.500 - Exceeds Drinking Water Criteria and Freshwater Aquatic Life Criteria a. Turbidity: BCMECCS Source Drinking Water Quality Guidelines, Guidelines Summary Table 2. Decreases compared to background concentrations are not interpreted as exceedances. b. Ammonia-N: BCMECCS Approved Water Quality Guidelines, Summary Report Table 26D. Temperature and pH dependent. c. Nitrite: BCMECCS Approved Water Quality Guidelines. Chloride dependent. d. Aluminum: criteria specified for dissolved species not total. Criteria pH dependent. If pH<6.5: e^(1.209-2.426*pH+0.286*pH²) e. Cadmium (mg/L) = (e^(1.03*LN(HARDNESS)-5.274))/1000, valid for Hardness (as CaCO₃) of 7 to 455 mg/L. f. Copper guidelines calculated using BCMECCS Biotic Ligand Model (BLM) software. Dependent on multiple other parameters. g. Lead: hardness dependent. For Hardness (as CaCO₃) > 8 mg/L: (e^(1.273*ln(HARDNESS)-1.460))/1000 . If hardness is < or equal to 8 mg/L: 0.003 mg/L. h. Manganese (mg/L) = (0.01102*HARDNESS)+0.54. i. Nickel: BCMECCS Working Water Quality Guidelines, Table 1. j. Silver: hardness <= 100 mg/L = 0.0001 mg/L, hardness > 100 mg/L = 0.003 mg/L k. Zinc (mg/L) = 0.033 for Hardness < or equal to 90 mg/L, (33+(0.75*(HARDNESS-90)))/1000 for Hardness > 90 mg/L l. Sulphate: BCMECCS Approved Water Quality Guidelines, Summary Report Table 40. Hardness dependent. m. Interim guideline n. Temperature: Streams with Bull Trout and/or Dolly Varden = 15, unknown fish distribution = 19 o. Alkalinity (Total as CaCO₃): BCMECCS Working Water Quality Guidelines, Table 1. w. Values reported from BCMECCS - Working Water Quality Guidelines for British Columbia (2017). Values are long-term (i.e., average) concentrations unless identified as a short-AO - Aesthetic Objective - No data available --- Currently no Standard/Criteria ND - Not detected above the laboratory Reportable Detection Limit (RDL)							

Table 15 2022 Groundwater Quality Results - MW13-1

Sample Date:	Units	BCMECCS Criteria ⁽¹⁾		Mar-22	Jul-22	Sep-22	Dec-22
Parameters:		DWQ ⁽²⁾	FWAL ⁽³⁾				
Lab Sample ID:				7999174	8142959	8288554	8424785
Field Parameters							
pH	s.u.	---	6.5-9.0	<u>6.27</u>	6.56	6.84	6.85
Conductivity, Electrical	µS/cm	---	---	0.678	1.14	1.1	1.2
Temperature	°C	15 (AO)	---	12.29	14.38	13.39	4.3
Dissolved Oxygen	mg/L	---	---	5.62	10	8.26	44.42
Redox Potential	(mV)	---	---	47	128	-66	8
General							
Chemical Oxygen Demand (COD)	mg/L	---	---	17	40.0	40.0	30.0
Dissolved Organic Carbon (DOC)	mg/L	---	---	-	-	-	-
Conductivity, Electrical	µS/cm	---	---	499	1159	1080	978
pH	s.u.	---	6.5-9.0	7.38	7.20	7.47	7.29
Alkalinity (Total as CaCO3)	mg/L	---	(o) ^(w)	243	504	482	441
Alkalinity (PP as CaCO3)	mg/L	---	---	ND (5)	ND (5)	ND (5)	ND (5)
Bicarbonate (HCO ₃)	mg/L	---	---	296	614	587	537
Carbonate (as CaCO ₃)	mg/L	---	---	ND (6)	ND (6)	ND (6)	ND (6)
Hydroxide (OH)	mg/L	---	---	ND (5)	ND (5)	ND (5)	ND (5)
Turbidity	NTU	(a)	---	57.6	-	-	99.4
Hardness (as CaCO ₃)	mg/L	---	---	160	220	188	340
Nutrients							
Ammonia	mg/L	---	0.681-28.7 ^(b)	<u>16.2</u>	<u>66.6</u>	<u>70.7</u>	<u>59.3</u>
Dissolved Nitrate (N)	mg/L	10	32.8	0.5	ND(0.1)	ND(0.1)	0.2
Dissolved Nitrite (N)	mg/L	1.0	0.06-0.6 ^(c)	ND(0.1)	ND(0.1)	ND(0.1)	ND(0.1)
Total Phosphorus (P)	mg/L	0.01 (AO)	---	0.125	0.187	0.2	0.188
Nitrate plus Nitrite (N)	mg/L	10	---	0.5	ND (0.20	ND(0.20)	0.2
Total Nitrogen (N)	mg/L	---	---	15.9	72.5	71.6	59.3
Total Kjeldahl Nitrogen (TKN)	mg/L	---	---	15.7	72.5	72	59.2
Anions							
Chloride	mg/L	250 (AO)	600	7.5	39.7	28	23.9
Sulfate	mg/L	500 (AO)	(l)	2	3	4.0	4
Dissolved Metals							
Aluminum	mg/L	9.5	0.1 ^(d)	0.18	0.2	0.218	0.003
Antimony	mg/L	---	0.009 ^(w)	0.00023	0.00016	0.0002	0.00004
Arsenic	mg/L	0.01	0.005	0.0013	0.0094	0.0088	0.0005
Barium	mg/L	---	1 ^(w)	0.047	0.15	0.139	0.02
Beryllium	mg/L	---	0.00013 ^(w)	ND (0.00005)	ND (0.00005)	ND (0.0001)	ND (0.0001)
Bismuth	mg/L	---	---	ND (0.0001)	ND (0.0001)	ND (0.0005)	ND (0.0001)
Boron	mg/L	5.0	1.2	0.047	0.085	0.069	1.6
Cadmium	mg/L	0.005	(e)	0.00002	0.00002	0.00004	0.00005
Calcium	mg/L	---	---	55	72	-	110
Chromium	mg/L	---	---	0.00017	0.00033	<0.0005	0.00037
Cobalt	mg/L	---	0.11	0.0025	0.0041	0.003	0.0054
Copper	mg/L	1.0	(f)	0.0008	0.0008	0.001	0.0018
Iron	mg/L	0.3 (AO)	0.35	9.5	19.0	14.2	0.022
Lead	mg/L	0.01	0.003 ^(g)	0.00021	0.00036	0.0004	0.00003
Lithium	mg/L	---	---	0.0018	0.0019	0.002	0.002
Magnesium	mg/L	---	---	6.7	10.0	-	19.0
Manganese	mg/L	0.05 (AO)	(h)	4.5	6.4	4.5	2.4
Mercury	mg/L	0.001	---	ND (0.00001)	ND (0.00001)	ND (0.00005)	ND (0.00001)
Molybdenum	mg/L	0.25	2	0.00045	0.00061	ND (0.001)	0.00023
Nickel	mg/L	---	0.025-0.15 ^{(i)(w)}	0.0011	0.0025	0.0022	0.002
Phosphorus	mg/L	---	---	0.125	0.187	0.2	0.34
Potassium	mg/L	---	---	6	16	-	6
Selenium	mg/L	0.01	0.002	ND (0.0002)	ND (0.0002)	ND (0.0002)	-
Silicon	mg/L	---	---	11	15	-	84
Silver	mg/L	---	0.0001-0.003 ⁽ⁱ⁾	0.00002	ND (0.00001)	0.00004	ND (0.00001)
Sodium	mg/L	---	---	14	34	-	50
Strontium	mg/L	---	---	0.62	1.5	1.23	0.5
Sulfur	mg/L	---	---	1.3	2.0	-	16.0
Tellurium	mg/L	---	---	-	-	-	-
Thallium	mg/L	---	---	ND (0.00001)	0.00001	ND (0.00005)	ND (0.00001)
Thorium	mg/L	---	---	ND (0.00005)	ND (0.00005)	-	ND (0.00005)
Tin	mg/L	---	---	ND (0.0001)	0.0003	ND (0.001)	0.0003
Titanium	mg/L	---	---	0.0071	0.0079	0.0084	ND (0.0002)
Tungsten	mg/L	---	---	-	-	-	ND (0.0002)
Uranium	mg/L	---	0.0085 ^(w)	0.00013	0.00032	ND (0.00005)	0.00008
Vanadium	mg/L	---	---	0.00034	0.00076	0.0009	0.00026
Zinc	mg/L	5.0 (AO)	(k)	0.019	0.014	0.018	0.0026
Zirconium	mg/L	---	---	ND (0.0001)	0.0001	ND (0.001)	0.0001
Volatile Organic Compounds							
1,1,1,2-tetrachloroethane	mg/L	---	---	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
1,1,1-trichloroethane	mg/L	---	---	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
1,1,2,2-tetrachloroethane	mg/L	---	---	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
1,1,2Trichloro-1,2,2Trifluoroethane	mg/L	---	---	-	-	-	-
1,1,2-trichloroethane	mg/L	---	---	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
1,1-dichloroethane	mg/L	---	---	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
1,1-dichloroethene	mg/L	---	---	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)
1,2,3-trichlorobenzene	mg/L	---	0.008 ^(w)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)

Table 15 2022 Groundwater Quality Results - MW13-1

Sample Date:	Units	BCMECCS Criteria ⁽¹⁾		Mar-22	Jul-22	Sep-22	Dec-22
Parameters:		DWQ ⁽²⁾	FWAL ⁽³⁾				
Lab Sample ID:				7999174	8142959	8288554	8424785
1,2,4-trichlorobenzene	mg/L	---	0.024 ^(w)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
1,2-dibromoethane	mg/L	---	---	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
1,2-dichlorobenzene	mg/L	---	0.0007 ^(w)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
1,2-dichloroethane	mg/L	---	0.100 ^(w)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)
1,2-dichloropropane	mg/L	---	---	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
1,3,5-trimethylbenzene	mg/L	---	---	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
1,3-dichlorobenzene	mg/L	---	0.150 ^(w)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
1,3-dichloropropane	mg/L	---	---	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
1,4-dichlorobenzene	mg/L	---	0.026 ^(w)	0.0005	0.0006	0.0002	0.0003
Benzene	mg/L	0.005	0.04 ^(m)	0.0007	0.001	0.0009	0.0008
Bromobenzene	mg/L	---	---	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
Bromodichloromethane	mg/L	---	---	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
Bromoform	mg/L	---	---	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
Bromomethane	mg/L	---	---	ND (0.001)	ND (0.001)	ND (0.001)	ND (0.001)
Dibromomethane	mg/L	---	---	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
Carbon Tetrachloride	mg/L	---	0.0133 ^(w)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)
Chlorobenzene	mg/L	---	---	0.0027	0.0031	0.0014	0.0023
Chlorodibromomethane	mg/L	---	---	-	-	-	-
Chloroethane	mg/L	---	---	0.001	0.001	ND (0.001)	ND (0.001)
Chloroform	mg/L	---	0.0018 ^(w)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
Chloromethane	mg/L	---	---	ND (0.001)	ND (0.001)	ND (0.001)	ND (0.001)
cis-1,2-dichloroethene	mg/L	---	---	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
cis-1,3-dichloropropene	mg/L	---	---	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
Dichlorodifluoromethane	mg/L	---	---	ND (0.001)	ND (0.001)	ND (0.001)	ND (0.001)
Dichloromethane	mg/L	---	0.0981 ^(w)	-	-	-	-
Ethylbenzene	mg/L	0.14/0.0016 (AO)	0.20 ^(m)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
Hexachlorobutadiene	mg/L	---	0.0013 ^(w)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
Isopropylbenzene	mg/L	---	---	ND (0.0001)	ND (0.0001)	ND (0.0001)	0.0002
m & p-Xylene	mg/L	---	---	-	-	-	-
Methyl-tert-butylether (MTBE)	mg/L	0.015 (AO)	3.4	0.0012	0.0023	0.0022	0.0017
o-Xylene	mg/L	---	---	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
Styrene	mg/L	---	0.072 ^(w)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
Tetrachloroethene	mg/L	---	---	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)
Toluene	mg/L	0.06/0.024 (AO)	0.0005	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
trans-1,2-dichloroethene	mg/L	---	---	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
trans-1,3-dichloropropene	mg/L	---	---	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
Trichloroethene	mg/L	---	---	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)
Trichlorofluoromethane	mg/L	---	---	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
VH C6-C10	mg/L	---	---	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Vinyl Chloride	mg/L	---	---	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)
VPH (VHW6 to 10 - BTEX)	mg/L	---	---	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Xylenes (total)	mg/L	0.09/0.02 (AO)	0.03	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
Notes: 1. Values reported from BCMECCS - British Columbia Water Quality Guidelines, 2019 Edition, unless otherwise stated. 2. Drinking Water Criteria (DWQ): Metal guidelines are for total concentrations. 3. Freshwater Aquatic Life Criteria (FWAL): All criteria for metals are for total metals except criteria for aluminum and iron, which are for dissolved. 0.500 - Exceeds Drinking Water Criteria 0.500 - Exceeds Freshwater Aquatic Life Criteria 0.500 - Exceeds Drinking Water Criteria and Freshwater Aquatic Life Criteria a. Turbidity: BCMECCS Source Drinking Water Quality Guidelines, Guidelines Summary Table 2. Decreases compared to background concentrations are not interpreted as exceedances. b. Ammonia-N: BCMECCS Approved Water Quality Guidelines, Summary Report Table 26D. Temperature and pH dependent. c. Nitrite: BCMECCS Approved Water Quality Guidelines. Chloride dependent. d. Aluminum: criteria specified for dissolved species not total. Criteria pH dependent. If pH<6.5: e^(1.209-2.426*pH+0.286*pH²) e. Cadmium (mg/L) = (e^(1.03*LN(HARDNESS)-5.274))/1000, valid for Hardness (as CaCO₃) of 7 to 455 mg/L. f. Copper guidelines calculated using BCMECCS Biotic Ligand Model (BLM) software. Dependent on multiple other parameters. g. Lead: hardness dependent. For Hardness (as CaCO₃) > 8 mg/L: (e^(1.273*ln(HARDNESS)-1.460))/1000 . If hardness is < or equal to 8 mg/L: 0.003 mg/L. h. Manganese (mg/L) = (0.01102*HARDNESS)+0.54. i. Nickel: BCMECCS Working Water Quality Guidelines, Table 1. j. Silver: hardness <= 100 mg/L = 0.0001 mg/L, hardness > 100 mg/L = 0.003 mg/L k. Zinc (mg/L) = 0.033 for Hardness < or equal to 90 mg/L, (33+(0.75*(HARDNESS-90)))/1000 for Hardness > 90 mg/L l. Sulphate: BCMECCS Approved Water Quality Guidelines, Summary Report Table 40. Hardness dependent. m. Interim guideline n. Temperature: Streams with Bull Trout and/or Dolly Varden = 15, unknown fish distribution = 19 o. Alkalinity (Total as CaCO3): BCMECCS Working Water Quality Guidelines, Table 1. w. Values reported from BCMECCS - Working Water Quality Guidelines for British Columbia (2017). Values are long-term (i.e., average) concentrations unless identified as a short-term maximum. AO - Aesthetic Objective - No data available --- Currently no Standard/Criteria ND - Not detected above the laboratory Reportable Detection Limit (RDL)							

Table 16 2022 Groundwater Quality Results - MW13-2

Sample Date:	Units	BCMECCS Criteria ¹		Jul-22	Sep-22	Dec-22
Parameters:		DWQ ⁽²⁾	FWAL ⁽³⁾			
Lab Sample ID:				8143111	8288624	8424786
Field Parameters						
pH	s.u.	---	6.5-9.0	6.51	6.53	6.7
Conductivity, Electrical	µS/cm	---	---	0.765	0.999	0.594
Temperature	°C	15 (AO)	---	14.7	15.12	4.74
Dissolved Oxygen	mg/L	---	---	5.5	8.64	5
Redox Potential	(mV)	---	---	-30	-14	30
General						
Chemical Oxygen Demand (COD)	mg/L	---	---	50.0	60	110.0
Dissolved Organic Carbon (DOC)	mg/L	---	---			
Conductivity, Electrical	µS/cm	---	---	715	872	731
pH	s.u.	---	6.5-9.0	6.64	6.89	6.84
Alkalinity (Total as CaCO3)	mg/L	---	(o) ^(w)	326	324	271
Alkalinity (PP as CaCO3)	mg/L	---	---	ND(5)	ND(5)	ND(5)
Bicarbonate (HCO ₃)	mg/L	---	---	397	395	331
Carbonate (as CaCO ₃)	mg/L	---	---	ND(6)	ND(6)	ND(6)
Hydroxide (OH)	mg/L	---	---	ND(5)	ND(5)	ND(5)
Turbidity	NTU	(a)	---	56	64	103.0
Hardness (as CaCO ₃)	mg/L	---	---	220	272	250
Nutrients						
Ammonia	mg/L	---	0.681-28.7 ^(b)	6.6	11.0	11.40
Dissolved Nitrate (N)	mg/L	10	32.8	ND(0.1)	ND(0.1)	ND(0.1)
Dissolved Nitrite (N)	mg/L	1.0	0.06-0.6 ^(c)	ND(0.1)	ND(0.1)	ND(0.1)
Total Phosphorus (P)	mg/L	0.01 (AO)	---	0.347	0.242	0.103
Nitrate plus Nitrite (N)	mg/L	10	---	ND (0.2)	ND (0.2)	ND (0.2)
Total Nitrogen (N)	mg/L	---	---	7.6	11.4	11.20
Total Kjeldahl Nitrogen (TKN)	mg/L	---	---	7.5	11.4	11.20
Anions						
Chloride	mg/L	250 (AO)	600	18.2	34.9	36.8
Sulfate	mg/L	500 (AO)	(l)	20	75	46
Dissolved Metals						
Aluminum	mg/L	9.5	0.1 ^(d)	0.031	0.177	ND (0.001)
Antimony	mg/L	---	0.009 ^(w)	0.00008	0.0004	0.00021
Arsenic	mg/L	0.01	0.005	0.005	0.0077	0.003
Barium	mg/L	---	1 ^(w)	0.12	0.162	0.1
Beryllium	mg/L	---	0.00013 ^(w)	ND(0.00005)	ND (0.0001)	ND (0.0001)
Bismuth	mg/L	---	---	ND (0.0001)	ND (0.0005)	ND (0.0001)
Boron	mg/L	5.0	1.2	0.15	0.257	0.17
Cadmium	mg/L	0.005	(e)	0.00001	0.00001	ND 0.00001
Calcium	mg/L	---	---	72	-	82
Chromium	mg/L	---	---	0.00033	0.0007	0.00015
Cobalt	mg/L	---	0.11	0.00033	0.0091	0.0054
Copper	mg/L	1.0	(f)	0.0009	0.001	0.0000018
Iron	mg/L	0.3 (AO)	0.35	42.0	32	0.009
Lead	mg/L	0.01	0.003 ^(g)	0.00018	0.0003	0.00001
Lithium	mg/L	---	---	0.0018	0.003	0.0019
Magnesium	mg/L	---	---	10	13	12
Manganese	mg/L	0.05 (AO)	(h)	8	8.3	7.9
Mercury	mg/L	0.001	---	ND(0.00001)	ND(0.000005)	ND(0.00001)
Molybdenum	mg/L	0.25	2	0.00052	ND(0.001)	0.00026
Nickel	mg/L	---	0.025-0.15 ^{(i)(w)}	0.0011	0.0105	0.0055
Phosphorus	mg/L	---	---	0.347	0.242	0.34
Potassium	mg/L	---	---	10	14	14
Selenium	mg/L	0.01	0.002	0.0003	ND(0.0002)	-
Silicon	mg/L	---	---	12	13	13
Silver	mg/L	---	0.0001-0.003 ^(j)	ND(0.00001)	ND(0.00001)	ND(0.00001)
Sodium	mg/L	---	---	23	34	23
Strontium	mg/L	---	---	0.9	1.3	1
Sulfur	mg/L	---	---	11	31	15.0
Tellurium	mg/L	---	---	-	-	-
Thallium	mg/L	---	---	ND(0.00001)	ND(0.00005)	ND(0.00001)
Thorium	mg/L	---	---	ND(0.00005)	-	ND(0.00005)
Tin	mg/L	---	---	ND (0.0001)	ND(0.001)	ND (0.0001)
Titanium	mg/L	---	---	0.0015	0.008	ND(0.0002)
Tungsten	mg/L	---	---	-	-	ND(0.0002)
Uranium	mg/L	---	0.0085 ^(w)	0.00024	0.0007	0.00047
Vanadium	mg/L	---	---	0.0008	0.0013	0.0001
Zinc	mg/L	5.0 (AO)	(k)	0.0055	0.02	0.0033
Zirconium	mg/L	---	---	ND (0.0001)	ND(0.001)	ND(0.00001)
Volatile Organic Compounds						
1,1,1,2-tetrachloroethane	mg/L	---	---	ND (0.0001)	ND (0.0001)	ND (0.0001)
1,1,1-trichloroethane	mg/L	---	---	ND (0.0001)	ND (0.0001)	ND (0.0001)
1,1,2,2-tetrachloroethane	mg/L	---	---	ND (0.0001)	ND (0.0001)	ND (0.0001)
1,1,2Trichloro-1,2,2Trifluoroethane	mg/L	---	---	-	-	-
1,1,2-trichloroethane	mg/L	---	---	ND (0.0001)	ND (0.0001)	ND (0.0001)
1,1-dichloroethane	mg/L	---	---	ND (0.0001)	ND (0.0001)	ND (0.0001)
1,1-dichloroethene	mg/L	---	---	ND (0.0005)	ND (0.0005)	ND (0.0005)

Table 16 2022 Groundwater Quality Results - MW13-2

Sample Date:	Units	BCMECCS Criteria ¹		Jul-22	Sep-22	Dec-22
Parameters:		DWQ ⁽²⁾	FWAL ⁽³⁾			
Lab Sample ID:				8143111	8288624	8424786
1,2,3-trichlorobenzene	mg/L	---	0.008 ^(w)	ND (0.0001)	ND (0.0001)	ND (0.0001)
1,2,4-trichlorobenzene	mg/L	---	0.024 ^(w)	ND (0.0001)	ND (0.0001)	ND (0.0001)
1,2-dibromoethane	mg/L	---	---	ND (0.0001)	ND (0.0001)	ND (0.0001)
1,2-dichlorobenzene	mg/L	---	0.0007 ^(w)	ND (0.0001)	ND (0.0001)	ND (0.0001)
1,2-dichloroethane	mg/L	---	0.100 ^(w)	ND (0.0005)	ND (0.0005)	ND (0.0005)
1,2-dichloropropane	mg/L	---	---	ND (0.0001)	ND (0.0001)	ND (0.0001)
1,3,5-trimethylbenzene	mg/L	---	---	ND (0.0001)	ND (0.0001)	ND (0.0001)
1,3-dichlorobenzene	mg/L	---	0.150 ^(w)	ND (0.0001)	ND (0.0001)	ND (0.0001)
1,3-dichloropropane	mg/L	---	---	ND (0.0001)	ND (0.0001)	ND (0.0001)
1,4-dichlorobenzene	mg/L	---	0.026 ^(w)	0.0004	0.0003	0.0003
Benzene	mg/L	0.005	0.04 ^(m)	0.0008	0.0005	0.001
Bromobenzene	mg/L	---	---	ND (0.0001)	ND (0.0001)	ND (0.0001)
Bromodichloromethane	mg/L	---	---	ND (0.0001)	ND (0.0001)	ND (0.0001)
Bromoform	mg/L	---	---	ND (0.0001)	ND (0.0001)	ND (0.0001)
Bromomethane	mg/L	---	---	ND (0.001)	ND (0.001)	ND (0.001)
Dibromomethane	mg/L	---	---	ND (0.0001)	ND (0.0001)	ND (0.0001)
Carbon Tetrachloride	mg/L	---	0.0133 ^(w)	ND (0.0005)	ND (0.0005)	ND (0.0005)
Chlorobenzene	mg/L	---	---	0.0014	0.001	0.0017
Chlorodibromomethane	mg/L	---	---	-	-	-
Chloroethane	mg/L	---	---	0.002	0.002	ND (0.001)
Chloroform	mg/L	---	0.0018 ^(w)	ND (0.0001)	ND (0.0001)	ND (0.0001)
Chloromethane	mg/L	---	---	ND (0.001)	ND (0.001)	ND (0.001)
cis-1,2-dichloroethene	mg/L	---	---	ND (0.0001)	ND (0.0001)	ND (0.0001)
cis-1,3-dichloropropene	mg/L	---	---	ND (0.0001)	ND (0.0001)	ND (0.0001)
Dichlorodifluoromethane	mg/L	---	---	ND (0.001)	ND (0.001)	ND (0.001)
Dichloromethane	mg/L	---	0.0981 ^(w)	-	-	-
Ethylbenzene	mg/L	0.14/0.0016 (AO)	0.20 ^(m)	ND (0.0001)	ND (0.0001)	ND (0.0001)
Hexachlorobutadiene	mg/L	---	0.0013 ^(w)	ND (0.0001)	ND (0.0001)	ND (0.0001)
Isopropylbenzene	mg/L	---	---	0.0006	0.0001	0.0003
m & p-Xylene	mg/L	---	---	ND (0.0001)	ND (0.0001)	ND (0.0001)
Methyl-tert-butylether (MTBE)	mg/L	0.015 (AO)	3.4	0.0007	0.0007	0.0007
o-Xylene	mg/L	---	---	ND (0.0001)	ND (0.0001)	ND (0.0001)
Styrene	mg/L	---	0.072 ^(w)	ND (0.0001)	ND (0.0001)	ND (0.0001)
Tetrachloroethene	mg/L	---	---	ND (0.0005)	ND (0.0005)	ND (0.0005)
Toluene	mg/L	0.06/0.024 (AO)	0.0005	ND (0.0001)	ND (0.0001)	ND (0.0001)
trans-1,2-dichloroethene	mg/L	---	---	ND (0.0001)	ND (0.0001)	ND (0.0001)
trans-1,3-dichloropropene	mg/L	---	---	ND (0.0001)	ND (0.0001)	ND (0.0001)
Trichloroethene	mg/L	---	---	ND (0.0005)	ND (0.0005)	ND (0.0005)
Trichlorofluoromethane	mg/L	---	---	ND (0.0001)	ND (0.0001)	ND (0.0001)
VH C6-C10	mg/L	---	---	ND (0.05)	ND (0.05)	ND (0.05)
Vinyl Chloride	mg/L	---	---	ND (0.0005)	ND (0.0005)	ND (0.0005)
VPH (VHW6 to 10 - BTEX)	mg/L	---	---	ND (0.05)	ND (0.05)	ND (0.05)
Xylenes (total)	mg/L	0.09/0.02 (AO)	0.03	ND (0.0001)	ND (0.0001)	ND (0.0001)
Notes: 1. Values reported from BCMECCS - British Columbia Water Quality Guidelines, 2019 Edition, unless otherwise stated. 2. Drinking Water Criteria (DWQ): Metal guidelines are for total concentrations. 3. Freshwater Aquatic Life Criteria (FWAL): All criteria for metals are for total metals except criteria for aluminum and iron, which are for dissolved. 0.500 - Exceeds Drinking Water Criteria 0.500 - Exceeds Freshwater Aquatic Life Criteria 0.500 - Exceeds Drinking Water Criteria and Freshwater Aquatic Life Criteria a. Turbidity: BCMECCS Source Drinking Water Quality Guidelines, Guidelines Summary Table 2. Decreases compared to background concentrations are not interpreted as exceedances. b. Ammonia-N: BCMECCS Approved Water Quality Guidelines, Summary Report Table 26D. Temperature and pH dependent. c. Nitrite: BCMECCS Approved Water Quality Guidelines. Chloride dependent. d. Aluminum: criteria specified for dissolved species not total. Criteria pH dependent. If pH<6.5: $e^{(1.209-2.426 \cdot \text{pH} + 0.286 \cdot \text{pH}^2)}$ e. Cadmium (mg/L) = $(e^{(1.03 \cdot \text{LN}(\text{HARDNESS}) - 5.274)}) / 1000$, valid for Hardness (as CaCO₃) of 7 to 455 mg/L. f. Copper guidelines calculated using BCMECCS Biotic Ligand Model (BLM) software. Dependent on multiple other parameters. g. Lead: hardness dependent. For Hardness (as CaCO₃) > 8 mg/L: $(e^{(1.273 \cdot \text{ln}(\text{HARDNESS}) - 1.460)}) / 1000$. If hardness is < or equal to 8 mg/L: 0.003 mg/L. h. Manganese (mg/L) = (0.01102*HARDNESS)+0.54. i. Nickel: BCMECCS Working Water Quality Guidelines, Table 1. j. Silver: hardness <= 100 mg/L = 0.0001 mg/L, hardness > 100 mg/L = 0.003 mg/L k. Zinc (mg/L) = 0.033 for Hardness < or equal to 90 mg/L, (33+(0.75*(HARDNESS-90)))/1000 for Hardness > 90 mg/L l. Sulphate: BCMECCS Approved Water Quality Guidelines, Summary Report Table 40. Hardness dependent. m. Interim guideline n. Temperature: Streams with Bull Trout and/or Dolly Varden = 15, unknown fish distribution = 19 o. Alkalinity (Total as CaCO₃): BCMECCS Working Water Quality Guidelines, Table 1. w. Values reported from BCMECCS - Working Water Quality Guidelines for British Columbia (2017). Values are long-term (i.e., average) concentrations unless identified as a short-term maximum. AO - Aesthetic Objective - No data available --- Currently no Standard/Criteria ND - Not detected above the laboratory Reportable Detection Limit (RDL)						

Table 17 2022 Groundwater Quality Results - MW13-3

Sample Date:	Units	BCMECCS Criteria ⁽¹⁾		Mar-22	Jul-22	Sep-22	Dec-22
Parameters:		DWQ ⁽²⁾	FWAL ⁽³⁾				
Lab Sample ID:				7999173	8143112	8288625	8424787
Field Parameters							
pH	s.u.	---	6.5-9.0	6.23	<u>5.93</u>	6.54	7.48
Conductivity, Electrical	µS/cm	---	---	0.443	0.797	0.593	0.321
Temperature	°C	15 (AO)	---	13.6	14.81	16.39	10.22
Dissolved Oxygen	mg/L	---	---	7.65	3.47	10.23	48.78
Redox Potential	(mV)	---	---	86	19	-6	120
General							
Chemical Oxygen Demand (COD)	mg/L	---	---	27	50	30	20.0
Dissolved Organic Carbon (DOC)	mg/L	---	---	-	-	-	-
Conductivity, Electrical	µS/cm	---	---	478	719	497	319
pH	s.u.	---	6.5-9.0	7.12	6.65	6.54	6.7
Alkalinity (Total as CaCO3)	mg/L	---	(o) ^(w)	220	341	55	126
Alkalinity (PP as CaCO3)	mg/L	---	---	ND(5)	ND(5)	ND(5)	ND(5)
Bicarbonate (HCO ₃)	mg/L	---	---	268	416	67	154
Carbonate (as CaCO ₃)	mg/L	---	---	ND(6)	ND(6)	ND(6)	ND(6)
Hydroxide (OH)	mg/L	---	---	ND(5)	ND(5)	ND(5)	ND(5)
Turbidity	NTU	(a)	---	199.0	69.1	182.0	166
Hardness (as CaCO ₃)	mg/L	---	---	200	220	125	98
Nutrients							
Ammonia	mg/L	---	0.681-28.7 ^(b)	<u>5</u>	<u>6.07</u>	<u>2.01</u>	1.2
Dissolved Nitrate (N)	mg/L	10	32.8	ND(0.1)	ND(0.1)	0.1	0.16
Dissolved Nitrite (N)	mg/L	1.0	0.06-0.6 ^(c)	ND(0.1)	ND(0.1)	ND(0.1)	0.02
Total Phosphorus (P)	mg/L	0.01 (AO)	---	0.375	0.152	0.092	0.077
Nitrate plus Nitrite (N)	mg/L	10	---	ND(0.20)	ND(0.20)	0.1	0.18
Total Nitrogen (N)	mg/L	---	---	5.89	6.62	2.68	1.27
Total Kjeldahl Nitrogen (TKN)	mg/L	---	---	5.78	6.61	2.6	1.15
Anions							
Chloride	mg/L	250 (AO)	600	13	18.1	19.8	15.7
Sulfate	mg/L	500 (AO)	(l)	10.0	16	158	9
Dissolved Metals							
Aluminum	mg/L	9.5	0.1 ^(d)	<u>1.1</u>	<u>0.19</u>	<u>0.1</u>	ND (0.001)
Antimony	mg/L	---	0.009 ^(w)	ND (0.0002)	0.00034	0.0003	0.0002
Arsenic	mg/L	0.01	0.005	0.005	0.02	<u>0.0097</u>	0.0014
Barium	mg/L	---	1 ^(w)	0.11	0.14	0.098	0.052
Beryllium	mg/L	---	0.00013 ^(w)	ND (0.00005)	ND (0.00005)	ND (0.0001)	0.00005
Bismuth	mg/L	---	---	ND (0.0001)	ND (0.0001)	ND (0.0005)	0.0001
Boron	mg/L	5.0	1.2	0.16	0.16	0.151	0.16
Cadmium	mg/L	0.005	(e)	ND (0.0001)	0.00002	0.0001	0.00002
Calcium	mg/L	---	---	68	74	-	32
Chromium	mg/L	---	---	0.001	0.00037	ND(0.0005)	0.0001
Cobalt	mg/L	---	0.11	0.0016	0.00089	0.0275	0.0082
Copper	mg/L	1.0	(f)	ND(0.05)	0.0012	0.001	ND (0.0005)
Iron	mg/L	0.3 (AO)	0.35	50	56	22	0.006
Lead	mg/L	0.01	0.003 ^(g)	0.0011	0.00028	0.0002	0.00001
Lithium	mg/L	---	---	0.006	0.0056	0.009	0.0046
Magnesium	mg/L	---	---	7.8	9.2	-	4.3
Manganese	mg/L	0.05 (AO)	(h)	6.8	8.3	4.8	3.6
Mercury	mg/L	0.001	---	ND (0.0001)	ND (0.0001)	ND(0.000005)	ND(0.00001)
Molybdenum	mg/L	0.25	2	ND(0.0002)	0.0036	ND (0.001)	0.00009
Nickel	mg/L	---	0.025-0.15 ^{(i)(w)}	0.002	0.0034	0.0276	0.014
Phosphorus		---	---	0.375	0.152	0.092	0.5
Potassium	mg/L	---	---	6.1	6.6	4.8	4.7
Selenium	mg/L	0.01	0.002	ND(0.0002)	ND(0.0002)	ND(0.0002)	ND(0.0002)
Silicon	mg/L	---	---	11.0	14	14	10
Silver	mg/L	---	0.0001-0.003 ⁽ⁱ⁾	ND (0.0001)	ND (0.0001)	ND(0.00001)	ND(0.00001)
Sodium	mg/L	---	---	25	34	33	22
Strontium	mg/L	---	---	1.2	1.3	0.786	0.51
Sulfur	mg/L	---	---	5	6	-	3
Tellurium		---	---	-	-	-	-
Thallium	mg/L	---	---	ND (0.0001)	ND (0.0001)	ND(0.00005)	ND(0.00005)
Thorium		---	---	ND(0.0005)	ND(0.00005)	-	ND(0.0001)
Tin	mg/L	---	---	0.002	0.0001	ND(0.001)	ND(0.0001)
Titanium	mg/L	---	---	0.042	0.0086	0.0041	ND(0.0001)
Tungsten		---	---	-	-	-	ND(0.0002)
Uranium	mg/L	---	0.0085 ^(w)	0.0002	0.0041	ND(0.0005)	0.00006
Vanadium	mg/L	---	---	0.0029	0.0013	0.0003	0.00007
Zinc	mg/L	5.0 (AO)	(k)	<u>0.35</u>	0.017	<u>0.124</u>	0.02
Zirconium	mg/L	---	---	ND(0.001)	0.0001	ND(0.001)	0.0001
Volatile Organic Compounds							
1,1,1,2-tetrachloroethane	mg/L	---	---	ND(0.0001)	ND(0.0001)	ND(0.001)	ND(0.001)
1,1,1-trichloroethane	mg/L	---	---	ND(0.0001)	ND(0.0001)	ND(0.0001)	ND(0.0001)
1,1,2,2-tetrachloroethane	mg/L	---	---	ND(0.0001)	ND(0.0001)	ND(0.0001)	ND(0.0001)
1,1,2Trichloro-1,2,2Trifluoroethane	mg/L	---	---				
1,1,2-trichloroethane	mg/L	---	---	ND(0.0001)	ND(0.0001)	ND(0.0001)	ND(0.0001)
1,1-dichloroethane	mg/L	---	---	0.0003	0.0002	ND(0.0001)	0.0002
1,1-dichloroethene	mg/L	---	---	ND(0.0005)	ND(0.0005)	ND(0.0005)	ND(0.0005)
1,2,3-trichlorobenzene	mg/L	---	0.008 ^(w)	ND(0.0001)	ND(0.0001)	ND(0.0001)	ND(0.0001)

Table 17 2022 Groundwater Quality Results - MW13-3

Sample Date:	Units	BCMECCS Criteria ⁽¹⁾		Mar-22	Jul-22	Sep-22	Dec-22
Parameters:		DWQ ⁽²⁾	FWAL ⁽³⁾				
Lab Sample ID:				7999173	8143112	8288625	8424787
1,2,4-trichlorobenzene	mg/L	---	0.024 ^(w)	ND(0.0001)	ND(0.0001)	ND(0.0001)	ND(0.0001)
1,2-dibromoethane	mg/L	---	---	ND(0.0001)	ND(0.0001)	ND(0.0001)	ND(0.0001)
1,2-dichlorobenzene	mg/L	---	0.0007 ^(w)	ND(0.0001)	ND(0.0001)	ND(0.0001)	ND(0.0001)
1,2-dichloroethane	mg/L	---	0.100 ^(w)	ND(0.0005)	ND(0.0005)	ND(0.0005)	ND(0.0005)
1,2-dichloropropane	mg/L	---	---	ND(0.0001)	ND(0.0001)	ND(0.0001)	ND(0.0001)
1,3,5-trimethylbenzene	mg/L	---	---	ND(0.0001)	ND(0.0001)	ND(0.0001)	ND(0.0001)
1,3-dichlorobenzene	mg/L	---	0.150 ^(w)	ND(0.0001)	ND(0.0001)	ND(0.0001)	ND(0.0001)
1,3-dichloropropane	mg/L	---	---	ND(0.0001)	ND(0.0001)	ND(0.0001)	ND(0.0001)
1,4-dichlorobenzene	mg/L	---	0.026 ^(w)	0.0009	0.0009	0.0005	0.0005
Benzene	mg/L	0.005	0.04 ^(m)	0.0014	0.0011	0.0001	0.0003
Bromobenzene	mg/L	---	---	ND(0.0001)	ND(0.0001)	ND(0.0001)	ND(0.0001)
Bromodichloromethane	mg/L	---	---	ND(0.0001)	ND(0.0001)	ND(0.0001)	ND(0.0001)
Bromoform	mg/L	---	---	ND(0.0001)	ND(0.0001)	ND(0.0001)	ND(0.0001)
Bromomethane	mg/L	---	---	ND(0.001)	ND(0.001)	ND(0.001)	ND(0.001)
Dibromomethane	mg/L	---	---	ND(0.0001)	ND(0.0001)	ND(0.0001)	ND(0.0001)
Carbon Tetrachloride	mg/L	---	0.0133 ^(w)	ND(0.0005)	ND(0.0005)	ND(0.0005)	ND(0.0005)
Chlorobenzene	mg/L	---	---	0.003	0.0029	0.0004	0.0007
Chlorodibromomethane	mg/L	---	---				
Chloroethane	mg/L	---	---	0.002	ND(0.001)	ND(0.001)	ND(0.001)
Chloroform	mg/L	---	0.0018 ^(w)	ND(0.0001)	ND(0.0001)	ND(0.0001)	ND(0.0001)
Chloromethane	mg/L	---	---	ND(0.001)	ND(0.001)	ND(0.001)	ND(0.001)
cis-1,2-dichloroethene	mg/L	---	---	0.0001	ND(0.0001)	ND(0.0001)	ND(0.0001)
cis-1,3-dichloropropene	mg/L	---	---	ND(0.0001)	ND(0.0001)	ND(0.0001)	ND(0.0001)
Dichlorodifluoromethane	mg/L	---	---	ND(0.001)	ND(0.001)	ND(0.001)	ND(0.001)
Dichloromethane	mg/L	---	0.0981 ^(w)				
Ethylbenzene	mg/L	0.14/0.0016 (AO)	0.20 ^(m)	ND(0.0001)	ND(0.0001)	ND(0.0001)	ND(0.0001)
Hexachlorobutadiene	mg/L	---	0.0013 ^(w)	ND(0.0001)	ND(0.0001)	ND(0.0001)	ND(0.0001)
Isopropylbenzene	mg/L	---	---				
m & p-Xylene	mg/L	---	---	ND(0.0001)	ND(0.0001)	ND(0.0001)	ND(0.0001)
Methyl-tert-butylether (MTBE)	mg/L	0.015 (AO)	3.4	0.0005	0.0004	ND(0.0001)	0.0003
o-Xylene	mg/L	---	---	ND(0.0001)	ND(0.0001)	ND(0.0001)	ND(0.0001)
Styrene	mg/L	---	0.072 ^(w)	ND(0.0001)	ND(0.0001)	ND(0.0001)	ND(0.0001)
Tetrachloroethene	mg/L	---	---	ND(0.0005)	ND(0.0005)	ND(0.0005)	ND(0.0005)
Toluene	mg/L	0.06/0.024 (AO)	0.0005	ND(0.0001)	ND(0.0001)	ND(0.0001)	ND(0.0001)
trans-1,2-dichloroethene	mg/L	---	---	ND(0.0001)	ND(0.0001)	ND(0.0001)	ND(0.0001)
trans-1,3-dichloropropene	mg/L	---	---	ND(0.0001)	ND(0.0001)	ND(0.0001)	ND(0.0001)
Trichloroethene	mg/L	---	---	ND(0.0005)	ND(0.0005)	ND(0.0005)	ND(0.0005)
Trichlorofluoromethane	mg/L	---	---	ND(0.0001)	ND(0.0001)	ND(0.0001)	ND(0.0001)
VH C6-C10	mg/L	---	---	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)
Vinyl Chloride	mg/L	---	---	ND(0.0005)	ND(0.0005)	ND(0.0005)	ND(0.0005)
VPH (VHW6 to 10 - BTEX)	mg/L	---	---	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)
Xylenes (total)	mg/L	0.09/0.02 (AO)	0.03	ND(0.0001)	ND(0.0001)	ND(0.0001)	ND(0.0001)
Notes: 1. Values reported from BCMECCS - British Columbia Water Quality Guidelines, 2019 Edition, unless otherwise stated. 2. Drinking Water Criteria (DWQ): Metal guidelines are for total concentrations. 3. Freshwater Aquatic Life Criteria (FWAL): All criteria for metals are for total metals except criteria for aluminum and iron, which are for dissolved. 0.500 - Exceeds Drinking Water Criteria 0.500 - Exceeds Freshwater Aquatic Life Criteria 0.500 - Exceeds Drinking Water Criteria and Freshwater Aquatic Life Criteria a. Turbidity: BCMECCS Source Drinking Water Quality Guidelines, Guidelines Summary Table 2. Decreases compared to background concentrations are not interpreted as exceedances. b. Ammonia-N: BCMECCS Approved Water Quality Guidelines, Summary Report Table 26D. Temperature and pH dependent. c. Nitrite: BCMECCS Approved Water Quality Guidelines. Chloride dependent. d. Aluminum: criteria specified for dissolved species not total. Criteria pH dependent. If pH<6.5: e^(1.209-2.426*pH+0.286*pH²) e. Cadmium (mg/L) = (e^(1.03*LN(HARDNESS)-5.274))/1000, valid for Hardness (as CaCO₃) of 7 to 455 mg/L. f. Copper guidelines calculated using BCMECCS Biotic Ligand Model (BLM) software. Dependent on multiple other parameters. g. Lead: hardness dependent. For Hardness (as CaCO₃) > 8 mg/L: (e^(1.273*ln(HARDNESS)-1.460))/1000 . If hardness is < or equal to 8 mg/L: 0.003 mg/L. h. Manganese (mg/L) = (0.01102*HARDNESS)+0.54. i. Nickel: BCMECCS Working Water Quality Guidelines, Table 1. j. Silver: hardness <= 100 mg/L = 0.0001 mg/L, hardness > 100 mg/L = 0.003 mg/L k. Zinc (mg/L) = 0.033 for Hardness < or equal to 90 mg/L, (33+(0.75*(HARDNESS-90)))/1000 for Hardness > 90 mg/L l. Sulphate: BCMECCS Approved Water Quality Guidelines, Summary Report Table 40. Hardness dependent. m. Interim guideline n. Temperature: Streams with Bull Trout and/or Dolly Varden = 15, unknown fish distribution = 19 o. Alkalinity (Total as CaCO₃): BCMECCS Working Water Quality Guidelines, Table 1. w. Values reported from BCMECCS - Working Water Quality Guidelines for British Columbia (2017). Values are long-term (i.e., average) concentrations unless identified as a short-term maximum. AO - Aesthetic Objective - No data available --- Currently no Standard/Criteria ND - Not detected above the laboratory Reportable Detection Limit (RDL)							

Table 18 2022 Groundwater Quality Results - MW2-21

Sample Date:	Units	BCMECCS Criteria ⁽¹⁾		Mar-22	Jul-22	Sep-22	Dec-22
Parameters:		DWQ ⁽²⁾	FWAL ⁽³⁾				
Lab Sample ID:				7999172	8143115	-	-
Field Parameters							
pH	s.u.	---	6.5-9.0	NM	7.05	DRY	DRY
Conductivity, Electrical	µS/cm	---	---	NM	1.550	DRY	DRY
Temperature	°C	15 (AO)	---	NM	13.89	DRY	DRY
Dissolved Oxygen	mg/L	---	---	NM	62	DRY	DRY
Redox Potential	(mV)	---	---	NM	5.20	DRY	DRY
General							
Chemical Oxygen Demand (COD)	mg/L	---	---	10		DRY	DRY
Dissolved Organic Carbon (DOC)	mg/L	---	---		50.0	DRY	DRY
Conductivity, Electrical	µS/cm	---	---	1141	1620	DRY	DRY
pH	s.u.	---	6.5-9.0	7.18	6.94	DRY	DRY
Alkalinity (Total as CaCO3)	mg/L	---	(o) ^(w)	94	100	DRY	DRY
Alkalinity (PP as CaCO3)	mg/L	---	---	ND(5)	ND(5)	DRY	DRY
Bicarbonate (HCO ₃)	mg/L	---	---	110	120	DRY	DRY
Carbonate (as CaCO ₃)	mg/L	---	---	ND(6)	ND(6)	DRY	DRY
Hydroxide (OH)	mg/L	---	---	ND(5)	ND(5)	DRY	DRY
Turbidity	NTU	(a)	---	203.0	145.0	DRY	DRY
Hardness (as CaCO ₃)	mg/L	---	---	620	880	DRY	DRY
Nutrients							
Ammonia	mg/L	---	0.681-28.7 ^(b)	ND (0.025)	ND (0.025)	DRY	DRY
Dissolved Nitrate (N)	mg/L	10	32.8	ND(0.1)	ND(0.1)	DRY	DRY
Dissolved Nitrite (N)	mg/L	1.0	0.06-0.6 ^(c)	ND(0.1)	ND(0.1)	DRY	DRY
Total Phosphorus (P)	mg/L	0.01 (AO)	---	0.248	0.167	DRY	DRY
Nitrate plus Nitrite (N)	mg/L	10	---	ND (0.2)	ND (0.2)	DRY	DRY
Total Nitrogen (N)	mg/L	---	---	0.28	0.21	DRY	DRY
Total Kjeldahl Nitrogen (TKN)	mg/L	---	---	0.15	0.19	DRY	DRY
Anions							
Chloride	mg/L	250 (AO)	600	99	222	DRY	DRY
Sulfate	mg/L	500 (AO)	(l)	393	521.0	DRY	DRY
Dissolved Metals							
Aluminum	mg/L	9.5	0.1 ^(d)	3.9	2.9	DRY	DRY
Antimony	mg/L	---	0.009 ^(w)	ND(0.002)	0.0001	DRY	DRY
Arsenic	mg/L	0.01	0.005	0.003	0.0027	DRY	DRY
Barium	mg/L	---	1 ^(w)	0.12	0.17	DRY	DRY
Beryllium	mg/L	---	0.00013 ^(w)	ND(0.0005)	0.00014	DRY	DRY
Bismuth	mg/L	---	---	ND(0.001)	ND(0.0001)	DRY	DRY
Boron	mg/L	5.0	1.2	0.1	0.084	DRY	DRY
Cadmium	mg/L	0.005	(e)	0.0001	0.00042	DRY	DRY
Calcium	mg/L	---	---	210	290	DRY	DRY
Chromium	mg/L	---	---	0.013	0.011	DRY	DRY
Cobalt	mg/L	---	0.11	0.0042	0.0036	DRY	DRY
Copper	mg/L	1.0	(f)	0.007	0.0054	DRY	DRY
Iron	mg/L	0.3 (AO)	0.35	18	11	DRY	DRY
Lead	mg/L	0.01	0.003 ^(g)	0.002	0.0013	DRY	DRY
Lithium	mg/L	---	---	ND(0.005)	0.0046	DRY	DRY
Magnesium	mg/L	---	---	24	38.0	DRY	DRY
Manganese	mg/L	0.05 (AO)	(h)	1.9	5.5	DRY	DRY
Mercury	mg/L	0.001	---	ND (0.00001)	ND (0.00001)	DRY	DRY
Molybdenum	mg/L	0.25	2	0.0019	0.0013	DRY	DRY
Nickel	mg/L	---	0.025-0.15 ^{(i)(w)}	0.004	0.0046	DRY	DRY
Phosphorus		---	---	0.248	0.167	DRY	DRY
Potassium	mg/L	---	---	2.8	3.2	DRY	DRY
Selenium	mg/L	0.01	0.002	ND (0.002)	0.0004	DRY	DRY
Silicon	mg/L	---	---	15	13.0	DRY	DRY
Silver	mg/L	---	0.0001-0.003 ^(j)	ND(0.0001)	0.00002	DRY	DRY
Sodium	mg/L	---	---	13	20	DRY	DRY
Strontium	mg/L	---	---	2	2.5	DRY	DRY
Sulfur	mg/L	---	---	120	160	DRY	DRY
Tellurium		---	---			DRY	DRY
Thallium	mg/L	---	---	ND(0.0001)	0.00007	DRY	DRY
Thorium		---	---	0.0008	0.00048	DRY	DRY
Tin	mg/L	---	---	0.001	ND(0.0001)	DRY	DRY
Titanium	mg/L	---	---	0.16	0.13	DRY	DRY
Tungsten		---	---			DRY	DRY
Uranium	mg/L	---	0.0085 ^(w)	0.0009	0.0005	DRY	DRY
Vanadium	mg/L	---	---	0.0091	0.0048	DRY	DRY
Zinc	mg/L	5.0 (AO)	(k)	0.016	0.013	DRY	DRY
Zirconium	mg/L	---	---	ND(0.001)	0.0007	DRY	DRY
Volatile Organic Compounds						-	-
1,1,1,2-tetrachloroethane	mg/L	---	---	ND(0.0001)	ND(0.0001)	DRY	DRY
1,1,1-trichloroethane	mg/L	---	---	ND(0.0001)	ND(0.0001)	DRY	DRY
1,1,2,2-tetrachloroethane	mg/L	---	---	ND(0.0001)	ND(0.0001)	DRY	DRY
1,1,2Trichloro-1,2,2Trifluoroethane	mg/L	---	---	-	-	DRY	DRY
1,1,2-trichloroethane	mg/L	---	---	ND(0.0001)	ND(0.0001)	DRY	DRY
1,1-dichloroethane	mg/L	---	---	ND(0.0001)	ND(0.0001)	DRY	DRY
1,1-dichloroethene	mg/L	---	---	ND(0.0005)	ND(0.0005)	DRY	DRY
1,2,3-trichlorobenzene	mg/L	---	0.008 ^(w)	ND(0.0001)	ND(0.0001)	DRY	DRY
1,2,4-trichlorobenzene	mg/L	---	0.024 ^(w)	ND(0.0001)	ND(0.0001)	DRY	DRY

Table 18 2022 Groundwater Quality Results - MW2-21

Sample Date:	Units	BCMECCS Criteria ⁽¹⁾		Mar-22	Jul-22	Sep-22	Dec-22
Parameters:		DWQ ⁽²⁾	FWAL ⁽³⁾				
Lab Sample ID:				7999172	8143115	-	-
1,2-dibromoethane	mg/L	---	---	ND(0.0001)	ND(0.0001)	DRY	DRY
1,2-dichlorobenzene	mg/L	---	0.0007 ^(w)	ND(0.0001)	ND(0.0001)	DRY	DRY
1,2-dichloroethane	mg/L	---	0.100 ^(w)	ND(0.0005)	ND(0.0005)	DRY	DRY
1,2-dichloropropane	mg/L	---	---	ND(0.0001)	ND(0.0001)	DRY	DRY
1,3,5-trimethylbenzene	mg/L	---	---	ND(0.0001)	ND(0.0001)	DRY	DRY
1,3-dichlorobenzene	mg/L	---	0.150 ^(w)	ND(0.0001)	ND(0.0001)	DRY	DRY
1,3-dichloropropane	mg/L	---	---	ND(0.0001)	ND(0.0001)	DRY	DRY
1,4-dichlorobenzene	mg/L	---	0.026 ^(w)	ND(0.0001)	ND(0.0001)	DRY	DRY
Benzene	mg/L	0.005	0.04 ^(m)	ND(0.0001)	ND(0.0001)	DRY	DRY
Bromobenzene	mg/L	---	---	ND(0.0001)	ND(0.0001)	DRY	DRY
Bromodichloromethane	mg/L	---	---	ND(0.0001)	ND(0.0001)	DRY	DRY
Bromoform	mg/L	---	---	ND(0.0001)	ND(0.0001)	DRY	DRY
Bromomethane	mg/L	---	---	ND(0.001)	ND(0.001)	DRY	DRY
Dibromomethane	mg/L	---	---	ND(0.0001)	ND(0.0001)	DRY	DRY
Carbon Tetrachloride	mg/L	---	0.0133 ^(w)	ND(0.0005)	ND(0.0005)	DRY	DRY
Chlorobenzene	mg/L	---	---	ND(0.0001)	ND(0.0001)	DRY	DRY
Chlorodibromomethane	mg/L	---	---	-	-	DRY	DRY
Chloroethane	mg/L	---	---	ND(0.001)	ND(0.001)	DRY	DRY
Chloroform	mg/L	---	0.0018 ^(w)	ND(0.0001)	ND(0.0001)	DRY	DRY
Chloromethane	mg/L	---	---	<0.001	<0.001	DRY	DRY
cis-1,2-dichloroethene	mg/L	---	---	ND(0.0001)	ND(0.0001)	DRY	DRY
cis-1,3-dichloropropene	mg/L	---	---	ND(0.0001)	ND(0.0001)	DRY	DRY
Dichlorodifluoromethane	mg/L	---	---	<0.001	<0.001	DRY	DRY
Dichloromethane	mg/L	---	0.0981 ^(w)	-	-	DRY	DRY
Ethylbenzene	mg/L	0.14/0.0016 (AO)	0.20 ^(m)	ND(0.0001)	ND(0.0001)	DRY	DRY
Hexachlorobutadiene	mg/L	---	0.0013 ^(w)	ND(0.0001)	ND(0.0001)	DRY	DRY
Isopropylbenzene	mg/L	---	---	-	-	DRY	DRY
m & p-Xylene	mg/L	---	---	ND(0.0001)	ND(0.0001)	DRY	DRY
Methyl-tert-butylether (MTBE)	mg/L	0.015 (AO)	3.4	ND(0.0001)	ND(0.0001)	DRY	DRY
o-Xylene	mg/L	---	---	ND(0.0001)	ND(0.0001)	DRY	DRY
Styrene	mg/L	---	0.072 ^(w)	ND(0.0001)	ND(0.0001)	DRY	DRY
Tetrachloroethene	mg/L	---	---	ND(0.0005)	ND(0.0005)	DRY	DRY
Toluene	mg/L	0.06/0.024 (AO)	0.0005	ND(0.0001)	ND(0.0001)	DRY	DRY
trans-1,2-dichloroethene	mg/L	---	---	ND(0.0001)	ND(0.0001)	DRY	DRY
trans-1,3-dichloropropene	mg/L	---	---	ND(0.0001)	ND(0.0001)	DRY	DRY
Trichloroethene	mg/L	---	---	ND(0.0005)	ND(0.0005)	DRY	DRY
Trichlorofluoromethane	mg/L	---	---	ND(0.0001)	ND(0.0001)	DRY	DRY
VH C6-C10	mg/L	---	---	ND(0.05)	ND(0.05)	DRY	DRY
Vinyl Chloride	mg/L	---	---	ND(0.0005)	ND(0.0005)	DRY	DRY
VPH (VHW6 to 10 - BTEX)	mg/L	---	---	ND(0.05)	ND(0.05)	DRY	DRY
Xylenes (total)	mg/L	0.09/0.02 (AO)	0.03	ND(0.0001)	ND(0.0001)	DRY	DRY
Notes: 1. Values reported from BCMECCS - British Columbia Water Quality Guidelines, 2019 Edition, unless otherwise stated. 2. Drinking Water Criteria (DWQ): Metal guidelines are for total concentrations. 3. Freshwater Aquatic Life Criteria (FWAL): All criteria for metals are for total metals except criteria for aluminum and iron, which are for dissolved. 0.500 - Exceeds Drinking Water Criteria 0.500 - Exceeds Freshwater Aquatic Life Criteria 0.500 - Exceeds Drinking Water Criteria and Freshwater Aquatic Life Criteria a. Turbidity: BCMECCS Source Drinking Water Quality Guidelines, Guidelines Summary Table 2. Decreases compared to background concentrations b. Ammonia-N: BCMECCS Approved Water Quality Guidelines, Summary Report Table 26D. Temperature and pH dependent. c. Nitrite: BCMECCS Approved Water Quality Guidelines. Chloride dependent. d. Aluminum: criteria specified for dissolved species not total. Criteria pH dependent. If pH<6.5: e^(1.209-2.426*pH+0.286*pH²) e. Cadmium (mg/L) = (e^(1.03*LN(HARDNESS)-5.274))/1000, valid for Hardness (as CaCO₃) of 7 to 455 mg/L. f. Copper guidelines calculated using BCMECCS Biotic Ligand Model (BLM) software. Dependent on multiple other parameters. g. Lead: hardness dependent. For Hardness (as CaCO₃) > 8 mg/L: (e^(1.273*ln(HARDNESS)-1.460))/1000 . If hardness is < or equal to 8 mg/L: 0.003 mg/L. h. Manganese (mg/L) = (0.01102*HARDNESS)+0.54. i. Nickel: BCMECCS Working Water Quality Guidelines, Table 1. j. Silver: hardness <= 100 mg/L = 0.0001 mg/L, hardness > 100 mg/L = 0.003 mg/L k. Zinc (mg/L) = 0.033 for Hardness < or equal to 90 mg/L, (33+(0.75*(HARDNESS-90)))/1000 for Hardness > 90 mg/L l. Sulphate: BCMECCS Approved Water Quality Guidelines, Summary Report Table 40. Hardness dependent. m. Interim guideline n. Temperature: Streams with Bull Trout and/or Dolly Varden = 15, unknown fish distribution = 19 o. Alkalinity (Total as CaCO3): BCMECCS Working Water Quality Guidelines, Table 1. w. Values reported from BCMECCS - Working Water Quality Guidelines for British Columbia (2017). Values are long-term (i.e., average) concentrations unless identified as a short-term maximum. AO - Aesthetic Objective - No data available --- Currently no Standard/Criteria ND - Not detected above the laboratory Reportable Detection Limit (RDL)							

Table 19 2022 Groundwater Quality Results - MW22-01

Sample Date:	Units	BCMECCS Criteria ⁽¹⁾		Jul-22
Parameters:		DWQ ⁽²⁾	FWAL ⁽³⁾	
Lab Sample ID:				8143118
Field Parameters				
pH	s.u.	---	6.5-9.0	7.12
Conductivity, Electrical	µS/cm	---	---	0.118
Temperature	°C	15 (AO)	---	12.99
Dissolved Oxygen	mg/L	---	---	13.3
Redox Potential	(mV)	---	---	119
General				
Chemical Oxygen Demand (COD)	mg/L	---	---	20.0
Dissolved Organic Carbon (DOC)	mg/L	---	---	
Conductivity, Electrical	µS/cm	---	---	127
pH	s.u.	---	6.5-9.0	7.60
Alkalinity (Total as CaCO3)	mg/L	---	(o) ^(w)	59
Alkalinity (PP as CaCO3)	mg/L	---	---	<5
Bicarbonate (HCO ₃)	mg/L	---	---	72
Carbonate (as CaCO ₃)	mg/L	---	---	<6
Hydroxide (OH)	mg/L	---	---	<5
Turbidity	NTU	(a)	---	16.6
Hardness (as CaCO ₃)	mg/L	---	---	52
Nutrients				
Ammonia	mg/L	---	0.681-28.7 ^(b)	ND (0.025)
Dissolved Nitrate (N)	mg/L	10	32.8	0.13
Dissolved Nitrite (N)	mg/L	1.0	0.06-0.6 ^(c)	<0.01
Total Phosphorus (P)	mg/L	0.01 (AO)	---	0.011
Nitrate plus Nitrite (N)	mg/L	10	---	0.13
Total Nitrogen (N)	mg/L	---	---	0.15
Total Kjeldahl Nitrogen (TKN)	mg/L	---	---	<0.07
Anions				
Chloride	mg/L	250 (AO)	600	1.42
Sulfate	mg/L	500 (AO)	(l)	2.6
Dissolved Metals				
Aluminum	mg/L	9.5	0.1 ^(d)	0.33
Antimony	mg/L	---	0.009 ^(w)	0.00039
Arsenic	mg/L	0.01	0.005	0.0002
Barium	mg/L	---	1 ^(w)	0.0096
Beryllium	mg/L	---	0.00013 ^(w)	<0.00005
Bismuth	mg/L	---	---	<0.0001
Boron	mg/L	5.0	1.2	0.004
Cadmium	mg/L	0.005	(e)	0.00001
Calcium	mg/L	---	---	18
Chromium	mg/L	---	---	0.00063
Cobalt	mg/L	---	0.11	0.0011
Copper	mg/L	1.0	(f)	0.0009
Iron	mg/L	0.3 (AO)	0.35	0.33
Lead	mg/L	0.01	0.003 ^(g)	0.00023
Lithium	mg/L	---	---	0.0011
Magnesium	mg/L	---	---	1.4
Manganese	mg/L	0.05 (AO)	(h)	0.056
Mercury	mg/L	0.001	---	<0.00001
Molybdenum	mg/L	0.25	2	0.0012
Nickel	mg/L	---	0.025-0.15 ^{(i)(w)}	0.0004
Phosphorus		---	---	0.011
Potassium	mg/L	---	---	1.0
Selenium	mg/L	0.01	0.002	<0.0002
Silicon	mg/L	---	---	9.9
Silver	mg/L	---	0.0001-0.003 ^(j)	<0.00001
Sodium	mg/L	---	---	5
Strontium	mg/L	---	---	0.064
Sulfur	mg/L	---	---	1.10
Tellurium		---	---	
Thallium	mg/L	---	---	<0.00001
Thorium		---	---	<0.00005
Tin	mg/L	---	---	0.0009
Titanium	mg/L	---	---	0.011
Tungsten		---	---	
Uranium	mg/L	---	0.0085 ^(w)	0.00008
Vanadium	mg/L	---	---	0.0011
Zinc	mg/L	5.0 (AO)	(k)	0.0078
Zirconium	mg/L	---	---	<0.0001
Volatile Organic Compounds				
1,1,1,2-tetrachloroethane	mg/L	---	---	ND(0.0001)
1,1,1-trichloroethane	mg/L	---	---	ND(0.0001)
1,1,2,2-tetrachloroethane	mg/L	---	---	ND(0.0001)
1,1,2Trichloro-1,2,2Trifluoroethane	mg/L	---	---	-
1,1,2-trichloroethane	mg/L	---	---	ND(0.0001)
1,1-dichloroethane	mg/L	---	---	ND(0.0001)
1,1-dichloroethene	mg/L	---	---	ND(0.0005)
1,2,3-trichlorobenzene	mg/L	---	0.008 ^(w)	ND(0.0001)
1,2,4-trichlorobenzene	mg/L	---	0.024 ^(w)	ND(0.0001)
1,2-dibromoethane	mg/L	---	---	ND(0.0001)
1,2-dichlorobenzene	mg/L	---	0.0007 ^(w)	ND(0.0001)

Table 19 2022 Groundwater Quality Results - MW22-01

Sample Date:	Units	BCMECCS Criteria ⁽¹⁾		Jul-22
Parameters:		DWQ ⁽²⁾	FWAL ⁽³⁾	
Lab Sample ID:				8143118
1,2-dichloroethane	mg/L	---	0.100 ^(w)	ND(0.0005)
1,2-dichloropropane	mg/L	---	---	ND(0.0001)
1,3,5-trimethylbenzene	mg/L	---	---	ND(0.0001)
1,3-dichlorobenzene	mg/L	---	0.150 ^(w)	ND(0.0001)
1,3-dichloropropane	mg/L	---	---	ND(0.0001)
1,4-dichlorobenzene	mg/L	---	0.026 ^(w)	ND(0.0001)
Benzene	mg/L	0.005	0.04 ^(m)	ND(0.0001)
Bromobenzene	mg/L	---	---	ND(0.0001)
Bromodichloromethane	mg/L	---	---	ND(0.0001)
Bromoform	mg/L	---	---	ND(0.0001)
Bromomethane	mg/L	---	---	ND(0.001)
Dibromomethane	mg/L	---	---	ND(0.0001)
Carbon Tetrachloride	mg/L	---	0.0133 ^(w)	ND(0.0005)
Chlorobenzene	mg/L	---	---	ND(0.0001)
Chlorodibromomethane	mg/L	---	---	-
Chloroethane	mg/L	---	---	ND(0.001)
Chloroform	mg/L	---	0.0018 ^(w)	ND(0.0001)
Chloromethane	mg/L	---	---	ND(0.001)
cis-1,2-dichloroethene	mg/L	---	---	ND(0.0001)
cis-1,3-dichloropropene	mg/L	---	---	ND(0.0001)
Dichlorodifluoromethane	mg/L	---	---	ND(0.001)
Dichloromethane	mg/L	---	0.0981 ^(w)	-
Ethylbenzene	mg/L	0.14/0.0016 (AO)	0.20 ^(m)	ND(0.0001)
Hexachlorobutadiene	mg/L	---	0.0013 ^(w)	ND(0.0001)
Isopropylbenzene	mg/L	---	---	-
m & p-Xylene	mg/L	---	---	ND(0.0001)
Methyl-tert-butylether (MTBE)	mg/L	0.015 (AO)	3.4	ND(0.0001)
o-Xylene	mg/L	---	---	ND(0.0001)
Styrene	mg/L	---	0.072 ^(w)	ND(0.0001)
Tetrachloroethene	mg/L	---	---	ND(0.0005)
Toluene	mg/L	0.06/0.024 (AO)	0.0005	ND(0.0001)
trans-1,2-dichloroethene	mg/L	---	---	ND(0.0001)
trans-1,3-dichloropropene	mg/L	---	---	ND(0.0001)
Trichloroethene	mg/L	---	---	ND(0.0005)
Trichlorofluoromethane	mg/L	---	---	ND(0.0001)
VH C6-C10	mg/L	---	---	ND(0.05)
Vinyl Chloride	mg/L	---	---	ND(0.0005)
VPH (VHW6 to 10 - BTEX)	mg/L	---	---	ND(0.05)
Xylenes (total)	mg/L	0.09/0.02 (AO)	0.03	ND(0.0001)
Notes: 1. Values reported from BCMECCS - British Columbia Water Quality Guidelines, 2019 Edition, unless otherwise stated. 2. Drinking Water Criteria (DWQ): Metal guidelines are for total concentrations. 3. Freshwater Aquatic Life Criteria (FWAL): All criteria for metals are for total metals except criteria for aluminum and iron, which are for dissolved. 0.500 - Exceeds Drinking Water Criteria 0.500 - Exceeds Freshwater Aquatic Life Criteria 0.500 - Exceeds Drinking Water Criteria and Freshwater Aquatic Life Criteria a. Turbidity: BCMECCS Source Drinking Water Quality Guidelines, Guidelines Summary Table 2. Decreases compared to background concentrations are not interpreted as exceedances. b. Ammonia-N: BCMECCS Approved Water Quality Guidelines, Summary Report Table 26D. Temperature and pH dependent. c. Nitrite: BCMECCS Approved Water Quality Guidelines. Chloride dependent. d. Aluminum: criteria specified for dissolved species not total. Criteria pH dependent. If pH<6.5: e^(1.209-2.426*pH+0.286*pH²) e. Cadmium (mg/L) = (e^(1.03*LN(HARDNESS)-5.274))/1000, valid for Hardness (as CaCO₃) of 7 to 455 mg/L. f. Copper guidelines calculated using BCMECCS Biotic Ligand Model (BLM) software. Dependent on multiple other parameters. g. Lead: hardness dependent. For Hardness (as CaCO₃) > 8 mg/L: (e^(1.273*ln(HARDNESS)-1.460))/1000 . If hardness is < or equal to 8 mg/L: 0.003 mg/L. h. Manganese (mg/L) = (0.01102*HARDNESS)+0.54. i. Nickel: BCMECCS Working Water Quality Guidelines, Table 1. j. Silver: hardness <= 100 mg/L = 0.0001 mg/L, hardness > 100 mg/L = 0.003 mg/L k. Zinc (mg/L) = 0.033 for Hardness < or equal to 90 mg/L, (33+(0.75*(HARDNESS-90)))/1000 for Hardness > 90 mg/L l. Sulphate: BCMECCS Approved Water Quality Guidelines, Summary Report Table 40. Hardness dependent. m. Interim guideline n. Temperature: Streams with Bull Trout and/or Dolly Varden = 15, unknown fish distribution = 19 o. Alkalinity (Total as CaCO₃): BCMECCS Working Water Quality Guidelines, Table 1. w. Values reported from BCMECCS - Working Water Quality Guidelines for British Columbia (2017). Values are long-term (i.e., average) concentrations unless identified as a short-term maximum. AO - Aesthetic Objective - No data available --- Currently no Standard/Criteria ND - Not detected above the laboratory Reportable Detection Limit (RDL)				

Table 20 2022 Groundwater Quality Results - MW22-02

Sample Date:	Units	BCMECCS Criteria ⁽¹⁾		Jul-22	Sep-22		Dec-22
Parameters:		DWQ ⁽²⁾	FWAL ⁽³⁾		8288629	Duplicate 8288632	
Lab Sample ID:							
				8143119			8424791
Field Parameters							
pH	s.u.	---	6.5-9.0	<u>6.05</u>	<u>6.05</u>	<u>6.05</u>	NM
Conductivity, Electrical	µS/cm	---	---	0.436	0.107	0.107	NM
Temperature	°C	15 (AO)	---	13.67	13.28	13.28	NM
Dissolved Oxygen	mg/L	---	---	3.45	12.88	12.88	NM
Redox Potential	(mV)	---	---	160	109	109	NM
General							
Chemical Oxygen Demand (COD)	mg/L	---	---	20.0	20	20	30
Dissolved Organic Carbon (DOC)	mg/L	---	---	-	-	-	
Conductivity, Electrical	µS/cm	---	---	436	102	101	103
pH	s.u.	---	6.5-9.0	6.69	7.74	7.55	7.34
Alkalinity (Total as CaCO3)	mg/L	---	(o) ^(w)	215	47	45	47
Alkalinity (PP as CaCO3)	mg/L	---	---	ND(5)	ND(5)	ND(5)	ND(5)
Bicarbonate (HCO ₃)	mg/L	---	---	262	57	55	57
Carbonate (as CaCO ₃)	mg/L	---	---	ND(6)	ND(6)	ND(6)	ND(6)
Hydroxide (OH)	mg/L	---	---	ND(5)	ND(5)	ND(5)	ND(5)
Turbidity	NTU	(a)	---	10.7	47	11.3	33
Hardness (as CaCO ₃)	mg/L	---	---	190	42	42	45
Nutrients							
Ammonia	mg/L	---	0.681-28.7 ^(b)	ND (0.025)	ND (0.025)	ND (0.025)	ND (0.025)
Dissolved Nitrate (N)	mg/L	10	32.8	ND(0.01)	0.16	0.18	0.16
Dissolved Nitrite (N)	mg/L	1.0	0.06-0.6 ^(c)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)
Total Phosphorus (P)	mg/L	0.01 (AO)	---	ND(0.005)	0.044	0.024	ND(0.005)
Nitrate plus Nitrite (N)	mg/L	10	---	ND(0.02)	0.16	0.18	0.16
Total Nitrogen (N)	mg/L	---	---	0.17	0.18	0.18	0.17
Total Kjeldahl Nitrogen (TKN)	mg/L	---	---	ND(0.07)	ND(0.07)	ND(0.07)	ND(0.07)
Anions							
Chloride	mg/L	250 (AO)	600	6	1.2	1.2	1.2
Sulfate	mg/L	500 (AO)	(l)	6.5	2	2	2
Dissolved Metals							
Aluminum	mg/L	9.5	0.1 ^(d)	0.041	0.544	0.3	0.008
Antimony	mg/L	---	0.009 ^(w)	0.00011	0.0003	0.0003	0.00027
Arsenic	mg/L	0.01	0.005	0.0005	ND(0.0002)	ND(0.0002)	0.0001
Barium	mg/L	---	1 ^(w)	0.056	0.011	0.007	0.0037
Beryllium	mg/L	---	0.00013 ^(w)	ND(0.0005)	ND(0.0001)	ND(0.0001)	ND(0.0005)
Bismuth	mg/L	---	---	ND(0.0001)	ND(0.0005)	ND(0.0005)	ND(0.0001)
Boron	mg/L	5.0	1.2	0.026	0.005	0.003	0.004
Cadmium	mg/L	0.005	(e)	0.00044	0.00001	0.00001	ND 0.00001
Calcium	mg/L	---	---	60	14	14	16
Chromium	mg/L	---	---	0.00015	0.0009	0.0005	0.00006
Cobalt	mg/L	---	0.11	0.0066	0.0014	0.0011	0.00058
Copper	mg/L	1.0	(f)	0.0011	0.001	0.001	ND(0.0005)
Iron	mg/L	0.3 (AO)	0.35	5	0.54	0.32	0.003
Lead	mg/L	0.01	0.003 ^(g)	0.00006	0.0004	0.0002	ND 0.00001
Lithium	mg/L	---	---	0.0054	ND(0.001)	ND(0.001)	ND(0.0005)
Magnesium	mg/L	---	---	10.0	1.7	1.6	1.6
Manganese	mg/L	0.05 (AO)	(h)	4.2	0.038	0.031	0.017
Mercury	mg/L	0.001	---	ND(0.00001)	ND(0.00001)	ND(0.00001)	ND(0.00001)
Molybdenum	mg/L	0.25	2	0.0001	ND(0.001)	ND(0.001)	0.00046
Nickel	mg/L	---	0.025-0.15 ^{(j)(w)}	0.0023	0.0006	0.0006	0.0003
Phosphorus		---	---	ND(0.005)	0.044	0.024	<0.005
Potassium	mg/L	---	---	4.5	0.8	0.8	0.8
Selenium	mg/L	0.01	0.002	ND(0.0002)	ND(0.0002)	ND(0.0002)	ND(0.0002)
Silicon	mg/L	---	---	12.0	10	10	10
Silver	mg/L	---	0.0001-0.003 ⁽ⁱ⁾	ND(0.00001)	ND(0.00001)	ND(0.00001)	ND(0.00001)
Sodium	mg/L	---	---	14	4	4	4
Strontium	mg/L	---	---	0.62	0.053	0.052	0.044
Sulfur	mg/L	---	---	3	0.6	0.6	0.79
Tellurium		---	---	-	-	-	-
Thallium	mg/L	---	---	ND(0.00001)	ND(0.00005)	ND(0.00005)	ND(0.00005)
Thorium		---	---	ND(0.00005)	ND(0.00005)	ND(0.00005)	ND(0.00005)
Tin	mg/L	---	---	0.0001	ND(0.001)	ND(0.001)	ND (0.00001)
Titanium	mg/L	---	---	0.0028	0.0226	0.0136	0.0003
Tungsten		---	---	-	-	-	0.0006
Uranium	mg/L	---	0.0085 ^(w)	0.00027	ND(0.0005)	ND(0.0005)	0.00003
Vanadium	mg/L	---	---	<0.00005	0.0017	0.0013	0.00066
Zinc	mg/L	5.0 (AO)	(k)	0.013	0.006	0.006	0.0018
Zirconium	mg/L	---	---	ND(0.0001)	ND(0.001)	ND(0.001)	ND(0.0001)
Volatile Organic Compounds							
1,1,1,2-tetrachloroethane	mg/L	---	---	ND(0.0001)	ND(0.001)	ND(0.001)	ND(0.001)
1,1,1-trichloroethane	mg/L	---	---	ND(0.0001)	ND(0.0001)	ND(0.0001)	ND(0.0001)
1,1,2,2-tetrachloroethane	mg/L	---	---	ND(0.0001)	ND(0.0001)	ND(0.0001)	ND(0.0001)
1,1,2Trichloro-1,2,2Trifluoroethane	mg/L	---	---				
1,1,2-trichloroethane	mg/L	---	---	ND(0.0001)	ND(0.0001)	ND(0.0001)	ND(0.0001)
1,1-dichloroethane	mg/L	---	---	ND(0.0001)	ND(0.0001)	ND(0.0001)	ND(0.0001)
1,1-dichloroethene	mg/L	---	---	ND(0.0005)	ND(0.0005)	ND(0.0005)	ND(0.0005)
1,2,3-trichlorobenzene	mg/L	---	0.008 ^(w)	ND(0.0001)	ND(0.0001)	ND(0.0001)	ND(0.0001)
1,2,4-trichlorobenzene	mg/L	---	0.024 ^(w)	ND(0.0001)	ND(0.0001)	ND(0.0001)	ND(0.0001)

Table 20 2022 Groundwater Quality Results - MW22-02

Sample Date:	Units	BCMECCS Criteria ⁽¹⁾		Jul-22	Sep-22		Dec-22
Parameters:		DWQ ⁽²⁾	FWAL ⁽³⁾		8288629	Duplicate 8288632	
Lab Sample ID:							
				8143119			8424791
1,2-dibromoethane	mg/L	---	---	ND(0.0001)	ND(0.0001)	ND(0.0001)	ND(0.0001)
1,2-dichlorobenzene	mg/L	---	0.0007 ^(w)	ND(0.0001)	ND(0.0001)	ND(0.0001)	ND(0.0001)
1,2-dichloroethane	mg/L	---	0.100 ^(w)	ND(0.0005)	ND(0.0005)	ND(0.0005)	ND(0.0005)
1,2-dichloropropane	mg/L	---	---	ND(0.0001)	ND(0.0001)	ND(0.0001)	ND(0.0001)
1,3,5-trimethylbenzene	mg/L	---	---	ND(0.0001)	ND(0.0001)	ND(0.0001)	ND(0.0001)
1,3-dichlorobenzene	mg/L	---	0.150 ^(w)	ND(0.0001)	ND(0.0001)	ND(0.0001)	ND(0.0001)
1,3-dichloropropane	mg/L	---	---	ND(0.0001)	ND(0.0001)	ND(0.0001)	ND(0.0001)
1,4-dichlorobenzene	mg/L	---	0.026 ^(w)	ND(0.0001)	ND(0.0001)	ND(0.0001)	ND(0.0001)
Benzene	mg/L	0.005	0.04 ^(m)	ND(0.0001)	ND(0.0001)	ND(0.0001)	ND(0.0001)
Bromobenzene	mg/L	---	---	ND(0.0001)	ND(0.0001)	ND(0.0001)	ND(0.0001)
Bromodichloromethane	mg/L	---	---	ND(0.0001)	ND(0.0001)	ND(0.0001)	ND(0.0001)
Bromoform	mg/L	---	---	ND(0.0001)	ND(0.0001)	ND(0.0001)	ND(0.0001)
Bromomethane	mg/L	---	---	ND(0.001)	ND(0.001)	ND(0.001)	ND(0.001)
Dibromomethane	mg/L	---	---	ND(0.0001)	ND(0.0001)	ND(0.0001)	ND(0.0001)
Carbon Tetrachloride	mg/L	---	0.0133 ^(w)	ND(0.0005)	ND(0.0005)	ND(0.0005)	ND(0.0005)
Chlorobenzene	mg/L	---	---	0.0024	ND(0.0001)	ND(0.0001)	ND(0.0001)
Chlorodibromomethane	mg/L	---	---	-	-	-	-
Chloroethane	mg/L	---	---	ND(0.001)	ND(0.001)	ND(0.001)	ND(0.001)
Chloroform	mg/L	---	0.0018 ^(w)	ND(0.0001)	ND(0.0001)	ND(0.0001)	ND(0.0001)
Chloromethane	mg/L	---	---	ND(0.001)	ND(0.001)	ND(0.001)	ND(0.001)
cis-1,2-dichloroethene	mg/L	---	---	ND(0.0001)	ND(0.0001)	ND(0.0001)	ND(0.0001)
cis-1,3-dichloropropene	mg/L	---	---	ND(0.0001)	ND(0.0001)	ND(0.0001)	ND(0.0001)
Dichlorodifluoromethane	mg/L	---	---	ND(0.001)	ND(0.001)	ND(0.001)	ND(0.001)
Dichloromethane	mg/L	---	0.0981 ^(w)		-	-	-
Ethylbenzene	mg/L	0.14/0.0016 (AO)	0.20 ^(m)	ND(0.0001)	ND(0.0001)	ND(0.0001)	ND(0.0001)
Hexachlorobutadiene	mg/L	---	0.0013 ^(w)	ND(0.0001)	ND(0.0001)	ND(0.0001)	ND(0.0001)
Isopropylbenzene	mg/L	---	---		-	-	-
m & p-Xylene	mg/L	---	---	ND(0.0001)	ND(0.0001)	ND(0.0001)	ND(0.0001)
Methyl-tert-butylether (MTBE)	mg/L	0.015 (AO)	3.4	0.0007	ND(0.0001)	ND(0.0001)	ND(0.0001)
o-Xylene	mg/L	---	---	ND(0.0001)	ND(0.0001)	ND(0.0001)	ND(0.0001)
Styrene	mg/L	---	0.072 ^(w)	ND(0.0001)	ND(0.0001)	ND(0.0001)	ND(0.0001)
Tetrachloroethene	mg/L	---	---	ND(0.0005)	ND(0.0005)	ND(0.0005)	ND(0.0005)
Toluene	mg/L	0.06/0.024 (AO)	0.0005	ND(0.0001)	ND(0.0001)	ND(0.0001)	ND(0.0001)
trans-1,2-dichloroethene	mg/L	---	---	ND(0.0001)	ND(0.0001)	ND(0.0001)	ND(0.0001)
trans-1,3-dichloropropene	mg/L	---	---	ND(0.0001)	ND(0.0001)	ND(0.0001)	ND(0.0001)
Trichloroethene	mg/L	---	---	ND(0.0005)	ND(0.0005)	ND(0.0005)	ND(0.0005)
Trichlorofluoromethane	mg/L	---	---	ND(0.0001)	ND(0.0001)	ND(0.0001)	ND(0.0001)
VH C6-C10	mg/L	---	---	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)
Vinyl Chloride	mg/L	---	---	ND(0.0005)	ND(0.0005)	ND(0.0005)	ND(0.0005)
VPH (VHW6 to 10 - BTEX)	mg/L	---	---	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)
Xylenes (total)	mg/L	0.09/0.02 (AO)	0.03	ND(0.0001)	ND(0.0001)	ND(0.0001)	ND(0.0001)
Notes: 1. Values reported from BCMECCS - British Columbia Water Quality Guidelines, 2019 Edition, unless otherwise stated. 2. Drinking Water Criteria (DWQ): Metal guidelines are for total concentrations. 3. Freshwater Aquatic Life Criteria (FWAL): All criteria for metals are for total metals except criteria for aluminum and iron, which are for dissolved. 0.500 - Exceeds Drinking Water Criteria 0.500 - Exceeds Freshwater Aquatic Life Criteria 0.500 - Exceeds Drinking Water Criteria and Freshwater Aquatic Life Criteria a. Turbidity: BCMECCS Source Drinking Water Quality Guidelines, Guidelines Summary Table 2. Decreases compared to background concentrations are not interpreted as b. Ammonia-N: BCMECCS Approved Water Quality Guidelines, Summary Report Table 26D. Temperature and pH dependent. c. Nitrite: BCMECCS Approved Water Quality Guidelines. Chloride dependent. d. Aluminum: criteria specified for dissolved species not total. Criteria pH dependent. If pH<6.5: $e^{(1.209-2.426 \cdot \text{pH}+0.286 \cdot \text{pH}^2)}$ e. Cadmium (mg/L) = $(e^{(1.03 \cdot \text{LN}(\text{HARDNESS})-5.274)})/1000$, valid for Hardness (as CaCO ₃) of 7 to 455 mg/L. f. Copper guidelines calculated using BCMECCS Biotic Ligand Model (BLM) software. Dependent on multiple other parameters. g. Lead: hardness dependent. For Hardness (as CaCO ₃) > 8 mg/L: $(e^{(1.273 \cdot \ln(\text{HARDNESS})-1.460)})/1000$. If hardness is < or equal to 8 mg/L: 0.003 mg/L. h. Manganese (mg/L) = (0.01102*HARDNESS)+0.54. i. Nickel: BCMECCS Working Water Quality Guidelines, Table 1. j. Silver: hardness <= 100 mg/L = 0.0001 mg/L, hardness > 100 mg/L = 0.003 mg/L k. Zinc (mg/L) = 0.033 for Hardness < or equal to 90 mg/L, $(33+(0.75 \cdot (\text{HARDNESS}-90)))/1000$ for Hardness > 90 mg/L l. Sulphate: BCMECCS Approved Water Quality Guidelines, Summary Report Table 40. Hardness dependent. m. Interim guideline n. Temperature: Streams with Bull Trout and/or Dolly Varden = 15, unknown fish distribution = 19 o. Alkalinity (Total as CaCO ₃): BCMECCS Working Water Quality Guidelines, Table 1. w. Values reported from BCMECCS - Working Water Quality Guidelines for British Columbia (2017). Values are long-term (i.e., average) concentrations unless identified as a short-term maximum. AO - Aesthetic Objective - No data available NM - not measured --- Currently no Standard/Criteria ND - Not detected above the laboratory Reportable Detection Limit (RDL)							

Table 21 2022 Groundwater Quality Results - MW22-03

Sample Date:	Units	BCMECCS Criteria ⁽¹⁾		Sep-22	Dec-22
Parameters:		DWQ ⁽²⁾	FWAL ⁽³⁾		
Lab Sample ID:				8288630	8424783
Field Parameters					
pH	s.u.	---	6.5-9.0	<u>6.34</u>	9.67
Conductivity, Electrical	µS/cm	---	---	1.32	0.111
Temperature	°C	15 (AO)	---	13.22	8.01
Dissolved Oxygen	mg/L	---	---	2.12	21.1
Redox Potential	(mV)	---	---	-37	103
General					
Chemical Oxygen Demand (COD)	mg/L	---	---	50.0	30.0
Dissolved Organic Carbon (DOC)	mg/L	---	---		
Conductivity, Electrical	µS/cm	---	---	1281	1244
pH	s.u.	---	6.5-9.0	7.6	7.3
Alkalinity (Total as CaCO3)	mg/L	---	(o) ^(w)	586	575
Alkalinity (PP as CaCO3)	mg/L	---	---	<5	<5
Bicarbonate (HCO ₃)	mg/L	---	---	714	701
Carbonate (as CaCO ₃)	mg/L	---	---	<6	<6
Hydroxide (OH)	mg/L	---	---	<5	<5
Turbidity	NTU	(a)	---	172	138
Hardness (as CaCO ₃)	mg/L	---	---	172	170
Nutrients					
Ammonia	mg/L	---	0.681-28.7 ^(b)	<u>96.7</u>	<u>92.9</u>
Dissolved Nitrate (N)	mg/L	10	32.8	ND(0.1)	ND(0.1)
Dissolved Nitrite (N)	mg/L	1.0	0.06-0.6 ^(c)	ND(0.1)	ND(0.1)
Total Phosphorus (P)	mg/L	0.01 (AO)	---	0.4	0.34
Nitrate plus Nitrite (N)	mg/L	10	---	ND(0.20)	ND(0.20)
Total Nitrogen (N)	mg/L	---	---	94.4	90.2
Total Kjeldahl Nitrogen (TKN)	mg/L	---	---	94.4	90.2
Anions					
Chloride	mg/L	250 (AO)	600	24.2	20.1
Sulfate	mg/L	500 (AO)	(l)	ND(1)	ND(1)
Dissolved Metals					
Aluminum	mg/L	9.5	0.1 ^(d)	<u>0.225</u>	ND (0.001)
Antimony	mg/L	---	0.009 ^(w)	0.0002	0.00007
Arsenic	mg/L	0.01	0.005	<u>0.0053</u>	0.0011
Barium	mg/L	---	1 ^(w)	0.186	0.1
Beryllium	mg/L	---	0.00013 ^(w)	ND(0.0001)	ND(0.0001)
Bismuth	mg/L	---	---	ND(0.0005)	ND(0.0001)
Boron	mg/L	5.0	1.2	0.082	0.076
Cadmium	mg/L	0.005	(e)	ND(0.00001)	ND(0.00001)
Calcium	mg/L	---	---	56	57
Chromium	mg/L	---	---	0.0006	0.00009
Cobalt	mg/L	---	0.11	0.0009	0.00084
Copper	mg/L	1.0	(f)	0.001	0.000001
Iron	mg/L	0.3 (AO)	0.35	18	0.015
Lead	mg/L	0.01	0.003 ^(g)	0.0002	0.00001
Lithium	mg/L	---	---	0.001	0.0008
Magnesium	mg/L	---	---	7.6	7.6
Manganese	mg/L	0.05 (AO)	(h)	5.7	5.8
Mercury	mg/L	0.001	---	ND(0.00005)	ND(0.00005)
Molybdenum	mg/L	0.25	2	ND(0.001)	0.00011
Nickel	mg/L	---	0.025-0.15 ^{(i)(w)}	0.0022	0.0018
Phosphorus		---	---	0.4	0.34
Potassium	mg/L	---	---	17.3	17.0
Selenium	mg/L	0.01	0.002	ND(0.0002)	-
Silicon	mg/L	---	---	15	14
Silver	mg/L	---	0.0001-0.003 ^(j)	ND(0.00001)	ND(0.00001)
Sodium	mg/L	---	---	38	37
Strontium	mg/L	---	---	1.2	1.1
Sulfur	mg/L	---	---	ND(0.3)	1
Tellurium		---	---	-	-
Thallium	mg/L	---	---	ND(0.00005)	ND(0.00001)
Thorium		---	---	ND(0.00005)	ND(0.00005)
Tin	mg/L	---	---	ND(0.001)	ND(0.0001)
Titanium	mg/L	---	---	0.01	<0.0002
Tungsten		---	---	ND(0.0002)	ND(0.0002)
Uranium	mg/L	---	0.0085 ^(w)	ND(0.0005)	0.00008
Vanadium	mg/L	---	---	0.0019	0.00005
Zinc	mg/L	5.0 (AO)	(k)	0.007	0.0038
Zirconium	mg/L	---	---	ND(0.001)	ND(0.00001)
Volatile Organic Compounds					
1,1,1,2-tetrachloroethane	mg/L	---	---	ND(0.0001)	ND(0.0001)
1,1,1-trichloroethane	mg/L	---	---	ND(0.0001)	ND(0.0001)
1,1,2,2-tetrachloroethane	mg/L	---	---	ND(0.0001)	ND(0.0001)
1,1,2Trichloro-1,2,2Trifluoroethane	mg/L	---	---	-	-
1,1,2-trichloroethane	mg/L	---	---	ND(0.0001)	ND(0.0001)
1,1-dichloroethane	mg/L	---	---	0.0002	0.0002
1,1-dichloroethene	mg/L	---	---	ND(0.0005)	ND(0.0005)
1,2,3-trichlorobenzene	mg/L	---	0.008 ^(w)	ND(0.0001)	ND(0.0001)
1,2,4-trichlorobenzene	mg/L	---	0.024 ^(w)	ND(0.0001)	ND(0.0001)
1,2-dibromoethane	mg/L	---	---	ND(0.0001)	ND(0.0001)

Table 21 2022 Groundwater Quality Results - MW22-03

Sample Date:	Units	BCMECCS Criteria ⁽¹⁾		Sep-22	Dec-22
Parameters:		DWQ ⁽²⁾	FWAL ⁽³⁾		
Lab Sample ID:				8288630	8424783
1,2-dichlorobenzene	mg/L	---	0.0007 ^(w)	ND(0.0001)	ND(0.0001)
1,2-dichloroethane	mg/L	---	0.100 ^(w)	ND(0.0005)	ND(0.0005)
1,2-dichloropropane	mg/L	---	---	ND(0.0001)	ND(0.0001)
1,3,5-trimethylbenzene	mg/L	---	---	ND(0.0001)	ND(0.0001)
1,3-dichlorobenzene	mg/L	---	0.150 ^(w)	ND(0.0001)	ND(0.0001)
1,3-dichloropropane	mg/L	---	---	ND(0.0001)	ND(0.0001)
1,4-dichlorobenzene	mg/L	---	0.026 ^(w)	0.0002	ND(0.0001)
Benzene	mg/L	0.005	0.04 ^(m)	0.0016	0.0014
Bromobenzene	mg/L	---	---	ND(0.0001)	ND(0.0001)
Bromodichloromethane	mg/L	---	---	ND(0.0001)	ND(0.0001)
Bromoform	mg/L	---	---	ND(0.0001)	ND(0.0001)
Bromomethane	mg/L	---	---	ND(0.001)	ND(0.001)
Dibromomethane	mg/L	---	---	ND(0.0001)	ND(0.0001)
Carbon Tetrachloride	mg/L	---	0.0133 ^(w)	ND(0.0005)	ND(0.0005)
Chlorobenzene	mg/L	---	---	0.0016	0.0018
Chlorodibromomethane	mg/L	---	---	-	-
Chloroethane	mg/L	---	---	ND(0.001)	ND(0.001)
Chloroform	mg/L	---	0.0018 ^(w)	ND(0.0001)	ND(0.0001)
Chloromethane	mg/L	---	---	ND(0.001)	ND(0.001)
cis-1,2-dichloroethene	mg/L	---	---	ND(0.0001)	ND(0.0001)
cis-1,3-dichloropropene	mg/L	---	---	ND(0.0001)	ND(0.0001)
Dichlorodifluoromethane	mg/L	---	---	ND(0.001)	ND(0.001)
Dichloromethane	mg/L	---	0.0981 ^(w)	-	-
Ethylbenzene	mg/L	0.14/0.0016 (AO)	0.20 ^(m)	ND(0.0001)	ND(0.0001)
Hexachlorobutadiene	mg/L	---	0.0013 ^(w)	ND(0.0001)	ND(0.0001)
Isopropylbenzene	mg/L	---	---	-	-
m & p-Xylene	mg/L	---	---	ND(0.0001)	ND(0.0001)
Methyl-tert-butylether (MTBE)	mg/L	0.015 (AO)	3.4	0.0037	0.0028
o-Xylene	mg/L	---	---	ND(0.0001)	ND(0.0001)
Styrene	mg/L	---	0.072 ^(w)	ND(0.0001)	ND(0.0001)
Tetrachloroethene	mg/L	---	---	ND(0.0005)	ND(0.0005)
Toluene	mg/L	0.06/0.024 (AO)	0.0005	ND(0.0001)	ND(0.0001)
trans-1,2-dichloroethene	mg/L	---	---	ND(0.0001)	ND(0.0001)
trans-1,3-dichloropropene	mg/L	---	---	ND(0.0001)	ND(0.0001)
Trichloroethene	mg/L	---	---	ND(0.0005)	ND(0.0005)
Trichlorofluoromethane	mg/L	---	---	ND(0.0001)	ND(0.0001)
VH C6-C10	mg/L	---	---	ND(0.05)	ND(0.05)
Vinyl Chloride	mg/L	---	---	ND(0.0005)	ND(0.0005)
VPH (VHW6 to 10 - BTEX)	mg/L	---	---	ND(0.05)	ND(0.05)
Xylenes (total)	mg/L	0.09/0.02 (AO)	0.03	ND(0.0001)	ND(0.0001)
Notes: 1. Values reported from BCMECCS - British Columbia Water Quality Guidelines, 2019 Edition, unless otherwise stated. 2. Drinking Water Criteria (DWQ): Metal guidelines are for total concentrations. 3. Freshwater Aquatic Life Criteria (FWAL): All criteria for metals are for total metals except criteria for aluminum and iron, which are for dissolved. 0.500 - Exceeds Drinking Water Criteria 0.500 - Exceeds Freshwater Aquatic Life Criteria 0.500 - Exceeds Drinking Water Criteria and Freshwater Aquatic Life Criteria a. Turbidity: BCMECCS Source Drinking Water Quality Guidelines, Guidelines Summary Table 2. Decreases compared to background concentrations are not interpreted as exceedances. b. Ammonia-N: BCMECCS Approved Water Quality Guidelines, Summary Report Table 26D. Temperature and pH dependent. c. Nitrite: BCMECCS Approved Water Quality Guidelines. Chloride dependent. d. Aluminum: criteria specified for dissolved species not total. Criteria pH dependent. If pH<6.5: $e^{(1.209-2.426 \cdot \text{pH}+0.286 \cdot \text{pH}^2)}$ e. Cadmium (mg/L) = $(e^{(1.03 \cdot \text{LN}(\text{HARDNESS})-5.274)})/1000$, valid for Hardness (as CaCO₃) of 7 to 455 mg/L. f. Copper guidelines calculated using BCMECCS Biotic Ligand Model (BLM) software. Dependent on multiple other parameters. g. Lead: hardness dependent. For Hardness (as CaCO₃) > 8 mg/L: $(e^{(1.273 \cdot \text{ln}(\text{HARDNESS})-1.460)})/1000$. If hardness is < or equal to 8 mg/L: 0.003 mg/L. h. Manganese (mg/L) = (0.01102*HARDNESS)+0.54. i. Nickel: BCMECCS Working Water Quality Guidelines, Table 1. j. Silver: hardness <= 100 mg/L = 0.0001 mg/L, hardness > 100 mg/L = 0.003 mg/L k. Zinc (mg/L) = 0.033 for Hardness < or equal to 90 mg/L, $(33+(0.75 \cdot (\text{HARDNESS}-90)))/1000$ for Hardness > 90 mg/L l. Sulphate: BCMECCS Approved Water Quality Guidelines, Summary Report Table 40. Hardness dependent. m. Interim guideline n. Temperature: Streams with Bull Trout and/or Dolly Varden = 15, unknown fish distribution = 19 o. Alkalinity (Total as CaCO₃): BCMECCS Working Water Quality Guidelines, Table 1. w. Values reported from BCMECCS - Working Water Quality Guidelines for British Columbia (2017). Values are long-term (i.e., average) concentrations unless identified as a short-term maximum. AO - Aesthetic Objective - No data available --- Currently no Standard/Criteria ND - Not detected above the laboratory Reportable Detection Limit (RDL)					

Table 22 2022 Surface Water Quality Results - Site A Upper Chapman Creek

Sample Date:	Units	BCMECCS Criteria ⁽¹⁾		Mar-22	Jul-22		Sep-22		Dec-22
Parameters:		DWQ ⁽²⁾	FWAL ⁽³⁾			Duplicate		Duplicate	
Lab Sample ID:				7998957	8143186	8143189	8288710	8288711	8424830
Field Parameters									
pH	s.u.	---	6.5-9.0	7.06	9.39	-	7.67	-	7.25
Conductivity, Electrical	µS/cm	---	---	0.014	0.019	-	0.04	-	0.034
Temperature	°C	15 (AO)	19 ⁽ⁿ⁾	4.96	14.18	-	12.27	-	1.07
Dissolved Oxygen		---	>5	257	115	-	195	-	228
Redox Potential	mV	---	---	17.49	15.57	-	15.74	-	50
General									
Chemical Oxygen Demand (COD)	mg/L	---	---						
Dissolved Organic Carbon (DOC)	mg/L	---	---	30.0	20	20.0	20	ND(10)	20
Conductivity, Electrical	µS/cm	---	---	12	14	66	27	27	27.0
pH	s.u.	---	6.5-9.0	6.59	6.63	7.34	-	7.34	7
Hardness (as CaCO ₃)	mg/L	---	---	ND(5)	<5	22	10	10	-
Nutrients									
Ammonia	mg/L	---	0.681-28.7 ^(b)	ND(0.025)	ND(0.025)	ND(0.025)	ND(0.025)	ND(0.025)	ND(0.025)
Dissolved Nitrate (N)	mg/L	10	32.8	0.02	0.02	0.15	0.04	0.04	0.08
Dissolved Nitrite (N)	mg/L	1	0.06-0.6 ^(c)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)
Nitrate plus Nitrite (N)	mg/L	10	---	0.02	0.02	0.15	0.04	-	0.08
Total Nitrogen (N)	mg/L	---	---	0.13	ND(0.10)	0.29	ND(0.10)	0.04	0.19
Total Kjeldahl Nitrogen (TKN)	mg/L	---	---	0.1	ND(0.10)	0.11	ND(0.07)	ND(0.10)	0.12
Anions									
Chloride	mg/L	250 (AO)	600	0.25	0.23	3.72	0.38	0.38	0.77
Total Metals									
Aluminum	mg/L	9.5	---	0.47	0.14	0.22	0.115	0.103	0.081
Antimony	mg/L	---	0.009 ^(w)	0.00005	0.00003	<0.00002	<0.0001	<0.0001	0.00005
Arsenic	mg/L	0.01	0.005	0.0002	0.0001	0.0001	0.00012	0.00019	<0.0001
Barium	mg/L	---	1 ^w	0.0042	0.0023	0.0066	0.0039	0.0039	0.0034
Beryllium	mg/L	---	0.00013 ^(w)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)
Bismuth	mg/L	---	---	ND(0.0001)	ND(0.0001)	ND(0.0001)	ND(0.0001)	ND(0.0001)	ND(0.0001)
Boron	mg/L	5.0	1.2	ND(0.002)	ND(0.002)	ND(0.002)	ND(0.002)	ND(0.002)	ND(0.002)
Cadmium	mg/L	0.005	(e)	0.0013	0.00002	ND(0.00001)	0.00001	0.00002	0.00001
Calcium	mg/L	---	---	1.6	1.8	7	4	4	3
Chromium	mg/L	---	---	0.00026	0.00016	0.00027	ND(0.0005)	0.0008	0.00017
Cobalt	mg/L	---	0.11	0.00013	0.00005	0.00009	ND(0.0001)	0.0001	0.00002
Copper	mg/L	1.0	(f)	0.0007	0.0003	0.0005	0.0004	0.0023	0.0005
Iron	mg/L	0.3 (AO)	1	0.28	0.069	0.21	0.149	0.867	0.058
Lead	mg/L	0.01	0.003 ^(g)	0.0002	0.00008	0.00009	ND(0.0001)	ND(0.0001)	0.00003
Lithium	mg/L	---	---	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)
Magnesium	mg/L	---	---	0.2	0.13	1.4	0.43	0.42	0.47
Manganese	mg/L	0.05 (AO)	(h)	0.009	0.002	0.012	0.0087	0.0107	0.001
Mercury	mg/L	0.001	---	ND(0.00001)	ND(0.00001)	ND(0.00001)	ND(0.00001)	ND(0.00001)	ND(0.00001)
Molybdenum	mg/L	0.25	2	0.00006	0.0001	0.00022	0.00031	0.00039	0.00024
Nickel	mg/L	---	0.025-0.15 ^{(i)(w)}	0.0003	<0.0002	<0.0002	<0.0002	0.001	<0.0002
Phosphorus	mg/L	0.01 (AO)	---	-	-	-	-	-	-
Potassium	mg/L	---	---	ND(0.04)	0.18	0.68	0.3	0.2	0.12
Selenium	mg/L	0.01	0.002	ND(0.0002)	ND(0.0002)	ND(0.0002)	ND(0.0001)	ND(0.0001)	ND(0.0002)
Silicon	mg/L	---	---	1.8	1.2	7.9	2.4	2.4	3.3
Silver	mg/L	---	0.0001-0.003 ⁽ⁱ⁾	ND(0.00001)	0.00003	ND(0.00001)	ND (0.00005)	ND (0.00005)	ND(0.00001)
Sodium	mg/L	---	---	1	0.5	3.8	1.1	1.1	1.4
Strontium	mg/L	---	---	0.0072	0.006	0.038	0.0127	0.0124	0.013
Sulfur	mg/L	---	---	0.28	0.36	0.9	0.55	0.54	0.55
Tellurium	mg/L	---	---	-	-	-	-	-	-
Thallium	mg/L	---	---	ND(0.00001)	ND(0.00001)	ND(0.00001)	ND(0.00001)	ND(0.00001)	ND(0.00001)
Thorium	mg/L	---	---	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)
Tin	mg/L	---	---	ND(0.0001)	0.0001	0.00010	ND(0.0001)	0.00010	0.00020
Titanium	mg/L	---	---	0.012	0.0019	0.0078	0.0031	0.0027	0.0008
Tungsten	mg/L	---	---	-	-	-	-	-	-
Uranium	mg/L	---	0.0085 ^(w)	0.00006	0.00003	0.00006	0.00003	0.00004	0.00006
Vanadium	mg/L	---	---	0.00076	0.00009	0.00093	0.0005	0.0004	0.00033
Zinc	mg/L	5.0 (AO)	(k)	0.0047	0.0032	0.0022	0.0023	0.0022	0.003
Zirconium	mg/L	---	---	0.0001	ND(0.0001)	ND(0.0001)	ND(0.0005)	ND(0.0005)	0.00010
Notes:									
1. Values reported from BCMECCS - British Columbia Water Quality Guidelines, 2019 Edition, unless otherwise stated.									
2. Drinking Water Criteria: Metal guidelines are for total concentrations.									
3. Freshwater Aquatic Life Criteria: All criteria for metals are for total metals.									
0.500 - Exceeds Drinking Water Criteria									
0.500 - Exceeds Freshwater Aquatic Life Criteria									
0.500 - Exceeds Drinking Water Criteria and Freshwater Aquatic Life Criteria									
b. Ammonia-N: BCMECCS Approved Water Quality Guidelines, Summary Report Table 26D. Temperature and pH dependent.									
c. Nitrite: BCMECCS Approved Water Quality Guidelines. Chloride dependent.									
e. Cadmium (mg/L) = (e^(1.03*LN(HARDNESS)-5.274))/1000, valid for Hardness (as CaCO ₃) of 7 to 455 mg/L.									
f. Copper guidelines calculated using BCMECCS Biotic Ligand Model (BLM) software. Dependent on multiple other parameters.									
g. Lead: hardness dependent. For Hardness (as CaCO ₃) > 8 mg/L: (e^(1.273*ln(HARDNESS)-1.460))/1000 . If hardness is < or equal to 8 mg/L: 0.003 mg/L.									
h. Manganese (mg/L) = (0.01102*HARDNESS)+0.54.									
i. Nickel: BCMECCS Water Quality Guidelines, Table 1.									
j. Silver: hardness <= 100 mg/L = 0.0001 mg/L, hardness > 100 mg/L = 0.003 mg/L									
k. Zinc (mg/L) = 0.033 for Hardness < or equal to 90 mg/L, (33+(0.75*(HARDNESS-90)))/1000 for Hardness > 90 mg/L									
n. Temperature: Streams with Bull Trout and/or Dolly Varden = 15, unknown fish distribution = 19									
w. Values reported from BCMECCS - Working Water Quality Guidelines for British Columbia (2017). Values are long-term (i.e. average) concentrations unless identified as a short-term maximum.									
AO - Aesthetic Objective									
- No data available									
--- Currently no Standard/Criteria									
ND - Not detected above the laboratory Reportable Detection Limit (RDL)									

Table 23 2022 Surface Water Quality Results - Site B Lower Chapman Creek

Sample Date:	Units	BCMECCS Criteria ⁽¹⁾		Mar-22		Jul-22	Sep-22	Dec-22	
Parameters:		DWQ ⁽²⁾	FWAL ⁽³⁾		Duplicate				Duplicate
Lab Sample ID:				7998960	7998961	8143188	8288684	8424836	8424836
Field Parameters									
pH	s.u.	---	6.5-9.0	6.79	-	6.6	6.8	7.45	-
Conductivity, Electrical	µS/cm	---	---	0.013	-	0.016	0.036	0.038	-
Temperature	°C	15 (AO)	19 ⁽ⁿ⁾	5.06	-	14.1	13.13	3.34	-
Dissolved Oxygen	mg/L	---	>5	240	-	252	224	185	-
Redox Potential	mV	---	---	16.9	-	14.65	14.44	50	-
General									-
Chemical Oxygen Demand (COD)	mg/L	---	---						
Dissolved Organic Carbon (DOC)	mg/L	---	---	20.0	ND(10)	10.0	20	20.0	20.0
Conductivity, Electrical	µS/cm	---	---	13	13	14	33	30	30
pH	s.u.	---	6.5-9.0	6.53	6.51	6.78	-	6.83	6.83
Hardness (as CaCO ₃)	mg/L	---	---	5	5	ND(5)	12	-	-
Nutrients									
Ammonia	mg/L	---	0.681-28.7 ^(b)	ND (0.025)	ND (0.025)	ND (0.025)	ND (0.025)	ND (0.025)	ND (0.025)
Dissolved Nitrate (N)	mg/L	10	32.8	0.03	0.07	0.02	0.03	0.17	0.17
Dissolved Nitrite (N)	mg/L	1	0.06-0.6 ^(c)	ND (0.001)	ND (0.001)	ND (0.001)	ND (0.001)	ND (0.001)	ND (0.001)
Nitrate plus Nitrite (N)	mg/L	10	---	0.03	0.07	0.02	0.03	0.17	0.17
Total Nitrogen (N)	mg/L	---	---	0.33	0.16	0.17	ND(0.10)	0.13	0.13
Total Kjeldahl Nitrogen (TKN)	mg/L	---	---	0.29	0.08	0.15	ND(0.07)	ND(0.07)	ND(0.07)
Anions									
Chloride	mg/L	250 (AO)	600	0.35	0.28	0.24	0.54	0.9	0.9
Total Metals									
Aluminum	mg/L	9.5	---	0.23	0.24	0.15	0.033	0.082	0.091
Antimony	mg/L	---	0.009 ^(w)	ND(0.00002)	ND(0.00002)	ND(0.00002)	ND(0.00002)	ND(0.00002)	ND(0.00002)
Arsenic	mg/L	0.01	0.005	0.0001	0.0001	0.0001	0.00012	<0.0001	<0.0001
Barium	mg/L	---	1 ^w	0.002	0.002	0.0024	0.0034	0.0037	0.0038
Beryllium	mg/L	---	0.00013 ^(w)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)
Bismuth	mg/L	---	---	ND(0.0001)	ND(0.0001)	ND(0.0001)	ND(0.0001)	ND(0.0001)	ND(0.0001)
Boron	mg/L	5.0	1.2	ND(0.002)	ND(0.002)	ND(0.002)	ND(0.002)	ND(0.002)	ND(0.002)
Cadmium	mg/L	0.005	(e)	ND(0.00001)	0.00001	ND(0.00001)	ND(0.00001)	ND(0.00001)	ND(0.00001)
Calcium	mg/L	---	---	1.7	1.7	1.9	4.4	3.8	3.8
Chromium	mg/L	---	---	0.00009	0.00011	0.00029	ND(0.0001)	0.00015	0.00016
Cobalt	mg/L	---	0.11	0.00003	0.00004	0.00004	ND(0.0001)	0.00002	0.00003
Copper	mg/L	1.0	(f)	0.0003	0.0003	0.001	0.0002	0.0003	0.0006
Iron	mg/L	0.3 (AO)	1	0.07	0.09	0.077	0.052	0.058	0.066
Lead	mg/L	0.01	0.003 ^(g)	0.00008	0.00007	0.00008	ND(0.0001)	0.00004	0.00005
Lithium	mg/L	---	---	ND(0.0005)	ND(0.0005)	ND(0.0005)	ND(0.0001)	ND(0.0005)	ND(0.0005)
Magnesium	mg/L	---	---	0.17	0.20	0.19	0.51	0.59	0.55
Manganese	mg/L	0.05 (AO)	(h)	0.003	0.002	0.002	0.0017	0.003	0.003
Mercury	mg/L	0.001	---	ND(0.00001)	ND(0.00001)	ND(0.00001)	ND(0.00001)	ND(0.00001)	ND(0.00001)
Molybdenum	mg/L	0.25	2	0.00006	0.00006	0.00010	0.00037	0.00024	0.00025
Nickel	mg/L	---	0.025-0.15 ^{(i)(w)}	ND(0.0002)	ND(0.0002)	ND(0.0002)	ND(0.0002)	ND(0.0002)	ND(0.0002)
Phosphorus	mg/L	0.01 (AO)	---	-	-	-	-	-	-
Potassium	mg/L	---	---	ND(0.4)	0.06	0.1	0.3	0.21	0.21
Selenium	mg/L	0.01	0.002	ND(0.0002)	ND(0.0002)	ND(0.0002)	ND(0.0002)	ND(0.0002)	ND(0.0002)
Silicon	mg/L	---	---	1.7	1.8	1.3	2.8	4	4
Silver	mg/L	---	0.0001-0.003 ^(j)	ND(0.00001)	ND(0.00001)	ND(0.00001)	ND(0.00001)	ND(0.00001)	ND(0.00001)
Sodium	mg/L	---	---	0.7	0.7	0.6	1.4	1.7	1.7
Strontium	mg/L	---	---	0.01	0.01	0.007	0.0153	0.015	0.015
Sulfur	mg/L	---	---	0.27	0.28	0.34	0.56	0.56	0.59
Tellurium	mg/L	---	---	-	-	-	-	-	-
Thallium	mg/L	---	---	ND(0.00001)	ND(0.00001)	ND(0.00001)	ND(0.00001)	ND(0.00001)	ND(0.00001)
Thorium	mg/L	---	---	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)
Tin	mg/L	---	---	ND(0.0001)	ND(0.0001)	ND(0.0001)	ND(0.0001)	ND(0.0001)	ND(0.0001)
Titanium	mg/L	---	---	0.00200	0.00190	0.00	<0.0005	0.0011	0.0012
Tungsten	mg/L	---	---	-	-	-	-	-	ND (0.0002)
Uranium	mg/L	---	0.0085 ^(w)	0.00004	0.00004	0.00003	0.00004	0.00006	0.00007
Vanadium	mg/L	---	---	0.00033	0.00030	0.00014	0.0003	0.00037	0.00039
Zinc	mg/L	5.0 (AO)	(k)	0.0016	0.0028	0.0100	<0.0010	0.0016	0.0028
Zirconium	mg/L	---	---	ND(0.0001)	ND(0.0001)	ND(0.0001)	ND(0.0001)	ND(0.0001)	ND(0.0001)
Notes:									
1. Values reported from BCMECCS - British Columbia Water Quality Guidelines, 2019 Edition, unless otherwise stated.									
2. Drinking Water Criteria: Metal guidelines are for total concentrations.									
3. Freshwater Aquatic Life Criteria: All criteria for metals are for total metals.									
0.500 - Exceeds Drinking Water Criteria									
0.500 - Exceeds Freshwater Aquatic Life Criteria									
0.500 - Exceeds Drinking Water Criteria and Freshwater Aquatic Life Criteria									
b. Ammonia-N: BCMECCS Approved Water Quality Guidelines, Summary Report Table 26D. Temperature and pH dependent.									
c. Nitrite: BCMECCS Approved Water Quality Guidelines. Chloride dependent.									
e. Cadmium (mg/L) = (e^(1.03*LN(HARDNESS)-5.274))/1000, valid for Hardness (as CaCO ₃) of 7 to 455 mg/L.									
f. Copper guidelines calculated using BCMECCS Biotic Ligand Model (BLM) software. Dependent on multiple other parameters.									
g. Lead: hardness dependent. For Hardness (as CaCO ₃) > 8 mg/L: (e^(1.273*ln(HARDNESS)-1.460))/1000 . If hardness is < or equal to 8 mg/L: 0.003 mg/L.									
h. Manganese (mg/L) = (0.01102*HARDNESS)+0.54.									
i. Nickel: BCMECCS Water Quality Guidelines, Table 1.									
j. Silver: hardness <= 100 mg/L = 0.0001 mg/L, hardness > 100 mg/L = 0.003 mg/L									
k. Zinc (mg/L) = 0.033 for Hardness < or equal to 90 mg/L, (33+(0.75*(HARDNESS-90)))/1000 for Hardness > 90 mg/L									
n. Temperature: Streams with Bull Trout and/or Dolly Varden = 15, unknown fish distribution = 19									
w. Values reported from BCMECCS - Working Water Quality Guidelines for British Columbia (2017). Values are long-term (i.e. average) concentrations unless identified as a short-term maximum.									
AO - Aesthetic Objective									
- No data available									
--- Currently no Standard/Criteria									
ND - Not detected above the laboratory Reportable Detection Limit (RDL)									

Table 24 2022 Surface Water Quality Results - Site E Upper Irgens Creek

Sample Date:	Units	BCMECCS Criteria ¹		Mar-22	Jul-22	Sep-22	Dec-22
Parameters:		DWQ ⁽²⁾	FWAL ⁽³⁾				
Lab Sample ID:				7998958	-	-	-
Field Parameters							
pH	s.u.	---	6.5-9.0	7.62	DRY	DRY	DRY
Conductivity, Electrical	µS/cm	---	---	0.023	DRY	DRY	DRY
Temperature	°C	15 (AO)	19 ⁽ⁿ⁾	6.1	DRY	DRY	DRY
Dissolved Oxygen	mg/L	---	>5	247	DRY	DRY	DRY
Redox Potential	mV	---	---	14.67	DRY	DRY	DRY
General							
Chemical Oxygen Demand (COD)	mg/L	---	---	10.0	DRY	DRY	DRY
Dissolved Organic Carbon (DOC)	mg/L	---	---	-	DRY	DRY	DRY
Conductivity, Electrical	µS/cm	---	---	20	DRY	DRY	DRY
pH	s.u.	---	6.5-9.0	6.7	DRY	DRY	DRY
Hardness (as CaCO ₃)	mg/L	---	---	6	DRY	DRY	DRY
Nutrients							
Ammonia	mg/L	---	0.681-28.7 ^(b)	ND (0.025)	DRY	DRY	DRY
Dissolved Nitrate (N)	mg/L	10	32.8	0.06	DRY	DRY	DRY
Dissolved Nitrite (N)	mg/L	1	0.06-0.6 ^(c)	ND (0.01)	DRY	DRY	DRY
Nitrate plus Nitrite (N)	mg/L	10	---	0.06	DRY	DRY	DRY
Total Nitrogen (N)	mg/L	---	---	0.21	DRY	DRY	DRY
Total Kjeldahl Nitrogen (TKN)	mg/L	---	---	0.11	DRY	DRY	DRY
Anions							
Chloride	mg/L	250 (AO)	600	0.62	DRY	DRY	DRY
Total Metals							
Aluminum	mg/L	9.5	---	0.053	DRY	DRY	DRY
Antimony	mg/L	---	0.009 ^(w)	ND(0.00002)	DRY	DRY	DRY
Arsenic	mg/L	0.01	0.005	ND(0.0001)	DRY	DRY	DRY
Barium	mg/L	---	1 ^w	0.0023	DRY	DRY	DRY
Beryllium	mg/L	---	0.00013 ^(w)	ND (0.00005)	DRY	DRY	DRY
Bismuth	mg/L	---	---	ND(0.0001)	DRY	DRY	DRY
Boron	mg/L	5.0	1.2	ND(0.002)	DRY	DRY	DRY
Cadmium	mg/L	0.005	(e)	ND(0.00001)	DRY	DRY	DRY
Calcium	mg/L	---	---	1.8	DRY	DRY	DRY
Chromium	mg/L	---	---	0.0001	DRY	DRY	DRY
Cobalt	mg/L	---	0.11	ND(0.0002)	DRY	DRY	DRY
Copper	mg/L	1.0	(f)	0.0002	DRY	DRY	DRY
Iron	mg/L	0.3 (AO)	1	0.007	DRY	DRY	DRY
Lead	mg/L	0.01	0.003 ^(g)	ND(0.00001)	DRY	DRY	DRY
Lithium	mg/L	---	---	ND(0.0005)	DRY	DRY	DRY
Magnesium	mg/L	---	---	0.32	DRY	DRY	DRY
Manganese	mg/L	0.05 (AO)	(h)	ND(0.001)	DRY	DRY	DRY
Mercury	mg/L	0.001	---	ND(0.00001)	DRY	DRY	DRY
Molybdenum	mg/L	0.25	2	0.00008	DRY	DRY	DRY
Nickel	mg/L	---	0.025-0.15 ^{(i)(w)}	ND(0.0002)	DRY	DRY	DRY
Phosphorus	mg/L	0.01 (AO)		-	DRY	DRY	DRY
Potassium	mg/L	---	---	0.11	DRY	DRY	DRY
Selenium	mg/L	0.01	0.002	ND(0.0002)	DRY	DRY	DRY
Silicon	mg/L	---	---	3.5	DRY	DRY	DRY
Silver	mg/L	---	0.0001-0.003 ^(j)	ND(0.00001)	DRY	DRY	DRY
Sodium	mg/L	---	---	1.4	DRY	DRY	DRY
Strontium	mg/L	---	---	0.011	DRY	DRY	DRY
Sulfur	mg/L	---	---	0.43	DRY	DRY	DRY
Tellurium	mg/L	---	---	-	DRY	DRY	DRY
Thallium	mg/L	---	---	ND(0.00001)	DRY	DRY	DRY
Thorium	mg/L	---	---	ND (0.00005)	DRY	DRY	DRY
Tin	mg/L	---	---	ND(0.0001)	DRY	DRY	DRY
Titanium	mg/L	---	---	ND(0.002)	DRY	DRY	DRY
Tungsten	mg/L	---	---	-	DRY	DRY	DRY
Uranium	mg/L	---	0.0085 ^(w)	0.00004	DRY	DRY	DRY
Vanadium	mg/L	---	---	0.00043	DRY	DRY	DRY
Zinc	mg/L	5.0 (AO)	(k)	0.0009	DRY	DRY	DRY
Zirconium	mg/L	---	---	ND(0.0001)	DRY	DRY	DRY
Notes:							
1. Values reported from BCMECCS - British Columbia Water Quality Guidelines, 2019 Edition, unless otherwise stated.							
2. Drinking Water Criteria: Metal guidelines are for total concentrations.							
3. Freshwater Aquatic Life Criteria: All criteria for metals are for total metals.							
0.500 - Exceeds Drinking Water Criteria							
0.500 - Exceeds Freshwater Aquatic Life Criteria							
0.500 - Exceeds Drinking Water Criteria and Freshwater Aquatic Life Criteria							
b. Ammonia-N: BCMECCS Approved Water Quality Guidelines, Summary Report Table 26D. Temperature and pH dependent.							
c. Nitrite: BCMECCS Approved Water Quality Guidelines. Chloride dependent.							
e. Cadmium (mg/L) = (e^(1.03*LN(HARDNESS)-5.274))/1000, valid for Hardness (as CaCO ₃) of 7 to 455 mg/L.							
f. Copper guidelines calculated using BCMECCS Biotic Ligand Model (BLM) software. Dependent on multiple other parameters.							
g. Lead: hardness dependent. For Hardness (as CaCO ₃) > 8 mg/L: (e^(1.273*ln(HARDNESS)-1.460))/1000 . If hardness is < or equal to 8 mg/L: 0.003 mg/L.							
h. Manganese (mg/L) = (0.01102*HARDNESS)+0.54.							
i. Nickel: BCMECCS Water Quality Guidelines, Table 1.							
j. Silver: hardness <= 100 mg/L = 0.0001 mg/L, hardness > 100 mg/L = 0.003 mg/L							
k. Zinc (mg/L) = 0.033 for Hardness < or equal to 90 mg/L, (33+(0.75*(HARDNESS-90)))/1000 for Hardness > 90 mg/L							
n. Temperature: Streams with Bull Trout and/or Dolly Varden = 15, unknown fish distribution = 19							
w. Values reported from BCMECCS - Working Water Quality Guidelines for British Columbia (2017). Values are long-term (i.e. average) concentrations unless identified as a short-term maximum.							
AO - Aesthetic Objective							
- No data available							
--- Currently no Standard/Criteria							
ND - Not detected above the laboratory Reportable Detection Limit (RDL)							

Table 25 2021 Surface Water Quality Results - Site C Lower Irgens Creek

Sample Date:	Units	BCMECCS Criteria ⁽¹⁾		Mar-22	Jul-22	Sep-22	Dec-22
Parameters:		DWQ ⁽²⁾	FWAL ⁽³⁾				
Lab Sample ID:				7998959	8143187	-	8424835
Field Parameters							
pH	s.u.	---	6.5-9.0	<u>6.32</u>	7.53	DRY	6.74
Conductivity, Electrical	µS/cm	---	---	0.041	0.077	DRY	0.082
Temperature	°C	15 (AO)	19 ⁽ⁿ⁾	6.87	16.01	DRY	3.53
Dissolved Oxygen	mg/L	---	>5	273	221	DRY	217
Redox Potential	mV	---	---	15.93	9.52	DRY	33.02
General							
Chemical Oxygen Demand (COD)	mg/L	---	---	-	-	DRY	-
Dissolved Organic Carbon (DOC)	mg/L	---	---	<10	<10	DRY	10.0
Conductivity, Electrical	µS/cm	---	---	36	65	DRY	72
pH	s.u.	---	6.5-9.0	7.02	7.3	DRY	7.16
Hardness (as CaCO ₃)	mg/L	---	---	11	19	DRY	-
Nutrients							
Ammonia	mg/L	---	0.681-28.7 ^(b)	ND (0.025)	ND (0.025)	DRY	ND (0.025)
Dissolved Nitrate (N)	mg/L	10	32.8	0.05	0.14	DRY	0.2
Dissolved Nitrite (N)	mg/L	1	0.06-0.6 ^(c)	ND (0.01)	ND (0.01)	DRY	ND (0.01)
Nitrate plus Nitrite (N)	mg/L	10	---	0.05	0.14	DRY	0.2
Total Nitrogen (N)	mg/L	---	---	0.25	0.3	DRY	0.21
Total Kjeldahl Nitrogen (TKN)	mg/L	---	---	0.16	0.12	DRY	ND (0.07)
Anions							
Chloride	mg/L	250 (AO)	600	1.92	3.69	DRY	4.16
Total Metals							
Aluminum	mg/L	9.5	---	0.09	0.055	DRY	0.10
Antimony	mg/L	---	0.009 ^(w)	0.00002	0.00004	DRY	0.00004
Arsenic	mg/L	0.01	0.005	ND(0.0001)	0.0001	DRY	ND(0.0001)
Barium	mg/L	---	1 ^w	0.0033	0.0056	DRY	0.0061
Beryllium	mg/L	---	0.00013 ^(w)	ND (0.00005)	ND (0.00005)	DRY	ND (0.00005)
Bismuth	mg/L	---	---	ND(0.0001)	ND(0.0001)	DRY	ND(0.0001)
Boron	mg/L	5.0	1.2	ND(0.002)	0.004	DRY	0.003
Cadmium	mg/L	0.005	(e)	0.00004	ND(0.00001)	DRY	0.00001
Calcium	mg/L	---	---	3.7	6.4	DRY	7.6
Chromium	mg/L	---	---	0.0001	0.00031	DRY	0.00016
Cobalt	mg/L	---	0.11	0.00003	0.00003	DRY	0.00004
Copper	mg/L	1.0	(f)	0.0003	0.0015	DRY	0.0005
Iron	mg/L	0.3 (AO)	1	0.061	0.049	DRY	0.078
Lead	mg/L	0.01	0.003 ^(g)	0.00003	0.00005	DRY	0.00009
Lithium	mg/L	---	---	ND(0.0005)	ND(0.0005)	DRY	ND(0.0005)
Magnesium	mg/L	---	---	0.7	1.3	DRY	1.60
Manganese	mg/L	0.05 (AO)	(h)	0.003	0.002	DRY	0.002
Mercury	mg/L	0.001	---	ND(0.00001)	ND(0.00001)	DRY	ND(0.00001)
Molybdenum	mg/L	0.25	2	0.00014	0.00024	DRY	0.00021
Nickel	mg/L	---	0.025-0.15 ^{(i)(w)}	ND(0.0002)	ND(0.0002)	DRY	ND(0.0002)
Phosphorus	mg/L	0.01 (AO)	---	-	-	DRY	-
Potassium	mg/L	---	---	0.34	0.71	DRY	0.8
Selenium	mg/L	0.01	0.002	ND(0.0002)	ND(0.0002)	DRY	ND(0.0002)
Silicon	mg/L	---	---	5.1	7.3	DRY	8.1
Silver	mg/L	---	0.0001-0.003 ^(j)	ND(0.00001)	ND(0.00001)	DRY	0.00003
Sodium	mg/L	---	---	2.5	3.7	DRY	3.9
Strontium	mg/L	---	---	0.02	0.04	DRY	0.039
Sulfur	mg/L	---	---	0.64	0.87	DRY	1.10
Tellurium	mg/L	---	---	-	-	DRY	-
Thallium	mg/L	---	---	ND(0.00001)	ND(0.00001)	DRY	ND(0.00001)
Thorium	mg/L	---	---	ND (0.00005)	ND (0.00005)	DRY	ND (0.00005)
Tin	mg/L	---	---	ND(0.0001)	0.0002	DRY	0.0016
Titanium	mg/L	---	---	0.0038	0.0016	DRY	0.0039
Tungsten	mg/L	---	---	-	-	DRY	-
Uranium	mg/L	---	0.0085 ^(w)	0.00006	0.00004	DRY	0.00003
Vanadium	mg/L	---	---	0.0007	0.00060	DRY	0.00066
Zinc	mg/L	5.0 (AO)	(k)	0.002	0.0055	DRY	0.0035
Zirconium	mg/L	---	---	ND(0.0001)	ND(0.0001)	DRY	ND(0.0001)
Notes: 1. Values reported from BCMECCS - British Columbia Water Quality Guidelines, 2019 Edition, unless otherwise stated. 2. Drinking Water Criteria: Metal guidelines are for total concentrations. 3. Freshwater Aquatic Life Criteria: All criteria for metals are for total metals. <u>0.500</u> - Exceeds Drinking Water Criteria <u>0.500</u> - Exceeds Freshwater Aquatic Life Criteria <u>0.500</u> - Exceeds Drinking Water Criteria and Freshwater Aquatic Life Criteria b. Ammonia-N: BCMECCS Approved Water Quality Guidelines, Summary Report Table 26D. Temperature and pH dependent. c. Nitrite: BCMECCS Approved Water Quality Guidelines. Chloride dependent. e. Cadmium (mg/L) = (e^(1.03*LN(HARDNESS)-5.274))/1000, valid for Hardness (as CaCO ₃) of 7 to 455 mg/L. f. Copper guidelines calculated using BCMECCS Biotic Ligand Model (BLM) software. Dependent on multiple other parameters. g. Lead: hardness dependent. For Hardness (as CaCO ₃) > 8 mg/L: (e^(1.273*ln(HARDNESS)-1.460))/1000 . If hardness is < or equal to 8 mg/L: 0.003 mg/L. h. Manganese (mg/L) = (0.01102*HARDNESS)+0.54. i. Nickel: BCMECCS Water Quality Guidelines, Table 1. j. Silver: hardness <= 100 mg/L = 0.0001 mg/L, hardness > 100 mg/L = 0.003 mg/L k. Zinc (mg/L) = 0.033 for Hardness < or equal to 90 mg/L, (33+(0.75*(HARDNESS-90)))/1000 for Hardness > 90 mg/L n. Temperature: Streams with Bull Trout and/or Dolly Varden = 15, unknown fish distribution = 19 w. Values reported from BCMECCS - Working Water Quality Guidelines for British Columbia (2017). Values are long-term (i.e. average) concentrations unless identified as a short-term maximum. AO - Aesthetic Objective - No data available --- Currently no Standard/Criteria ND - Not detected above the laboratory Reportable Detection Limit (RDL)							

Table 26 Soil Gas Probe Completion Details

Soil Gas Probe	Location ⁽¹⁾		Top of Casing Elevation (mASL)	Ground Elevation (mASL)	2022-12-13	Screened Interval (mbgs)	Lithology
	Northing	Easting					
GP13-01S	5482130.734	448263.505	-	215.82	3.0*	2.2 - 3.0	Sandy Silt/Sandy Gravel
GP13-01D	5482130.734	448263.505	-	215.82	4.9*	4.1 - 4.9	Sandy Gravel
GP13-02S	5482107.643	448298.745	-	216.39	2.7*	1.8 - 2.7	Sandy Silt
GP13-02D	5482107.643	448298.745	-	216.39	4.6*	3.7 - 4.6	Sandy Gravel
GP17-01S	5482085.863	448375.303	219.32	218.51	2.7*	1.8 - 2.7	Sandy Silt
GP17-01D	5482085.863	448375.303	219.32	218.51	4.6*	3.7 - 4.6	Sandy Gravel

Notes:
(1) Soil Gas Probe locations obtained from survey completed by Strait Land Surveying Inc. in 2013 (GP13-01, GP13-02) and 2017 (GP17-01).
* Depth on completion
mASL - Metres above sea level

Table 27 Soil Gas Monitoring Trigger Levels and Criteria

Soil Gas Probe Locations	Contingency Trigger Level (% LEL) ³	Regulatory Criteria (% LEL) ²
GP13-01S	10%	25%
GP13-01D	10%	25%
GP13-02S	10%	25%
GP13-02D	10%	25%
GP17-01S	10%	25%
GP17-01D	10%	25%
In On-Site Structures	1%	20% ¹
In Off-Site Structures	1%	25%
Notes: LEL - Lower Explosive Limit ¹ Source: BCMECCS, Landfill Criteria for Municipal Solid Waste, June 2016. ² Source: Operational Certificate No. 106060 ³ Trigger level as per the Environmental Monitoring Program prepared by XCG dated April 27, 2018.		

Table 28 2022 Soil Gas Probe and Interior Building Gas Results

Soil Gas Probe/Building	Date	Static Water Level (mbtoc)	Static Water Level (mbgs)	Blinded	2022-12-13	Pressure (inches WC)	CH ₄ (% Gas by Vol.)	CO ₂ (% Gas by Vol.)	O ₂ (% Gas by Vol.)
April Sampling Event									
GP13-01S	27-Apr-22	-	-	No	0.50	-	-	-	-
GP13-01D	27-Apr-22	-	-	No	0.50	-	-	-	-
GP13-02S	27-Apr-22	-	-	No	0.50	-	-	-	-
GP13-02D	27-Apr-22	-	-	No	0.50	-	-	-	-
GP17-01S	27-Apr-22	Dry	Dry	No	0.50	-0.05	60.3	30.2	0.8
GP17-01D	27-Apr-22	Dry	Dry	No	0.50	0.18	54.3	27.6	2.8
Office Building	27-Apr-22	-	-	-	0.05	-	0.0000*	-	-
							0.0000*		
Scale House	27-Apr-22	-	-	-	0.05	-	0.0000*	-	-
							0.0000*		
Maintenance Shed	27-Apr-22	-	-	-	0.05	-	0.0000*	-	-
							0.0000*		
Paint C-can	27-Apr-22	-	-	-	0.05	-	0.0000*	-	-
							0.0000*		
Equipment C-Can	27-Apr-22	-	-	-	0.05	-	0.0000*	-	-
							0.0000*		
Staff Shed	27-Apr-22	-	-	-	0.05	-	0.0000*	-	-
							0.0000*		
December Sampling Event									
GP13-01S	15-Dec-22	-	-	No	0.50	-	-	-	-
GP13-01D	15-Dec-22	-	-	No	0.50	-	-	-	-
GP13-02S	15-Dec-22	-	-	No	0.50	-	-	-	-
GP13-02D	15-Dec-22	-	-	No	0.50	-	-	-	-
GP17-01S	15-Dec-22	Dry	Dry	No	0.50	-0.26	9.8	6	0
GP17-01D	15-Dec-22	Dry	Dry	No	0.50	-0.16	11.6	7.6	0
Office Building	15-Dec-22	-	-	-	0.05	-	0.0000*	-	-
							0.0000*		
Maintenance Shed	15-Dec-22	-	-	-	0.05	-	0.0000*	-	-
							0.0005*		
Scale House	15-Dec-22	-	-	-	0.05	-	0.0005*	-	-
							0.0000*		
Notes:									
1. All buildings were monitored using an RKI Eagle. Buildings were monitored at ground surface and at breathing level.									
2. Trigger level as per the Environmental Monitoring Program prepared by XCG dated April 27, 2018.									
31.5 Exceeds Environmental Monitoring Program trigger level limit									
31.5 Exceeds Occupational Certificate limit of 25% LEL (1.25 percent total volume)									
31.5 Exceeds Environmental Monitoring Program trigger level limit and Occupational Certificate limit of 25% LEL (1.25 percent total volume)									
- No data available									

Table 29 Climate Normals

Month	Daily Average Temperature (Celsius)	Average Total Precipitation (mm)
January	4.6	187
February	5.2	124
March	7.1	122
April	9.5	96
May	12.7	82
June	15.3	67
July	17.6	41
August	17.9	41
September	15.1	58
October	10.5	140
November	6.5	219
December	4.2	178
Annual	10.5	1,355
Note: 1. Source: Environment Canada, Climate ID 1043152 (1981-2010), Gibsons Gower Point.		

Table 30 2022 Solid Waste Disposal and Diversion Summary

Material	Description	Total (Tonnes)
Landfilled Material		
2	Residential/MSW	3,562,750.00
11	Commercial Waste	6,204.60
15	Roofing	567.37
15A	Pender Roofing	43.8
18	Dead Animals	0.43
19	Asphalt	0
22	Asbestos	11.02
23	Durable Goods	771.10
24	Concrete	14.01
25	Dirt/Rocks	44.78
28	Bulky Items Hot Tubs	10.10
43A	Pender Transfer Station Landfill Material	1,044.49
44	Beach Styrofoam	15.8
45	Wet Mattress/Box Spring	4.23
99/100	Share Shed	0
118	Boats	8.20
119	RVs	0.00
15B	SL Remediation Asphalt Shingles	0.00
02A	SL Remediation Residential Landfill Material	0.00
Total Landfilled Material		3,571,489.88
Recycled/Reused Material		
1	Gyproc	123.00
4	Passenger Tires without Rims	18.81
20	Cardboard	42.69
21	Scrap Metal	628.13
29	Polystyrene Foam	0
31	Beverage Containers	0
41/111	Mattress - Regular	81.93
107	Treated/Contaminated Wood	0
108	Outbound Clean Wood	5
112	Outbound Paint	36.1
113	Outbound Solvents	4.31
114	Outbound Pesticides	0.91
115	Outbound Aerosols	0.80
116	Outbound Aerosol Barrels	1.75
Total Material Recycled/Reused		943.81
Composted Material		
91	Commercial Brush	0.00
Total Composted Material		0.00
Reused On-Site Material		
		0
Total Material Reused On-Site		0
Unprocessed On-Site Material		
		-
Total Material Unprocessed On-Site		0
Landfilled Elsewhere Material		
		30
Total Material Landfilled Elsewhere		30
Total Material Diverted from Landfill		943.81
Total Material		3,572,463.66

Table 31 Solid Waste Data

Year	SCRD Population ¹	Tonnes per Person per Year ²	Tonnes of Waste	Total Waste Landfilled (tonnes)	2022-12-13
2023	33,254	0.37	12,304	12,304	18,642
2024	33,649	0.37	12,450	24,754	37,506
2025	34,026	0.37	12,590	37,344	56,581
2026	34,398	0.37	9,310	46,654	70,688

Notes:

1. Future population data provided by BC Stats.<https://bcstats.shinyapps.io/popApp/>. Sunshine Coast 2021-2041.
2. Per capita waste generation (2023 - 2026) calculated to be 0.38 tonnes per year. Based on 2022 population projection and waste tonnage data. (12,308 tonnes / 32,823 = 0.37 t/person).
3. Airspace consumption apparent density of 0.66 tonnes per cubic metre as per "Design, Operations, and Closure Plan" (XCG, 2017).

Table 32 Development Summary

Development Stage ¹	Stage Air Space (m ³)	Cumulative Air Space (m ³)	Estimated Stage Life (months) ²	Cumulative Life (years)	2022-12-13
Stage H (reached capacity)	0	0	0	0.0	2021.0
Stage I (remaining airspace)	7,700	7,700	4	0.4	2023.4
Stage J	25,400	33,100	15	1.6	2024.6
Stage K	24,700	57,800	14	2.8	2025.8
Final Stage	12,900	70,700	7	3.4	2026.4
Notes: 1. Development stages and stage air space from "Design, Operations, and Closure Plan" (XCG, 2017). 2. Airspace consumption apparent density of 0.66 tonnes per cubic metre as per "Design, Operations, and Closure Plan" (XCG, 2017).					

Table 33 2021 Revenue and Expenditures

Account Description	Cost
Total Revenues	\$3,924,318
Transfers & Unfunded Amortization	\$515,515
Total Operations/Maintenance Expenditures	(\$3,408,803)
Total Capital Expenditures	\$ 75,973
Total Surplus (Excluding GST)	-

Table 34 Development Cost Summary

Stage	Year	Cost
Stage H Plus	2022	\$ 3,017,340
Final Closure	2025 (Mid)	\$ 3,749,810
Total (Excluding GST)		\$ 6,767,150

Table 35 Development Cost - Progressive Closure During Stage H Plus

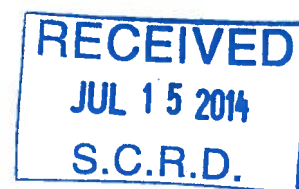
Item	Description	Unit	Approx. Quantity	Unit Price	\$44,908
Administration and Execution Requirements	Bonds, Insurance, Mobilization, Demobilization, Temporary Controls, and Closeout (15%)				\$225,305
Operations	Temporary Haul Road - supply, place, and compact	L.M.	65	\$222	\$14,449
Closure	Ditch Realignment - fill in interior ditch, realign exterior ditch to pond, erosion control	L.M.	40	\$95	\$3,811
	Remove culvert by pond, construct inlet to pond with erosion control	L.S.	1	\$3,176	\$3,176
	Remove culvert on lower portion of the haul road ditch	L.M.	15	\$95	\$1,429
	Final Cover - district supplied native soils and topsoil, supply, place, compact, grade, seed	m ²	23,262	\$83	\$1,920,672
Subtotal					\$2,235,067
Engineering (15%)					\$335,260
Contingency (20%)					\$447,013
Total (Excluding GST)					\$3,017,340
Notes: 1. Closure costs originally from "Design, Operations, and Closure Plan" (XCG, 2017). 2. Costs in 2022 dollars. 3. Cost adjusted by annual inflation rate of 5.4% for 2018, 4.3% for 2019, 0.7% for 2020, 6.6% for 2021 and 9.7% in 2022 based on non-residential building index for Vancouver (Statistics Canada Table 18-10-0135-01), as discussed with the SCRD.					

Table 36 Development Cost - Final Closure

Item	Description	Unit	Approx. Quantity	Unit Price	\$44,908
Administration and Execution Requirements	Bonds, Insurance, Mobilization, Demobilization, Temporary Controls, and Closeout (15%)				\$362,300
Closure	Final Cover - district supplied native soils and topsoil, haul, place, compact, grade, and seed	m ²	28,680	\$83	\$2,368,019
	Culvert - Removal	L.M.	45	\$64	\$2,858
	Pond Overflow - construct primary emergency overflow and connect to existing stormwater gravity drain, elevate existing overflow for use as secondary	L.S.	1	\$6,351	\$6,351
	Regrade Haul Road	L.M.	180	\$64	\$11,432
	Ditching - including erosion control	L.M.	280	\$95	\$26,675
Subtotal					\$2,777,637
Engineering (15%)					\$416,646
Contingency (20%)					\$555,527
Total (Excluding GST)					\$3,749,810
Notes: 1. Closure costs originally from "Design, Operations, and Closure Plan" (XCG, 2017). 2. Costs in 2022 dollars. 3. Cost adjusted by annual inflation rate of 5.4% for 2018, 4.3% for 2019, 0.7% for 2020, 4.3% for 2021 and 9.7% in 2022 based on non-residential building index for Vancouver (Statistics Canada Table 18-10-0135-01), as discussed with the SCRD.					



APPENDIX A
OPERATIONAL CERTIFICATE No. 106060



July 8, 2014

Tracking Number: 243546
Authorization Number: 106060

REGISTERED MAIL

SUNSHINE COAST REGIONAL DISTRICT
1975 FIELD ROAD
SECHELT, BC
V0N 3A1

MASTER FILE COPY

Dear Operational Certificate Holder:

Enclosed is Operational Certificate 106060 issued under the provisions of the *Environmental Management Act*. Your attention is respectfully directed to the terms and conditions outlined in the operational certificate. An annual fee will be determined according to the Permit Fees Regulation.

Please be aware that the following documents are required for submission by the specified dates set forth in the operational certificate:

- A hydrogeologic characterization and impact assessment of the landfill by August 31, 2015;
- An updated design and operating plan by December 31, 2017;
- An geotechnical and seismic assessment by April 30, 2018
- An environmental monitoring plan by April 30, 2018
- A leachate management plan for the landfill, acceptable to the Director, by December 31, 2015; and
- An annual report for the preceding 12 month period from January 1 to December 31 must be submitted to the Regional Director, Environmental Protection, by March 31 of each year.

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

.../2

RECEIVED

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

Administration of this operational certificate will be carried out by staff from the Coast Region. Plans, data and reports pertinent to the operational certificate are to be submitted to the Regional Director, Environmental Protection, at Ministry of Environment, Regional Operations, Coast Region, 2nd Floor, 10470 - 152 Street, Surrey, BC V3R 0Y3.

Yours truly,



Avtar S. Sundher BSc.
for Director, *Environmental Management Act*
Coast Region

Enclosure

cc: Environment Canada



**MINISTRY OF
ENVIRONMENT**

OPERATIONAL CERTIFICATE

106060

*Under the Provisions of the Environmental Management Act and
in accordance with the Sunshine Coast Regional District's
Solid Waste Management Plan*

**SUNSHINE COAST REGIONAL DISTRICT
1975 FIELD ROAD
SECHELT, BC
V0N 3A1**

is authorized to manage municipal solid waste / recyclable material and discharge residual solid waste to the ground at the Sechelt Landfill located at 4901 Dusty Road, Sechelt, British Columbia, subject to the conditions listed herein. Contravention of any of these conditions is a violation of the *Environmental Management Act* and may result in prosecution.

This Operational Certificate supersedes and cancels all previous versions of the permit PR-02547 issued under the authority of the *Environmental Management Act*.

1. AUTHORIZED DISCHARGES

- 1.1 This section applies to the discharge of municipal solid waste and contaminated soil to the Sechelt Landfill. The discharge of municipal solid waste must be restricted to sources within the Sunshine Coast Regional District. The site reference number for this discharge is E208123.

Date issued: July 8, 2014

Avtar S. Sundher BSc.
for Director, *Environmental Management Act*
South Coast Region

- 1.1.1 The discharge is authorized by the Sunshine Coast Regional District's approved solid waste management plan. The maximum rate of discharge is 15,000 metric tonnes per year.
- 1.1.2 The characteristics of the discharge must be municipal solid waste as defined in the *Environmental Management Act* and include other material as specifically authorized by the Director. Waste asbestos may be discharged in accordance to Section 40 of the Hazardous Waste Regulation and in accordance with the Sunshine Coast Regional District's bylaws.

Materials prohibited from discharge include hazardous waste (excluding asbestos), liquids, semi-solid waste, biomedical waste and the following:

- Recyclable Materials including:
 - a. used white goods,
 - b. auto hulks and other large metallic waste,
 - c. used tires,
 - d. used lead acid batteries,
 - e. gypsum wallboard, and
 - f. corrugated cardboard.
- any other waste and/or recyclable material regulated under the Ministry's Recycling Regulation when alternate disposal options become available;
- other materials banned by the regional district in implementing the Sunshine Coast Regional District's solid waste management plan or bylaws; and
- other materials which may be designated by the Director when alternative disposal becomes available.

- 1.1.3 Waste must not be discharged into water or within a buffer zone as identified in Section 2.9, 2.10 and 2.11. The burning of waste is prohibited.
- 1.1.4 The authorized works common to this section and Section 1.2 and 1.3 are a sanitary landfill, locking gate to control access by the public, weigh scale and related appurtenances, approximately located as shown on Site Plan A.

Date issued: July 8, 2014



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for Director, *Environmental Management Act*
South Coast Region

- 1.1.5 The authorized works specific to this section are those associated with a landfill operation and include berms, covering material, electrified bear fence, surface water diversionary works and environmental monitoring systems, approximately located as shown on attached Site Plan A and Site Plan B.
-
- 1.1.6 The authorized works must be complete and in operation while discharging.
- 1.1.7 The legal description of the location of the area of discharge is:
- Block C, District Lot 7613, Group 1, New Westminster District.
- 1.1.8 The civic address of the Sechelt Landfill is 4901 Dusty Road, Sechelt, BC.
- 1.2 This section applies to a public drop off and recycling area for the management of municipal solid waste and recyclable material from sources within the Sunshine Coast Regional District.
- 1.2.1 The types of materials which may be managed in this area include waste as set out in Section 1.1.2, and typical recyclable materials.
- 1.2.2 The quantity of recyclable material that may be stored is limited to the capacity that can be reasonably handled on the site.
- 1.2.3 The authorized works are those associated with a public drop off and recycling area and include an access area, roll-off bins and related appurtenances approximately located as shown on Site Plan A.
- 1.2.4 The facility is located on a portion of Block C, District Lot 7613, Group 1, New Westminster District.
- 1.3 This section applies to a return collection facility for the management of household hazardous waste from sources within the Sunshine Coast Regional District.
- 1.3.1 The operational certificate holder must obtain the necessary approvals prior to commencement of operation of the return collection facility and ensure compliance with all applicable legislation. The operational certificate holder must notify the Director at least 30 days prior to commencement of operations.

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for Director, *Environmental Management Act*
South Coast Region

- 1.3.2 The types of material which may be managed at this facility are typical household hazardous wastes.
- 1.3.3 The quantity of household hazardous waste that may be stored must be in accordance with the Hazardous Waste Regulation and is limited to the registration quantity as a return collection facility.
- 1.3.4 The authorized works are those associated with a return collection facility and include an access area, a secured storage area for household hazardous waste and related appurtenances approximately located as shown on Site Plan A.
- 1.3.5 The facility location is proposed to be on a portion of Block C, District Lot 7613, Group 1, New Westminster District.
- 1.3.6 The operational certificate holder must submit an updated Site Plan A at least 30 days prior to commencement of operations.

2. **DESIGN AND PERFORMANCE REQUIREMENTS**

2.1 **Design and Operating Plan**

The operational certificate holder must operate the facilities authorized in Section 1 in accordance with a design and operating plan certified by a qualified professional. The operational certificate holder must submit an updated design and operating plan of the existing landfill authorized in Section 1, acceptable to the Director. The plan must address each of the subsections in the Landfill Criteria for Municipal Solid Waste (June 1993, or the most recent version) including performance, siting, design, operational, closure and post-closure criteria and the Guideline for Environmental Monitoring at Municipal Solid Waste Landfills (January 1996 or the most recent version).

The plan must include, but is not limited to, information regarding:

- A fill strategy for the design capacity of the landfill. The plan must incorporate the concept of progressive closure and take into consideration environmental protection measures and the proposed end use of the site.

Date issued: July 8, 2014



Avtar S. Sundher BSc.
for Director, *Environmental Management Act*
South Coast Region

- A contingency plan (including funding) to close the landfill is to be developed prior to the design capacity being achieved should the landfill not be supported by future Sunshine Coast Regional District solid waste management plans or is closed for any other reason;
- Estimated elevations;
- Cell size, compaction details, daily, intermediate and final cover including types of materials used;
- Actions taken to ensure slope stability;
- Anticipated schedule for progressive closure activities;
- Measures to minimize leachate generation, including surface water diversion measures;
- A groundwater monitoring program in accordance with the requirements of Section 2.5;
- Recommended action plan to be undertaken as a result of the existing and subsequent leachate management assessment required in Section 3.13;
- A landfill gas management plan if required by Section 2.4 and updated in accordance with anticipated legislation changes;
- Recommended actions as a result of the existing and subsequent geotechnical, hydrogeological, landfill gas and any other assessments;
- Contingencies to address environmental protection issues, including leachate, landfill gas management and slope stability, in the event of an earthquake or any other emergency;
- Fire prevention measures;
- Operational requirements for the return collection facility for household hazardous waste, if applicable;
- List of recyclable materials accepted and how they are managed at the site;
- Incoming waste inspection, removal of unauthorized waste and staff supervision on the active face;
- Estimated closure/post closure-costs and details of how the closure/post-closure funds will be accrued;
- Measures to minimize hazards to public safety; and
- Measures to control vectors, odours, dust, wind-blown litter and scavenging.

The facilities must be developed, operated and closed in accordance with the design and operating plan. Should there be any inconsistency between this Operational Certificate and the design and operating plan, this Operational Certificate must take precedence unless otherwise agreed in writing by the Director.

Date issued: July 8, 2014



Avtar S. Sundher BSc.
for Director, *Environmental Management Act*
South Coast Region

The Interim Design and Operating Plan was submitted in December 2012. The operational certificate holder must review the design and operating plan on an annual basis to determine if changes are required. Any revisions to the design and operating plan must be certified by a qualified professional and acceptable to the Director as part of the annual report required in Section 4.6.

The operational certificate holder must also submit an updated design and operating plan every five (5) years which includes, at a minimum, any revisions submitted as part of the previous five years of annual reporting. The next design and operating plan is required by December 31, 2017

2.2 Geotechnical and Seismic Assessment

The operational certificate holder must submit a geotechnical and seismic assessment for the landfill, acceptable to the Director, which meets the Landfill Criteria for Municipal Solid Waste (June 1993, or the most recent version). The assessment must address, at a minimum, slope stability during construction, operation, and post-closure is required. The geotechnical and seismic assessment must be reviewed and updated every five (5) years hereafter. The next assessment is required by **April 30, 2018**. Actions recommended in the assessment and subsequent reviews must be incorporated into the design and operating plan as required in Section 2.1. A qualified professional must conduct the assessment and subsequent reviews.

2.3 Hydrogeological Assessment

The operational certificate holder must review the hydrogeology of the landfill authorized in Section 1.1 annually and submit the results with the annual report required in Section 4.6. Actions recommended in the annual reviews must be incorporated into the design and operating plan as required in Section 2.1 and form the basis of a recommended groundwater monitoring program as required in Section 2.5. A qualified professional must conduct the annual reviews.

The operational certificate holder must submit an updated hydrogeologic characterization and impact assessment of the landfill authorized in Section 1.1 acceptable to the Director, by **August 31, 2015**. The assessment must meet the Landfill Criteria for Municipal Solid Waste (June 1993, or the most recent version) and be reviewed and updated every five (5) years hereafter. A qualified professional must conduct the assessment and subsequent reviews.

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for Director, *Environmental Management Act*
South Coast Region

2.4 **Landfill Gas Assessment**

The operational certificate holder must submit to the Director supplemental landfill gas assessments and generation reports every five years as required under the Landfill Gas Management Regulation. Annual monitoring and reporting of landfill gas must be done in accordance with the Landfill Gas Management Regulation and the criteria set out in the Environmental Monitoring Program (EMP) in Section 2.5.

The landfill gas assessment must address, but is not limited to, each relevant subsection in the Landfill Criteria for Municipal Solid Waste (June 1993, or the most recent version) and the Guideline for Environmental Monitoring at Municipal Solid Waste Landfills (January 1996 or the most recent version). Should the assessment indicate that the nonmethane organic compounds (NMOCs) will exceed 150 tonnes/year, then the operational certificate holder must submit a landfill gas management plan, acceptable to the Director.

At any time, based on the assessment or any other information, the Director may require the installation and operation of gas recovery and pollution prevention works, including landfill gas monitoring wells. It should be noted that the Ministry of Environment has developed the Landfill Gas Management Regulation under the Greenhouse Gas Reduction (Emissions Standards) Statutes Amendment Act, 2008. The requirements of the Regulation and its guideline documents must be incorporated by the operational certificate holder into the landfill gas management plan and design and operating plan as they come into effect.

2.5 **Environmental Monitoring Plan**

The Operational Certificate holder must submit an Environmental Monitoring Plan acceptable to the Director by April 30, 2018. The plan must be prepared by a qualified professional and meet the requirements set forth in the Landfill Criteria for Municipal Solid Waste (June 1993, or the most recent version) and the Guideline for Environmental Monitoring at Municipal Solid Waste Landfills (January 1996 or the most recent version).

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for Director, *Environmental Management Act*
South Coast Region

The operational certificate holder must review the environmental monitoring plan on an annual basis to determine if changes are required. Any revisions to the plan must be prepared and certified by a qualified professional acceptable to the Director. The operational certificate holder must also submit an updated environmental monitoring plan every five (5) years, which includes, at a minimum, any revisions submitted as part of the previous five years of annual reporting required in Section 4.6.

2.6 Qualified Professionals

All facilities and information, including works, plans, assessments, investigations, surveys, programs and reports, must be certified by qualified professionals. Refer to Section 3.1 of the operational certificate for the definition of a qualified professional.

2.7 Additional Facilities or Works

The Director may require investigations, surveys, and the construction of additional facilities or works including, but not limited to, leachate and bear-proofing measures. The Director may also amend the requirements of any of the information required by this operational certificate including plans, programs, assessments and reports.

2.8 Public Health, Safety and Nuisance

The landfill must be operated in a manner such that it will not create a public nuisance or become a significant threat to public health or safety with respect to landfill gas, unauthorized access, roads, traffic, airport activity, noise, dust, litter, vectors, or wildlife attraction.

2.9 Surface Water Diversion

Discharge of municipal solid waste into water is prohibited. The Operational Certificate holder must construct adequate surface water and groundwater diversion works to minimize surface water run-off and groundwater seepage from entering the landfill.

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for Director, *Environmental Management Act*
South Coast Region

2.10 Ground and Surface Water Quality Impairment

The landfill must be operated in a manner such that ground or surface water quality does not decrease beyond that specified by the British Columbia Water Quality Guidelines, or other appropriate criteria as may be specified by the Director, at or beyond the landfill property boundary.

If exceedances to the specified water quality criteria occur as a result of landfill operations, the Director may require that control measures or works be undertaken in addition to those outlined in Section 3.13.

2.11 Buffer Zones

The operational certificate holder must maintain the existing buffer zone relative to the property boundary of: 2 to 4.5 metres to the south, 10 to 98 metres to the west, 4.42 metres to the north and 4 to 18 metres to the east as shown in Site Plan A and Site Plan B.

The buffer zone must include an adequate firebreak. The firebreak must be maintained free of combustibles.

2.12 Survey of the Landfill

The Operational Certificate holder must conduct a legal survey which identifies the metes and bounds for both the limits of the landfill footprint and the boundaries of the landfill site. Copies of the land surveys are to be kept on file for review if requested by the Director. The corners and breakpoints of landfill footprint limits and landfill site boundaries are to be established and maintained in the field.

The operational certificate holder must also conduct an annual survey of the height, contour, surface area and settlement of the landfill and submit as part of the annual report required in Section 4.6.

3. OPERATIONAL REQUIREMENTS

3.1 Definitions

“director” means the Director or a person delegated to act on behalf of the Director, as defined in the *Environmental Management Act*;

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Avtar S. Sundher BSc.
for Director, *Environmental Management Act*
South Coast Region

“commercial quality soil” means soil which does not contain any substance with a concentration exceeding the lowest applicable numerical soil standard for commercial land as set forth in the Contaminated Sites Regulation.

“hazardous wastes” as defined by the Hazardous Waste Regulation pursuant to the *Environmental Management Act* are prohibited from disposal unless expressly authorised by the Hazardous Waste Regulation, approved by the Director or as specified in the Operational Certificate;

“regional director” means Regional Director, Environmental Protection;

“qualified professional” means an applied scientist or technologist specializing in a particular applied science including, but not necessarily limited to, agrology, biology, chemistry, engineering, geology, or hydrogeology and

- who is registered in British Columbia with their appropriate professional organization, acting under that association’s Code of Ethics and subject to disciplinary action by that association, and
- who, through suitable education, experience, accreditation and knowledge, may be reasonably relied on to provide advice within their area of expertise;

“return collection facility” means a household hazardous waste collection facility or a mobile household hazardous waste collection facility;

“suitable cover” means soils utilized in accordance with Section 3.5 of this operational certificate or other material acceptable to the Director:

“commercial quality soil” means soil which does not contain any substance with a concentration exceeding the lowest applicable numerical soil standard for commercial land (CL) use as set forth in the Contaminated Sites Regulation.

3.2 Bypasses

The discharge of effluent which has bypassed site control works as listed in Section 1.1.5 is prohibited unless the prior approval of the Director is obtained and confirmed in writing. In the event of an emergency, Section 3.3 must be followed.

Date issued: July 8, 2014



Avtar S. Sundher BSc.
for Director, *Environmental Management Act*
South Coast Region

3.3 **Emergency Procedures**

The authorized works must be inspected regularly and maintained in good working order. In the event of an emergency or condition beyond the control of the operational certificate holder including, but not limited to, unauthorized fires arising from spontaneous combustion or other causes, or detection of leachate on the property, the operational certificate holder must take appropriate remedial action and notify the Director immediately. The Director may reduce or suspend operations to protect the environment until the authorized works has been restored, and/or corrective steps taken to prevent unauthorized discharges.

3.4 **Inspections**

The operational certificate holder must inspect the authorized works regularly and maintain them in good working order. The Director must be immediately notified of any malfunction of these works.

The operational certificate holder must inspect the property boundaries regularly and notify the Director of any visual evidence of environmental impacts on adjacent properties.

3.5 **Soil Management**

Soil meeting the commercial land use standard, as set forth in the Contaminated Sites Regulation, may be utilized for berm construction, daily, intermediate and final cover, top dressing and landscaping. Soil with any substance with a concentration exceeding the lowest applicable numerical soil standard for commercial land may only be used for internal berms or daily or intermediate cover. The utilization or discharge exceeding the industrial quality soil and hazardous waste soil is prohibited.

Soils utilized for berm construction, intermediate and final cover, top dressing and landscaping must not be included in determining the rate of discharge specified in Section 1.1.1.

Date issued: July 8, 2014



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for Director, *Environmental Management Act*
South Coast Region

3.6 **Waste Compaction and Covering**

All waste must be placed in cells of a size determined by a qualified professional, and in accordance with the design and operating plan and must address each of the subsections in the Landfill Criteria for Municipal Solid Waste (June 1993, or the most recent version). The working face must be confined to the smallest practical area. The waste must be compacted and covered as per the design and operating plan.

Daily cover consisting of a minimum of 0.15 metres of suitable cover material or a functionally alternate cover material, as authorized by the Director, must be applied to the working face at the end of each operating day. If alternate cover is utilized, then the working face must be covered with a minimum of 0.15 meters of suitable cover at least once every week or as approved by the Director. Intermediate cover, consisting of a minimum 0.30 metre of suitable cover material must be applied within thirty (30) days to any area of the landfill which will not receive any further waste for thirty (30) days. The Director may vary the frequency of covering when freezing conditions adversely affect normal operation.

3.7 **Completed Areas of the Landfill**

The operational certificate holder must apply final cover to any area of the landfill which will not receive any further waste. Final cover must be applied in accordance with the design and operating plan required in Section 2.1 and, at a minimum, must consist of a minimum of 1.0 metre of low permeability ($<1 \times 10^{-5}$ cm/s) compacted soil (or equivalent) cap plus a minimum of 0.15 metre of topsoil and suitable vegetative cover, or as approved the Director.

With the written approval of the Director, the topsoil used for the final covering may be mixed with conditioning agents such as sludge (biosolids), compost and the like to add organics and improve the moisture holding capacity and nutrient value of the soil. Soil must be utilized in accordance with Section 3.5. Final cover must be constructed and maintained with adequate drainage and erosion controls and seeded with suitable grasses. Surface water runoff must be directed away from the landfill footprint. Soils must be in accordance with the Organic Matter Recycling Regulation (OMRR) and the Contaminated Sites Regulation (CSR).

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Avtar S. Sundher BSc.
for Director, *Environmental Management Act*
South Coast Region

3.8 Wildlife and Vector Management

Vectors (carriers capable of transmitting a pathogen from one organism to another including, but not limited to flies and other insects, rodents, and birds) must be controlled by the application of cover material at the required frequency per Section 3.6 or by such additional methods as specified by the design and operating plan and the Director. This landfill must be operated so as to minimize the attraction of wildlife such as bears and birds by applying cover at required frequencies and instituting a good housekeeping program.

Additional works may be required or other operating instructions may be issued by the Director should a wildlife nuisance or hazard arise.

3.9 Litter Control

Litter must be controlled by compacting the waste, minimizing the work face area, applying cover at the required frequencies, providing litter control fences and instituting a regular litter pickup and general good housekeeping program or as specified by the Director.

3.10 Electric Fencing

The operational certificate holder must maintain an electrified bear fence, at a minimum, around the landfill footprint, or implement alternative bear-proofing measures, acceptable to the Director, that will deter bears from entering that part of the site. The electric fence must be energized at all times, unless otherwise approved prior by the Director in writing. The fence must be maintained to the standards set out by the manufacturer until implementation of the landfill closure plan required in Section 5.2. Any penetrations through the electric fencing by bears must be immediately reported to the Ministry's Conservation Officer Service.

3.11 Fire Prevention and Control

The operational certificate holder must take all reasonable measures necessary to prevent fires from occurring at the site and is responsible for complying with all local fire safety requirements. The operational certificate holder must provide adequate fire breaks that are free of combustibles around the perimeter of the landfill footprint.

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Avtar S. Sundher BSc.
for Director, *Environmental Management Act*
South Coast Region

The operational certificate holder must maintain firefighting equipment and materials as required. In the event of a landfill fire, immediately notify the local fire department, the Provincial Emergency Program and the Director.

3.12 Posting of Signs

The operational certificate holder must post signage, to the satisfaction of the Director, at the entrance of the landfill site with the following current information including:

- Site name;
- Owner and operator;
- Contact telephone number and address for the owner and operator;
- 24 hour telephone number in case of emergency;
- Hours of operation;
- Materials and wastes accepted for recycling and land filling;
- Prohibited materials and wastes; and
- Tipping fees.

3.13 Leachate Management

The operational certificate holder must, to the satisfaction of the Director, take measures to minimize leachate generation, including but not limited to, providing effective covering and surface water runoff. Actions taken and their effectiveness must be detailed in the annual report as required in Section 4.6.

The operational certificate holder must submit a leachate management plan for the landfill authorized in Section 1.1, acceptable to the Director, by **August 31, 2015**. The plan must meet the Landfill Criteria for Municipal Solid Waste (June 1993, or the most recent version) and the Guideline for Environmental Monitoring at Municipal Solid Waste Landfills (January 1996 or the most recent version) and must be reviewed and updated every five (5) years hereafter. The leachate management plan, prepared by a qualified professional, must review the adequacy of the existing works to protect the receiving environment and identify any necessary upgrades and include a schedule for their implementation. Once implemented, the upgraded works must form part of the authorized works identified in Section 1.1.5.

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Avtar S. Sundher BSc.
for Director, *Environmental Management Act*
South Coast Region

3.14 Landfill Gas Management

The Landfill must not cause combustible gas concentrations to exceed the lower explosive limit in soils at the property boundary or 25% of the lower explosive limit at or in on-site or off-site structures.

3.15 Management of Recyclable Materials

The operational certificate holder must take all practical measures to segregate for recycling and reuse of waste destined for disposal at this site.

Recyclable materials must be managed in a manner to not cause pollution and in accordance with the *Environmental Management Act* and its regulations.

3.16 Management of Household Hazardous Waste

The amount of household hazardous waste accumulated at the facility authorized in Section 1.4 must be stored in accordance with the Hazardous Waste Regulation and is limited to the registration quantity as a return collection facility.

4. MONITORING AND REPORTING REQUIREMENTS

4.1 Monitoring

The Operational Certificate holder must implement an environmental monitoring program as required in Section 2.5. The Operational Certificate holder must maintain records of all monitoring program data and analyses available for inspection. Based on the information submitted in the annual report, or any other information relevant to the site, the Director may vary the frequency, location and analyses of environmental monitoring as warranted.

4.1.1 Slope Stability Monitoring

The operational certificate holder must regularly monitor for evidence of slope instability as part of regular operations for evidence of tension cracking, veneer instability or failure.

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Avtar S. Sundher BSc.
for Director, *Environmental Management Act*
South Coast Region

4.2 **Sampling Procedures**

Sampling is to be carried out in accordance with the procedures described in the "British Columbia Field Sampling Manual for Continuous Monitoring and the Collection of Air, Air-Emission, Water, Wastewater, Soil, Sediment, and Biological Samples, 2003 Edition (Permittee)", or most recent edition, or by suitable alternative procedures as authorized by the Director.

A copy of the above manual is available on the Ministry web page at http://www.env.gov.bc.ca/wsd/data_searches/field_sampling_manual/field_manual_03.html

4.3 **Analytical Procedures**

Analyses are to be carried out in accordance with procedures described in the "British Columbia Laboratory Manual (2009 Permittee Edition)", or the most recent edition, or by suitable alternative procedures as authorized by the Director.

A copy of the above manual is available on the Ministry web page at www.env.gov.bc.ca/epe/wamr/labsys/lab_meth_manual.html.

4.4 **Waste and Recyclable Materials Recording**

The operational certificate holder must record the quantity, in tonnes, of waste, recycling, and return collection received at the landfill. Also, the quantity of recyclable materials and household hazardous waste removed from these facilities must be recorded.

4.5 **Records Management**

The operational certificate holder must maintain the following information and records, current and suitably tabulated, at the landfill office or Regional District office for inspection:

- A copy of Operational Certificate 106060;
- Training procedures and personnel training records;
- Contingency plans and notification procedures;
- The current design and operating plan;
- Inspection records from staff and regulatory agencies;
- Most recent hydrogeological, geotechnical and landfill gas assessments;

Date issued: July 8, 2014



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for Director, *Environmental Management Act*
South Coast Region

- Incoming waste and soil records;
- Records of recyclable material and household hazardous wastes shipped offsite including the name of company and location the recyclable material and household hazardous waste is sent;
- Environmental monitoring results and interpretations;
- Records of commercial quality soil used as cover material identified in Section 3.5 along with records of soil shipped offsite; and
- Annual operating and monitoring reports for the previous 5 years.

4.6 **Reporting**

The operational certificate holder must prepare an annual report which must include, but is not limited to, the following:

- A review and interpretation of the analytical data from receiving environment monitoring for the calendar year;
- Summaries of waste and recyclable material records, with the amount of waste landfilled reported as a volume and tonnage;
- Summary of recyclable material and household hazardous wastes shipped offsite including the name of company and location the recyclable material and household hazardous waste is sent;
- Summary of amount of commercial quality soil brought onsite;
- Updated estimates for the remaining capacity, closure date for the current phase and closure date for the current landfill footprint;
- Results of the annual survey required under Section 2.12;
- An evaluation of leachate generation control measures;
- Results of the landfill gas monitoring;
- Revised closure/post closure costs, confirmation of sufficient funds available, and a statement of the current dollar value of the Closure Fund and the amount earmarked for the Sechelt Landfill site;
- Revised design and operating plan and planned improvements if applicable for minor revisions;
- Revised environmental monitoring program;
- Identification of operating problems and corrective actions taken;
- An evaluation of the recycling programs including waste diversion;
- Summary of public complaint/resolutions for the landfill;
- In the event of any non-compliance with the conditions of this operational certificate, an action plan and schedule to achieve compliance; and

Date issued: July 8, 2014



Avtar S. Sundher BSc.
for Director, *Environmental Management Act*
South Coast Region

- The results of all monitoring programs as specified in this Operational Certificate. Data interpretation and comparison to the performance criteria in the Landfill Criteria for Municipal Solid Waste, the Guidelines for Environmental Monitoring and Municipal Solid Waste Landfills. Trend analyses, as well as an evaluation of the impacts of the discharges on the receiving environment in the previous year must be carried out by a qualified professional.
- Monitoring data must be entered into EMS – Environmental Monitoring System electronically and submitted in electronic and printed format satisfactory to the Regional Director.

The annual report for the preceding 12 month period from January 1 to December 31 must be submitted to the Regional Director, Environmental Protection, by **March 31** of each year.

5. CLOSURE AND POST-CLOSURE REQUIREMENTS

5.1 Closure Plan / Funding

The operational certificate holder must accrue, during the life of the landfill, a dedicated reserve fund in a form acceptable to the Director, sufficient to finance closure and environmental contingencies related to the landfill. The estimated cost of carrying out closure and how the fund will be accrued must be included in the design and operating plan required in Section 2.1. The estimated costs of closure and post-closure activities must be updated annually and submitted to the Director as part of the annual report required in Section 4.6. Should the estimated costs of closure and post-closure increase then the operational certificate holder must increase the rate of accrual as

5.2 Progressive Closure

The operational certificate holder must submit a closure plan as part of a Design and Operating Plan for the facilities authorized in Section 1 by **December 31, 2015** acceptable to the Director. The plan must be reviewed and updated every 5 years as part of the Design and Operating Plan or until the site is decommissioned and a closure-plan under Section 5.3 is approved. The plan must be prepared by an independent qualified professional and include information regarding:

- Phasing plan showing areas to be progressively closed.
- Estimated total waste volumes and tonnage and the closure date;

Date issued: July 8, 2014



Avtar S. Sundher BSc.
for Director, *Environmental Management Act*
South Coast Region

- A topographical plan showing the final elevation contours of the landfill and surface water diversion and drainage controls;
- Design of the final cover including the thickness and permeability of barrier layers and drainage layers and information on topsoil, vegetative cover and erosion prevention controls;
- Rodent and nuisance wildlife control procedures;
- Proposed end use of the property after closure;
- A post-closure monitoring program for groundwater, surface water, landfill gas, erosion and settlement for a minimum period of 25 years;
- Post-closure operation of pollution abatement engineering works such as leachate and landfill gas collection/treatment systems for a minimum period of 25 years; and
- Contingencies to address environmental impact concerns which may arise during the minimum post-closure period of 25 years.

5.3 **Post-Closure Operation and Maintenance**

A post-closure plan must be submitted not less than 2 years prior to decommissioning of the landfill. The closure plan must be reviewed every 5 years following closure and updated to encompass the next 10 years of post-closure activities. The post-closure plan and subsequent updates must be prepared by an independent qualified professional licensed to practice in the province of British Columbia and knowledgeable in such matters. The post-closure plan and subsequent updates must be submitted to the Director for approval and must include at least the following:

- a complete review and assessment report of the overall integrity of the landfill,
- Procedures for notifying the public about the closure and alternative waste disposal facilities;
- a detailed timetable for post-closure procedures and correction of any deficiency identified in the review and assessment report,
- a detailed schedule of inspection, monitoring and maintenance to be carried out for a minimum post-closure period of 25 years, and
- a process for the administration of the post-closure security fund required under Section 5.1 of this operational certificate.

Date issued: July 8, 2014



Avtar S. Sundher BSc.
for Director, *Environmental Management Act*
South Coast Region

5.4 **Declaration of Landfill**

Landfills sited on titled land must register a covenant that the property was used for the purpose of waste disposal as a charge against the title to the property as provided for under Section 219 (1) of the *Land Title Act*. Landfills located on crown land are to have a "notation on file" registered that the property was used for the purpose of waste disposal. The registration of the charge or legal notification is to be submitted to the Regional Director.

5.5 **Site Decommissioning**

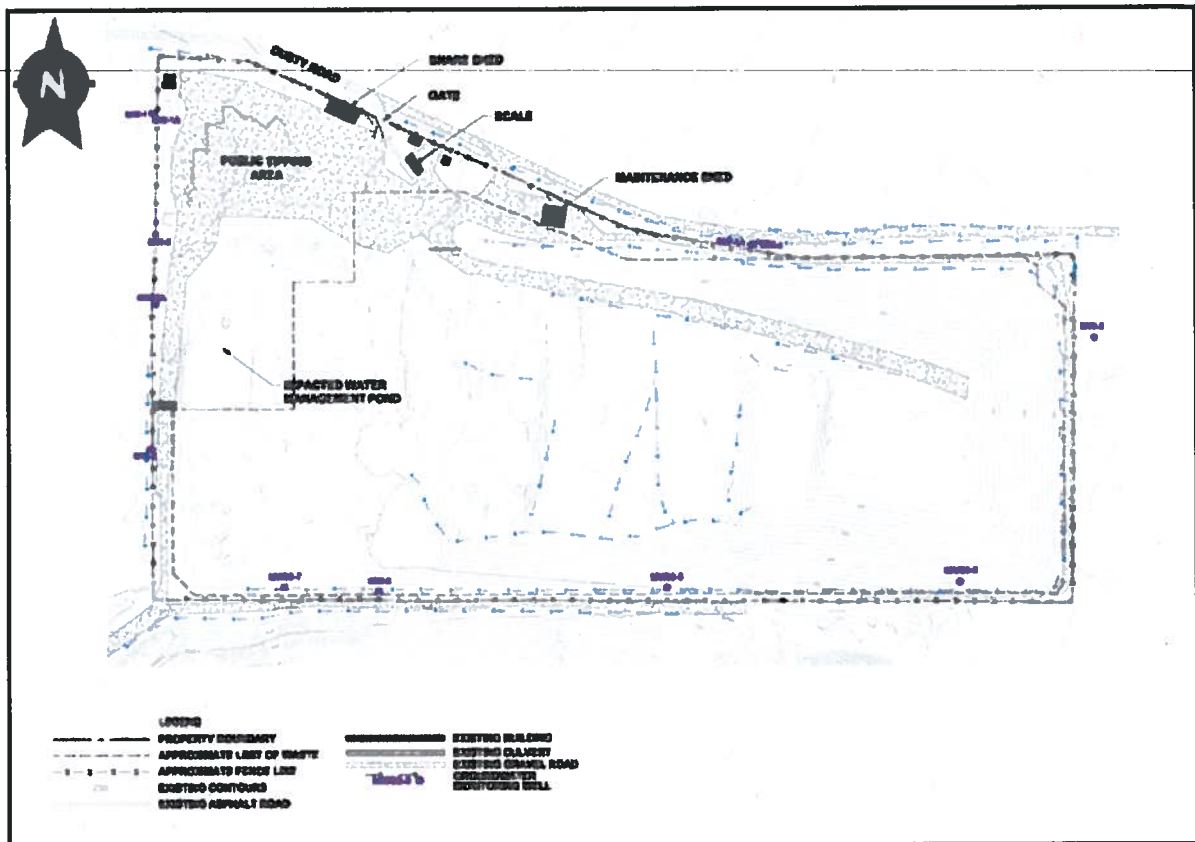
In accordance with Section 40 of the *Environmental Management Act* and Part 2 of the Contaminated Sites Regulation, the operational certificate holder must submit a site profile to the Director not less than 10 days prior to decommissioning the facilities authorized in Section 1.

Date issued: July 8, 2014



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South Coast Region

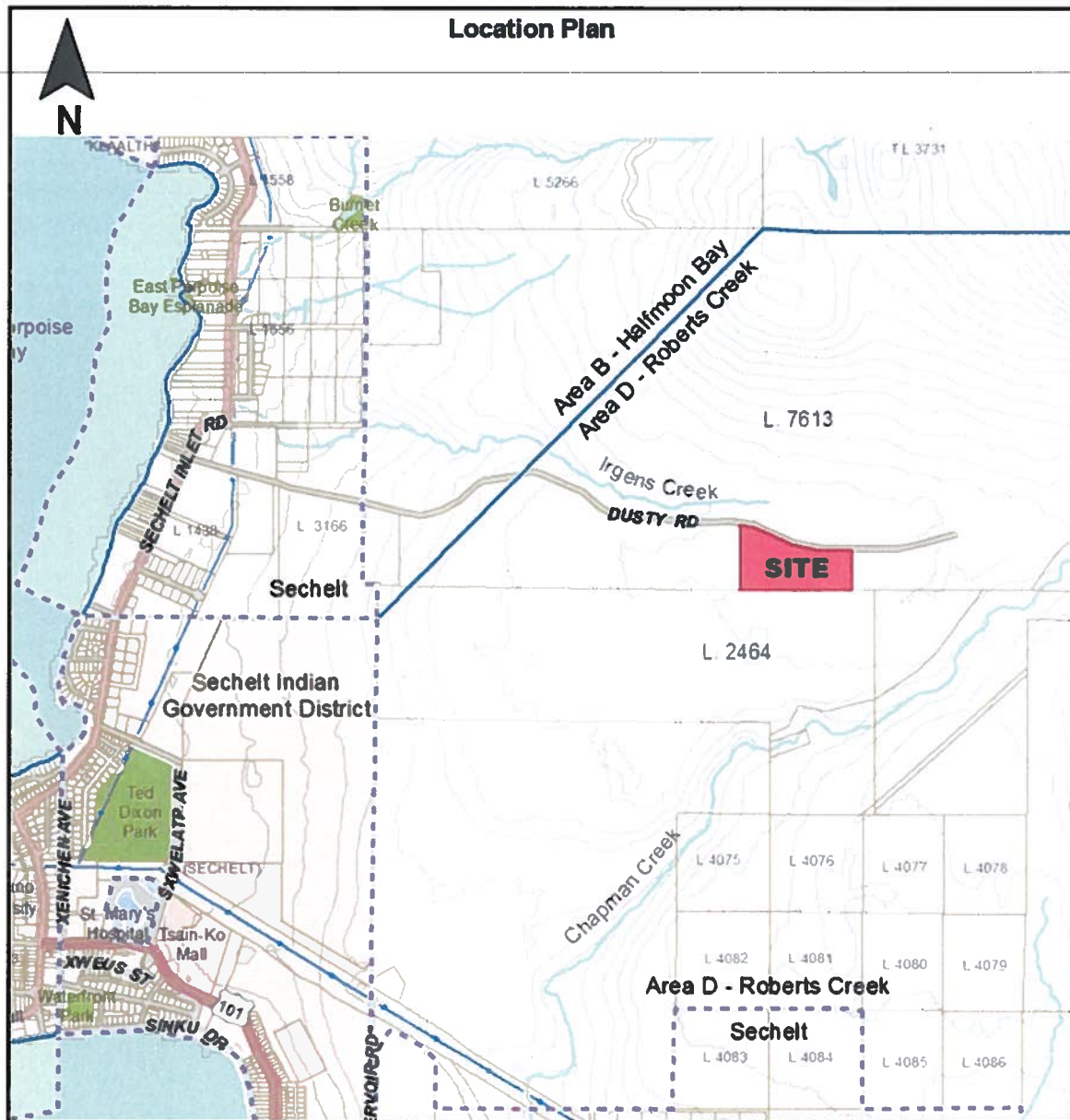
SITE PLAN A



Date issued: July 8, 2014

Avtar S. Sundher BSc.
for Director, *Environmental Management Act*
South Coast Region

SITE PLAN B



Date issued: July 8, 2014

Avtar S. Sundher BSc.
for Director, *Environmental Management Act*
South Coast Region



APPENDIX B
HISTORIC STRATIGRAPHIC LOGS AND GEOLOGIC CROSS-SECTION

**DAYTON & KNIGHT LTD.***Consulting Engineers*P.O. BOX 91247, (612 CLYDE AVENUE), WEST VANCOUVER, BRITISH COLUMBIA, CANADA V7V 3N9
TELEPHONE: (604) 922-3255 FAX: (604) 922-3253

July 29, 1993

Mr. S. K. Lehmann
Superintendent of Public Works
Sunshine Coast Regional District
P.O. Box 800
5477 Wharf Road
Sechelt, B.C.
V0N 3A0

Attention: Ms. Cathy Kenny
Solid Waste Management Coordinator

Dear Ms. Kenny:

Re: **Monitoring Well Installation**
Sechelt Landfill

This letter documents Dayton & Knight's installation of groundwater monitoring wells, with the assistance of SDS Drilling Ltd. at the above site, and the descriptions of the wells.

1.0 PROCEDURE

A total of nine (9) groundwater monitoring wells were installed between July 21 and 23, 1993. Three deep wells were constructed. The depth of these wells is approximately 15 m from the ground surface. The rest of the wells are shallow and have the depth of 4 to 5 m. The two deep wells were each nested with a shallow well. The locations of the wells are illustrated on Figure 1.

Installation of the wells was carried out by using a Becker Hammer drill. A piledriving hammer advanced a casing of double wall construction. During driving, compressed air was continuously forced down the annulus between the walls and returned up through the centre of the casing carrying the soil up to the surface through the air induced cyclone. This ensured that the boreholes, in which the wells were installed, were not contaminated.

The boreholes were driven to depths of about 4.0 m to 23.5 m below ground surface. The advancement of deep wells was stopped when a white, fine, dry, well-compacted, low impervious silt layer was encountered. Soil samples in the boreholes were collected from the cyclone. The casing of Becker Hammer was steam-cleaned between well installations to minimize cross-contamination of the installations.

- 2 -

The wells consist of 50 mm diameter schedule 40 PVC pipes with threaded couplings. The lower 1.5 m of each well consists of 0.010 inch width, 0.250 inch spacing slotted 50 mm diameter schedule 40 PVC pipe with threaded couplings. The screened portions of the wells were surrounded with Grade 16 silica sand. Bentonite chips were placed above and below the screen portion of each shallow well, as well as at 1 m below the ground surface, for all wells to prevent contamination infiltration. The portions above the screen were backfilled with selective native granular soils. Dedicated 5/8" HDPE tubing was installed with foot valve attached on the bottom in each well for sampling.

The location of the installed wells is to be determined by survey. The groundwater level of the wells is to be determined on initial sampling.

The well installation was carried out under the full-time supervision by Mr. John Lee of Dayton & Knight Ltd., who logged the well installations.

2.0 WELLS

The detailed records of the well installations and the soil strata encountered at the well locations are presented on the Record of Borehole sheets following this text.

The well installation depths and the screened strata are summarized as follows:

Well No.	Type	Depth of Well (m)	Strata Screened
1	Nested (deep)	11.2	Silty sand
1A	Nested (shallow)	5.03	Silty sand
2	Shallow	5.77	Silty sand
2A	Shallow	7.06	Medium sand
3	Shallow	4.27	Silty sand
4	Nested (deep)	11.50	Compacted sandy silt
4A	Nested (shallow)	4.04	Silty sand
5	Deep	14.3	Sandy silt
6	Shallow (gas)	8.38	Silty sand

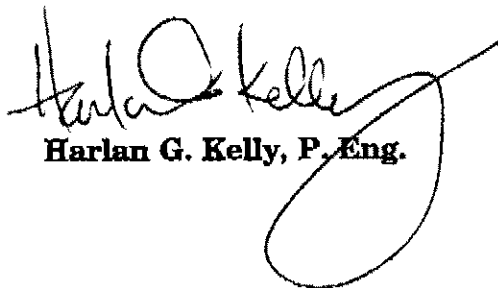
As recommended, quarterly sampling should be undertaken in accordance with Ministry of Environment requirements to determine if leachate is leaving the landfill. Analysis of the results will determine extent of required improvements.

- 3 -

We trust that this report provides the information required at this time. If you have any questions regarding the above, please do not hesitate to contact us.

Yours truly,

Dayton & Knight Ltd.

A handwritten signature in black ink, appearing to read "Harlan G. Kelly", is written over the printed name. The signature is fluid and cursive, with a large loop at the end.

Harlan G. Kelly, P. Eng.

JL:aa
28.146
Encl.

RECORD OF BOREHOLE MW 1 and 1A

ELEV.	DESCRIPTION	STRATIGRAPHY PLOT	STANDPIPE INSTALLATION
DEPTH (meters)			
	Ground surface		
0.0	Top soil organics, fine to medium, brownish (Tan) Loose compacted silty sand		
0.6	Moist, Medium compacted light brownish grey silty Sand, trace few fine gravel		 Bentonite Seal Native Sand Backfill. Silica Sand Grade 16 MICRO slot Screen
6.5	Medium compacted, moist to wet, fine to medium, silty to washed clean, medium to dark grey sand		
9.5			

Cont'd on sheet 2 of 3

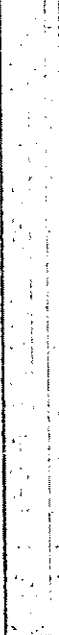
Sheet 1 of 3

Location (See Figure 1) Boring Date July 21, 1993
 Borehole Type: Becker Ham. Borehole Dia. 6 3/8"
 Vertical Scale: 1:50 Datum: Geodetic

DAYTON & KNIGHT LTD.
 CONSULTING ENGINEERS

DATE July 28, 1993 SKETCH No. _____ ISSUE _____
 DRAWN J.H.S. DRAWING No. 28.146

RECORD OF BOREHOLE MW 1 and 1A

ELEV.	DESCRIPTION	STRATIGRAPHY PLOT	STANDPIPE INSTALLATION
DEPTH (meters)			
	Cont'd from Sheet 1		
	Medium compacted, Wet to Very wet, fine to medium, silty to medium clean, brownish grey Silty sand, trace fine gravel.		 Micro Slot Screen. Silica Sand.
12.0	Wet, fine, medium Compacted, brownish grey, silty silt.		 Native Sand.
16.3	Moist, fine, grey, medium compacted, silt.		
17.8	Moist, fine to medium, medium compacted, grey, Sandy silt, trace fine gravel.		

Cont'd on Sheet 3 of 3

Sheet 2 of 3

Location (See Figure 1) Boring Date : July 21, 1993
 Borehole Type : Becker Ham. Borehole Dia. : 6 3/8"
 Vertical Scale : 1 : 50 Datum : Geodetic

DAYTON & KNIGHT LTD.
 CONSULTING ENGINEERS

DATE July 28, 1993 SKETCH No. _____ ISSUE _____
 DRAWN JHL DRAWING No. 28.146

RECORD OF BOREHOLE MW 1 and 1A

ELEV.	DESCRIPTION	STRATIGRAPHY PLOT	STANDPIPE INSTALLATION
DEPTH (meters)			
	Cont'd from Sheet 2		
20.5	Fine, moist to dry, very densely compacted, brownish grey silt, trace fine gravel.		
23.4	Very fine, dry, powder, light grey, dense, silty till		
24.0	End of Borehole		

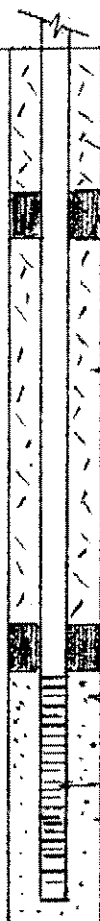
Sheet 3 of 3

Location (See Figure 1) Boring Date: July 21, 1993
 Borehole Type: Becker Ham. Borehole Dia.: 3 5/8"
 Vertical Scale: 1:50 Datum: Geodetic

DAYTON & KNIGHT LTD.
 CONSULTING ENGINEERS

DATE July 28, 1993 SKETCH No. _____ ISSUE _____
 DRAWN JHL DRAWING No. 28.146

RECORD OF BOREHOLE MW 2

ELEV.	DESCRIPTION	STRATIGRAPHY PLOT	STANDPIPE INSTALLATION
DEPTH (meters)			
	Ground Surface		
0.0	Tan Brownish grey, light compacted, fine to medium silty sand, trace gravel		
1.0	Brownish to light grey, medium compacted, moist, uniform medium silty sand, trace fine gravel.		 Bentonite seal Native sand backfill Silica sand Micro slot screen
3.3	Moist to medium wet, fine to medium, medium compacted, medium to light grey silty sand, trace fine gravel.		
5.9	End of Borehole		

Sheet of

Location (See Figure 1) Boring Date : July 21, 1993
 Borehole Type : Becker Ham. Borehole Dia. : 6 5/8"
 Vertical Scale : 1 : 50 Datum : Geodetic

DAYTON & KNIGHT LTD.
 CONSULTING ENGINEERS

DATE July 28, 1993 SKETCH No. _____ ISSUE _____
 DRAWN JHL DRAWING No. 28.146

RECORD OF BOREHOLE MW 2A

ELEV.	DESCRIPTION	STRATIGRAPHY PLOT	STANDPIPE INSTALLATION
DEPTH (meters)			
	Ground Surface		
0.0	Tan brownish grey, light Compacted, fine to medium Silty Sand, trace fine gravel		
1.0	Brownish to light grey, Medium Compacted, moist, Silty Sand		Bentonite Native Sand
3.3	Moist to medium wet, medium compacted, fine to medium, light to medium grey, silty Sand, trace fine gravel		
5.9	Medium compacted, moist to wet, fine to medium, Silty to washed, medium to dark grey sand		Micro slot screen Silica Sand
7.4	End of Borehole		

Sheet 1 of 1

Location (See Figure 1) Boring Date : July 23, 1993
 Borehole Type : Becker Ham. Borehole Dia. : 6 5/8"
 Vertical Scale : 1 : 50 Datum :

DAYTON & KNIGHT LTD.
 CONSULTING ENGINEERS

DATE July 28, 1993 SKETCH No. _____ ISSUE _____
 DRAWN J.V.L. DRAWING No. 28.146

RECORD OF BOREHOLE MW 4 and 4A

ELEV.	DESCRIPTION	STRATIGRAPHY PLOT	STANDPIPE INSTALLATION
DEPTH (meters)			
	Ground Surface		
0.0	Moist, medium compact, light brownish grey, Silty Sand, trace fine gravel.		
2.5	Moist, powder to fine, brownish grey, uniform, Medium compacted, Silty Sand, trace some fine gravel.		
5.4	Moist, fine to medium, dark grey, medium compacted, dusty silty Sand		
6.5	Moist to dry, fine, brownish grey, heavily compacted, sandy silt, trace boulders and fine gravel		
9.3	Dry, fine, light grey, heavily compacted silt.		

Cont'd on sheet 2 of 2

Sheet 1 of 2

Location (See Figure 1) Boring Date : July 23, 1993
 Borehole Type : Becker Ham, Borehole Dia. : 6 5/8"
 Vertical Scale : 1 : 50 Datum :

DAYTON & KNIGHT LTD.
 CONSULTING ENGINEERS

DATE July 28, 1993 SKETCH No. _____ ISSUE _____
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JUL 29 '93 04:00PM DAYTON KNIGHT

P.11/15

RECORD OF BOREHOLE MW 4 and 4A

ELEV.	DESCRIPTION	STRATIGRAPHY Plot	STANDPIPE INSTALLATION
DEPTH (meters)			
	cont'd from sheet 1		
	Trace boulders and fine gravel	1. < >	
10.6	Dark grey, dry, heavily compacted, sandy silt, trace fine gravel		
12.0	End of Borehole		

Sheet of

Location (See Figure 1) Boring Date : July 23, 1993
 Borehole Type : Becker Ham. Borehole Dia. : 6 5/8"
 Vertical Scale : 1 : 50 Datum :

DAYTON & KNIGHT LTD.
 CONSULTING ENGINEERS

DATE July 29, 1993 SKETCH No. _____ ISSUE _____
 DRAWN JKL DRAWING No. 28.146

RECORD OF BOREHOLE

M W 5 (Gas)

ELEV.	DESCRIPTION	STRATIGRAPHY PLOT	STANDPIPE INSTALLATION
DEPTH (meters)			
	Ground Surface		
0.0	Light brownish to grey, medium to fine, light to medium compacted, moist, silty sand. trace large sand		
4.0	Light to medium compacted, moist to dry, brownish to light grey, uniform medium fine, silty sand, trace large sand.		
7.2	Dry, dense, brownish grey, fine sandy silt trace fine gravel.		
8.1	Fine, dry, dense, grey Sandy silt. trace fine to medium gravel		

Native Sand backfill

cont'd on sheet 2 of 2

Sheet 1 of 2

Location (See Figure 1) Boring Date : July 23, 1993
 Borehole Type : Becker Ham. Borehole Dia. : 6 5/8"
 Vertical Scale : 1 : 50 Datum :

DAYTON & KNIGHT LTD.
 CONSULTING ENGINEERS

DATE Jul 23 1993 SKETCH No. ISSUE

RECORD OF BOREHOLE MW 5 (Gas)

ELEV.	DESCRIPTION	STRATIGRAPHY PLOT	STANDPIPE INSTALLATION
DEPTH (meters)			
	cont'd from sheet 1		
11.0	Light brownish grey, fine to medium, dry, dense, dusty, Sandy silt trace fine gravel		 Bentonite Micro slot screen Silica Sand
14.7	Powder to fine, very dense, dusty, dry, white, silty sand trace boulders		
16.5	End of Borehole Note: Fire bombs were dropped to determine Water @ 11.2 m and 16.5 m		

Sheet 2 of 2

Location (See Figure 1) Boring Date :
 Borehole Type : Becker Ham. Borehole Dia. :
 Vertical Scale: 1 : 50 Datum :

DAYTON & KNIGHT LTD.
 CONSULTING ENGINEERS

DATE July 28, 1993 SKETCH No. _____ ISSUE _____
 DRAWN JHL DRAWING No. 28.146

RECORD OF BOREHOLE MW 6

ELEV.	DESCRIPTION	STRATIGRAPHY PLOT	STANDPIPE INSTALLATION
DEPTH (meters)			
0.0	Ground Surface		
0.0	MEDIUM COMPACTED; MOIST, LIGHT BROWNISH TO LIGHT GRAY, UNIFORM FINE TO MEDIUM SILTY SAND TRACE OF FEW FINE GRAVEL		Native backfill
4.5	MOIST, BROWNISH TO GRAY; FINE TO MEDIUM, MEDIUM COMPACTED SILTY SAND TRACE OF SOME COARSE SAND		manually slotted on site. 6 in spacing

Cont'd on sheet 2 of 2

Sheet 1 of 2

Location (See Figure 1) Boring Date : July 22, 1993
 Borehole Type : Becker Ham. Borehole Dia. : 6 5/8"
 Vertical Scale : 1 : 50 Datum :

DAYTON & KNIGHT LTD.
 CONSULTING ENGINEERS

DATE July 28, 1993 SKETCH No. _____ ISSUE _____

RECORD OF BOREHOLE MW 6

ELEV.	DESCRIPTION	STRATIGRAPHY PLOT	STANDPIPE INSTALLATION
DEPTH (meters)			
	Cont'd from sheet 1		
10.3	MOIST TO DRY, LIGHT BROWNISH GRAY MEDIUM COMPACTED SANDY SILT, TRACE OF COARSE SAND		
12.5	MEDIUM TO LIGHT BROWNISH GRAY, MOIST TO DRY, UNIFORMLY FINE, DENSELY COMPACTED SANDY SILT. TRACE OF COARSE SAND.		Native backfill
16.0	NOTE: ADVANCEMENT WAS STOPPED WHEN SIMILAR SOIL FORMATION ENCOUNTERED AS MW1		

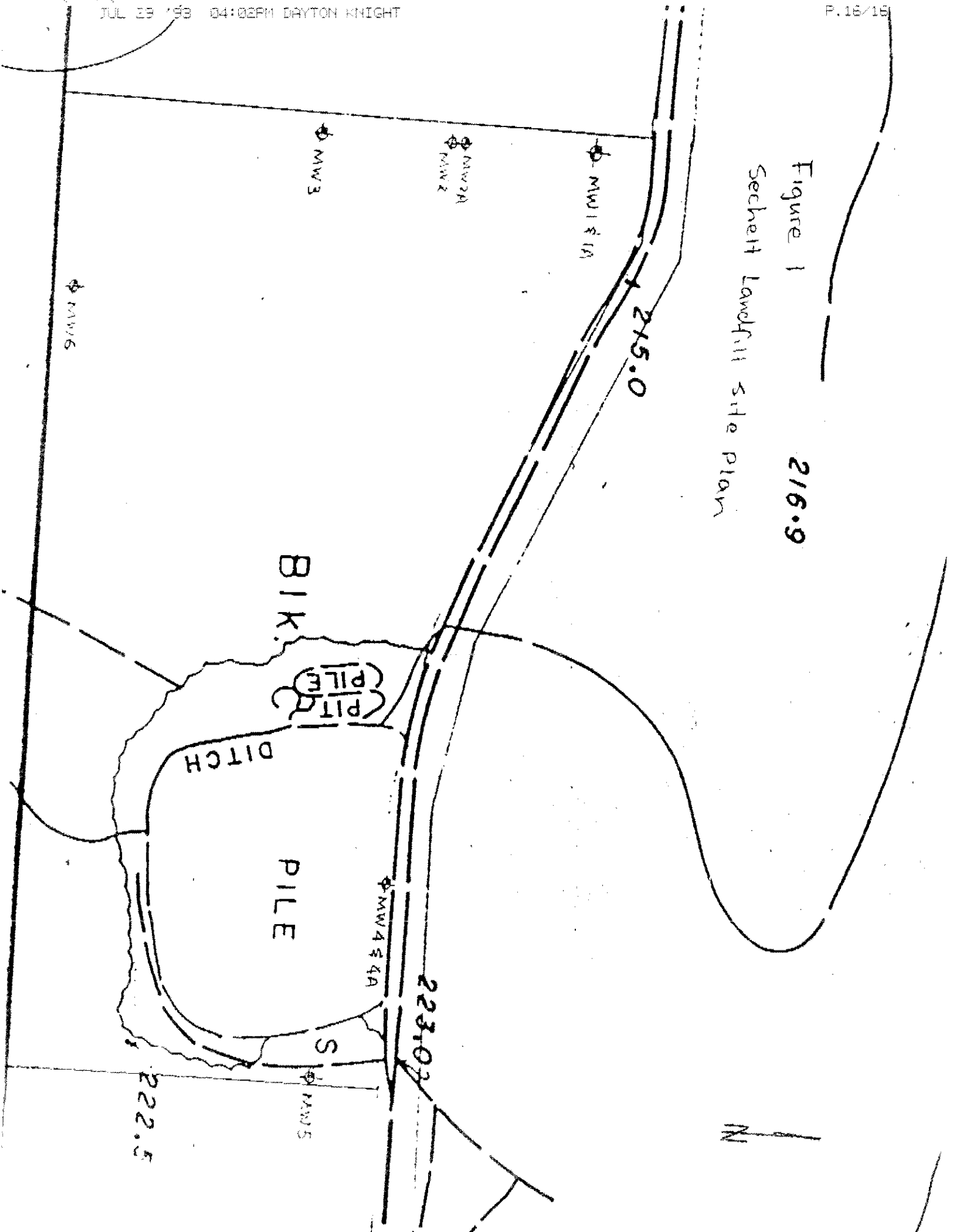
Sheet 2 of 2

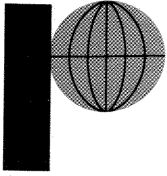
Location (See Figure 1.) Boring Date : July 28, 1993
 Borehole Type : Becker Ham. Borehole Dia. : 3 3/8"
 Vertical Scale : 1 : 50 Datum :

DAYTON & KNIGHT LTD.
 CONSULTING ENGINEERS

DATE July 28, 1993 SKETCH No. _____ ISSUE _____
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Figure 1
Sechealt Landfill site plan





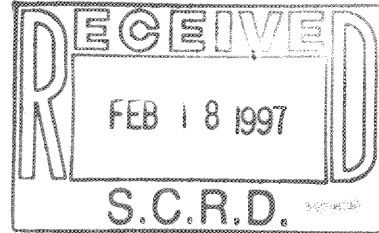
PITEAU ASSOCIATES

GEOTECHNICAL AND
HYDROGEOLOGICAL CONSULTANTS

215 - 260 WEST ESPLANADE
NORTH VANCOUVER, B.C.
CANADA V7M 3G7
TELEPHONE (604) 986-8551
FAX (604) 985-7286

Our file: 1647

February 12, 1996



Sunshine Coast Regional District
5477 Wharf Road
Box 800
Sechelt, B.C.
V0N 3A0

Attention: Ms. Cathy Kenny
Solid Waste Management Co-ordinator

Dear Sirs:

Re: Design and Installation of New Monitoring Wells
Sechelt Landfill, Sunshine Coast Regional District

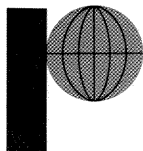
As requested in Mr. Sieg Lehmann's letter to Mr. Agris Berzins of Dayton & Knight Ltd., dated October 9, 1996, Piteau Associates Engineering Ltd. (Piteau) has expedited and supervised the construction of three new monitoring wells at the Sechelt Landfill. The scope of our services for this project included:

- Review of water level and chemistry monitoring data to determine required depth and preferred location of wells on southern boundary of site,
- Site visit to perform electromagnetic (EM) survey, to select well sites, and to make arrangements for access preparation,
- Necessary arrangements for drilling contractor to construct new wells,
- Supervision of well construction program,
- Well development and initial sampling, and
- Preparation of well logs and well completion report.

A description of the work performed and the results of the EM study and initial sampling suite are presented herein.

EM-34 SURVEY

Piteau performed a terrain electrical conductivity survey. A Geonics EM-34 was used for the survey at the Sechelt Landfill on November 21, 1996. This instrument involves two people traversing the survey area with two electromagnetic coils: one to transmit and a second to receive. By varying the spacing between the two coils, the apparent electrical conductance of the ground can be measured at depths varying up to 30m. The purpose of the survey was to detect changes in ground conductivity that would be indicative of the presence of highly conductive leachate plumes in the groundwater beneath the site.



Sunshine Coast Regional District
Attention: Ms. Cathy Kenny
Solid Waste Management Coordinator

-2- February 12, 1997

Distances were measured by pacing, with fixed landmarks noted along the actual traverse lines to assist with locating anomalies. The approximate spacing between measurements was every 10m. The east and west traverse lines were compromised by dense forest, which required surveying closer to the fences than would otherwise be desirable.

Readings were taken using the vertical coil orientation (measures to 30m depth), and the horizontal coil orientation (measures to 15m depth). Horizontal readings were not performed on the west side traverse, as the proximity of the fence produced suspect readings.

East side

This traverse extended from south of the road ditch to just short of the southeast property corner (see location on Fig. 1). Several 0.3m deep ponds were encountered in this area. One anomaly was present (Fig. 2), suggesting a localized conductive source. Measurement accuracy in the latter half of the traverse was affected by the proximity of the fence. Monitoring well MW-5 does not appear to be in an anomalous area.

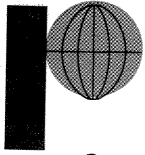
West side

The traverse was located inside the landfill property, between the toe of the refuse and the fence. This line was sited between the toe of the refuse and the fence, to minimize interference from either of these features. A uniform distance was maintained from the fence so that any contributory effects would be constant.

The survey indicated that higher conductivities are present adjacent to the toe of the landfill, and decline as distance from the landfill increases (Figs. 1 and 2). Monitoring well MW-3 is located within the higher conductance zone.

South Side

A single traverse was made across the southern boundary, at least 8m from the toe of the landfill. This is an open area with no fences parallel to the traverse. Two anomalous zones were identified, between 110 and 206m, and between 355 to 428m from the southeast property corner (Figs. 1 and 2). Drilling targets were identified at 205m and 390 from the southeast property corner. Only one monitoring well, MW-6, is present on this traverse, and is just outside an anomalous zone. It should be noted that the anomalies identified were not strong, but were interpreted to be associated with leachate, given their location on the downgradient side of the landfill, relative strength and broad distribution.



Sunshine Coast Regional District
Attention: Ms. Cathy Kenny
Solid Waste Management Coordinator

-3- February 12, 1997

MONITORING WELL DRILLING AND INSTALLATION

The monitoring well drilling and installation program was conducted on December 17 and 18, 1996 by Beck Drilling and Environmental Services Ltd. Three wells were drilled using a Becker Hammer drilling rig. All wells were drilled and cased with 4 inch (102 mm) I.D. double wall steel casing. Well locations are shown on Fig. 1.

Work was supervised by Mr. Chris Keith of Piteau. While on site, Mr. Keith logged drill cuttings, performed field water quality measurements and kept records of drilling progress and monitoring well construction details. Hydrogeologic logs and well completion details are shown in Appendix A.

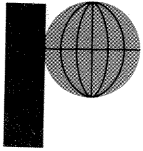
All three wells are located along the southern boundary of the landfill property line. Monitoring well MW-7 was drilled approximately 55m west of MW-6 at an EM-34 survey anomaly. Drilling encountered fine to coarse sand with some gravel and boulders to a depth of 8.8m. This was underlain by sand and gravel to gravel with some boulders to a depth of 18.0m. Drilling was terminated at 18.3m when a large boulder or bedrock was encountered. The sandy silt encountered from 18.0 to 18.3m was damp.

Monitoring well MW-8 was located roughly in the middle of the southern property line where the EM-34 survey indicated a second conductivity anomaly. Drilling encountered a complex series of fine to coarse sand and gravel layers to a depth of 29.9m. Silty sand was encountered from 2.7 to 3.4m, and there was evidence of a perched water table from 2.4 to 3.4m. Saturated soil was again encountered from 28.9 to 29.9m.

Monitoring well MW-9 was located in the southeast corner of the property, near GP-4. A complex series of fine to coarse sand and fine to coarse gravel was encountered to a depth of 26.0m. Soils were unsaturated to a depth of 24.5m.

Field electric conductivity measurements were taken for water samples blown to surface with the drill cuttings from saturated zones. These measurements are reported on the logs in Appendix A.

All screened intervals were located in the bottom 1.52m (5 ft.) of the drilled holes, with a sand filter pack set between the bottom of the hole and a point 3.1 to 3.8m above the bottom of the hole. A bentonite seal, ranging from 3.1 to 3.5m thick, was placed above the filter sand. The holes were then backfilled with drill cuttings to just below grade, where a thin bentonite seal (0.2 to 0.5m) was placed, followed by a flush mounted well casing set in concrete. MW-8 had an



Sunshine Coast Regional District
Attention: Ms. Cathy Kenny
Solid Waste Management Coordinator

-4- February 12, 1997

additional bentonite seal placed between 2.4 to 4.6m below grade, where perched water was encountered during drilling.

WELL DEVELOPMENT AND SAMPLING

Development and sampling of the three new monitoring wells was conducted on January 8, 1997. The purge volume required for the monitoring wells was calculated as three well volumes, based on water level measurements taken that same day. Electrical conductivity of the water withdrawn from the wells was also monitored, to ensure that it had stabilized prior to sample collection.

Water was withdrawn using new disposable plastic bailers and nylon twine. A plastic sheet was placed around the well to coil the twine on as the bailer was pulled from the well. Once purging was complete, the field EC, pH and temperature were recorded, and appropriate sample containers were filled. Disposable latex gloves were used during the sampling procedure.

Samples were placed in a cooler with ice, and were delivered to Analytical Services Laboratories Ltd. of Vancouver on January 9, 1997.

INTERPRETED GROUNDWATER FLOW REGIME

Groundwater beneath the site is interpreted to flow in a dominantly southward direction (Fig. 1). Flows may be perched on low permeability sediments which underlie the landfill area, but these low permeability sediments do not appear to extend south of the landfill property, where permeable sediments were noted to continue to depths of 29 to 26m in MW- 8 and MW-9, respectively.

The water table shows a very steep gradient to the south, and the equipotential contours indicate groundwater flows trend towards MW-8, where the depth of permeable sediments appears to be greatest (Fig. 1).

SAMPLING RESULTS

The first suite of sample results indicate that groundwater beneath the south landfill perimeter has been significantly impacted by leachate. COD, manganese and chloride concentrations are elevated in all three wells. Manganese exceeds the acceptable drinking water concentration of 0.05 mg/L (Health & Welfare, 1996) in all three wells, but chloride only exceeds the acceptable limit of 250 mg/L in MW-9 (Table I). Similarly, total nitrogen levels are low (<2 mg/L-N) in MW-7 and MW-8, but ammonia levels are very high (127 mg/L-N) in MW-9. The high ammonia levels indicate that very little nitrification is occurring in the unsaturated zone beneath the east end of



Sunshine Coast Regional District
Attention: Ms. Cathy Kenny
Solid Waste Management Coordinator

-5- February 12, 1997

the landfill, which suggests a fairly rapid infiltration rate to the water table. Conditions may be more favourable for subsurface renovation of leachate beneath the western portions of the landfill, as the first suite of samples indicates water quality is generally better in MW-7 and MW-8 than in MW-9.

RECOMMENDATIONS

Water level measurements and water quality sampling should continue on a bi-monthly or quarterly schedule, to properly define the leachate impact and groundwater flow regime on the south side of the landfill. A suite of samples collected in the late summer or early fall should be submitted for a detailed chemical analysis, and the remaining samples should be submitted for a reduced suite. A suggested list of parameters for both the detailed and reduced suites is included as Table II.

Water levels should be measured prior to purging and sampling. The new wells should be purged by removing two well volumes prior to sample collection. Due to the depth to water in the new wells, they should be sampled with either 2m long bailers or a 50mm diameter submersible pump. If a submersible pump is used, dedicated delivery tubes should be left in each well.

We trust this report presents the information you require regarding the three new monitoring wells at the Sechelt Landfill, and our recommendations for sampling these new installations. If you have any questions regarding this report, or require any additional assistance with the regular monitoring program, please contact us.

Yours very truly,

PITEAU ASSOCIATES ENGINEERING LTD.

Andrew T. Holmes, P.Eng.

ATH/ef

Att.

c: Daryl Sinclair, Dayton & Knight Ltd.

TABLES

TABLE I
SUMMARY OF LABORATORY CHEMISTRY DATA
FOR NEW MONITORING WELLS

Parameter	Units/ Symbols	MW-7 Jan 8/1997	MW-8 Jan 8/1997	MW-9 Jan 8/1997	GCDWQ	
					Maximum Acceptable	Objective
Physical Tests						
pH - field		6.69	6.92	6.63		
EC - field	µS/cm	1190	940	3080		
Temp - field	C°	11.9	10.6	10.7		
Colour - field		med. grey/br	lt. grey/br	med. grey/br	-	-
Odour - field		none	none	faint		
pH - Lab		6.82	6.44	6.57	6.5 - 8.5	-
EC - Lab	µS/cm	1420	1150	3740	-	-
Turbidity	NTU	28500	1650	2930	5	-
Dissolved Anions (mg/L)						
Alkalinity	CaCO ₃	576	454	1250	-	-
Chloride	Cl	121.0	112.0	298.0	250	250
Sulphate	SO ₄	5.7	6.7	4.1	500	500
Dissolved Cations (mg/L)						
Calcium	Ca	182	147	329	-	-
Magnesium	Mg	38.0	20.5	43.9	-	-
Potassium	K	12	6	27	-	-
Sodium	Na	75	53	180	-	-
Dissolved Metals (mg/L)						
Arsenic	As	0.0023	0.0009	0.0099	0.025	0.005
Barium	Ba	0.29	0.0500	0.68	1	0.1
Boron	B	<0.1	<0.1	<0.1	5	0.01
Cadmium	Cd	0.0002	0.0017	<0.0002	0.005	0.001
Iron	Fe	0.10	0.07	28.5	0.30	0.050
Lead	Pb	<0.001	<0.001	0.002	0.01	0.001
Manganese	Mn	38.0	20.5	43.9	0.05	0.010
Mercury	Hg	<0.00005	<0.00005	<0.00005	0.001	0.0002
Nutrients (mg/L)						
Nitrate	N	0.0070	0.0160	<0.005	10	0.001
Nitrite	N	0.003	0.009	0.018	1	0.001
Ammonia Nitrogen	N	1.38	0.70	127	-	-
Total Kjeldahl Nitrogen	N	1.84	0.72	132	-	-
Total Phosphate	P	0.197	3.2	6.16	-	-
Pollutant Tests (mg/L)						
Chemical Oxygen Demand	COD	6260	373	809	-	-
Dissolved Organic Carbon	C	29.8	92.6	32.0	-	-

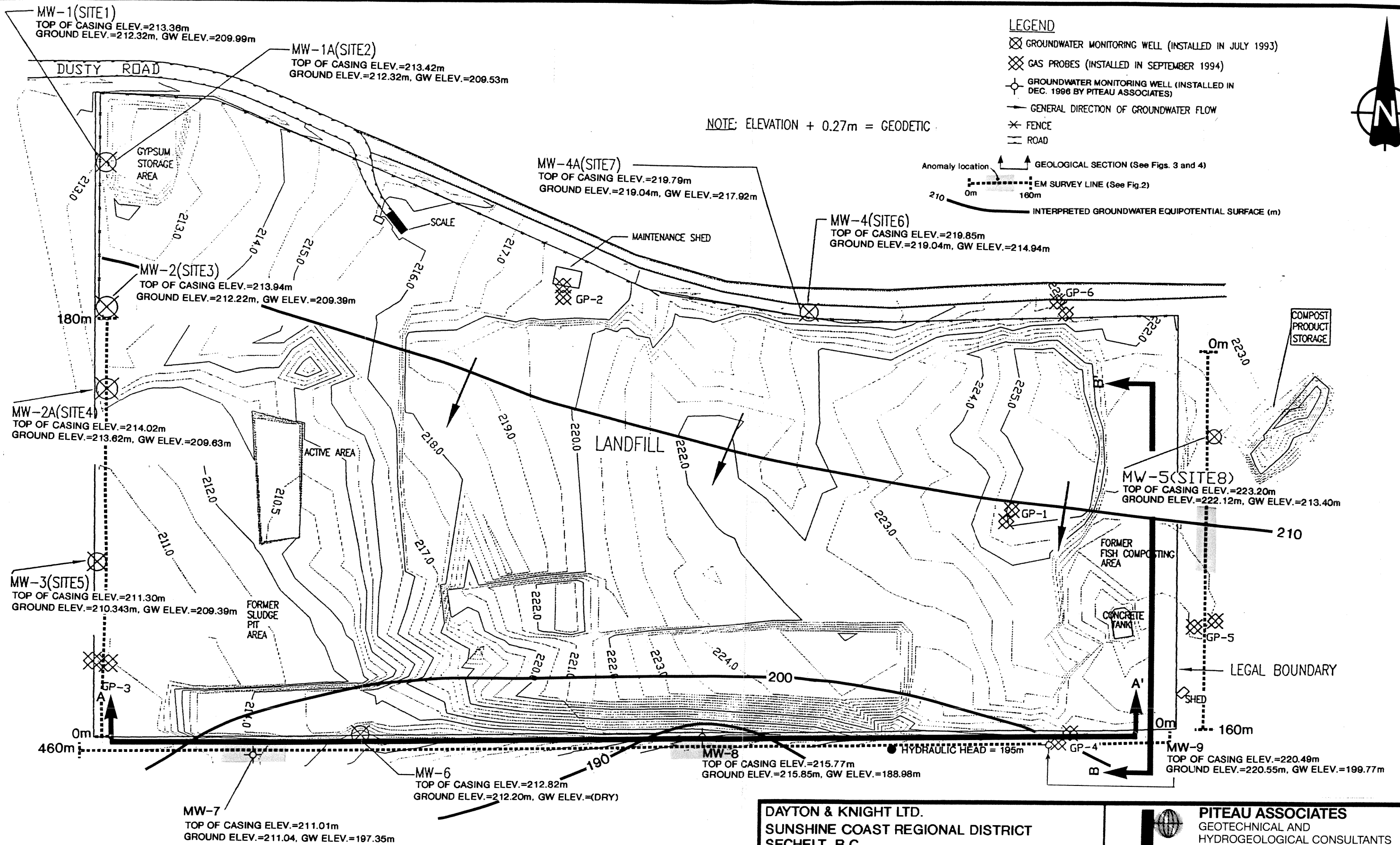
NOTES:

1. < = Less than detection limit
2. GCDWQ = Guidelines for Canadian Drinking Water Quality
3. Bolding indicates those parameters that exceed the GCDWQ criteria, or which are cause for concern.

TABLE II
RECOMMENDED WATER QUALITY ANALYSIS SUITES

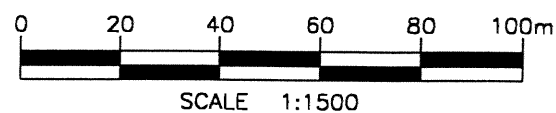
Analytes for detailed suite (Once per year)	Analytes for reduced suite (Three to five times per year)
Physical Tests pH - field EC - field Temp - field Colour - field Odour - field pH - Lab EC - Lab Turbidity	Physical Tests pH - field EC - field Temp - field Colour - field Odour - field pH - Lab EC - Lab Turbidity
Dissolved Anions (mg/L) Alkalinity Chloride Sulphate	Dissolved Anions (mg/L) Chloride Sulphate
Dissolved Cations (mg/L) Calcium Magnesium Potassium Sodium	Nutrients (mg/L) Nitrate Total Kjeldahl Nitrogen
Dissolved Metals (mg/L) Arsenic Barium Boron Cadmium Iron Lead Manganese Mercury	
Nutrients (mg/L) Nitrate Nitrite Ammonia Nitrogen Total Kjeldahl Nitrogen Total Phosphate	
Pollutant Tests (mg/L) Chemical Oxygen Demand Dissolved Organic Carbon	

FIGURES



NOTE:

1. SITE PLAN MODIFIED FROM DAYTON & KNIGHT SITE PLAN
2. GROUNDWATER ELEVATIONS MEASURED ON JAN.8, 1997



DAYTON & KNIGHT LTD.
SUNSHINE COAST REGIONAL DISTRICT
SECHLT, B.C.

MONITORING WELL
CONSTRUCTION PROGRAM
SECHLT LANDFILL

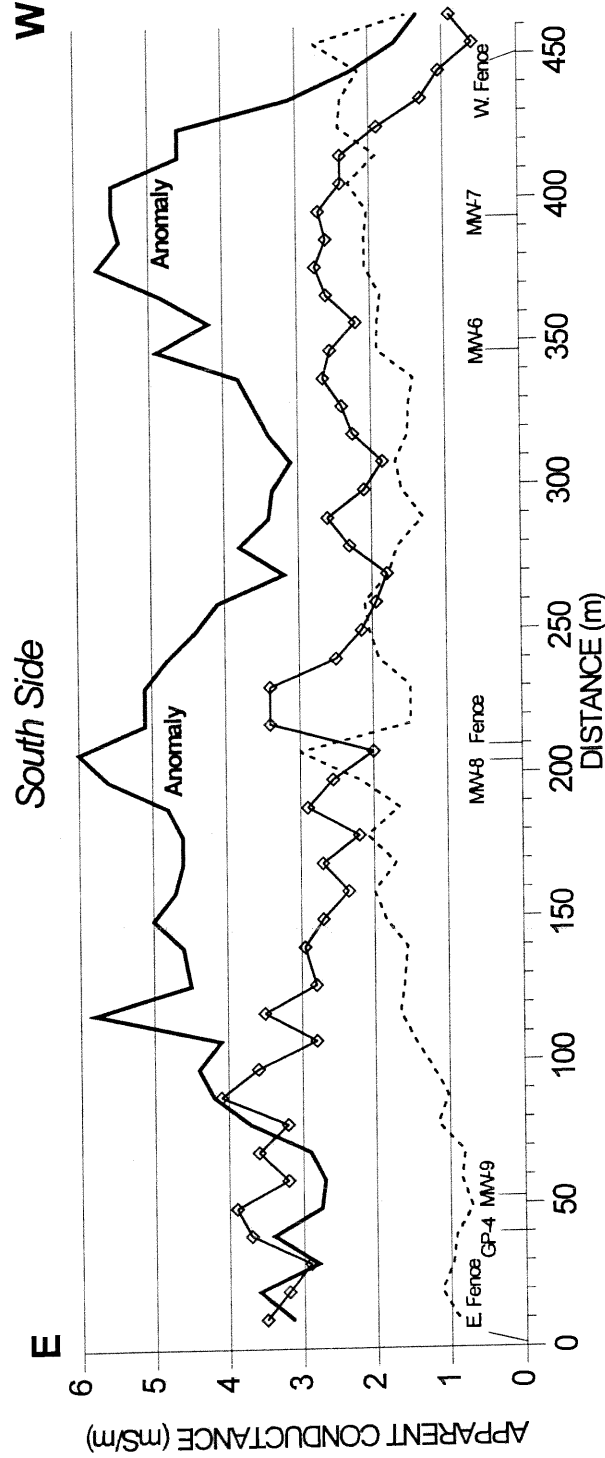
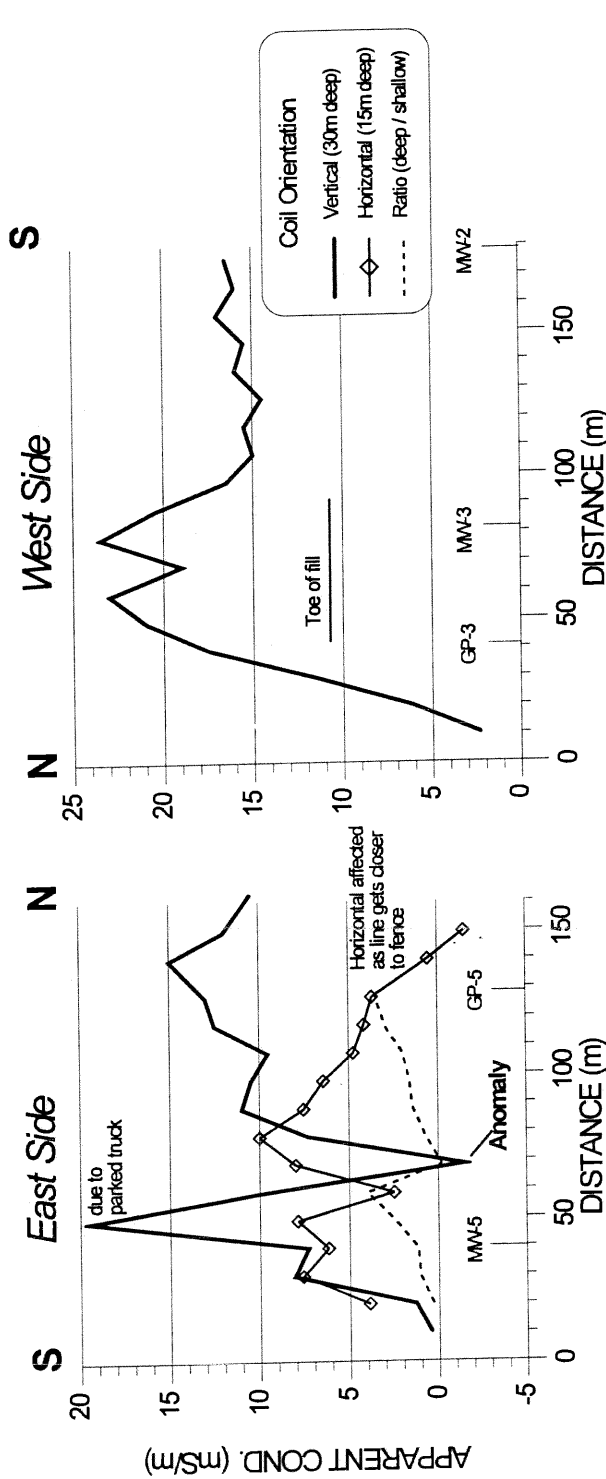


PITEAU ASSOCIATES
GEOTECHNICAL AND
HYDROGEOLOGICAL CONSULTANTS
VANCOUVER CALGARY

SITE PLAN

BY: CRK/CV	DATE: FEB.97
APPROVED: <i>[Signature]</i>	DWG: 1

DWG NUMBER: -----



Note: See Fig. 1 for location of survey lines.

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SUNSHINE COAST REGIONAL DISTRICT
SECHLT, B.C.



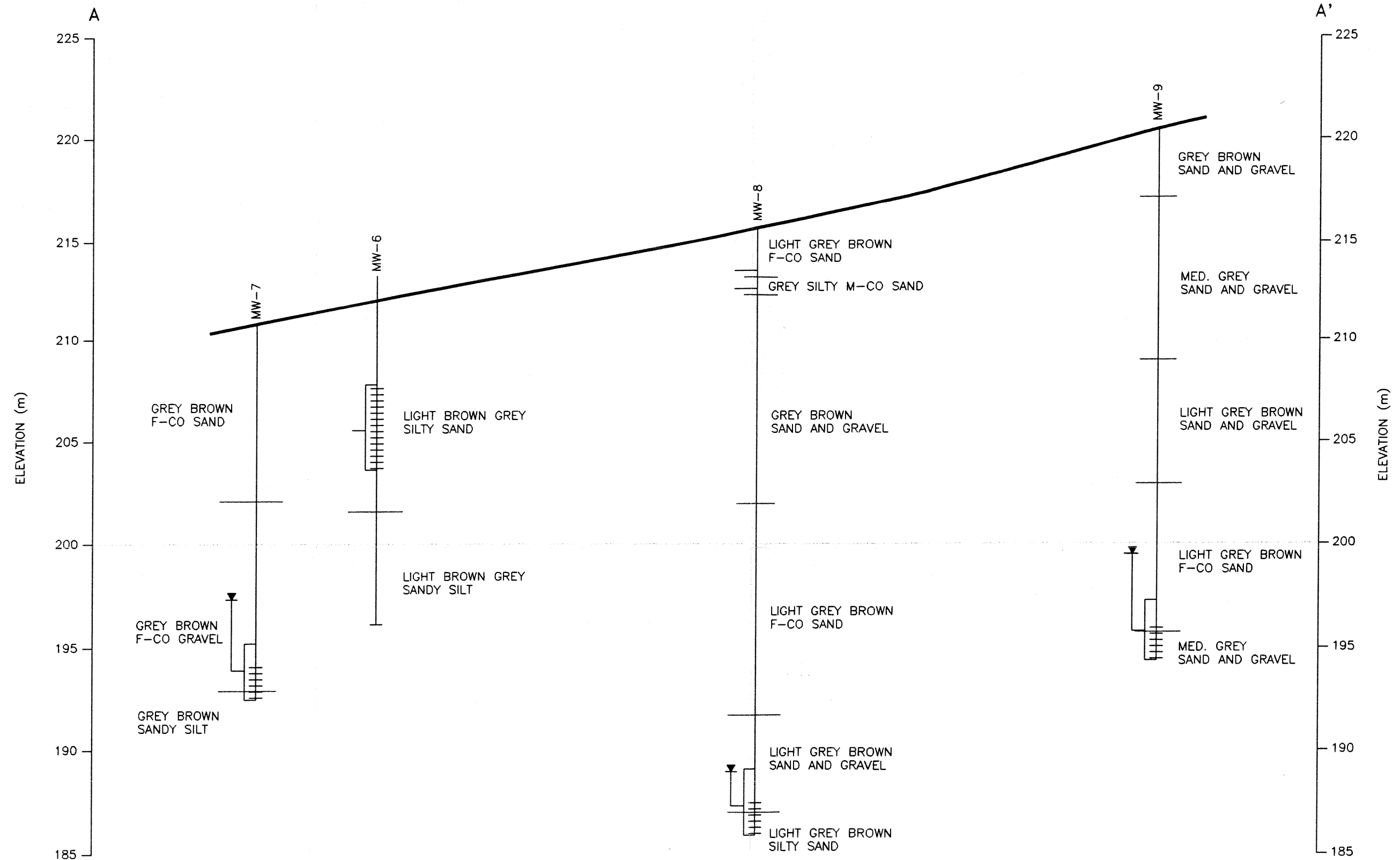
PITEAU ASSOCIATES
GEOTECHNICAL & HYDROGEOLOGICAL CONSULTANTS
VANCOUVER CALGARY

MONITORING WELL
CONSTRUCTION PROGRAM
SECHLT LANDFILL

EM-31 SURVEY RESULTS -
CONDUCTANCE PROFILES
ALONG LANDFILL PERIMETER

BY:
ATH
APPROVED:
[Signature]

DATE:
OCT 96
FIG. **2**



LEGEND

MONITORING WELL WITH
COMPLETION INTERVAL,
AND WATER LEVEL MEASURED
ON JAN. 8 1997

HORIZONTAL SCALE 1:1500
VERTICAL SCALE 1:200
VERTICAL EXAGGERATION = 7.5x
NOTE: WATER LEVELS MEASURED ON JAN. 8 1997

PREPARED SOLELY FOR THE USE OF OUR CLIENT AND NO REPRESENTATION OF ANY KIND IS MADE TO OTHER PARTIES WITH WHICH PITEAU ASSOCIATES ENGINEERING LTD. HAS NOT ENTERED INTO A CONTRACT.

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SUNSHINE COAST REGIONAL DISTRICT
SECHelt, B.C.

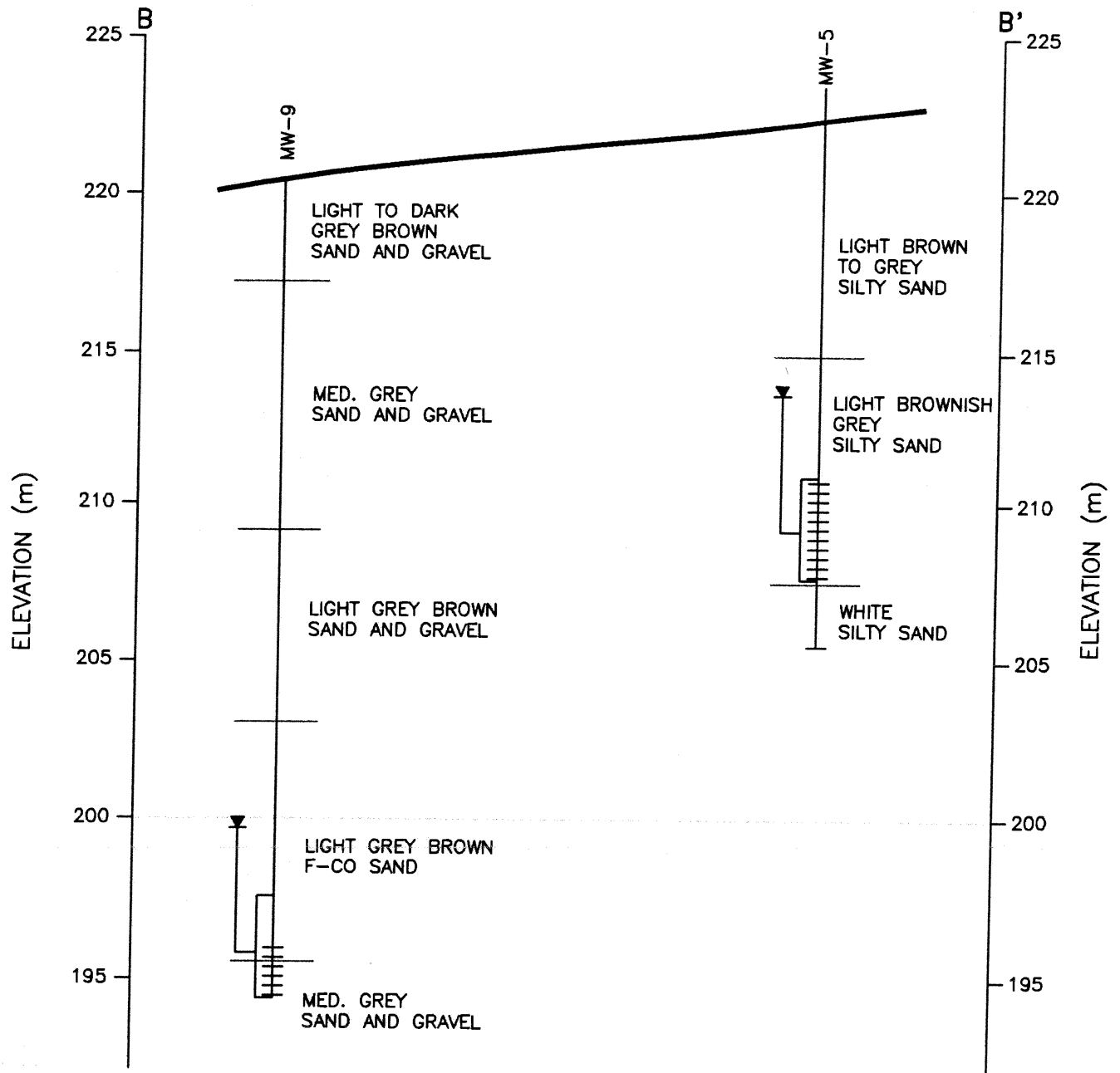
MONITORING WELL
CONSTRUCTION PROGRAM
SECHelt LANDFILL



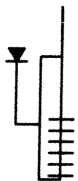
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VANCOUVER CALGARY

SECTION A-A'

BY:	DATE:
CRK/CV	FEB. 97
APPROVED:	FIG:
<i>[Signature]</i>	3



LEGEND



MONITORING WELL WITH
COMPLETION INTERVAL,
AND WATER LEVEL MEASURED
ON JAN. 8 1997

HORIZONTAL SCALE 1:1500
VERTICAL SCALE 1:200
VERTICAL EXAGGERATION = 7.5x

NOTE: WATER LEVELS MEASURED ON JAN. 8 1997

PREPARED SOLELY FOR THE USE OF OUR CLIENT AND NO REPRESENTATION OF ANY KIND IS MADE TO OTHER PARTIES WITH WHICH PITEAU ASSOCIATES ENGINEERING LTD. HAS NOT ENTERED INTO A CONTRACT.

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MONITORING WELL
CONSTRUCTION PROGRAM
SECHLT LANDFILL

SECTION B-B'

BY:	DATE:
CRK/CV	FEB. 97
APPROVED:	FIG:
<i>CH</i>	4

APPENDIX A

WELL LOGS

HYDROGEOLOGIC LOG

PURPOSE OF HOLE: MONITORING WELL

TYPE OF RIG: BECKER HAMMER

DRILLING CONTRACTOR: BECK DRILLING AND ENVIRONMENTAL SERVICES LTD.

DATE DRILLED: DEC. 17, 1996

GROUND ELEVATION (m-asl): 211.04

STEEL CASING STICK UP: FLUSH MOUNTED

BOREHOLE:

MW7

ELEV. TOP OF PVC CASE: 211.01 m-asl

DEPTH TO WATER: 13.66 m-btoc

ELEVATION OF WATER: 197.35 m-asl

Note: Water levels were measured on Jan. 8, 97

Depth (m)	Elev. (m-asl)	DESCRIPTION OF LITHOLOGY ENCOUNTERED	WELL CONSTRUCTION MATERIALS	Well Diagram	Sample depths (m)
0.0	211.04	Ground surface	Flush Mount Well Casing		
1.0		Med. brown to light-med. grey fine to med. SAND, some f-co gravel moist, lightly compacted	Cement Bentonite seal (0.3-0.8m)		
2.0	208.94				
3.0		Light grey brown m-co SAND some m-co gravel and cobbles moist, lightly compacted Boulder @3.0-3.7m	50mm dia. PVC pipe, with threaded joints		
4.0					
5.0	205.84				
6.0		Grey brown f-m SAND, trace to some m-co gravel and cobbles moist, light to med compacted	Backfill with Drill Cuttings (0.8-12.7m)		
7.0	211.04				
8.0		Grey brown f-co gravelly co SAND moist, lightly compacted			
9.0		Grey brown fine to med. SAND, some m-co gravel, moist, lightly compacted large boulder @7.9m			
10.0					
11.0		Grey brown fine sandy m-co GRAVEL trace to some cobbles and boulders trace silt, dry to moist, light to med. compacted			
12.0					
13.0					
14.0	197.34		Bentonite seal (12.7-15.8m)		
15.0		Grey brown f-m SAND and f-co GRAVEL, trace cobbles, moist, med. compacted			
SUNSHINE COAST REGIONAL DISTRICT SECHLT, B.C.			 PITEAU ASSOCIATES GEOTECHNICAL & HYDROGEOLOGICAL CONSULTANTS VANCOUVER CALGARY		
MONITORING WELL CONSTRUCTION PROGRAM SECHLT LANDFILL		WELL LOG OF BOREHOLE MW7		BY: CRK APPROVED: 	DATE: DEC 96 FIG #: A-1

File: 1647\logs\mwells.xls

HYDROGEOLOGIC LOG

PURPOSE OF HOLE: MONITORING WELL

TYPE OF RIG: BECKER HAMMER

DRILLING CONTRACTOR: BECK DRILLING AND ENVIRONMENTAL SERVICES LTD.

DATE DRILLED: DEC. 17-18, 1996

GROUND ELEVATION (m-asl): 215.85

STEEL CASING STICK UP: FLUSH MOUNTED

BOREHOLE:

MW8

ELEV. TOP OF PVC CASE: 215.77 m-asl

DEPTH TO WATER: 26.79 m-btoc

ELEVATION OF WATER: 188.98 m-asl

Note: Water levels were measured on Jan. 8, 97

Depth (m)	Elev. (m-asl)	DESCRIPTION OF LITHOLOGY ENCOUNTERED	WELL CONSTRUCTION MATERIALS	Well Diagram	Sample depths (m)
<u>15.0</u>					
		cont'd 15.5			
<u>16.0</u>	199.75	Light greyish brown m-co SAND, some m-co gravel, moist, lightly compacted 16.1			
<u>17.0</u>					
<u>18.0</u>			50mm dia. PVC pipe, with threaded joints		
<u>19.0</u>		Light greyish brown f-m SAND, tr f-co gravel and cobble, moist, lightly compacted, densely compacted @19.2-20.4m	Backfill with Drill Cuttings (4.5-23.5m)		
<u>20.0</u>					
<u>21.0</u>					
<u>22.0</u>	193.55				
<u>23.0</u>		Light greyish brown, f-m SAND with some silt to f sandy silt, moist, med to densely compacted			
<u>24.0</u>	191.75				23.2
<u>25.0</u>		Light greyish brown f-co gravelly f-co SAND, tr. silt and cobble, moist, light to med. compacted 25.3	Bentonite seal (23.5-26.8m)		
<u>26.0</u>		Light greyish brown f-m SAND and f-co GRAVEL, some cobbles, moist, med to densely compacted			
<u>27.0</u>	188.45				
<u>28.0</u>		Light brownish grey m-co GRAVEL, some m-co sand, moist, med to densely compacted	Sand Filter Pack (26.8-29.9m)		
<u>29.0</u>	186.95		EC(uS/cm)		
		L gr br f-co gr SILT, some m-co sand, wet 29.3	591		
		L gr br m-co SAND, tr. silt, wet, m comp 29.6	768		
<u>30.0</u>		M gr m-co gravelly m-co SAND 29.9	865		
			976		
		END OF HOLE 29.9m	50mm dia. PVC screen (28.3-29.9m)		
SUNSHINE COAST REGIONAL DISTRICT SECHLT, B.C.			 PITEAU ASSOCIATES GEOTECHNICAL & HYDROGEOLOGICAL CONSULTANTS VANCOUVER CALGARY		
MONITORING WELL CONSTRUCTION PROGRAM SECHLT LANDFILL			WELL LOG OF BOREHOLE MW8 (Cont'd)		BY: CRK DATE: DEC 96 APPROVED:  FIG #: A-2

File: 1647\logs\mwells.xls

HYDROGEOLOGIC LOG

PURPOSE OF HOLE: MONITORING WELL

TYPE OF RIG: BECKER HAMMER

DRILLING CONTRACTOR: BECK DRILLING AND ENVIRONMENTAL SERVICES LTD.

DATE DRILLED: DEC. 18, 1996

GROUND ELEVATION (m-asl): 220.55

STEEL CASING STICK UP: FLUSH MOUNTED

BOREHOLE:

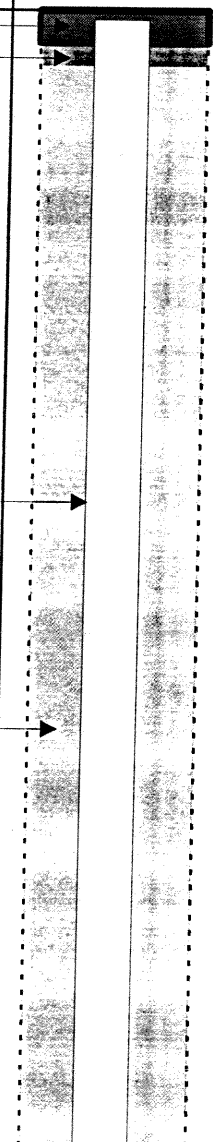
MW9

ELEV. TOP OF PVC CASE: 220.49 m-asl

DEPTH TO WATER: 20.72 m-btoc

ELEVATION OF WATER: 199.77 m-asl

Note: Water levels were measured on Jan. 8, 97

Depth (m)	Elev. (m-asl)	DESCRIPTION OF LITHOLOGY ENCOUNTERED	WELL CONSTRUCTION MATERIALS	Well Diagram	Sample depths (m)
0.0	220.55	Ground surface	Flush Mount Well Casing		
1.0		Med. to dark brown f-co GRAVEL, some co sand, tr silt and cobble, damp, light to med compacted 0.9	Cement Bentonite seal (0.3-0.5m)		
2.0		Light grey brown to med grey, m-co SAND and f-co GRAVEL, tr cobble and silt, moist, med to densely compacted			
3.0	217.15	boulder @1.2m 3.4			
4.0					
5.0		Med grey m-co SAND, m-co gravelly to some f-co gravel, trace f sand, silt, and cobble, moist, med to densely compacted			
6.0					
7.0	220.55	7.0	50mm dia. PVC pipe, with threaded joints		6.1
8.0		Med. grey, m-co GRAVEL, some m-co sand, tr cobble and silt, moist, light to med compacted 8.2			
9.0	212.35	Med grey to light grey brown, m-co SAND, m-co gravelly to some m-co gravel, tr to some silt, tr cobble, med compacted 9.5			
10.0		Med grey f-m GRAVEL, some silty f-co sand, trco gravel, moist, light to med compacted 11.3	Backfill with Drill Cuttings (0.5-19.7m)		
11.0	209.25	11.9			
12.0		Grey to brown f-m SAND, some f-m gravel tr silt, moist, med compacted 11.9			
13.0		M grey f-m GRAV, some co grav + cobble, some silty m-co sand, moist, med comp 12.5			
14.0		Light grey brown m-co SAND and f-m GRAVEL, some co grav and cobble tr silt, moist, lightly compacted 14.3			11.6
15.0	206.25	14.9			
	205.65	L grey brown f-m SAND + m-co GRAVEL 14.9			
SUNSHINE COAST REGIONAL DISTRICT SECHLT, B.C.			 PITEAU ASSOCIATES GEOTECHNICAL & HYDROGEOLOGICAL CONSULTANTS VANCOUVER CALGARY		
MONITORING WELL CONSTRUCTION PROGRAM SECHLT LANDFILL			WELL LOG OF BOREHOLE MW9		BY: CRK DATE: DEC 96 APPROVED:  FIG #: A-3

File: 1647\logs\mwells.xls

HYDROGEOLOGIC LOG

PURPOSE OF HOLE: MONITORING WELL

TYPE OF RIG: BECKER HAMMER

DRILLING CONTRACTOR: BECK DRILLING AND ENVIRONMENTAL SERVICES LTD.

DATE DRILLED: DEC. 18, 1996

GROUND ELEVATION (m-asl): 220.55

STEEL CASING STICK UP: FLUSH MOUNTED

BOREHOLE:

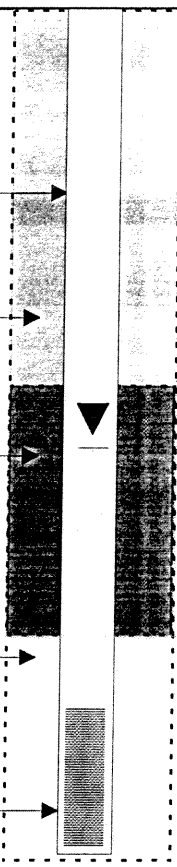
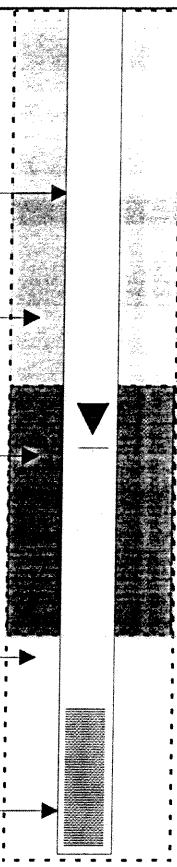
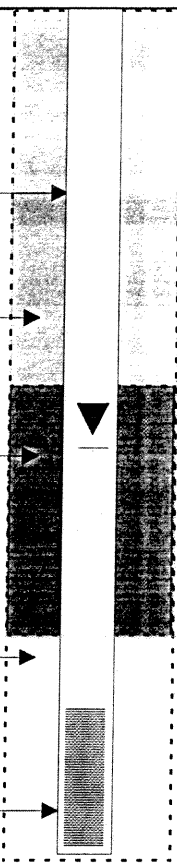
MW9

ELEV. TOP OF PVC CASE: 220.49 m-asl

DEPTH TO WATER: 20.72 m-btoc

ELEVATION OF WATER: 199.77 m-asl

Note: Water levels were measured on Jan. 8, 97

Depth (m)	Elev. (m- asl)	DESCRIPTION OF LITHOLOGY ENCOUNTERED	WELL CONSTRUCTION MATERIALS	Well Diagram	Sample depths (m)
<u>15.0</u>					
<u>16.0</u>	204.35	Light grey brown f-m SAND, tr to some f-co gravel and cobble, moist, light to med compacted 16.2	50mm dia. PVC pipe, with threaded joints		17.1
<u>17.0</u>	203.15	Light grey brown m-co GRAVEL, some f-m sand, tr cobble, moist, lightly compacted 17.4			
<u>18.0</u>	201.95	Light grey brown, f-co SAND, tr f-co grav, moist, lightly compacted 18.6			
<u>19.0</u>		L gr br f-m gravelly m-co SAND, moist, lightly compacted 19.2			
<u>20.0</u>		Light grey brown, f-co SAND, some f-co gravel, tr cobble, moist, lightly compacted			
<u>21.0</u>	220.55		Bentonite seal (19.7-23.2m)		22.6
<u>22.0</u>	198.25	Light grey brown f-m SAND, moist, lightly compacted 22.3			
<u>23.0</u>		Med grey f SAND, some silt, damp, med compacted 23.5			
<u>24.0</u>		Light grey brown, f-m SAND, some f-co gravel, moist to wet, light to med compacted			
<u>25.0</u>	195.85	Med grey, f gravelly m-co SAND to m-co sandy f-co GRAVEL, tr silt and cobble, wet, light to med compacted 24.7			
<u>26.0</u>	220.55		EC(mS/cm) 2.76 2.94 2.89 2.96 2.99		26.0
<u>27.0</u>			50mm dia. PVC screen (24.5-26.0m)		
<u>28.0</u>		END OF HOLE 26.0m			
<u>29.0</u>					
<u>30.0</u>					

SUNSHINE COAST REGIONAL DISTRICT
SECHELT, B.C.**PITEAU ASSOCIATES**

GEOTECHNICAL & HYDROGEOLOGICAL CONSULTANTS

VANCOUVER CALGARY

MONITORING WELL
CONSTRUCTION PROGRAM
SECHELT LANDFILLWELL LOG OF
BOREHOLE MW9 (Cont'd)

BY: CRK	DATE: DEC 96
APPROVED: 	FIG #: A-3

File: 1647\logs\mwells.xls

APPENDIX B

CHEMICAL ANALYSIS RESULTS



CHEMICAL ANALYSIS REPORT

Date: January 29, 1997

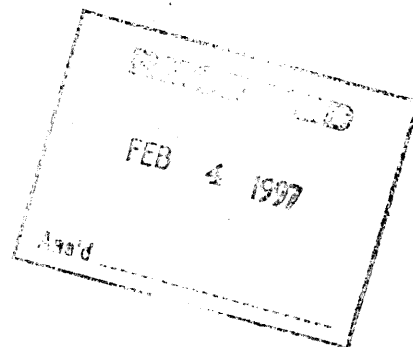
ASL File No. G8356

Report On: 1647 Water Analysis

Report To: **Piteau Assoc. Engineering Ltd.**
215 - 260 West Esplanade
North Vancouver, BC
V7M 3G7

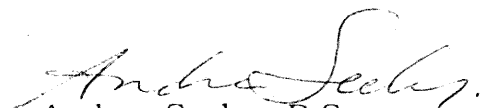
Attention: **Mr. Andy Holmes**

Received: January 9, 1997



ASL ANALYTICAL SERVICE LABORATORIES LTD.

per:


Andrea Seeley, B.Sc.
Project Chemist


Joyce Chow, B.Sc.
Project Chemist

**RESULTS OF ANALYSIS - Water**

File No. G8356

		MW7	MW8	MW9
		97 01 08 14:00	97 01 08 12:05	97 01 08 13:15
<u>Physical Tests</u>				
Conductivity	(umhos/cm)	1420	1150	3740
pH		6.82	6.44	6.57
Turbidity	(NTU)	28500	1650	2930
<u>Dissolved Anions</u>				
Alkalinity-Total	CaCO3	576	454	1250
Chloride	Cl	121	112	298
Sulphate	SO4	26	3	<1
<u>Nutrients</u>				
Ammonia Nitrogen	N	1.38	0.699	127
Total Kjeldahl Nitrogen	N	1.84	0.72	132
Nitrate Nitrogen	N	0.007	0.016	<0.005
Nitrite Nitrogen	N	0.003	0.009	0.018
Total Phosphate	P	0.197	3.20	6.16
<u>Dissolved Metals</u>				
Arsenic	D-As	0.0023	0.0009	0.0099
Barium	D-Ba	0.29	0.05	0.68
Boron	D-B	<0.1	<0.1	<0.1
Cadmium	D-Cd	0.0002	0.0017	<0.0002
Calcium	D-Ca	182	147	329
Iron	D-Fe	0.10	0.07	28.5
Lead	D-Pb	<0.001	<0.001	<0.001
Magnesium	D-Mg	38.0	20.5	43.9
Manganese	D-Mn	4.61	10.3	15.5
Mercury	D-Hg	<0.00005	<0.00005	<0.00005
Potassium	D-K	12	6	27
Sodium	D-Na	75	53	180
<u>Organic Parameters</u>				
Chemical Oxygen Demand	COD	6260	373	809
Dissolved Organic Carbon	C	29.8	92.6	32.0

Results are expressed as milligrams per litre except for pH,
Conductivity (umhos/cm), and Turbidity (NTU).
< = Less than the detection limit indicated.



METHODOLOGY

File No. G8356

Outlines of the methodologies utilized for the analysis of the samples submitted are as follows:

Conventional Parameters in Water

These analyses are carried out in accordance with procedures described in "Methods for Chemical Analysis of Water and Wastes" (USEPA), "Manual for the Chemical Analysis of Water, Wastewaters, Sediments and Biological Tissues" (BCMOE), and/or "Standard Methods for the Examination of Water and Wastewater" (APHA). Further details are available on request.

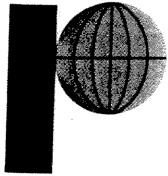
Metals in Water

This analysis is carried out in accordance with procedures described in "Standard Methods for the Examination of Water and Wastewater" 19th Edition 1995 published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion or filtration (EPA Method 3005), followed by instrumental analysis by atomic absorption spectrophotometry (EPA Method 7000), inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010), and/or inductively coupled plasma - mass spectrometry (EPA Method 6020).

Mercury in Water

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" 19th Edition 1995 published by the American Public Health Association. A cold-oxidation procedure involving bromine monochloride is used, followed by instrumental analysis by cold-vapour atomic absorption spectrophotometry (CVAAS).

End of Report



PITEAU ASSOCIATES

GEOTECHNICAL AND
HYDROGEOLOGICAL CONSULTANTS

215 - 260 WEST ESPLANADE
NORTH VANCOUVER, B.C.
CANADA V7M 3G7
TELEPHONE (604) 986-8551
FAX (604) 985-7286

Our file: 2077

December 30, 1999

Sunshine Coast Regional District
5477 Warf Road
Sechelt, B.C.
V0N 3A0

Attention: Ms. Cathy Kenny
Solid Waste Management Co-ordinator

Dear Sirs:

Re: Replacement of Three Monitoring Wells
Sechelt Landfill, Sunshine Coast Regional District

The Sunshine Coast Regional District (SCRD) operates the Sechelt Landfill, located about 6.5 km northeast of Sechelt (Fig. 1). Three monitoring wells installed on the south side of the landfill were recently destroyed and required replacement. Piteau Associates Engineering Ltd. (Piteau) has expedited and supervised the construction of the three new replacement monitoring wells. The scope of our services for this project included:

- Review of previous well logs, water levels and chemistry to determine the required depth and preferred location of the wells on the southern landfill boundary;
- Coordinating the monitoring well drilling contractor;
- Supervision of well construction program;
- Well development and initial sampling; and
- Preparation of well logs and well completion report.

A description of the work performed and results of the drilling and sampling program are presented herein.

MONITORING WELL DRILLING AND INSTALLATION

The monitoring well drilling and installation program was conducted between November 29 and December 1, 1999 by Beck Drilling and Environmental Services Ltd. The three wells were installed using a Becker Hammer drilling rig. All wells were drilled and cased with 102mm (4 inch) I.D. double wall steel casing. Well locations are shown on Fig. 1.

Work was supervised by Mr. Matt Pye of Piteau. While on site, Mr. Pye sited well locations with the assistance of Ms. Kathy Kenny from the SCRD, logged drill cuttings, and kept records of



Sunshine Coast Regional District
Attention: Ms. Cathy Kenny
Solid Waste Management Co-ordinator

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drilling progress and monitoring well construction details. Hydrogeological logs and well completion details are shown in Appendix A.

All three wells are located along the southern toe of the landfill footprint, within about 3 to 5m of the property line (Fig. 2). A loader was used to remove a portion of the landfill toe at each well location, to provide access for the drill rig to collar the wells off the north side of the perimeter access road.

Monitoring Well MW99-7

Monitoring Well MW99-7 was drilled approximately 68m from the western landfill property line. Drilling encountered the following lithologic profile:

0 to 1.8m	WASTE and FILL materials
1.8 to 8.2m	moist, medium to coarse SAND, some gravel to sand and gravel, trace silt and boulders
8.2 to 10.1m	moist, medium to coarse SAND and GRAVEL, trace silt
10.1 to 13.0m	dry, fine to medium SAND, some gravel, trace to some silt and boulders
13.0 to 14.6	moist, fine to medium SAND, some silt to silty, some gravel and trace boulders
14.6 to 18.6m	moist, well-graded, SAND, some gravel, trace to some silt; a large boulder was encountered from 16.5 to 17.0m
18.6 to 19.2m	wet sandy SILT, trace clay
19.2 to 19.5m	dry, dense, bouldery TILL

Monitoring Well MW99-8

Monitoring Well MW99-8 was located roughly in the middle of the southern property line, approximately 257m from the western landfill property line (Fig. 2). Drilling encountered the following:

0 to 1.2m	WASTE and FILL materials
1.2 to 11.3m	moist to wet, medium to coarse SAND to SAND and GRAVEL, trace silt
11.3 to 14.0m	dry, well graded SAND to SAND and GRAVEL, occasional boulders
14.0 to 20.4m	moist to dry, fine to coarse SAND, some gravel
20.4 to 21.6m	wet, fine to medium silty SAND
21.6 to 22.3m	dense TILL
22.3 to 29.0m	moist becoming wet, medium to coarse SAND to well graded SAND and GRAVEL, trace silt; saturated below 28.0m.



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Solid Waste Management Co-ordinator

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Monitoring Well MW99-9

Monitoring Well MW99-9 was located near the southeast corner of the property, approximately 400m from the western landfill property line (Fig. 2). Sediments encountered during drilling consisted of the following:

0 to 1.8m	WASTE and FILL materials
1.8 to 7.0m	moist to wet, medium to coarse SAND and GRAVEL, some boulders
7.0 to 10.4m	wet, gravelly SAND
10.4 to 15.9m	slightly moist, well graded SAND and GRAVEL, trace to some silt and boulders
15.9 to 20.4m	moist, fine to coarse SAND, some gravel
20.4 to 22.0m	dry, fine to medium SAND and GRAVEL, trace to some silt, boulders
22.0 to 25.9m	wet, medium to coarse gravelly SAND, trace silt

All well screens were set over the bottom 1.52m (5 ft) of the drilled holes. A sand filter pack was placed around the screens from the bottom of the hole to 3 to 3.5m above the top of the screens. A bentonite seal, ranging from 4.2 to 4.5m thick, was then placed above the sand pack. The holes were then backfilled with drill cuttings to just below grade, where a second bentonite seal was placed from 0.9 to 0.3m depth. A 1.5m steel surface casing was set in the bentonite from about 0.6 to 0.3m depth followed by concrete to ground surface. The wells were left with an approximate stick-up of 0.9m. Details of the well completions are shown graphically on the well logs (Appendix A).

The wet sediments encountered during the drilling of Monitoring Well MW99-7 did not produce any water and the piezometer was dry two days after it had been installed. Therefore, an attempt was made to drill a deeper well approximately 2m away. This second attempt encountered a similar dense bouldery till at about 18.3m depth. The Becker Hammer met refusal at this depth, as it was only able to penetrate 0.15m after 40 minutes of drilling at 90 blows/minute. A second piezometer was not installed at this location since the first hole reached a greater depth and would be more likely to intercept groundwater during peak water table conditions.

WELL DEVELOPMENT AND SAMPLING

Monitoring Well MW99-7 was dry at the time of the drilling program but it will possibly contain water in the late winter, following the winter precipitation.

Monitoring wells MW99-8 and MW99-9 were developed and sampled on December 1, 1999. The purge volume required to develop the wells was calculated as seven well volumes, based on water level measurements taken that day. However, it will only be necessary to purge three standing water columns during subsequent sampling of these wells.



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Water was withdrawn using Waterra foot valves on high density polyethylene tubing. These foot valves are operated simply by moving the tubing up and down inside the piezometer pipe. Once purging was complete, the appropriate sample containers were filled. The dissolved metals samples were filtered in the field and preserved with nitric acid. The COD, ammonia and organic carbon sample was preserved with hydrochloric acid. Disposable latex gloves were used during the sampling procedure.

Samples were placed in a cooler with ice, and were delivered to Analytical Services Laboratories Ltd. of Vancouver on December 2, 1999.

INTERPRETED GROUNDWATER FLOW REGIME

The basal groundwater flow regime (i.e. flow along the bedrock surface) beneath the site is interpreted to flow in a south to southwesterly direction (Fig. 1). Perched flows appear to be present on layers of low permeability sediments above the basal flow regime (Figs. 3 and 4), but over significant distances, these flows would eventually percolate down to the deeper sediments.

A test well, drilled at the approximate location shown on Fig. 1, encountered bedrock at about 120m elevation, with no indication of a water table (Piteau Associates Engineering Ltd., 1999). This information suggests that the groundwater will concentrate along low points in the bedrock surface and flow in the direction of the bedrock surface gradient. Bedrock will therefore control the flow direction. The possible range of flow directions is indicated on Fig. 1.

Most of the monitoring wells surrounding the Sechelt Landfill appear to encounter perched water tables. Deeper wells typically encounter deeper water tables, indicative of a strong downward hydraulic gradient. Leachate seeping from the landfill is therefore interpreted to migrate vertically through the layered sediments beneath the site, with some minor lateral flow to the west or south on the lower permeability layers. Ultimately, the leachate will seep to the basal sediment layer, and then flow in a southerly direction towards Chapman Creek, or in a westerly direction towards Trail Bay, or possibly to the head of Porpoise Bay.

There appears to be a relatively continuous perched flow regime at about elevation 210m, which displays a gradient towards the west-southwest (see posted heads on Fig. 2). This flow is interpreted to seep to depth as it moves away from the landfill, and should eventually reach the basal flow regime perched on the bedrock surface.

A water depth of 8.0m was measured in the shallow piezometer MW-6, located about 40m east of MW99-7, on November 30, 1999. Wet sediments were also seen in monitoring wells MW99-8 and MW99-9 at depths between 5 and 10m. These observations indicate the presence of some

* Piteau Associates Engineering Ltd., 1999. Letter to Mr. Apris Berzins at Dayton & Knight Ltd., regarding Sunshine Coast Aquifer Protection Plan, Monitoring Well Update, Jan. 19, 8p.



Sunshine Coast Regional District
Attention: Ms. Cathy Kenny
Solid Waste Management Co-ordinator

-5- December 30, 1999

shallow perched groundwater flow south of the landfill, but as noted above, this shallow groundwater is expected to seep to depth within a relatively short distance of the landfill.

SAMPLING RESULTS

There have been two suites of chemical analyses performed on samples collected from deep monitoring wells installed south of the landfill. The first suite was performed on samples collected from the three destroyed wells, MW-7, MW-8 and MW-9, on January 8, 1997 (Table I). The second suite of samples was collected on December 1, 1999 from the replacement wells constructed as a part of this study (Table II). The general characteristics of the samples collected in 1999 are similar to those collected 1997, but the concentrations of most parameters are slightly lower. This may indicate that the first seasonal flush, which likely conveys the largest leachate component, had not yet reached the depth of the wells at the time of the 1999 sampling event.

The results of the two sampling suites indicate that groundwater beneath the south landfill perimeter has been significantly impacted by leachate. COD, manganese, EC and chloride concentrations are elevated in all samples collected from the three wells. Manganese concentrations exceed the aesthetic drinking water objective (AO) of 0.05 mg/L (Health & Welfare, 1996) in all samples collected to date, and chloride concentration exceeded the AO of 250 mg/L in the 1997 sample from MW-9.

The total nitrogen concentrations levels are low (<2 mg/L) in samples collected from MW-7, MW-8 and MW99-8. However, ammonia concentrations were very high in the sample collected from MW-9, and were elevated in the sample collected from MW99-9. The high ammonia and low nitrate concentrations indicate that very little nitrification is occurring in the unsaturated zone beneath the east end of the landfill, suggesting a fairly rapid infiltration rate to the water table. Conditions may be more favourable for subsurface renovation of leachate beneath the western portions of the landfill, as the sampling results indicate that water quality is generally better in MW-7, MW-8 and MW99-8 (west end of the landfill) than in MW-9 and MW99-9 (east end of the landfill). The differences in water quality may also be the result of waste partitioning within the landfill. If different types of waste have been placed in separate zones, then the resulting leachate generated from the separate zones will have different properties. Monitoring well chemistry data will reflect the leachate generated upgradient of the well locations.

RECOMMENDATIONS

Water level measurements and water quality sampling should continue on a bi-monthly or quarterly schedule, to properly define the leachate impact and groundwater flow regime on the south side of the landfill. Two suites of samples, collected in the late summer or early fall and again in mid winter, should be submitted for a detailed chemical analysis, and the remaining



Sunshine Coast Regional District
Attention: Ms. Cathy Kenny
Solid Waste Management Co-ordinator

-6- December 30, 1999

samples should be submitted for a reduced suite. A suggested list of parameters for both the detailed and reduced suites are included as Table III.

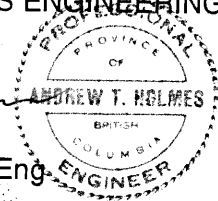
Water levels should be measured prior to purging and sampling. The new wells should be purged by removing three well volumes prior to sample collection. A Waterra foot valve on high density polyethylene tubing has been dedicated to each of the wells for use during sampling.

We trust this report presents the information you require regarding the recent construction of the three new monitoring wells at the Sechelt Landfill, and recommendations for sampling. If you have any further questions regarding this report, or require any additional assistance with the regular monitoring program, please contact us.

Yours truly,

PITEAU ASSOCIATES ENGINEERING LTD.

Andrew T. Holmes, P.Eng.



Matthew D. Pye, E.I.T.

MDP/bms

Att.

TABLES

TABLE I
SUMMARY OF LABORATORY CHEMISTRY DATA
FOR DESTROYED AND REPLACEMENT MONITORING WELLS

Parameter	Units/ Symbols	MW-7 8-Jan-97	MW-8 8-Jan-97	MW99-8 1-Dec-99	MW-9 8-Jan-97	MW99-9 1-Dec-99	GCDWQ	
							Maximum Acceptable	Objective
Physical Tests								
pH-Field	uS/cm °C	6.69	6.92		6.63		6.5-8.5	-
EC-Field		1190	940		3080		-	-
Temp-Field		11.9	10.6		10.7		-	-
Colour-Field		m grey/br	lt grey/br		m grey/br		-	-
Odour-Field		none	none		faint		-	-
pH-Lab	umhos/cm	6.82	6.44	7.52	6.57	7.48	6.5-8.5	-
EC-Lab		1420	1150	1240	3740	2040	-	-
Turbidity		NTU	28500	1650	9300	2930	1780	5
Dissolved Anions (mg/L)								
Alkalinity	CaCO ₃	576	454	598	1250	1030	-	-
Chloride	Cl	121	112	94.2	298	151	250	250
Sulphate	SO ₄	5.7	6.7	7	4.1	2	500	500
Dissolved Cations (mg/L)								
Calcium	Ca	182	147	140	329	232	-	-
Magnesium	Mg	38.0	20.5	22.0	43.9	32.8	-	-
Potassium	K	12	6	8	27	14	-	-
Sodium	Na	75	53	90	180	150	-	-
Dissolved Metals (mg/L)								
Arsenic	As	0.0023	0.0009	0.0003	0.0099	0.0067	0.025	0.005
Barium	Ba	0.29	0.05	0.05	0.68	0.15	1	0.1
Boron	Ba	<0.1	<0.1	0.2	<0.1	<0.1	5	0.01
Cadmium	Cd	0.0002	0.0017	0.0003	<0.0002	<0.0002	0.005	0.001
Iron	Fe	0.10	0.07	<0.03	28.5	<0.03	0.3	0.05
Lead	Pb	<0.001	<0.001	<0.001	0.002	<0.001	0.01	0.001
Manganese	Mn	38.0	20.5	6.78	43.9	7.94	0.05	0.01
Mercury	Hg	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	0.001	0.0002
Nutrients (mg/L)								
Nitrate	N	0.0070	0.0160	<0.005	<0.005	0.0090	10	0.001
Nitrite	N	0.003	0.009	0.005	0.018	0.005	1	0.001
Ammonia Nitrogen	N	1.38	0.70	0.34	127	17.4	-	-
Total Kjeldahl Nitrogen	N	1.84	0.72	1.17	132	17.4	-	-
Total Phosphate	P	0.197	3.2	7.88	6.16	1.96	-	-
Pollutant Tests (mg/L)								
Chemical Oxygen Demand	COD	6260	373	100	809	112	-	-
Dissolved Organic Carbon	C	29.8	92.6	9.7	32.0	24.7	-	-

NOTES:

1. < = Less than detection limit
2. GCDWQ = Guideline for Canadian Drinking Water Quality
3. Bolding indicates those parameters that exceed GCDWQ criteria, or which are cause for concern.

TABLE II
RECOMMENDED WATER QUALITY ANALYSIS SUITES

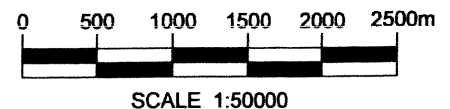
Analytes for detailed suite (Twice per year)	Analytes for reduced suite (Two to four times per year)
Physical Tests pH-Field EC-Field Temp-Field Colour-Field Odour-Field pH-Lab EC-Lab Turbidity	Physical Tests pH-Field EC-Field Temp-Field Colour-Field Odour-Field pH-Lab EC-Lab Turbidity
Dissolved Anions (mg/L) Alkalinity Chloride Sulphate	Dissolved Anions (mg/L) Chloride
Dissolved Cations (mg/L) Calcium Magnesium Potassium Sodium	Nutrients (mg/L) Nitrate Ammonia
Dissolved Metals (mg/L) Arsenic Barium Boron Cadmium Iron Lead Manganese Mercury	
Nutrients (mg/L) Nitrate Nitrite Ammonia Nitrogen Total Kjeldahl Nitrogen Total Phosphate	
Pollutant Tests (mg/L) Chemical Oxygen Demand Dissolved Organic Carbon	

FIGURES



SYMBOLS

-  INTERPRETED RANGE FOR GROUNDWATER FLOW DIRECTION
-  1998 TEST WELL LOCATION (PITEAU, 1999)



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SUNSHINE COAST REGIONAL DISTRICT



PITEAU ASSOCIATES
GEOTECHNICAL AND HYDROGEOLOGICAL CONSULTANTS
VANCOUVER CALGARY

MONITORING WELL
CONSTRUCTION PROGRAM
SECHULT LANDFILL
SECHULT, B.C.

LANDFILL LOCATION PLAN

BY:	DATE:
ATH/cz	DEC. 99
APPROVED:	FIG:
	1

MW-1(SITE1)
TOP OF CASING ELEV.=213.36m
GROUND ELEV.=212.32m, GW ELEV.=210.22m

MW-1A(SITE2)
TOP OF CASING ELEV.=213.42m
GROUND ELEV.=212.32m, GW ELEV.=209.39m

MW-4A(SITE7)
TOP OF CASING ELEV.=219.79m
GROUND ELEV.=219.04m, GW ELEV.=217.12m

GW ELEV.=213.46m
GW ELEV.=188.98m

MW-4(SITE6)
TOP OF CASING ELEV.=219.85m
GROUND ELEV.=219.04m, GW ELEV.=213.46m

MW-2(SITE3)
TOP OF CASING ELEV.=213.94m
GROUND ELEV.=212.22m, GW ELEV.=208.71m

MW-2A(SITE4)
TOP OF CASING ELEV.=214.02m
GROUND ELEV.=213.62m, GW ELEV.=208.71m

MW-3(SITE5)
TOP OF CASING ELEV.=211.30m
GROUND ELEV.=210.343m, GW ELEV.=208.83m

MW99-7
TOP OF CASING ELEV.=212.33m
GROUND ELEV.=211.5m, GW ELEV.=192.33m

MW-6
TOP OF CASING ELEV.=212.82m
GROUND ELEV.=212.20m, GW ELEV.=204.20m (TRANSIENT PERCHED WATERTABLE)

MW99-8
TOP OF CASING ELEV.=216.93m
GROUND ELEV.=216.0m, GW ELEV.=188.53m

MW-8
TOP OF CASING ELEV.=215.77m
GROUND ELEV.=215.85m, GW ELEV.=188.98m

MW-7
TOP OF CASING ELEV.=211.01m
GROUND ELEV.=211.04m, GW ELEV.=197.35m

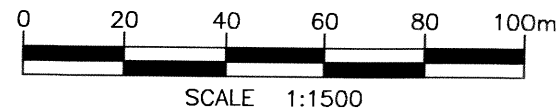
LEGEND

- ⊕ GROUNDWATER MONITORING WELL (INSTALLED IN JUL. 1993)
- ⊕ GAS PROBES (INSTALLED IN SEP. 1994)
- ⊕ GROUNDWATER MONITORING WELL (INSTALLED IN DEC. 1996 AND NOV. 1999 BY PITEAU ASSOCIATES)
- PERCHED WATERTABLE CONTOUR
- DEEP WATERTABLE CONTOUR
- ELEVATION OF PERCHED WATERTABLE
- ELEVATION OF DEEP WATERTABLE
- GENERAL DIRECTION OF GROUNDWATER FLOW
- × FENCE
- ROAD
- ↑ GEOLOGICAL SECTION (SEE FIGS. 3 AND 4)



LANDFILL

NOTE: ELEVATION + 0.27m = GEODETIC



- NOTES:
1. SITE PLAN MODIFIED FROM DAYTON & KNIGHT SITE PLAN.
 2. GROUNDWATER ELEVATIONS MEASURED ON JAN. 8, 1997, AND DEC. 1, 1999.

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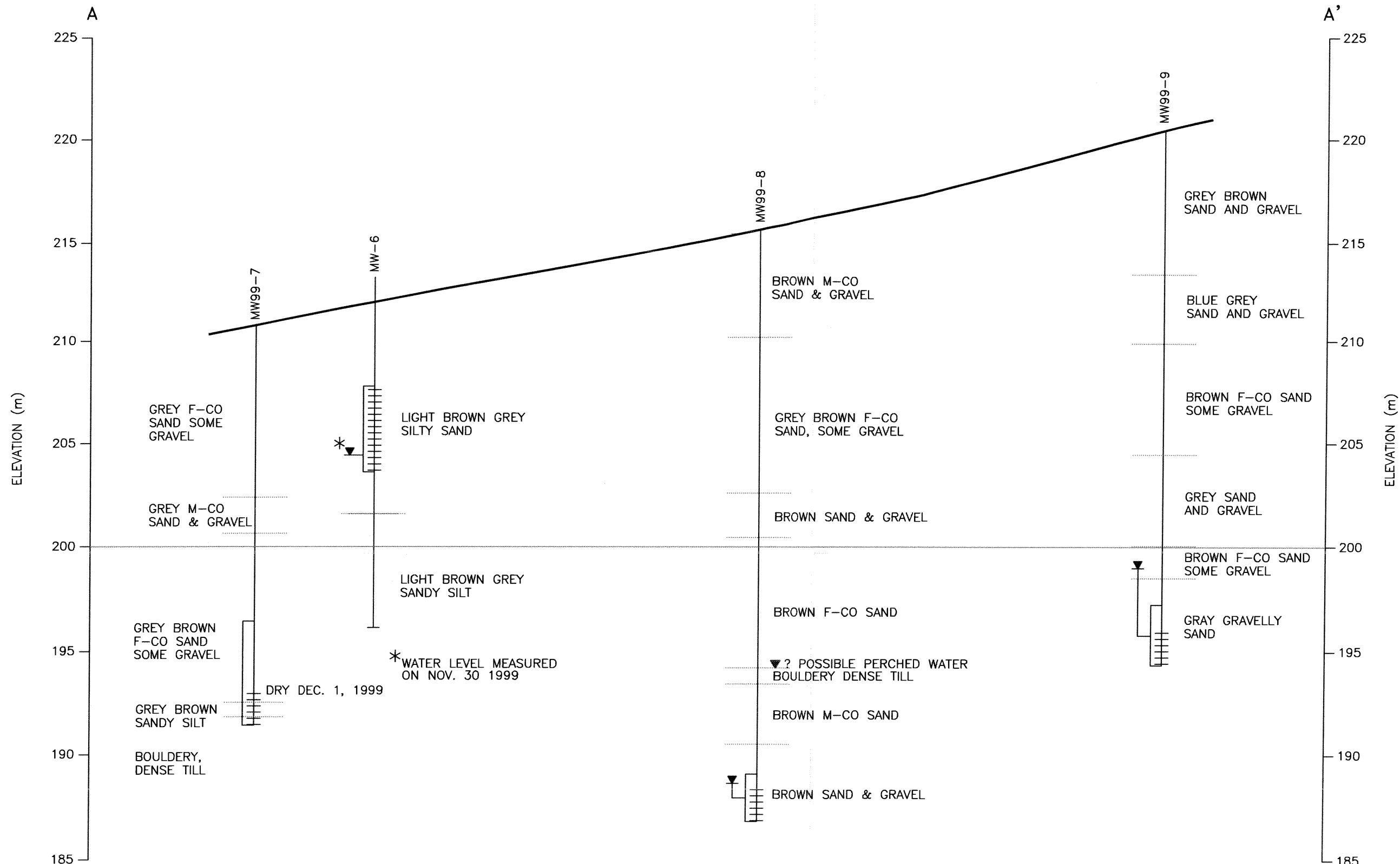
MONITORING WELL
CONSTRUCTION PROGRAM
SECHLT LANDFILL
SECHLT, B.C.

SITE PLAN

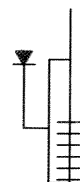


PITEAU ASSOCIATES
GEOTECHNICAL AND HYDROGEOLOGICAL CONSULTANTS
VANCOUVER CALGARY

BY: MDP/AB
APPROVED:
DATE: FEB. 2000
FIG: 2



LEGEND



MONITORING WELL WITH
COMPLETION INTERVAL,
AND WATER LEVEL MEASURED
ON DEC. 1 1999

HORIZONTAL SCALE 1:1500
VERTICAL SCALE 1:200
VERTICAL EXAGGERATION = 7.5x

NOTE: WATER LEVELS MEASURED ON DEC. 1 1999

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SUNSHINE COAST REGIONAL DISTRICT

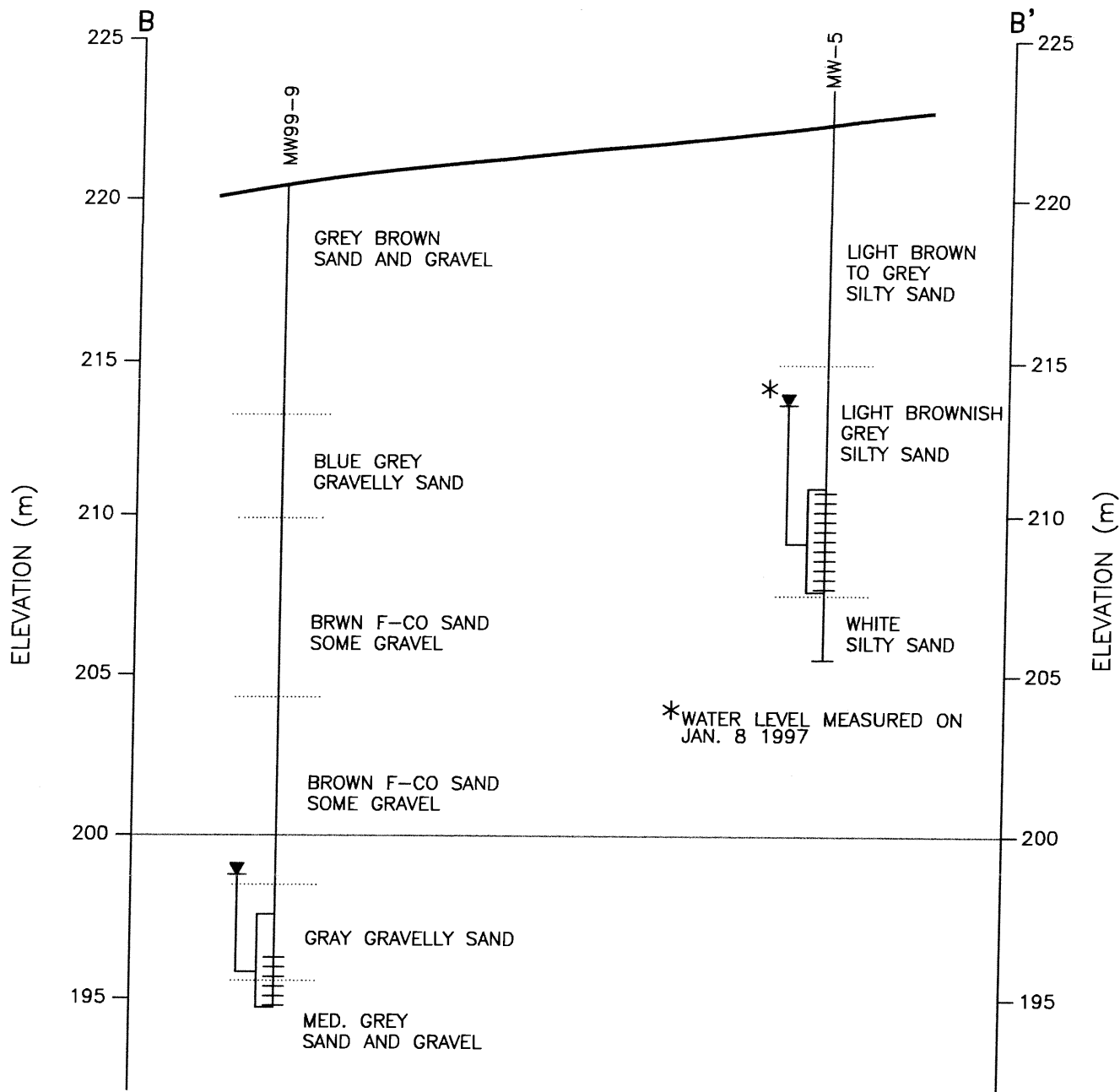


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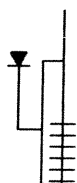
MONITORING WELL
CONSTRUCTION PROGRAM
SECHULT LANDFILL
SECHULT, B.C.

SECTION A-A'

BY:	DATE:
MDP/cz	DEC. 99
APPROVED:	FIG:
<i>[Signature]</i>	3



LEGEND



MONITORING WELL WITH
COMPLETION INTERVAL,
AND WATER LEVEL MEASURED
ON DEC. 1 1999

HORIZONTAL SCALE 1:1500
VERTICAL SCALE 1:200
VERTICAL EXAGGERATION = 7.5x

NOTE: WATER LEVELS MEASURED ON DEC. 1 1999

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OTHER PARTIES WITH WHICH PITEAU ASSOCIATES ENGINEERING LTD. HAS NOT ENTERED INTO A CONTRACT.

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VANCOUVER CALGARY

MONITORING WELL
CONSTRUCTION PROGRAM
SECHLT LANDFILL
SECHLT, B.C.

SECTION B-B'

BY:	DATE:
MDP/cz	DEC. 99
APPROVED:	FIG:
<i>[Signature]</i>	4

APPENDIX A

WELL LOGS



PITEAU ASSOCIATES
GEOTECHNICAL AND HYDROGEOLOGICAL CONSULTANTS
VANCOUVER CALGARY

LOG OF BORING : MW99-7

(Page 1 of 1)

SUNSHINE COAST REGIONAL DISTRICT
SECHULT LANDFILL

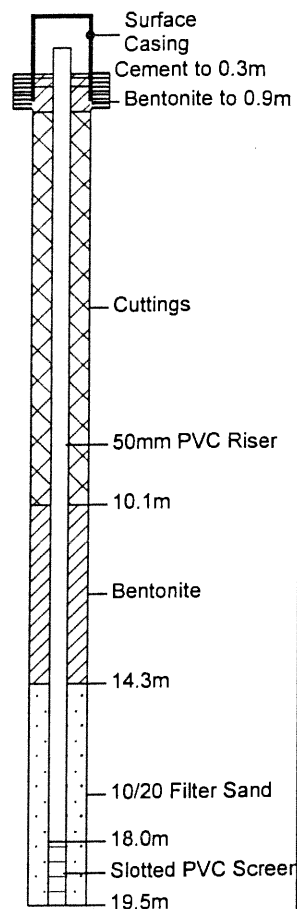
MONITORING WELL INSTALLATION

Date Completed : 11/29/99
Hole Diameter : 0.17
Drilling Method : Becker Hammer
Sampling Method : Cyclone
Field Engineer : M. Pye

Project Engineer : A.T. Holmes
Driller : Beck Drilling
Water Level (Date) : dry (11/30/99)

Depth in Meters	GRAPHIC	DESCRIPTION	REMARKS
0		Brown, SAND, some gravel with waste material (fill). 1.8m	
5		Grey, medium to coarse SAND, some gravel, trace silt and boulders, moist. 8.2m	
10		Grey, medium to coarse SAND and GRAVEL, trace silt, moist. 10.1m	
		Grey, fine to medium SAND, some gravel, trace to some silt and boulders, dry. 13.0m	
15		Grey/brown, fine to medium, SAND, some silt to silty, some gravel, trace boulders, very slightly moist. 14.6m	
		Brown, well-graded SAND, some gravel and silt, trace clay, moist. 16.5m	
		Boulders. 17.0m	
		Brown, well-graded SAND, some gravel, trace to some silt, moist. 18.6m	
		Grey, sandy SILT, trace clay, wet. 19.2m	
20		Bouldery, dense TILL. End of Hole at 19.5m	
25			
30			

Well: MW99-7
Elev.:





LOG OF BORING : MW99-8

(Page 1 of 1)

SUNSHINE COAST REGIONAL DISTRICT
SECHLT LANDFILL

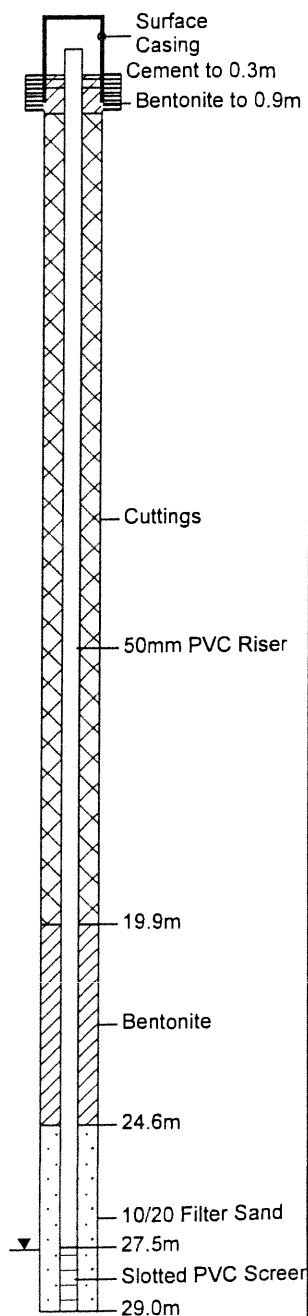
MONITORING WELL INSTALLATION

Date Completed : 11/30/99
Hole Diameter : 0.17
Drilling Method : Becker Hammer
Sampling Method : Cyclone
Field Engineer : M. Pye

Project Engineer : A.T. Holmes
Driller : Beck Drilling
Water Level (Date) : 28.405m tPVC (12/01/99)

Depth in Meters	GRAPHIC	DESCRIPTION	REMARKS
0		Brown, SAND, some gravel with waste material (fill). 1.2m	Purged and sampled well on 12/01/99.
		Brown, medium to coarse SAND and GRAVEL, moist. 2.1m	
		Grey, medium to coarse SAND and GRAVEL, moist to wet. 4.0m	
		Brown/grey, coarse SAND and GRAVEL, wet. 5.2m	
5		Grey, well-graded SAND, some gravel, trace to some silt, wet. 6.9m	
		Brown, medium to coarse SAND, trace to some gravel, trace silt, moist. 11.3m	
10		Brown, well-graded SAND, some gravel and boulders, dry. 13.1m	
		Brown, well graded SAND and GRAVEL, dry. 14.0m	
		Brown, silty SAND and GRAVEL, wet. 14.9m	
15		Brown, fine to medium SAND, some gravel, moist. 16.2m	
		Brown, medium to coarse SAND, dry. 20.4m	
20		Brown, fine to medium, silty SAND, wet. 21.6m	
		Bouldery, dense TILL. 22.3m	
		Brown, medium to coarse SAND, trace gravel, slightly moist. 25.3m	
25		Brown, well-graded SAND and GRAVEL, trace silt and boulders, slightly moist. 28.0m	
		Brown, coarse SAND and GRAVEL, some fine sand, trace silt, wet. End of Hole at 29.0m	
30			

Well: MW99-8
Elev.:



LOG OF BORING : MW99-9

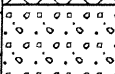
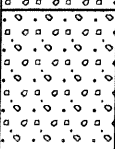
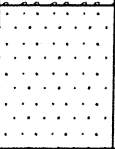
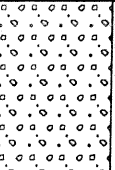
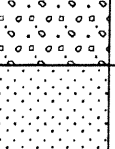
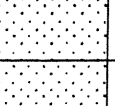
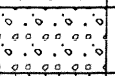
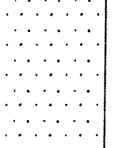
(Page 1 of 1)

**SUNSHINE COAST REGIONAL DISTRICT
 SECHELT LANDFILL**

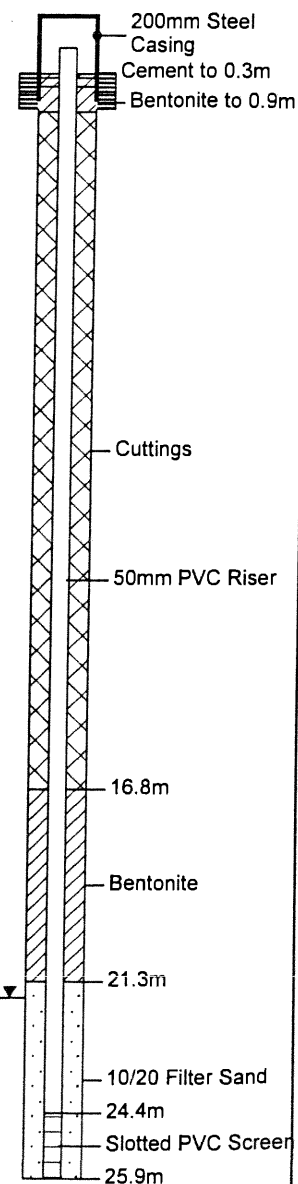
MONITORING WELL INSTALLATION

Date Completed : 11/30/99
 Hole Diameter : 0.17
 Drilling Method : Becker Hammer
 Sampling Method : Cyclone
 Field Engineer : M. Pye

Project Engineer : A.T. Holmes
 Driller : Beck Drilling
 Water Level (Date) : 22.580m tPVC (12/01/99)

Depth in Meters	GRAPHIC	DESCRIPTION	REMARKS
0		Brown, SAND, some gravel with waste material (fill).	Purged and sampled well on 12/01/99.
		1.8m	
		Grey/brown, medium to coarse SAND and GRAVEL, some boulders, moist.	
		3.7m	
5		Blue/grey, coarse SAND and GRAVEL, wet.	
		7.0m	
		Blue/grey, gravelly SAND, wet.	
10		10.4m	
		Grey, well-graded SAND and GRAVEL, trace to some silt, trace boulders, slightly moist.	
15		15.9m	
		Brown, medium to coarse SAND, some gravel, moist.	
		19.2m	
20		Brown, fine to medium SAND, some gravel, slightly moist.	
		20.4m	
		Grey, fine to medium SAND and GRAVEL, trace to some silt, trace boulders, dry.	
		22.0m	
25		Grey/brown, medium to coarse, gravelly SAND, trace silt, saturated.	
		End of Hole at 25.9m	
30			

Well: MW99-9
 Elev.:



APPENDIX B

CHEMICAL ANALYSIS RESULTS



CHEMICAL ANALYSIS REPORT

Date: December 17, 1999

ASL File No. L3049

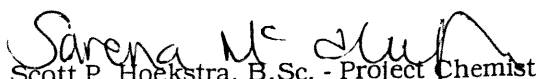
Report On: Water Analysis
2077

Report To: **Piteau Assoc. Engineering Ltd.**
215 - 260 West Esplanade
North Vancouver, BC
V7M 3G7

Attention: **Mr. Ryan Martin**

Received: December 2, 1999

ASL ANALYTICAL SERVICE LABORATORIES LTD.
per:


Scott P. Hoekstra, B.Sc. - Project Chemist
Sarena McHugh, B.Sc. - Project Chemist



**RESULTS OF ANALYSIS - Water**

File No. L3049

Sample ID

MW99-8

MW99-9

Physical Tests

Conductivity	(umhos/cm)	1240	2040
pH		7.52	7.48
Turbidity	(NTU)	9300	1780

Dissolved Anions

Alkalinity-Total	CaCO3	598	1030
Chloride	Cl	94.2	151
Sulphate	SO4	7	2

Nutrients

Ammonia Nitrogen	N	0.34	17.4
Total Kjeldahl Nitrogen	N	1.17	17.4
Nitrate Nitrogen	N	<0.005	0.009
Nitrite Nitrogen	N	0.005	0.005
Total Phosphate	P	7.88	1.96

Dissolved Metals

Arsenic	D-As	0.0003	0.0067
Barium	D-Ba	0.05	0.15
Boron	D-B	0.2	<0.1
Cadmium	D-Cd	0.0003	<0.0002
Calcium	D-Ca	140	232
Iron	D-Fe	<0.03	<0.03
Lead	D-Pb	<0.001	<0.001
Magnesium	D-Mg	22.0	32.8
Manganese	D-Mn	6.78	7.94
Mercury	D-Hg	<0.00005	<0.00005
Potassium	D-K	8	14
Sodium	D-Na	90	150

Organic Parameters

Chemical Oxygen Demand	COD	100	112
Dissolved Organic Carbon C		9.7	24.7

Results are expressed as milligrams per litre except where noted.
< = Less than the detection limit indicated.



METHODOLOGY

File No. L3049

Outlines of the methodologies utilized for the analysis of the samples submitted are as follows:

Conventional Parameters in Water

These analyses are carried out in accordance with procedures described in "Methods for Chemical Analysis of Water and Wastes" (USEPA), "Manual for the Chemical Analysis of Water, Wastewaters, Sediments and Biological Tissues" (BCMOE), and/or "Standard Methods for the Examination of Water and Wastewater" (APHA). Further details are available on request.

Metals in Water

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" 20th Edition 1998 published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotplate or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by atomic absorption/emission spectrophotometry (EPA Method 7000 series), inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B), and/or inductively coupled plasma - mass spectrometry (EPA Method 6020).

Recommended Holding Time:

Sample:	6 months
Reference:	EPA
For more detail see:	ASL "Collection & Sampling Guide"

Mercury in Water

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" 20th Edition 1998 published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic absorption spectrophotometry (EPA Method 7470A/7471A).

Recommended Holding Time:



METHODOLOGY (cont'd)

File No. L3049

Sample: 28 days
Reference: EPA
For more detail see: ASL "Collection & Sampling Guide"

End of Report

Driller: Mud Bay Drilling Co. Inc.,
Drill Method: Sonic Drilling Rig
Sample Method: N/A

Borehole Diameter: 20 cm

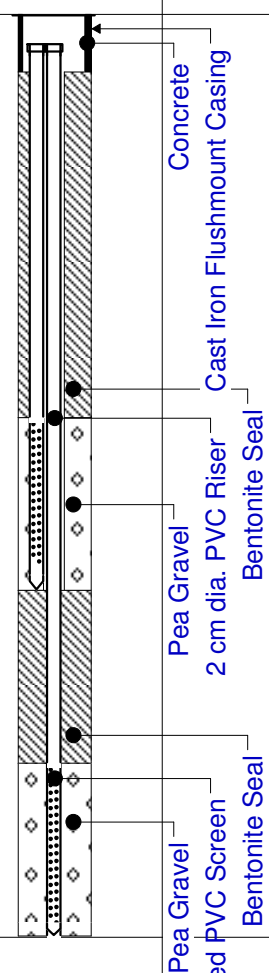
Start Date: Sept. 12, 2013

Completed: Sept. 12, 2013

Checked By: ML

Logged By: MV

Depth	Sample No.	N-Value	Recovery (%)	Vapour Conc (ppm)	Graphic Log	Geology Description	Depth/Elev (m)	Well Completion	Well Details
ft m						Ground Surface	0.0		
0						Rock	-0.3		
2						Silty Sand and Gravel with some cobbles, compact, coarse grained, brown, moist.	-1.8		
4									
6						Sandy Silt with some gravel and cobbles, non-plastic, compact, coarse grained, brown, moist.	-2.7		
8									
10						Sandy Gravel with some cobbles, compact, coarse grained, brown, dry.	-4.9		
12									
14									
16						End of Borehole			
18									
20									



Groundwater Elevation: 0

T.O.P Elevation: 0

Ground Surface Elevation: 0

Screening Tool: N/A

Monitoring Well Log
For Environmental Purposes Only

Sheet: 1 of 1

Driller: Mud Bay Drilling Co. Inc,

Drill Method: Sonic Drilling Rig

Sample Method: N/A

Borehole Diameter: 20 cm

Start Date: Sept. 12, 2013

Completed: Sept. 12, 2013

Checked By: ML

Logged By: MV

Depth	Sample No.	N-Value	Recovery (%)	Vapour Conc (ppm)	Graphic Log	Geology Description	Depth/Elev (m)	Well Completion	Well Details
ft m						Ground Surface	0.0		
0						Gravelly Sand with some cobbles, compact, coarse grained, brown, dry.	-0.3		
2						Silty Sand and Gravel with some cobbles, compact, coarse grained, brown, moist.	-1.8		
4									
6						Sandy Silt with some gravel and cobbles, non-plastic, compact, coarse grained, brown, moist.	-2.7		
8									
10						Sandy Gravel with some cobbles, compact, coarse grained, brown, dry.	-4.9		
12									
14									
16						End of Borehole			
18									
20									

Groundwater Elevation: 0

T.O.P Elevation: 0

Ground Surface Elevation: 0

Screening Tool: N/A

Monitoring Well Log
For Environmental Purposes Only

Sheet: 1 of 1

Driller: Mud Bay Drilling Co. Inc,

Drill Method: Sonic Drilling Rig

Sample Method: N/A

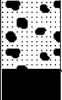
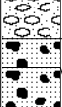
Borehole Diameter: 20 cm

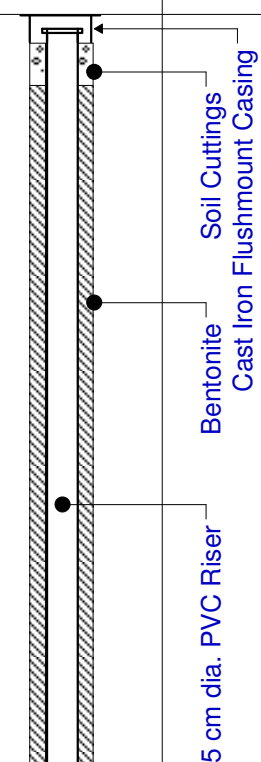
Start Date: Sept. 9, 2013

Completed: Sept. 10, 2013

Checked By: ML

Logged By: MV

Depth	Sample No.	N-Value	Recovery (%)	Vapour Reading	Graphic Log	Geology Description	Depth/Elev (m)	Well Completion	Well Details
0 ft 0 m						Ground Surface	0.0		
2						Gravelly Sand with some cobbles, loose, coarse grained, brown, moist.	-0.8		
4						Asphalt	-1.2		
6						Sandy Gravel loose, coarse grained, brown, moist.			
8							-3.0		
10						Gravelly Sand with cobbles and boulders, compact, coarse grained, greyish brown, dry.	-3.4		
12							-4.3		
14						Gravelly Sand with some boulders, compact, coarse grained, brown, slightly moist.	-4.9		
16									
18						Gravel with some sand, compact, coarse grained, brown, slightly moist.			
20									
22						Gravel with some sand, cobbles, and boulders, compact, coarse grained, grey, wet.			
24									
26							-8.2		
28						Silty Clayey Gravel with some cobbles and sand, non-plastic, dense, coarse grained, grey, moist.			
30									
32						Silty Gravel with some cobbles, non-plastic, compact, coarse grained, brown, moist to wet.	-9.8		
34									
36									
38							-11.4		
40									



Groundwater Elevation: 0

T.O.P Elevation: 0

Ground Surface Elevation: 0

Screening Tool: N/A

Monitoring Well Log
For Environmental Purposes Only

Sheet: 1 of 3

Driller: Mud Bay Drilling Co. Inc,

Drill Method: Sonic Drilling Rig

Sample Method: N/A

Borehole Diameter: 20 cm

Start Date: Sept. 9, 2013

Completed: Sept. 10, 2013

Checked By: ML

Logged By: MV

Depth	Sample No.	N-Value	Recovery (%)	Vapour Reading	Graphic Log	Geology Description	Depth/Elev (m)	Well Completion	Well Details
42						Sand with some silt, clay, and cobbles, compact, coarse grained, grey, dry.	-12.5		
44						Sandy Gravel with some cobbles and boulders, compact, coarse grained, grey, moist.			
46	14								
48									
50									
52	16								
54									
56							-17.1		
58						Sandy Gravel with some silt, compact, medium grained, grey, moist.			
60	18								
62							-18.6		
64						Gravel with some sand and cobbles, compact, coarse grained, grey, moist.			
66	20								
68							-20.4		
70						Sand with some gravel, compact, coarse grained, grey, moist.			
72	22						-21.6		
74						Gravel with sand, compact, coarse grained, grey, moist.			
76							-23.2		
78	24					Gravelly Sand with boulders, loose, coarse grained, wet.			
80									

Groundwater Elevation: 0

T.O.P Elevation: 0

Ground Surface Elevation: 0

Screening Tool: N/A

Monitoring Well Log
For Environmental Purposes Only

Sheet: 2 of 3



Project #: 4-2111-01-27-02

Project: 2013 MW and GP Installation
Client: Sunshine Coast Regional District
Location: Sechelt Landfill

Privileged and Confidential

LOG OF WELL: MW13-01

Driller: Mud Bay Drilling Co. Inc,
Drill Method: Sonic Drilling Rig
Sample Method: N/A

Borehole Diameter: 20 cm

Start Date: Sept. 9, 2013

Completed: Sept. 10, 2013

Checked By: ML

Logged By: MV

Depth	Sample No.	N-Value	Recovery (%)	Vapour Reading	Graphic Log	Geology Description	Depth/Elev (m)	Well Completion	Well Details
82									
84									
86	26						-26.2		
88						End of Borehole			
90									
92	28								
94									
96									
98									
100	30								
102									
104									
106	32								
108									
110									
112	34								
114									
116									
118	36								
120									

Groundwater Elevation: 0

T.O.P Elevation: 0

Ground Surface Elevation: 0

Screening Tool: N/A

Monitoring Well Log
For Environmental Purposes Only

Sheet: 3 of 3

Driller: Mud Bay Drilling Co. Inc,

Drill Method: Sonic Drilling Rig

Sample Method: N/A

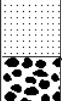
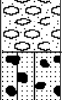
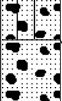
Borehole Diameter: 20 cm

Start Date: Sept. 10, 2013

Completed: Sept. 10, 2013

Checked By: ML

Logged By: MV

Depth	Sample No.	N-Value	Recovery (%)	Vapour Reading	Graphic Log	Geology Description	Depth/Elev (m)	Well Completion	Well Details
0 ft 0 m						Ground Surface	0.0		
2						Gravel with some sand and boulders, dense, coarse grained, brown, dry.	-0.9		
4						Sand compact, medium grained, brown, dry.	-1.7		
6						Gravel with some sand, cobbles and boulders, compact, coarse grained, brown, dry.	-2.7		
8						Sandy Gravel with some cobbles and boulders, compact, coarse grained, grey, dry.	-4.9		
10						Gravel with some boulders and trace sand, compact, coarse grained, brown, dry.	-6.1		
12						Sandy Gravel with some boulders, compact, coarse grained, greyish brown, moist.	-7.9		
14						Silty Sand and Gravel with some cobbles and boulders, non-plastic, compact, coarse grained, greyish brown, wet.	-8.8		
16						Gravelly Sand with some cobbles and boulders, compact, coarse grained, greyish brown, wet.	-11.0		
18						Silty Sand and Gravel with some cobbles and boulders, non-plastic, compact, medium grained, grey, moist.			
20									
22									
24									
26									
28									
30									
32									
34									
36									
38									
40									

Groundwater Elevation: 0

T.O.P Elevation: 0

Ground Surface Elevation: 0

Screening Tool: N/A

Monitoring Well Log
For Environmental Purposes Only

Sheet: 1 of 3



Project #: 4-2111-01-27-02

Project: 2013 MW and GP Installation
Client: Sunshine Coast Regional District
Location: Sechelt Landfill

Privileged and Confidential

LOG OF WELL: MW13-02

Driller: Mud Bay Drilling Co. Inc.,
Drill Method: Sonic Drilling Rig
Sample Method: N/A

Borehole Diameter: 20 cm

Start Date: Sept. 10, 2013

Completed: Sept. 10, 2013

Checked By: ML

Logged By: MV

Depth	Sample No.	N-Value	Recovery (%)	Vapour Reading	Graphic Log	Geology Description	Depth/Elev (m)	Well Completion	Well Details
42									
44									
46	14								
48							-14.6		
50						Sandy Gravel with some silt and cobbles, compact, coarse grained, grey and brown, moist.			
52	16								
54									
56									
58	18								
60									
62									
64									
66	20								
68									
70									
72	22								
74									
76							-23.2		
78	24					Silty Sand with boulders, non-plastic, compact, medium grained, greyish brown, wet.			
80									

Groundwater Elevation: 0

T.O.P Elevation: 0

Ground Surface Elevation: 0

Screening Tool: N/A

Monitoring Well Log
For Environmental Purposes Only

Sheet: 2 of 3

Driller: Mud Bay Drilling Co. Inc,

Drill Method: Sonic Drilling Rig

Sample Method: N/A

Borehole Diameter: 20 cm

Start Date: Sept. 10, 2013

Completed: Sept. 10, 2013

Checked By: ML

Logged By: MV

Depth	Sample No.	N-Value	Recovery (%)	Vapour Reading	Graphic Log	Geology Description	Depth/Elev (m)	Well Completion	Well Details
82						Sand with some gravel and cobbles, dense, coarse grained, grey, moist.	-24.7		
84	26					Silt with some cobbles and boulders, non-plastic, dense, fine grained, grey, moist.	-25.3		
86									
88							-26.8		
90						Rock	-27.4		
92	28					Silty Sand and Gravel with some boulders, non-plastic, compact, coarse grained, grey, wet at 29.9 metres.			
94									
96									
98	30								
100									
102									
104	32								
106							-32.3		
108						End of Borehole			
110									
112	34								
114									
116									
118	36								
120									

Groundwater Elevation: 0

T.O.P Elevation: 0

Ground Surface Elevation: 0

Screening Tool: N/A

Monitoring Well Log
For Environmental Purposes Only

Sheet: 3 of 3

Driller: Mud Bay Drilling Co. Inc,

Drill Method: Sonic Drilling Rig

Sample Method: N/A

Borehole Diameter: 20 cm

Start Date: Sept. 11, 2013

Completed: Sept. 11, 2013

Checked By: ML

Logged By: MV

Depth	Sample No.	N-Value	Recovery (%)	Vapour Reading	Graphic Log	Geology Description	Depth/Elev (m)	Well Completion	Well Details
ft m						Ground Surface	0.0		
0						Sandy Gravel with some cobbles, boulders, and silt, compact, coarse grained, brown, slightly moist.	-1.7		
2						Gravelly Sand with some cobbles and boulders, compact, coarse grained, brown, slightly moist.	-4.0		
4						Sandy Gravel with some cobbles and boulders, compact, coarse grained, greyish brown, moist.	-5.2		
6						Sand with some gravel, cobbles, and trace silt, compact, medium grained, greyish brown, moist.	-6.1		
8						Rock	-6.4		
10						Gravelly Sand with some cobbles and trace silt, compact, coarse grained, grey, moist.	-7.9		
12						Silty Sand with some cobbles and boulders, non-plastic, compact, medium grained, grey and brown, wet.			

Groundwater Elevation: 0

T.O.P Elevation: 0

Ground Surface Elevation: 0

Screening Tool: N/A

Monitoring Well Log
For Environmental Purposes Only

Sheet: 1 of 2

Driller: Mud Bay Drilling Co. Inc,

Drill Method: Sonic Drilling Rig

Sample Method: N/A

Borehole Diameter: 20 cm

Start Date: Sept. 11, 2013

Completed: Sept. 11, 2013

Checked By: ML

Logged By: MV

Depth	Sample No.	N-Value	Recovery (%)	Vapour Reading	Graphic Log	Geology Description	Depth/Elev (m)	Well Completion	Well Details
42							-13.3		
44						Rock	-13.6		
46	14					Silty Sand with some cobbles and boulders, non-plastic, compact, medium grained, grey, wet.			
48									
50									
52	16								
54							-17.1		
56						Silty Sand with cobbles and boulders, non- plastic, compact, medium grained, grey and brown, moist.			
58	18								
60									
62						Rock	-18.9		
64						Silty Sand with cobbles and boulders, non- plastic, compact, medium grained, grey and brown, moist.	-19.2		
66	20						-20.1		
68						End of Borehole			
70									
72	22								
74									
76									
78	24								
80									

Groundwater Elevation: 0

T.O.P Elevation: 0

Ground Surface Elevation: 0

Screening Tool: N/A

Monitoring Well Log
For Environmental Purposes Only

Sheet: 2 of 2

Driller: Mud Bay Drilling Co. Inc,

Drill Method: Sonic Drilling Rig

Sample Method: N/A

Borehole Diameter: 20 cm

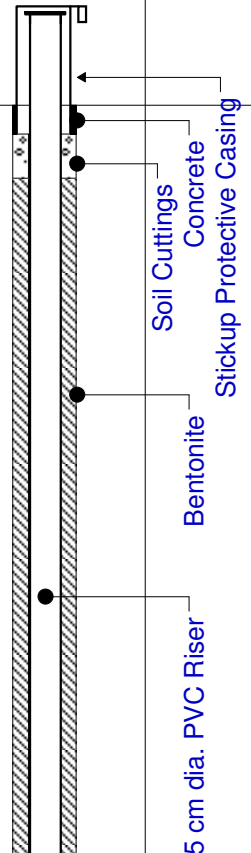
Start Date: Sept. 11, 2013

Completed: Sept. 11, 2013

Checked By: ML

Logged By: MV

Depth	Sample No.	N-Value	Recovery (%)	Vapour Reading	Graphic Log	Geology Description	Depth/Elev (m)	Well Completion	Well Details
ft m									
-3									
-1									
1						Ground Surface	0.0		
3						Sand and Gravel with some cobbles, compact, coarse grained, brown and grey, dry.	-1.8		
5									
7						Sandy Gravel with some cobbles and boulders, compact, coarse grained, brownish grey, moist.	-2.6		
9									
11						Rock			
13						Sandy Gravel with some cobbles and boulders, compact, coarse grained, brownish grey, moist.	-4.9		
15									
17						Gravelly Sand with some boulders, compact, coarse grained, brown and grey, slightly moist.	-7.6		
19									
21									
23									
25						Gravel with some sand, cobbles, and boulders, compact, coarse grained, grey, wet.	-10.1		
27									
29									
31									
33						Silty Sand and Gravel with some boulders, non-plastic, compact, coarse grained, grey, wet.	-11.0		
35									



Groundwater Elevation: 0

T.O.P Elevation: 0

Ground Surface Elevation: 0

Screening Tool: N/A

Monitoring Well Log
For Environmental Purposes Only

Sheet: 1 of 2

Driller: Mud Bay Drilling Co. Inc,
Drill Method: Sonic Drilling Rig
Sample Method: N/A

Borehole Diameter: 20 cm

Start Date: Sept. 11, 2013

Completed: Sept. 11, 2013

Checked By: ML

Logged By: MV

Depth	Sample No.	N-Value	Recovery (%)	Vapour Reading	Graphic Log	Geology Description	Depth/Elev (m)	Well Completion	Well Details
38	12					Sand with silty mottling, compact, medium grained, greyish brown, moist.			
40									
42									
44									
46	14					Sand with trace silt, loose, medium grained, brownish grey, wet.	-14.0		
48									
50									
52									
54	16								
56									
58									
60									
62	18						-19.2		
64									
66									
68									
70	20					Silty Sand non-plastic, dense, medium grained, brownish grey, wet.	-20.1		
72									
74									
76									
						End of Borehole			

Filter Sand Pack
5 cm dia. PVC 10 Slot Screen

Groundwater Elevation: 0

T.O.P Elevation: 0

Ground Surface Elevation: 0

Screening Tool: N/A

Monitoring Well Log
For Environmental Purposes Only

Sheet: 2 of 2

Driller: Mud Bay Drilling Co. Inc,
Drill Method: Sonic Drilling Rig
Sample Method: N/A

Borehole Diameter: 20 cm

Start Date: Sept. 11, 2013

Completed: Sept. 11, 2013

Checked By: ML

Logged By: MV

Depth	Sample No.	N-Value	Recovery (%)	Vapour Reading	Graphic Log	Geology Description	Depth/Elev (m)	Well Completion	Well Details
ft m									
-3									
-1									
						Ground Surface	0.0		
1						Sand and Gravel with some cobbles, compact, coarse grained, brown and grey, dry.			
3									
5							-1.8		
7	2					Sandy Gravel with some cobbles and boulders, compact, coarse grained, brownish grey, dry.			
9									
11									
13	4								
15							-4.9		

Groundwater Elevation: 0

T.O.P Elevation: 0

Ground Surface Elevation: 0

Screening Tool: N/A

Monitoring Well Log
For Environmental Purposes Only

Sheet: 1 of 2

Driller: Mud Bay Drilling Co. Inc,

Drill Method: Sonic Drilling Rig

Sample Method: N/A

Borehole Diameter: 20 cm

Start Date: Sept. 11, 2013

Completed: Sept. 11, 2013

Checked By: ML

Logged By: MV

Depth	Sample No.	N-Value	Recovery (%)	Vapour Reading	Graphic Log	Geology Description	Depth/Elev (m)	Well Completion	Well Details
18						Gravelly Sand with some cobbles and boulders, compact, coarse grained, brown, moist.			
20	6								
22							-7.0		
24						Sandy Gravel with silty mottling and some cobbles, compact, coarse grained, grey, wet.			
26	8						-7.9		
28						Sand with some cobbles and boulders, compact, medium grained, grey, wet.			
30									
32							-9.8		
34	10					Sand with some cobbles and boulders, compact, medium grained, greyish brown, moist.			
36							-11.0		
						End of Borehole			

Groundwater Elevation: 0

T.O.P Elevation: 0

Ground Surface Elevation: 0

Screening Tool: N/A

Monitoring Well Log
For Environmental Purposes Only

Sheet: 2 of 2



Project #: 4-2111-01-49

Privileged and Confidential

Project: Sechelt Landfill

LOG OF: GP17-01

Client: Sunshine Coast Regional District

Location: 4901 Dusty Road, Sechelt, British Columbia

Driller: Mud Bay Drilling

Monitoring Well Diameter: 15.24 cm

Drill Method: DB320

Start Date: August 16, 2017

Checked By: CS

Sample Method: Continuous

Completed: August 16, 2017

Logged By: TM

Depth	Sample No.	N-Value	Recovery (%)	Vapour Conc (ppm)	Graphic Log	Geology Description	Depth/Elev (m)	Well Completion	Well Details
-3 ft m									
-2									
-1									
0						Ground Surface			Monument Steel Casing Set In Concrete Collar
1						SILTY SAND AND GRAVEL Some cobbles, compact, coarse-grained, light brown, dry.	-0.3		
2						SILTY SAND Some gravel, trace cobbles, coarse-grained, brown and grey, moist.			
3						Large boulder at 1.2 mbgs.			Bentonite
4							-1.5		
5						SANDY SILT Some gravel and cobbles, grey, dry.			
6									
7							-2.7		1.9 cm PVC Screen
8									
9						SANDY GRAVEL Compact, coarse-grained, brownish grey, dry.			Pea Gravel
10									
11									Bentonite
12									
13									1.9 cm PVC Screen
14									
15							-4.6		Pea Gravel
16						End of Borehole			
17									

Groundwater Elevation: NM

T.O.P. Elevation: 219.32 masl

Ground Surface Elevation: 218.51 masl

FOR ENVIRONMENTAL PURPOSES ONLY

Northing: 5482084.863

Easting: 448375.297

Sheet: 1 of 1



Project #: 4-2111-01-49

Privileged and Confidential

Project: Sechelt Landfill

LOG OF: MW17-01

Client: Sunshine Coast Regional District

Location: 4901 Dusty Road, Sechelt, British Columbia

Driller: Mud Bay Drilling

Monitoring Well Diameter: 15.24 cm

Drill Method: DB320

Start Date: August 16, 2017

Checked By: CS

Sample Method: Continuous

Completed: August 16, 2017

Logged By: TM

Depth	Sample No.	N-Value	Recovery (%)	Vapour Conc (ppm)	Graphic Log	Geology Description	Depth/Elev (m)	Well Completion	Well Details
ft m									
-2						Ground Surface			Monument Steel Casing Set In Concrete Collar
0									
2						SAND and GRAVEL Compact, dry, grey to light brown at 0.4 mbgs.			
4						Seam of assorted refuse from 0.9 to 1.1 mbgs.	-1.1		
6						ORGANIC SOIL Trace wood fragments and rootlets, dark brown to black, moist.	-1.6		
8						SAND Trace subangular gravel, medium-grained, grey, moist.	-2.1 -2.2		
10						ORGANIC SOIL Trace wood fragments, dark brown to black, moist.			
12						SAND and GRAVEL Compact, medium-grained, dark brown, dry.	-3.7		
14						Becomes light grey with cobbles at 2.4 mbgs.			
16						SANDY GRAVEL Some silt, some cobbles, compact, coarse-grained, grey, wet.			
18						Light grey and dry at 4.7 mbgs.			
20						Moist at 5.5 mbgs.	-5.8		
22						GRAVELLY SAND Trace cobbles, compact, grey, moist.			Bentonite
24									

Groundwater Elevation: NM

T.O.P. Elevation: 224.79 masl

Ground Surface Elevation: 224.00 masl

FOR ENVIRONMENTAL PURPOSES ONLY

Northing: 5481984.527

Easting: 448624.957

Sheet: 1 of 2



Project #: 4-2111-01-49

Privileged and Confidential

Project: Sechelt Landfill

LOG OF: MW17-01

Client: Sunshine Coast Regional District

Location: 4901 Dusty Road, Sechelt, British Columbia

Driller: Mud Bay Drilling

Monitoring Well Diameter: 15.24 cm

Drill Method: DB320

Start Date: August 16, 2017

Checked By: CS

Sample Method: Continuous

Completed: August 16, 2017

Logged By: TM

Depth	Sample No.	N-Value	Recovery (%)	Vapour Conc (ppm)	Graphic Log	Geology Description	Depth/Elev (m)	Well Completion	Well Details
ft-m									
26-8						GRAVELLY SAND Trace cobbles, compact, grey, moist. (continued)	-8.8		
28						SAND Some silt, some gravel and subangular cobbles, grey, moist.	-9.8		
30-10						GRAVELLY SAND Trace cobbles, compact, grey, moist.	-11.6		
32									
34									
36									
38						GRAVEL and COBBLES Trace sand, rounded gravel, grey, very moist.	-13.3		Pea Gravel
40-12									
42									
44						SILTY SAND Some coarse subangular gravel, trace cobbles, grey, very moist to wet.	-14.9		5.08 cm PVC Screen
46-14									
48									
50						Brownish grey and damp at 14.9 metres bgs.			
52						End of Borehole			
						Note- Well magnet present in casing.			

Groundwater Elevation: NM

Northing: 5481984.527

T.O.P. Elevation: 224.79 masl

FOR ENVIRONMENTAL PURPOSES ONLY

Easting: 448624.957

Ground Surface Elevation: 224.00 masl

Sheet: 2 of 2



Project #: 4-2111-01-49

Privileged and Confidential

Project: Sechelt Landfill

LOG OF: MW17-02

Client: Sunshine Coast Regional District

Location: 4901 Dusty Road, Sechelt, British Columbia

Driller: Mud Bay Drilling

Monitoring Well Diameter: 15.24 cm

Drill Method: DB320

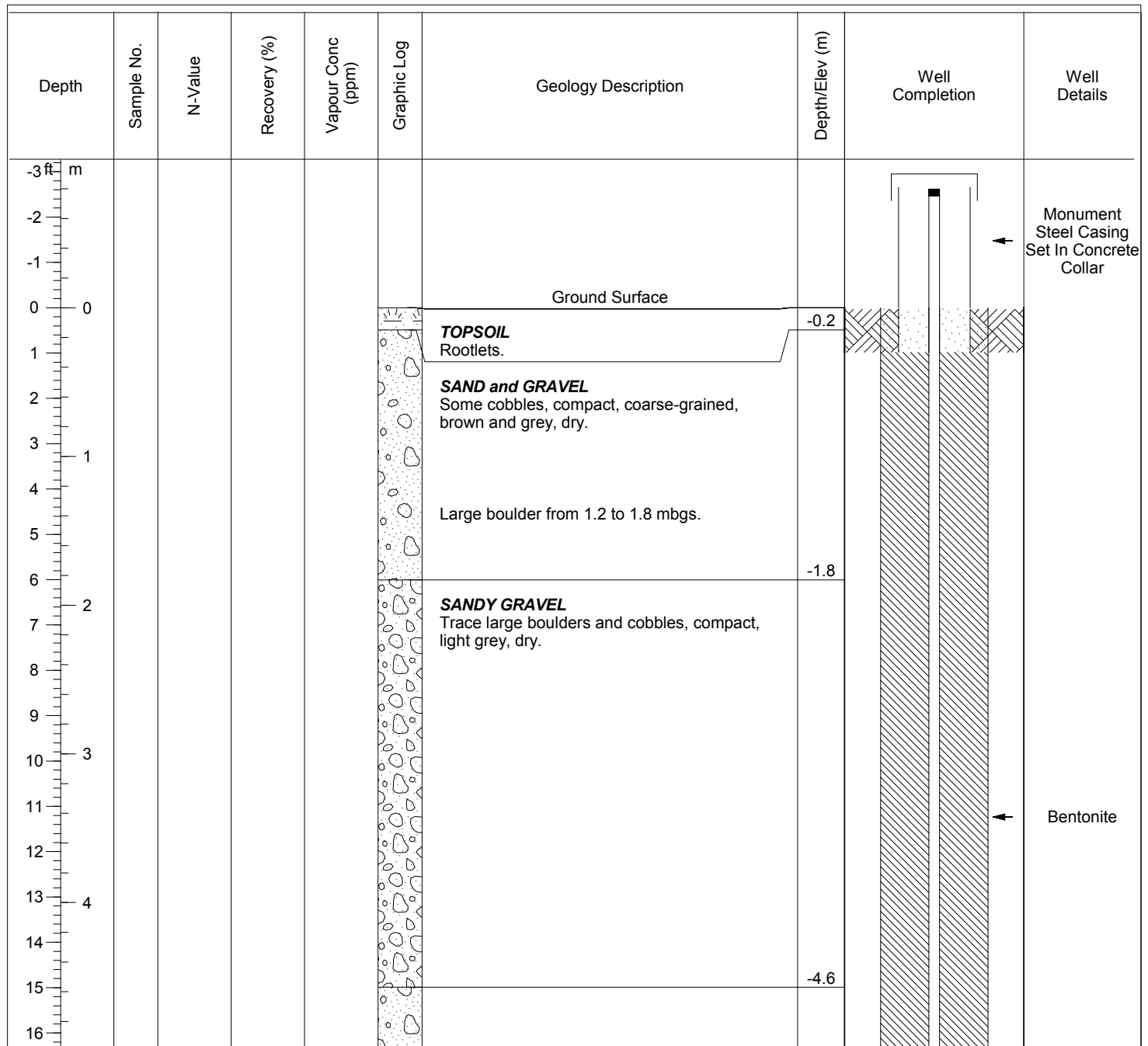
Start Date: August 16, 2017

Checked By: CS

Sample Method: Continuous

Completed: August 16, 2017

Logged By: TM



Groundwater Elevation: NM

Northing: 5482088.822

T.O.P. Elevation: 222.20 masl

FOR ENVIRONMENTAL PURPOSES ONLY

Easting: 448545.540

Ground Surface Elevation: 221.37 masl

Sheet: 1 of 2



Project #: 4-2111-01-49

Privileged and Confidential

Project: Sechelt Landfill

LOG OF: MW17-02

Client: Sunshine Coast Regional District

Location: 4901 Dusty Road, Sechelt, British Columbia

Driller: Mud Bay Drilling

Monitoring Well Diameter: 15.24 cm

Drill Method: DB320

Start Date: August 16, 2017

Checked By: CS

Sample Method: Continuous

Completed: August 16, 2017

Logged By: TM

Depth	Sample No.	N-Value	Recovery (%)	Vapour Conc (ppm)	Graphic Log	Geology Description	Depth/Elev (m)	Well Completion	Well Details
ft m									
17						GRAVELLY SAND Some cobbles, compact, coarse-grained. brown, moist. <i>(continued)</i>			
18									
19									
20							-6.4		
21						SANDY GRAVEL Some cobbles, compact, brown, moist.			
22							-7.0		
23									← Pea Gravel
24						SAND Some rounded cobbles, medium-grained, brown, wet.			
25									
26									← 5.08 cm PVC Screen
27									
28									
29									
30									
31						Very moist with trace subangular gravel at 9.1 mbgs.			
32							-9.8		
33						End of Borehole			
34									
35									

Groundwater Elevation: NM

Northing: 5482088.822

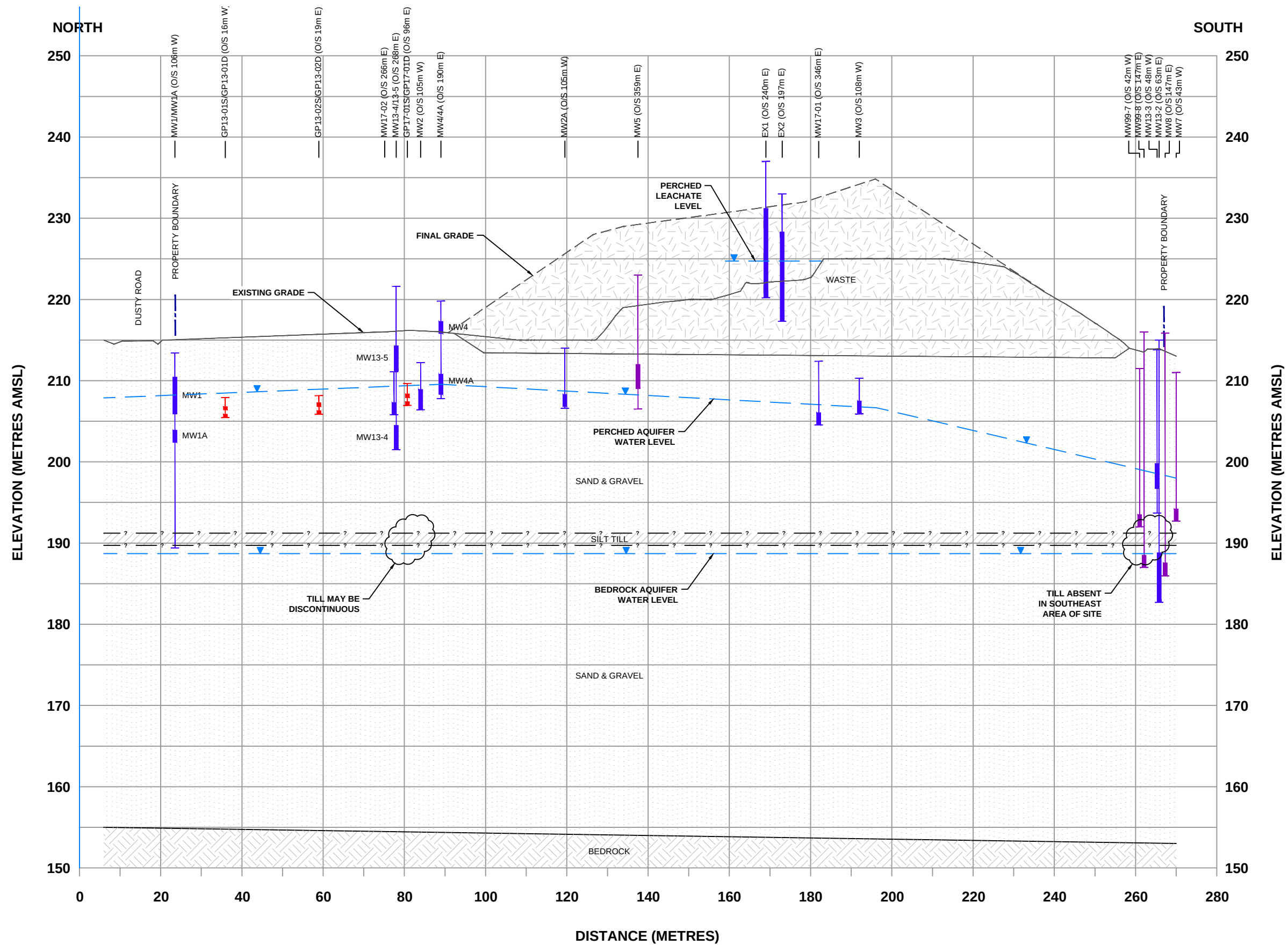
T.O.P. Elevation: 222.20 masl

FOR ENVIRONMENTAL PURPOSES ONLY

Easting: 448545.540

Ground Surface Elevation: 221.37 masl

Sheet: 2 of 2



LEGEND

- EXISTING GROUNDWATER MONITORING WELL
- DECOMMISSIONED GROUNDWATER MONITORING WELL
- EXISTING LFG MONITORING WELL

GEOLOGICAL CROSS-SECTION		
2017 ANNUAL REPORT		
SECHULT LANDFILL		
SUNSHINE COAST REGIONAL DISTRICT		
		
DATE	JOB NO.	FIGURE NO.
MARCH 2018	4-2111-01-54	B1

(file: R421110154001FIGB1.dwg)



APPENDIX C
HISTORIC GROUNDWATER ELEVATIONS AND HYDROGRAPHS



Table C1 Historic Groundwater Elevations

Date:		Jun-94			Sep-94			Dec-94			Mar-95			Jun-95			Dec-95		
Monitoring Well	Well Depth (m)	Depth to GW (m)	Depth Below Ground Level (m)	Groundwater Elevation (mAMSL)	Depth to GW (m)	Depth Below Ground Level (m)	Groundwater Elevation (mAMSL)	Depth to GW (m)	Depth Below Ground Level (m)	Groundwater Elevation (mAMSL)	Depth to GW (m)	Depth Below Ground Level (m)	Groundwater Elevation (mAMSL)	Depth to GW (m)	Depth Below Ground Level (m)	Groundwater Elevation (mAMSL)	Depth to GW (m)	Depth Below Ground Level (m)	Groundwater Elevation (mAMSL)
MW-1	11.20	5.15	4.09	208.23	5.73	4.67	207.65	4.81	3.75	208.57	4.19	3.13	209.19	5.27	4.21	208.11	3.63	2.57	209.75
MW-2	5.77	6.22	5.51	206.71	6.90	6.19	206.03	6.45	5.74	206.48	5.15	4.44	207.78	6.38	5.67	206.55	5.00	4.29	207.93
MW-2A	7.06	6.24	5.87	207.75	6.26	5.89	207.73	6.26	5.89	207.73	5.32	4.95	208.67	5.90	5.53	208.09	5.23	4.86	208.76
MW-3	4.27	3.19	2.24	208.10	3.84	2.89	207.45	3.40	2.45	207.89	2.49	1.54	208.80	3.62	2.67	207.67	1.67	0.72	209.62
MW-4	11.50	8.76	8.06	210.98	10.54	9.84	209.20	8.38	7.68	211.36	5.84	5.14	213.90	9.22	8.52	210.52	6.19	5.49	213.55
MW-4A	4.04	4.00	3.35	215.69	4.50	3.85	215.19	3.25	2.60	216.44	3.38	2.73	216.31	3.72	3.07	215.97	1.70	1.05	217.99
MW-5	14.30	-	-	-	15.23	15.18	206.95	15.27	15.22	206.91	10.57	10.07	212.06	13.28	13.23	208.89	12.48	12.43	209.69
MW99-7	19.50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW99-8	29.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW99-9	25.90	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW13-1	25.90	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW13-2	32.30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW13-3	17.10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW13-4	20.10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW13-5	10.36	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW17-01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW17-02	10.36	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Notes: m - metres mAMSL - metres above sea level																			



Table C1 Historic Groundwater Elevations

Date:		Mar-96			Jun-96			Jan-97			Apr-97			Jun-97			Oct-97		
Monitoring Well	Well Depth (m)	Depth to GW (m)	Depth Below Ground Level (m)	Groundwater Elevation (mAMSL)	Depth to GW (m)	Depth Below Ground Level (m)	Groundwater Elevation (mAMSL)	Depth to GW (m)	Depth Below Ground Level (m)	Groundwater Elevation (mAMSL)	Depth to GW (m)	Depth Below Ground Level (m)	Groundwater Elevation (mAMSL)	Depth to GW (m)	Depth Below Ground Level (m)	Groundwater Elevation (mAMSL)	Depth to GW (m)	Depth Below Ground Level (m)	Groundwater Elevation (mAMSL)
MW-1	11.20	4.31	3.25	209.07	4.31	3.25	209.07	3.43	2.37	209.95	5.15	4.09	208.23	4.76	3.70	208.62	4.51	3.45	208.87
MW-2	5.77	5.00	4.29	207.93	6.00	5.29	206.93	4.41	3.70	208.52	5.12	4.41	207.81	5.65	4.94	207.28	5.75	5.04	207.18
MW-2A	7.06	5.17	4.80	208.82	6.21	5.84	207.78	4.58	4.21	209.41	5.28	4.91	208.71	5.73	5.36	208.26	6.14	5.77	207.85
MW-3	4.27	2.58	1.63	208.71	2.84	1.89	208.45	1.89	0.94	209.40	3.75	2.80	207.54	4.76	3.81	206.53	2.14	1.19	209.15
MW-4	11.50	5.73	5.03	214.01	7.93	7.23	211.81	4.91	4.21	214.83	5.67	4.97	214.07	5.71	5.01	214.03	8.00	7.30	211.74
MW-4A	4.04	2.87	2.22	216.82	4.24	3.59	215.45	4.18	3.53	215.51	2.79	2.14	216.90	2.78	2.13	216.91	2.53	1.88	217.16
MW-5	14.30	10.14	10.09	212.03	13.94	13.89	208.23	9.79	9.74	212.38	10.52	10.47	211.65	12.34	12.29	209.83	14.30	14.25	207.87
MW99-7	19.50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW99-8	29.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW99-9	25.90	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW13-1	25.90	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW13-2	32.30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW13-3	17.10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW13-4	20.10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW13-5	10.36	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW17-01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW17-02	10.36	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Notes: m - metres mAMSL - metres above sea level																			

Table C1 Historic Groundwater Elevations

Date:		Jan-98			May-98			Jul-98			Oct-98			Dec-98			Mar-99		
Monitoring Well	Well Depth (m)	Depth to GW (m)	Depth Below Ground Level (m)	Groundwater Elevation (mAMSL)	Depth to GW (m)	Depth Below Ground Level (m)	Groundwater Elevation (mAMSL)	Depth to GW (m)	Depth Below Ground Level (m)	Groundwater Elevation (mAMSL)	Depth to GW (m)	Depth Below Ground Level (m)	Groundwater Elevation (mAMSL)	Depth to GW (m)	Depth Below Ground Level (m)	Groundwater Elevation (mAMSL)	Depth to GW (m)	Depth Below Ground Level (m)	Groundwater Elevation (mAMSL)
MW-1	11.20	3.43	2.37	209.95	6.10	5.04	207.28	6.42	5.36	206.96	6.10	5.04	207.28	2.60	1.54	210.78	4.70	3.64	208.68
MW-2	5.77	5.47	4.76	207.46	5.80	5.09	207.13	5.32	4.61	207.61	5.50	4.79	207.43	4.12	3.41	208.81	4.45	3.74	208.48
MW-2A	7.06	5.47	5.10	208.52	7.00	6.63	206.99	6.12	5.75	207.87	6.22	5.85	207.77	5.42	5.05	208.57	4.64	4.27	209.35
MW-3	4.27	3.31	2.36	207.98	3.13	2.18	208.16	3.40	2.45	207.89	4.22	3.27	207.07	1.55	0.60	209.74	1.80	0.85	209.49
MW-4	11.50	6.26	5.56	213.48	8.41	7.71	211.33	8.18	7.48	211.56	11.00	10.30	208.74	5.28	4.58	214.46	4.26	3.56	215.48
MW-4A	4.04	2.79	2.14	216.90	3.85	3.20	215.84	4.00	3.35	215.69	2.81	2.16	216.88	1.80	1.15	217.89	2.88	2.23	216.81
MW-5	14.30	11.72	11.67	210.45	13.78	13.73	208.39	15.33	15.28	206.84	14.00	13.95	208.17	10.19	10.14	211.98	6.70	6.65	215.47
MW99-7	19.50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW99-8	29.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW99-9	25.90	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW13-1	25.90	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW13-2	32.30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW13-3	17.10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW13-4	20.10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW13-5	10.36	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW17-01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW17-02	10.36	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Notes: m - metres mAMSL - metres above sea level																			



Table C1 Historic Groundwater Elevations

Date:		Oct-99			Dec-99			May-00			Jun-00			Sep-00			Dec-00		
Monitoring Well	Well Depth (m)	Depth to GW (m)	Depth Below Ground Level (m)	Groundwater Elevation (mAMSL)	Depth to GW (m)	Depth Below Ground Level (m)	Groundwater Elevation (mAMSL)	Depth to GW (m)	Depth Below Ground Level (m)	Groundwater Elevation (mAMSL)	Depth to GW (m)	Depth Below Ground Level (m)	Groundwater Elevation (mAMSL)	Depth to GW (m)	Depth Below Ground Level (m)	Groundwater Elevation (mAMSL)	Depth to GW (m)	Depth Below Ground Level (m)	Groundwater Elevation (mAMSL)
MW-1	11.20	5.89	4.83	207.49	3.14	2.08	210.24	4.74	3.68	208.64	4.98	3.92	208.40	5.87	4.81	207.51	3.88	2.82	209.50
MW-2	5.77	7.00	6.29	205.93	5.23	4.52	207.70	5.69	4.98	207.24	5.90	5.19	207.03	6.70	5.99	206.23	6.45	5.74	206.48
MW-2A	7.06	6.23	5.86	207.76	5.31	4.94	208.68	5.75	5.38	208.24	6.03	5.66	207.96	6.11	5.74	207.88	6.10	5.73	207.89
MW-3	4.27	4.00	3.05	207.29	2.47	1.52	208.82	2.00	1.05	209.29	2.33	1.38	208.96	3.87	2.92	207.42	2.32	1.37	208.97
MW-4	11.50	10.78	10.08	208.96	6.39	5.69	213.35	7.23	6.53	212.51	8.13	7.43	211.61	10.46	9.76	209.28	9.37	8.67	210.37
MW-4A	4.04	3.00	2.35	216.69	2.67	2.02	217.02	1.83	1.18	217.86	1.93	1.28	217.76	3.94	3.29	215.75	3.38	2.73	216.31
MW-5	14.30	14.33	14.28	207.84	13.88	13.83	208.29	12.73	12.68	209.44	14.33	14.28	207.84	15.19	15.14	206.98	15.16	15.11	207.01
MW99-7	19.50	-	-	-	20.07	19.17	192.33	15.46	14.56	196.94	15.34	14.44	197.06	16.90	16.00	195.50	15.50	14.60	196.90
MW99-8	29.00	-	-	-	28.37	27.47	188.53	27.78	26.88	189.12	27.94	27.04	188.96	28.25	27.35	188.65	28.51	27.61	188.39
MW99-9	25.90	-	-	-	22.60	21.70	199.20	21.97	21.07	199.83	22.20	21.30	199.60	22.50	21.60	199.30	22.65	21.75	199.15
MW13-1	25.90	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW13-2	32.30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW13-3	17.10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW13-4	20.10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW13-5	10.36	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW17-01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW17-02	10.36	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Notes: m - metres mAMSL - metres above sea level																			



Table C1 Historic Groundwater Elevations

Date:		Mar-01			Jul-01			Sep-01			Dec-01			Mar-02			Jun-02		
Monitoring Well	Well Depth (m)	Depth to GW (m)	Depth Below Ground Level (m)	Groundwater Elevation (mAMSL)	Depth to GW (m)	Depth Below Ground Level (m)	Groundwater Elevation (mAMSL)	Depth to GW (m)	Depth Below Ground Level (m)	Groundwater Elevation (mAMSL)	Depth to GW (m)	Depth Below Ground Level (m)	Groundwater Elevation (mAMSL)	Depth to GW (m)	Depth Below Ground Level (m)	Groundwater Elevation (mAMSL)	Depth to GW (m)	Depth Below Ground Level (m)	Groundwater Elevation (mAMSL)
MW-1	11.20	4.80	3.74	208.58	5.50	4.44	207.88	5.84	4.78	207.54	3.88	2.82	209.50	4.24	3.18	209.14	5.57	4.51	207.81
MW-2	5.77	4.60	3.89	208.33	6.49	5.78	206.44	6.77	6.06	206.16	5.47	4.76	207.46	5.45	4.74	207.48	6.76	6.05	206.17
MW-2A	7.06	4.85	4.48	209.14	6.12	5.75	207.87	6.13	5.76	207.86	5.58	5.21	208.41	5.92	5.55	208.07	-	-	-
MW-3	4.27	2.50	1.55	208.79	3.40	2.45	207.89	3.10	2.15	208.19	2.29	1.34	209.00	2.57	1.62	208.72	3.75	2.80	207.54
MW-4	11.50	5.45	4.75	214.29	9.79	9.09	209.95	10.60	9.90	209.14	7.14	6.44	212.60	5.68	4.98	214.06	9.37	8.67	210.37
MW-4A	4.04	-	-	-	3.72	3.07	215.97	3.64	2.99	216.05	1.85	1.20	217.84	3.71	3.06	215.98	3.98	3.33	215.71
MW-5	14.30	7.10	7.05	215.07	15.18	15.13	206.99	15.15	15.10	207.02	14.75	14.70	207.42	-	-	-	15.82	15.77	206.35
MW99-7	19.50	16.70	15.80	195.70	15.61	14.71	196.79	15.17	14.27	197.23	14.73	13.83	197.67	14.90	14.00	197.50	15.85	14.95	196.55
MW99-8	29.00	27.79	26.89	189.11	28.61	27.71	188.29	28.34	27.44	188.56	28.40	27.50	188.50	27.68	26.78	189.22	28.00	27.10	188.90
MW99-9	25.90	21.85	20.95	199.95	22.48	21.58	199.32	22.65	21.75	199.15	22.57	21.67	199.23	21.70	20.80	200.10	22.25	21.35	199.55
MW13-1	25.90	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW13-2	32.30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW13-3	17.10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW13-4	20.10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW13-5	10.36	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW17-01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW17-02	10.36	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Notes: m - metres mAMSL - metres above sea level																			



Table C1 Historic Groundwater Elevations

Date:		Oct-02			Feb-03			Mar-03			Sep-03			Mar-04			Dec-04		
Monitoring Well	Well Depth (m)	Depth to GW (m)	Depth Below Ground Level (m)	Groundwater Elevation (mAMSL)	Depth to GW (m)	Depth Below Ground Level (m)	Groundwater Elevation (mAMSL)	Depth to GW (m)	Depth Below Ground Level (m)	Groundwater Elevation (mAMSL)	Depth to GW (m)	Depth Below Ground Level (m)	Groundwater Elevation (mAMSL)	Depth to GW (m)	Depth Below Ground Level (m)	Groundwater Elevation (mAMSL)	Depth to GW (m)	Depth Below Ground Level (m)	Groundwater Elevation (mAMSL)
MW-1	11.20	6.10	5.04	207.28	4.49	3.43	208.89	4.35	3.29	209.03	6.70	5.64	206.68	4.27	3.21	209.11	4.70	3.64	208.68
MW-2	5.77	7.56	6.85	205.37	5.95	5.24	206.98	5.74	5.03	207.19	7.06	6.35	205.87	5.23	4.52	207.70	5.69	4.98	207.24
MW-2A	7.06	6.88	6.51	207.11	6.40	6.03	207.59	6.35	5.98	207.64	6.80	6.43	207.19	5.95	5.58	208.04	6.85	6.48	207.14
MW-3	4.27	4.24	3.29	207.05	2.17	1.22	209.12	2.00	1.05	209.29	4.23	3.28	207.06	2.42	1.47	208.87	2.21	1.26	209.08
MW-4	11.50	11.46	10.76	208.28	7.48	6.78	212.26	7.59	6.89	212.15	11.49	10.79	208.25	6.20	5.50	213.54	9.76	9.06	209.98
MW-4A	4.04	4.00	3.35	215.69	3.27	2.62	216.42	3.14	2.49	216.55	4.10	3.45	215.59	3.20	2.55	216.49	2.88	2.23	216.81
MW-5	14.30	16.70	16.65	205.47	15.12	15.07	207.05	15.40	15.35	206.77	16.80	16.75	205.37	12.30	12.25	209.87	15.30	15.25	206.87
MW99-7	19.50	16.30	15.40	196.10	14.75	13.85	197.65	14.59	13.69	197.81	16.90	16.00	195.50	15.00	14.10	197.40	14.34	13.44	198.06
MW99-8	29.00	28.46	27.56	188.44	28.28	27.38	188.62	28.00	27.10	188.90	28.34	27.44	188.56	27.63	26.73	189.27	28.70	27.80	188.20
MW99-9	25.90	22.66	21.76	199.14	22.42	21.52	199.38	22.23	21.33	199.57	22.54	21.64	199.26	21.73	20.83	200.07	22.70	21.80	199.10
MW13-1	25.90	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW13-2	32.30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW13-3	17.10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW13-4	20.10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW13-5	10.36	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW17-01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW17-02	10.36	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Notes: m - metres mAMSL - metres above sea level																			



Table C1 Historic Groundwater Elevations

Date:		Mar-05			Feb-06			May-06			Sep-06			Nov-06			Apr-07		
Monitoring Well	Well Depth (m)	Depth to GW (m)	Depth Below Ground Level (m)	Groundwater Elevation (mAMSL)	Depth to GW (m)	Depth Below Ground Level (m)	Groundwater Elevation (mAMSL)	Depth to GW (m)	Depth Below Ground Level (m)	Groundwater Elevation (mAMSL)	Depth to GW (m)	Depth Below Ground Level (m)	Groundwater Elevation (mAMSL)	Depth to GW (m)	Depth Below Ground Level (m)	Groundwater Elevation (mAMSL)	Depth to GW (m)	Depth Below Ground Level (m)	Groundwater Elevation (mAMSL)
MW-1	11.20	4.81	3.75	208.57	3.38	2.32	210.00	4.87	3.81	208.51	6.00	4.94	207.38	3.37	2.31	210.01	4.70	3.64	208.68
MW-2	5.77	5.54	4.83	207.39	4.44	3.73	208.49	5.56	4.85	207.37	7.20	6.49	205.73	5.29	4.58	207.64	5.50	4.79	207.43
MW-2A	7.06	6.25	5.88	207.74	5.23	4.86	208.76	6.60	6.23	207.39	6.80	6.43	207.19	6.60	6.23	207.39	5.60	5.23	208.39
MW-3	4.27	3.65	2.70	207.64	2.11	1.16	209.18	3.64	2.69	207.65	4.22	3.27	207.07	1.45	0.50	209.84	2.99	2.04	208.30
MW-4	11.50	7.30	6.60	212.44	2.50	1.80	217.24	7.84	7.14	211.90	10.46	9.76	209.28	6.95	6.25	212.79	5.29	4.59	214.45
MW-4A	4.04	3.59	2.94	216.10	5.50	4.85	214.19	1.87	1.22	217.82	4.60	3.95	215.09	1.91	1.26	217.78	2.41	1.76	217.28
MW-5	14.30	11.57	11.52	210.60	14.43	14.38	207.74	14.50	14.45	207.67	16.70	16.65	205.47	14.76	14.71	207.41	9.37	9.32	212.80
MW99-7	19.50	15.61	14.71	196.79	14.43	13.53	197.97	15.77	14.87	196.63	16.48	15.58	195.92	13.90	13.00	198.50	13.98	13.08	198.42
MW99-8	29.00	27.52	26.62	189.38	27.73	26.83	189.17	28.87	27.97	188.03	28.44	27.54	188.46	28.59	27.69	188.31	26.48	25.58	190.42
MW99-9	25.90	21.67	20.77	200.13	24.74	23.84	197.06	22.08	21.18	199.72	22.63	21.73	199.17	22.68	21.78	199.12	20.56	19.66	201.24
MW13-1	25.90	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW13-2	32.30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW13-3	17.10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW13-4	20.10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW13-5	10.36	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW17-01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW17-02	10.36	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Notes: m - metres mAMSL - metres above sea level																			

Table C1 Historic Groundwater Elevations

Date:		Jul-08			Nov-08			Jul-09			Nov-09			Mar-10			Aug-10		
Monitoring Well	Well Depth (m)	Depth to GW (m)	Depth Below Ground Level (m)	Groundwater Elevation (mAMSL)	Depth to GW (m)	Depth Below Ground Level (m)	Groundwater Elevation (mAMSL)	Depth to GW (m)	Depth Below Ground Level (m)	Groundwater Elevation (mAMSL)	Depth to GW (m)	Depth Below Ground Level (m)	Groundwater Elevation (mAMSL)	Depth to GW (m)	Depth Below Ground Level (m)	Groundwater Elevation (mAMSL)	Depth to GW (m)	Depth Below Ground Level (m)	Groundwater Elevation (mAMSL)
MW-1	11.20	5.75	4.69	207.63	4.95	3.89	208.43	5.64	4.58	207.74	5.96	4.90	207.42	4.22	3.16	209.16	5.66	4.60	207.72
MW-2	5.77	7.85	7.14	205.08	6.31	5.60	206.62	6.46	5.75	206.47	6.93	6.22	206.00	5.67	4.96	207.26	6.63	5.92	206.30
MW-2A	7.06	6.78	6.41	207.21	7.82	7.45	206.17	6.78	6.41	207.21	6.82	6.45	207.17	5.87	5.50	208.13	6.79	6.42	207.20
MW-3	4.27	4.00	3.05	207.29	2.39	1.44	208.90	3.90	2.95	207.39	1.95	1.00	209.34	1.99	1.04	209.30	3.85	2.90	207.44
MW-4	11.50	10.05	9.35	209.69	8.47	7.77	211.27	9.85	9.15	209.89	10.93	10.23	208.81	6.31	5.61	213.43	10.85	10.15	208.89
MW-4A	4.04	4.30	3.65	215.39	3.21	2.56	216.48	4.70	4.05	214.99	3.98	3.33	215.71	2.95	2.30	216.75	4.17	3.52	215.52
MW-5	14.30	16.00	15.95	206.17	16.10	16.05	206.07	-	-	-	16.80	16.75	205.37	-	-	-	-	-	-
MW99-7	19.50	15.41	14.51	196.99	14.50	13.60	197.90	15.95	15.05	196.45	15.16	14.26	197.24	-	-	-	-	-	-
MW99-8	29.00	28.29	27.39	188.61	28.72	27.82	188.18	28.80	27.90	188.10	28.99	28.09	187.91	-	-	-	28.17	27.27	188.73
MW99-9	25.90	22.47	21.57	199.33	22.80	21.90	199.00	22.32	21.42	199.48	23.00	22.10	198.80	-	-	-	-	-	-
MW13-1	25.90	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW13-2	32.30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW13-3	17.10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW13-4	20.10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW13-5	10.36	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW17-01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW17-02	10.36	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Notes: m - metres mAMSL - metres above sea level																			



Table C1 Historic Groundwater Elevations

Date:		Dec-10			Jul-11			Oct-11			Dec-11			Feb-12			Mar-12		
Monitoring Well	Well Depth (m)	Depth to GW (m)	Depth Below Ground Level (m)	Groundwater Elevation (mAMSL)	Depth to GW (m)	Depth Below Ground Level (m)	Groundwater Elevation (mAMSL)	Depth to GW (m)	Depth Below Ground Level (m)	Groundwater Elevation (mAMSL)	Depth to GW (m)	Depth Below Ground Level (m)	Groundwater Elevation (mAMSL)	Depth to GW (m)	Depth Below Ground Level (m)	Groundwater Elevation (mAMSL)	Depth to GW (m)	Depth Below Ground Level (m)	Groundwater Elevation (mAMSL)
MW-1	11.20	3.45	2.39	209.93	5.40	4.34	207.98	6.07	5.01	207.31	5.26	4.20	208.12	-	-	-	-	-	-
MW-2	5.77	6.26	5.55	206.67	6.49	5.78	206.44	7.03	6.32	205.90	6.45	5.74	206.48	-	-	-	-	-	-
MW-2A	7.06	5.77	5.40	208.22	6.79	6.42	207.20	6.81	6.44	207.19	6.80	6.43	207.19	-	-	-	6.78	6.41	207.21
MW-3	4.27	2.50	1.55	208.79	3.60	2.65	207.69	3.35	2.40	207.95	3.16	2.21	208.13	-	-	-	-	-	-
MW-4	11.50	7.74	7.04	212.00	8.99	8.29	210.75	11.12	10.42	208.62	9.30	8.60	210.44	-	-	-	-	-	-
MW-4A	4.04	1.97	1.32	217.72	4.20	3.55	215.49	3.43	2.78	216.26	3.92	3.27	215.77	3.20	2.55	216.49	-	-	-
MW-5	14.30	16.30	16.25	205.87	15.24	15.19	206.93	16.05	16.00	206.12	16.15	16.10	206.02	13.97	13.92	208.20	-	-	-
MW99-7	19.50	14.50	13.60	197.90	15.71	14.81	196.69	16.05	15.15	196.36	15.10	14.20	197.30	-	-	-	-	-	-
MW99-8	29.00	28.53	27.63	188.37	27.94	27.04	188.96	28.37	27.47	188.53	28.56	27.66	188.34	-	-	-	-	-	-
MW99-9	25.90	22.71	21.81	199.09	22.34	21.44	199.46	22.61	21.71	199.19	22.72	21.82	199.08	-	-	-	-	-	-
MW13-1	25.90	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW13-2	32.30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW13-3	17.10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW13-4	20.10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW13-5	10.36	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW17-01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW17-02	10.36	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Notes: m - metres mAMSL - metres above sea level																			



Table C1 Historic Groundwater Elevations

Date:		Jul-12			Dec-12			Mar-13			Jun-13			Sep-13			Nov-13		
Monitoring Well	Well Depth (m)	Depth to GW (m)	Depth Below Ground Level (m)	Groundwater Elevation (mAMSL)	Depth to GW (m)	Depth Below Ground Level (m)	Groundwater Elevation (mAMSL)	Depth to GW (m)	Depth Below Ground Level (m)	Groundwater Elevation (mAMSL)	Depth to GW (m)	Depth Below Ground Level (m)	Groundwater Elevation (mAMSL)	Depth to GW (m)	Depth Below Ground Level (m)	Groundwater Elevation (mAMSL)	Depth to GW (m)	Depth Below Ground Level (m)	Groundwater Elevation (mAMSL)
MW-1	11.20	5.26	4.20	208.12	3.84	2.78	209.54	4.30	3.26	209.06	4.73	3.69	208.63	5.92	4.88	207.44	-	-	-
MW-2	5.77	6.18	5.47	206.75	4.67	3.96	208.26	-	-	-	5.52	3.80	208.42	7.11	5.39	206.83	-	-	-
MW-2A	7.06	5.61	5.24	208.38	5.42	5.05	208.57	-	-	-	6.19	5.79	207.83	6.88	6.48	207.14	-	-	-
MW-3	4.27	3.79	2.84	207.50	2.20	1.25	209.09	2.78	1.82	208.52	3.96	3.00	210.47	5.80	4.80	208.67	-	-	-
MW-4	11.50	8.50	7.80	211.24	7.40	6.70	212.34	5.84	5.03	216.35	7.64	6.83	212.21	10.27	9.46	209.58	-	-	-
MW-4A	4.04	4.00	3.35	215.69	1.91	1.26	217.78	3.44	2.69	216.35	3.49	2.74	216.30	4.10	3.35	215.69	-	-	-
MW-5	14.30	15.60	15.55	206.57	14.94	14.89	207.23	12.34	11.26	210.86	14.10	13.02	209.10	16.39	15.31	206.81	-	-	-
MW99-7	19.50	15.20	14.30	197.20	13.88	12.98	198.52	14.60	13.77	197.73	14.73	13.90	197.60	-	-	-	-	-	-
MW99-8	29.00	28.80	27.90	188.10	28.48	27.58	188.42	27.71	26.78	189.22	27.84	26.91	189.09	-	-	-	-	-	-
MW99-9	25.90	22.31	21.41	199.49	22.57	21.67	199.23	21.93	21.03	198.97	22.50	21.60	198.40	-	-	-	-	-	-
MW13-1	25.90	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	22.12	22.12	199.80
MW13-2	32.30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	26.16	26.16	189.08
MW13-3	17.10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	14.73	14.73	199.08
MW13-4	20.10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	16.14	15.14	205.53
MW13-5	10.36	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11.26	10.26	210.26
MW17-01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW17-02	10.36	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Notes: m - metres mAMSL - metres above sea level																			



Table C1 Historic Groundwater Elevations

Date:		Dec-13			Apr-14			Jun-14			Sep-14			Dec-14			Mar-15		
Monitoring Well	Well Depth (m)	Depth to GW (m)	Depth Below Ground Level (m)	Groundwater Elevation (mAMSL)	Depth to GW (m)	Depth Below Ground Level (m)	Groundwater Elevation (mAMSL)	Depth to GW (m)	Depth Below Ground Level (m)	Groundwater Elevation (mAMSL)	Depth to GW (m)	Depth Below Ground Level (m)	Groundwater Elevation (mAMSL)	Depth to GW (m)	Depth Below Ground Level (m)	Groundwater Elevation (mAMSL)	Depth to GW (m)	Depth Below Ground Level (m)	Groundwater Elevation (mAMSL)
MW-1	11.20	-	-	-	4.30	3.26	209.06	5.08	4.04	208.28	-	-	-	3.28	2.24	210.08	4.31	3.27	209.05
MW-2	5.77	-	-	-	4.58	2.86	209.36	5.65	3.93	208.29	7.09	5.37	206.85	4.10	2.38	209.84	4.95	3.23	208.99
MW-2A	7.06	-	-	-	5.37	4.97	208.65	-	-	-	-	-	-	4.82	4.42	209.20	5.47	5.07	208.55
MW-3	4.27	-	-	-	4.17	3.17	210.30	5.02	4.02	209.45	5.64	4.64	208.83	4.17	3.17	210.30	209.30	2.94	210.53
MW-4	11.50	-	-	-	6.27	5.46	213.58	8.60	7.79	211.25	-	-	-	6.28	5.47	213.57	6.89	6.08	212.96
MW-4A	4.04	-	-	-	3.30	2.55	216.49	-	-	-	4.00	3.25	215.79	1.61	0.86	218.18	3.10	2.35	216.69
MW-5	14.30	-	-	-	13.20	12.12	210.00	14.97	13.89	208.23	-	-	-	15.40	14.32	207.80	12.33	11.25	210.87
MW99-7	19.50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW99-8	29.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW99-9	25.90	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW13-1	25.90	22.14	22.14	199.77	21.50	21.50	200.41	21.68	21.68	200.23	22.95	22.95	198.96	22.70	22.70	199.21	21.35	21.35	200.56
MW13-2	32.30	26.38	26.38	188.86	24.78	24.78	190.45	27.26	27.26	187.97	29.25	29.25	185.98	23.97	23.97	191.26	25.28	25.28	189.95
MW13-3	17.10	14.90	14.90	198.91	13.79	13.79	200.02	14.90	14.90	198.91	15.63	15.63	198.18	11.86	11.86	201.95	14.79	14.79	199.02
MW13-4	20.10	16.23	15.23	205.44	14.32	13.32	207.35	14.90	13.90	206.77	15.98	14.98	205.69	14.96	13.96	206.71	12.21	11.21	209.46
MW13-5	10.36	11.23	10.23	210.29	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW17-01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW17-02	10.36	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Notes: m - metres mAMSL - metres above sea level																			

Table C1 Historic Groundwater Elevations

Date:		Jul-15			Oct-15			Nov-15			Mar-16			Jul-16			Sep-16		
Monitoring Well	Well Depth (m)	Depth to GW (m)	Depth Below Ground Level (m)	Groundwater Elevation (mAMSL)	Depth to GW (m)	Depth Below Ground Level (m)	Groundwater Elevation (mAMSL)	Depth to GW (m)	Depth Below Ground Level (m)	Groundwater Elevation (mAMSL)	Depth to GW (m)	Depth Below Ground Level (m)	Groundwater Elevation (mAMSL)	Depth to GW (m)	Depth Below Ground Level (m)	Groundwater Elevation (mAMSL)	Depth to GW (m)	Depth Below Ground Level (m)	Groundwater Elevation (mAMSL)
MW-1	11.20	5.68	4.64	207.68	5.92	4.88	207.44	4.40	3.36	208.96	4.11	3.07	209.25	5.31	4.27	208.05	5.87	4.83	207.49
MW-2	5.77	6.44	4.72	207.50	6.84	5.12	207.10	5.18	3.46	208.76	4.45	2.73	209.49	6.10	4.38	207.84	6.78	5.06	207.16
MW-2A	7.06	-	-	-	-	-	-	6.00	5.60	208.02	5.27	4.87	208.75	6.77	6.37	207.25	6.80	6.40	207.22
MW-3	4.27	5.11	4.11	209.36	5.20	4.20	209.27	4.75	3.75	209.72	4.47	3.47	210.00	5.20	4.20	209.27	5.30	4.30	209.17
MW-4	11.50	9.92	9.11	209.93	11.10	10.29	208.75	8.00	7.19	211.85	6.14	5.33	213.71	9.34	8.53	210.51	11.40	10.59	208.45
MW-4A	4.04	-	-	-	-	-	-	3.65	2.90	216.14	3.48	2.73	216.31	4.00	3.25	215.79	Dry	-	-
MW-5	14.30	-	-	-	-	-	-	-	-	-	11.78	10.70	211.42	16.20	15.12	207.00	15.97	14.89	207.23
MW99-7	19.50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW99-8	29.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW99-9	25.90	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW13-1	25.90	21.80	21.80	200.11	-	-	-	22.24	22.24	199.67	21.33	21.33	200.58	21.88	21.88	200.03	22.14	22.14	199.77
MW13-2	32.30	28.06	28.06	187.17	28.43	28.43	186.80	25.20	25.20	190.03	25.70	25.70	189.53	26.99	26.99	188.24	28.75	28.75	186.48
MW13-3	17.10	15.42	15.42	198.39	15.29	15.29	198.52	14.40	14.40	199.41	14.62	14.62	199.19	14.91	14.91	198.90	15.25	15.25	198.56
MW13-4	20.10	14.68	13.68	206.99	17.62	16.62	204.05	16.72	15.72	204.95	12.15	11.15	209.52	13.78	12.78	207.89	16.19	15.19	205.48
MW13-5	10.36	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW17-01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW17-02	10.36	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Notes: m - metres mAMSL - metres above sea level																			



Table C1 Historic Groundwater Elevations

Date:		Dec-16			Apr-17			Jun-17			Nov-17			Dec-17		
Monitoring Well	Well Depth (m)	Depth to GW (m)	Depth Below Ground Level (m)	Groundwater Elevation (mAMSL)	Depth to GW (m)	Depth Below Ground Level (m)	Groundwater Elevation (mAMSL)	Depth to GW (m)	Depth Below Ground Level (m)	Groundwater Elevation (mAMSL)	Depth to GW (m)	Depth Below Ground Level (m)	Groundwater Elevation (mAMSL)	Depth to GW (m)	Depth Below Ground Level (m)	Groundwater Elevation (mAMSL)
MW-1	11.20	3.95	2.91	209.41	3.65	2.61	209.71	4.50	3.46	208.86	5.78	4.74	207.58	4.30	3.26	209.60
MW-2	5.77	2.53	0.81	211.41	4.35	2.63	209.59	5.17	3.45	208.77	5.67	3.95	208.27	4.40	2.68	209.54
MW-2A	7.06	5.31	4.91	208.71	5.15	4.75	208.87	5.95	5.55	209.39	6.80	6.40	207.22	6.74	6.34	207.28
MW-3	4.27	4.57	3.57	209.90	4.40	3.40	210.07	4.63	3.63	209.84	4.89	3.89	207.22	4.55	3.55	207.28
MW-4	11.50	6.30	5.49	213.55	8.84	8.03	213.01	7.50	6.69	212.35	10.97	10.16	208.88	7.61	6.80	212.24
MW-4A	4.04	3.51	2.76	216.28	3.14	2.39	216.65	Dry	-	-	3.68	2.93	216.11	3.30	2.55	216.49
MW-5	14.30	14.20	13.12	209.00	12.90	11.82	210.30	13.28	12.20	209.92	-	-	-	-	-	-
MW99-7	19.50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW99-8	29.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW99-9	25.90	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW13-1	25.90	21.88	21.88	200.03	20.50	20.50	201.41	21.47	21.47	200.44	22.14	22.14	199.77	22.10	22.10	199.81
MW13-2	32.30	24.44	24.44	190.79	24.30	24.30	190.93	26.70	26.70	188.53	26.74	26.74	188.49	25.00	25.00	190.23
MW13-3	17.10	14.16	14.16	199.65	12.40	12.40	201.41	14.88	14.88	198.93	15.17	15.17	198.64	14.20	14.20	199.61
MW13-4	20.10	15.59	14.59	206.08	13.10	12.10	208.57	12.45	11.45	209.22	16.39	15.39	205.28	16.15	15.15	205.52
MW13-5	10.36	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW17-01	-	-	-	-	-	-	-	-	-	-	14.94	14.15	209.85	-	-	-
MW17-02	10.36	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Notes: m - metres mAMSL - metres above sea level																

Table C1 Historic Groundwater Elevations

Date:		Mar-18			Jun-18			Jul-18			Sep-18			Dec-18		
Monitoring Well	Well Depth (m)	Depth to GW (m)	Depth Below Ground Level (m)	Groundwater Elevation (mAMSL)	Depth to GW (m)	Depth Below Ground Level (m)	Groundwater Elevation (mAMSL)	Depth to GW (m)	Depth Below Ground Level (m)	Groundwater Elevation (mAMSL)	Depth to GW (m)	Depth Below Ground Level (m)	Groundwater Elevation (mAMSL)	Depth to GW (m)	Depth Below Ground Level (m)	Groundwater Elevation (mAMSL)
MW-1	11.20	3.97	2.93	209.39	5.30	4.26	208.06	5.40	4.36	207.96	6.04	5.00	207.32	4.04	3.00	209.32
MW-2	5.77	4.40	#REF!	209.54	5.72	213.94	208.22	4.43	2.71	209.51	6.85	5.13	207.09	5.09	3.37	208.85
MW-2A	7.06	5.22	3.50	208.80	6.34	5.94	207.68	-	-	-	6.84	6.44	207.18	5.91	5.51	208.11
MW-3	4.27	4.40	4.00	210.07	4.80	3.80	209.67	4.83	3.83	209.64	5.06	4.06	209.41	4.43	3.43	210.04
MW-4	11.50	6.43	5.43	213.42	8.78	7.97	211.07	9.56	8.75	210.29	11.50	10.69	208.35	7.60	6.79	212.25
MW-4A	4.04	3.50	2.69	216.29	3.81	3.06	215.98	-	-	-	3.50	2.75	216.29	2.78	2.03	217.01
MW-5	14.30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW99-7	19.50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW99-8	29.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW99-9	25.90	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW13-1	25.90	21.31	21.31	200.60	21.61	21.61	200.30	21.80	21.80	200.11	22.07	22.07	199.84	22.12	22.12	199.79
MW13-2	32.30	25.10	25.10	190.13	27.10	27.10	188.13	27.56	27.56	187.67	29.25	29.25	185.98	25.22	25.22	190.01
MW13-3	17.10	14.42	14.42	199.39	15.10	15.10	198.71	15.20	15.20	198.61	14.53	14.53	199.28	13.74	13.74	200.07
MW13-4	20.10	12.24	11.24	209.43	13.27	12.27	208.40	14.14	13.14	207.53	16.00	15.00	205.67	16.39	15.39	205.28
MW13-5	10.36	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW17-01	-	11.21	#REF!	213.58	-	-	-	-	-	-	14.95	#REF!	209.84	-	-	-
MW17-02	10.36	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Notes: m - metres mAMSL - metres above sea level																



Table C1 Historic Groundwater Elevations

Date:		Apr-19			Nov-19			Dec-19			Mar-20			Jul-20		
Monitoring Well	Well Depth (m)	Depth to GW (m)	Depth Below Ground Level (m)	Groundwater Elevation (mAMSL)	Depth to GW (m)	Depth Below Ground Level (m)	Groundwater Elevation (mAMSL)	Depth to GW (m)	Depth Below Ground Level (m)	Groundwater Elevation (mAMSL)	Depth to GW (m)	Depth Below Ground Level (m)	Groundwater Elevation (mAMSL)	Depth to GW (m)	Depth Below Ground Level (m)	Groundwater Elevation (mAMSL)
MW-1	11.20	6.20	5.16	207.16	6.04	5.00	207.32	4.04	3.00	209.32	4.00	2.96	209.36	5.25	4.21	208.11
MW-2	5.77	5.38	3.66	208.56	5.66	3.94	208.28	5.30	3.58	208.64	5.20	3.48	208.74	6.60	4.88	207.34
MW-2A	7.06	6.17	5.77	207.85	6.41	6.01	207.61	6.40	6.00	207.62	5.7	5.30	208.32	6.45	6.05	207.57
MW-3	4.27	4.92	3.92	209.55	4.68	3.68	209.79	4.65	3.65	209.82	4.6	3.60	209.87	5.95	4.95	208.52
MW-4	11.50	8.60	7.79	211.25	8.60	7.79	211.25	8.20	7.39	211.65	7.70	6.89	212.15	10.01	9.20	209.84
MW-4A	4.04	4.02	3.27	215.77	3.67	2.92	216.12	3.50	2.75	216.29	-	-	-	-	-	-
MW-5	14.30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW99-7	19.50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW99-8	29.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW99-9	25.90	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW13-1	25.90	21.60	21.60	200.31	22.14	22.14	199.77	22.15	22.15	199.76	21.51	21.51	200.40	22.00	22.00	199.91
MW13-2	32.30	26.66	26.66	188.57	25.90	25.90	189.33	25.92	25.92	189.31	25.80	25.80	189.43	28.70	28.70	186.53
MW13-3	17.10	14.82	14.82	198.99	14.60	14.60	199.21	14.40	14.40	199.41	14.70	14.70	199.11	15.05	15.05	198.76
MW13-4	20.10	13.40	12.40	208.27	16.47	15.47	205.20	16.24	15.24	205.43	12.00	11.00	209.67	15.30	14.30	206.37
MW13-5	10.36	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW17-01	-	11.21	10.42	213.58	-	-	-	-	-	-	12.31	11.52	212.48	-	-	-
MW17-02	10.36	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Notes: m - metres mAMSL - metres above sea level																

Table C1 Historic Groundwater Elevations

Date:		Oct-20			Dec-20			Mar-21			Jun-21			Oct-21			Dec-21		
Monitoring Well	Well Depth (m)	Depth to GW (m)	Depth Below Ground Level (m)	Groundwater Elevation (mAMSL)	Depth to GW (m)	Depth Below Ground Level (m)	Groundwater Elevation (mAMSL)	Depth to GW (m)	Depth Below Ground Level (m)	Groundwater Elevation (mAMSL)	Depth to GW (m)	Depth Below Ground Level (m)	Groundwater Elevation (mAMSL)	Depth to GW (m)	Depth Below Ground Level (m)	Groundwater Elevation (mAMSL)	Depth to GW (m)	Depth Below Ground Level (m)	Groundwater Elevation (mAMSL)
MW-1	11.20	5.25	4.21	208.11	4.82	3.78	208.54	4	2.96	209.36	5.39	4.35	207.97	5.46	4.42	207.9	3.5	2.46	209.86
MW-2	5.77	4.67	2.95	209.27	6.90	5.18	209.04	4.94	3.22	209	5.37	3.65	208.57	6.5	4.78	207.44	-	-	-
MW-2A	7.06	-	-	-	5.42	5.02	208.60	5.42	5.02	-	-	-	-	6.7	6.3	207.32	3.63	3.23	-
MW-3	4.27	5.90	4.90	208.57	4.32	3.32	210.15	4.6	3.6	209.87	5.18	4.18	209.29	5.3	4.3	209.17	3.8	2.8	210.67
MW-4	11.50	10.26	9.45	209.59	7.17	6.36	212.68	6.68	5.87	213.17	9.71	8.90	210.14	10.3	9.49	209.55	3.63	2.82	216.22
MW-4A	4.04	3.42	2.67	216.37	3.86	3.11	215.93	3.77	3.02	216.02	4	3.25	215.79	3.56	2.81	216.23	3.63	2.88	216.16
MW-5	14.30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW99-7	19.50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW99-8	29.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW99-9	25.90	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW13-1	25.90	22.17	22.17	199.74	22.12	22.12	199.79	21.35	21.35	200.56	22.5	22.5	199.41	22.7	22.7	199.21	21.9	21.9	200.01
MW13-2	32.30	29.30	29.30	185.93	25.20	25.20	190.03	25.6	25.6	189.63	28.3	28.3	186.93	29	29	186.23	24.0	24	191.23
MW13-3	17.10	12.33	12.33	201.48	13.47	13.47	200.34	0.63	0.63	213.19	15.9	15.9	197.91	15	15	198.81	12.5	12.5	201.31
MW13-4	20.10	16.38	15.38	205.29	16.70	15.70	204.97	11.2	10.2	210.47	14.42	13.42	207.25	18	17	203.67	13.65	12.65	208.02
MW13-5	10.36	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW17-01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW17-02	10.36	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Notes: m - metres mAMSL - metres above sea level																			

Table C1 Historic Groundwater Elevations

Date:		Mar-22			Jul-22			Sep-22			Dec-22		
Monitoring Well	Well Depth (m)	Depth to GW (m)	Depth Below Ground Level (m)	Groundwater Elevation (mAMSL)	Depth to GW (m)	Depth Below Ground Level (m)	Groundwater Elevation (mAMSL)	Depth to GW (m)	Depth Below Ground Level (m)	Groundwater Elevation (mAMSL)	Depth to GW (m)	Depth Below Ground Level (m)	Groundwater Elevation (mAMSL)
MW-1	11.20	3.61	2.57	209.36	4.88	3.84	207.97	6.18	5.14	207.9	3.5	2.46	209.86
MW-2	5.77	-	-	-	-	-	-	-	-	-	-	-	-
MW-2A	7.06	5	4.60	-	6.25	5.85	-	-	-	207.32	-	-	-
MW-3	4.27	4.1	3.10	209.87	4.82	3.82	209.29	5.7	5.67	209.17	-	-	210.67
MW-4	11.50	6.23	5.42	213.17	12.85	12.85	210.14	11.14	11.14	209.55	-	-	216.22
MW-4A	4.04	4.43	4.43	216.02	-	-	215.79	-	-	-	-	-	-
MW-5	14.30	-	-	-	-	-	-	-	-	-	-	-	-
MW99-7	19.50	-	-	-	-	-	-	-	-	-	-	-	-
MW99-8	29.00	-	-	-	-	-	-	-	-	-	-	-	-
MW99-9	25.90	-	-	-	-	-	-	-	-	-	-	-	-
MW13-1	25.90	22.79	22.8	200.56	21.7	21.65	199.41	29.0	28.96	199.21	-	-	200.01
MW13-2	32.30	-	-	189.63	15.9	15.92	186.93	17	17.44	186.23	-	-	191.23
MW13-3	17.10	12.21	12.2	213.19		0.00	197.91		0.00	198.81			201.31
MW13-4	20.10	11.8	11.76	210.47	20.32	19.32	207.25	20	20.37	203.67	-	-	208.02
MW13-5	10.36	-	-	-	-	-	-	-	-	-	-	-	-
MW17-01	-	-	-	-	-	-	-	-	-	-	-	-	-
MW17-02	10.36	-	-	-	-	-	-	-	-	-	-	-	-
Notes: m - metres mAMSL - metres above sea level													

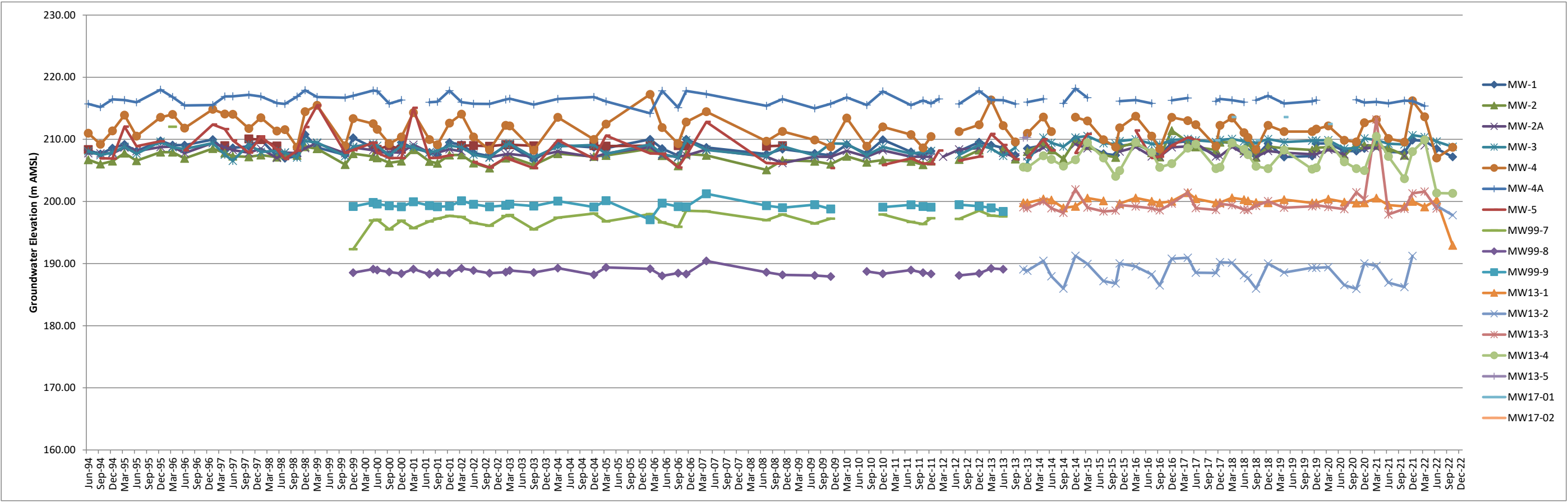


Figure C1
Historic Groundwater Elevations
Sechelt Landfill



APPENDIX D
MINISTRY OF ENVIRONMENT – CONDITIONAL WATER
LICENCE

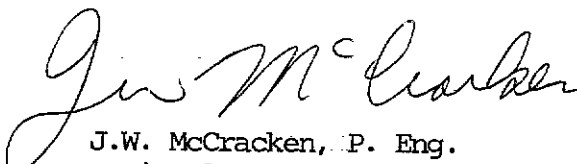
THE PROVINCE OF BRITISH COLUMBIA—WATER ACT

CONDITIONAL WATER LICENCE

Sunshine Coast Regional District of Box 800, Sechelt, B.C. V0N 3A0

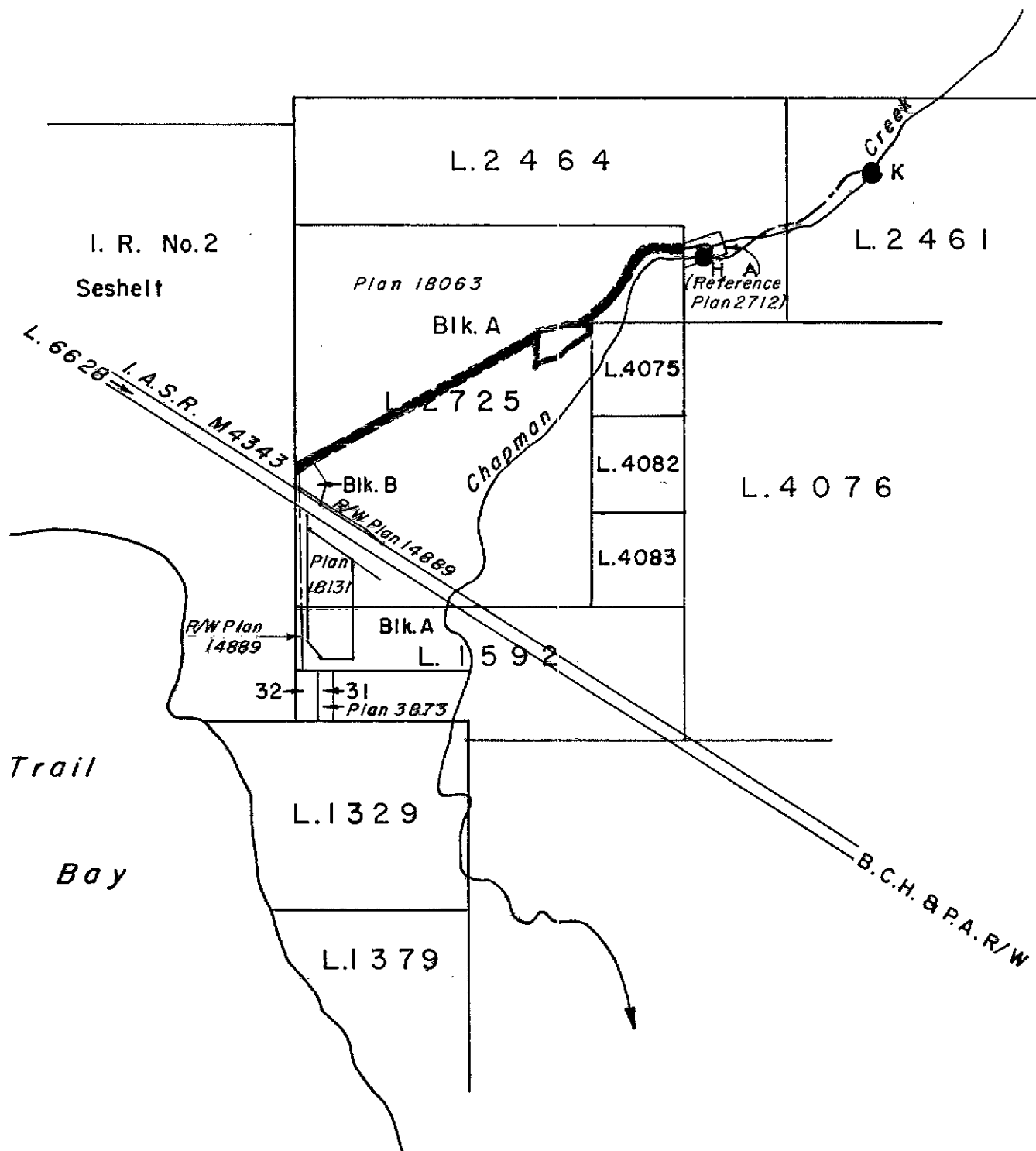
is hereby authorized to divert and use water as follows:

- (a) The stream on which the rights are granted is Chapman Creek.
- (b) The point of diversion is located as shown on the attached plan.
- (c) The date from which this licence shall have precedence is 3rd June, 1929.
- (d) The purpose for which this licence is issued is waterworks.
- (e) The maximum quantity of water which may be diverted is 300,000 gallons a day.
- (f) The period of the year during which the water may be used is the whole year.
- (g) This licence is appurtenant to the waterworks undertaking of the licensee within the boundaries of the Sunshine Coast Regional District.
- (h) The works authorized to be constructed are diversion structure, tank, pipe and distribution system, which shall be located approximately as shown on the attached plan.
- (i) The construction of the said works has been completed and the water is being beneficially used. The licensee shall continue to make a regular beneficial use of the water in the manner authorized herein.
- (j) This licence is issued in substitution of Conditional Licence 11728.


J.W. McCracken, P. Eng.
Regional Water Manager



Province of British Columbia



WATER DISTRICT : VANCOUVER
PRECINCT : HOWE SOUND
LAND DISTRICT : GP. I, NEW WESTMINSTER

LEGEND

Scale : 1:25,000
Point of Diversion : ●●
Map Number : WR 926-042-3-4
Pipe :
Permit over Crown Land:  

Signature *J. W. McPherson*
Date 14th April, 1989.

C.L. 69217
File 0086708
P.C.L. 17351

This licence is appurtenant to all the land within The Sunshine Coast Regional District.



APPENDIX E
HISTORIC DATA AND CONCENTRATION VERSUS TIME
GRAPHS

Notes:
- No data available

Notes:

Table E2 Historic Groundwater Quality Results - Site MW-2

Sample Date:		Jun-00	Dec-00	Jul-01	Dec-01	Jul-02	Oct-02	Mar-03	Sep-03	Mar-04	Dec-04	Mar-05	Feb-06	May-06	Nov-06	Apr-07	Sep-07	Nov-07	Jul-08	Dec-08	Jul-09	Jul-09	Nov-09	Aug-10	Aug-10	Dec-10	Jul-11	Dec-11	Aug-12	Dec-12	Mar-13	Jun-13	Sep-13	Dec-13	Dec-13			
	Units																				Duplicate			Duplicate											Duplicate			
Parameters:																																						
General																																						
Theoretical Oxygen Demand (COD)	mg/L	11	11	12	ND (10)	11	12	16	32	11	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	15	ND (10)	ND (10)	ND (10)	30	32	ND (10)	27	21	14	ND (10)	25	21	18	ND (10)	16			
Dissolved Organic Carbon	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	ND (10)	ND (10)	ND (10)	-	2.5	1.5	-	-	2.6	-	1.15	0.8	1.3	-	-	3.19	1.37	1.69	2.03			
Conductivity, Electrical	mS/cm	899	612	688	587	868	697	672	825	760	757	689	934	843	863	1370	1040	730	1000	710	980	990	738	1560	1520	534	1440	771	921	326	488	900	1150	715	710			
pH	s.u.	6.4	6.2	6.2	6.5	6.7	7.3	7.1	6.9	6.9	6.8	6.8	7	6.7	7.1	7.2	7.1	6.9	6.8	7	7.4	7.6	7.9	7.5	6.7	7.6	7	7.3	7.5	7.09	7.32	7.36	7.22	7.36	7.18	7.11		
Alkalinity (Total as CaCO3)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	85	-	-	-	-	-	-	73	107	48.7	94.6	83.9	68.7	61.3	60.6			
Alkalinity (PP as CaCO3)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	ND (0.5)	ND (0.5)	-	-	ND (0.5)	-	-	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)			
Bicarbonate (HCO3)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	106	100	-	-	120	89.2	59.5	82.8	90.5	82.8	83.8	81.8	82.77	82.78				
Carbonate (as CaCO3)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	ND (0.5)	ND (0.5)	-	-	-	-	-	-	-	-	-	-	-	-	ND (0.50)			
Hydroxide (OH)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	ND (0.5)	ND (0.5)	-	-	-	-	-	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)		
Turbidity	NTU	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2.9	3.6	-	-	4	-	-	4.85	12.9	2.3	1.84	1.34	9.04	3	1.42			
Hardness (as CaCO3)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	411	-	-	-	677	722	223	702	361	477	129	190	320	601	341	333		
Nutrients																																						
Ammonia	mg/L	ND (0.005)	0.006	0.007	0.022	ND (0.005)	0.006	0.006	0.053	0.013	0.018	0.013	ND (0.005)	0.077	0.02	0.017	ND (0.005)	ND (0.005)	0.002	0.03	0.034	0.107	0.026	ND (0.005)	-	0.006	ND (0.005)	0.019	0.011	0.018	0.019	0.019	0.033	0.0699	0.14			
Dissolved Nitrate (N)	mg/L	0.14	0.13	0.31	0.013	0.24	0.31	0.36	0.08	0.03	0.17	0.35	0.14	0.35	0.17	0.35	0.14	0.35	0.14	0.35	0.14	0.35	0.14	0.35	0.14	0.35	0.14	0.35	0.14	0.35	0.14	0.35	0.14	0.35	0.14			
Dissolved Nitrate (No)	mg/L	ND (0.05)	ND (0.05)	0.013	0.018	0.01	ND (0.05)	ND (0.05)	0.005	ND (0.05)	0.009	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.050)	ND (0.050)	ND (0.050)	ND (0.050)	ND (0.050)	ND (0.050)			
Total Phosphorus	mg/L	-	-	ND (0.1)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	ND (0.01)	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
Nitrate plus Nitrite (N)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
Total Nitrogen (N)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
Total Kjeldahl Nitrogen	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.14	0.17	-	-	-	-	-	-	-	-	-	-	-	-	-			
Anions																																						
Chloride	mg/L	20	14	26	48.6	39.4	22.6	2.3	46.6	51.8	43.3	37.5	88.3	55.1	48.9	93.1	51	35.5	65	43	160	150	89	190	200	56	160	58	100	41	68	140	80	80	82			
Sulfate	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	150	-	-	-	-	-	-	128	181	38.2	49.8	170	411	165	168			
Dissolved Metals																																						
Aluminum	mg/L	-	-	0.04	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.009	-	-	-	0.014	0.01	0.058	0.012	0.0165	0.0126	0.0134	0.0039	0.0295	0.0112	ND (0.0030)	ND (0.0030)		
Antimony	mg/L	-	-	ND (0.0005)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	ND (0.0005)	-	-	-	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)			
Arsenic	mg/L	-	-	ND (0.0001)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0002	-	-	-	0.0001	0.0001	0.0001	0.00019	0.00016	0.00016	0.00016	0.00016	0.00016	0.00016	0.00016			
Barium	mg/L	-	-	0.02	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.019	-	-	-	0.031	0.036	0.012	0.033	0.03	0.0107	0.0168	0.0168	0.0155	0.0153	-			
Beryllium	mg/L	-	-	ND (0.0002)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	ND (0.0001)	-	-	-	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)			
Bismuth	mg/L	-	-	ND (0.05)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	ND (0.001)	-	-	-	ND (0.001)	ND (0.001)	ND (0.001)	ND (0.001)	ND (0.001)	ND (0.001)	ND (0.001)	ND (0.001)	ND (0.001)	ND (0.001)	ND (0.001)			
Boron	mg/L	-	-	0.152	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.165	-	-	-	0.116	0.083	0.101	0.137	0.129	0.174	0.165	0.168	0.124	0.151	0.155			
Cadmium	mg/L	-	-	0.0002	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.00162	-	-	-	0.00067	0.00073	0.00083	0.00074	0.000335	0.000132	0.000682	0.00022	0.000286	0.000338	0.000185			
Calcium	mg/L	-	-	150	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	259	205	-	-	259	205	25	44	64	212	119	-	-	116				
Chromium	mg/L	-	-	ND (0.005)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	ND (0.001)	-	-	-	ND (0.001)	ND (0.001)	ND (0.001)	ND (0.001)	ND (0.001)	ND (0.001)	ND (0.001)	ND (0.001)	ND (0.001)	ND (0.001)	ND (0.001)			
Cobalt	mg/L	-	-	ND (0.005)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	ND (0.0005)	-	-	-	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)			
Copper	mg/L	-	-	ND (0.005)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0025	-	-	-	0.0006	0.0007	0.0021	0.0008	0.00071	0.00019	0.00075	0.00069	0.00075	0.00089	0.00667	0.0208		
Iron	mg/L	ND (0.005)	0.013	0.012	0.117	0.055	0.018	0.207	0.234	0.088	0.11	0.13	0.051	ND (0.005)	0.021	0.013	0.012	ND (0.005)	0.005	ND (0.005)	0.028	0.035	0.127	0.025	-	0.054	0.027	0.239	0.116	0.0184	0.0072	0.0343	0.037	0.0119	ND (0.0050)			
Lead	mg/L	-	-	ND (0.001)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	ND (0.0002)	-	-	-	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.00020)	ND (0.0002)	ND (0.00020)	ND (0.00020)	0.00021			
Lithium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
Lithium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
Magnesium	mg/L	-	-	5.16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9.04	-	-	-	16.2	18.3	5.41	15.6	12.5	4.36	7.07	6.54	7.07	10.5	10.6			
Manganese	mg/L	-	-	0.79	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.268	-	-	-	0.353	0.677	0.556	0.473	1.77	1.84	3.41	1.94	0.811	2.05	2.1			
Mercury	mg/L	-	-	ND (0.00005)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	ND (0.00005)	-	-	-	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)			
Molybdenum	mg/L	-	-	ND (0.005)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	ND (0.001)	-	-	-	ND (0.001)	ND (0.001)	ND (0.001)	ND (0.001)	ND (0.001)	ND (0.001)	ND (0.001)	ND (0.001)	ND (0.001)	ND (0.001)	ND (0.001)			
Nickel	mg/L	-	-	ND (0.008)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.005	-	-	-	ND (0.001)	ND (0.001)	ND (0.001)	ND (0.001)	ND (0.001)	ND (0.001)	ND (0.001)	ND (0.001)	ND (0.001)	ND (0.001)	ND (0.001)			
Phosphorus	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
Potassium	mg/L	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.81	-	-	-	2.68	2.99	1.57	2.28	1.89	1.88	1.12	1.41	1.62	2.02	1.71	1.68		
Selenium	mg/L	-	-	ND (0.001)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	ND (0.0001)	-	-	-	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)			
Silicon	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6.7	-	-	-	8.4	7.98	6.16	9.65	7.31	9.18	7.17	8.85	8.52	8.47				
Silver	mg/L	-	-	ND (0.0001)	-	-	-	-	-	-	-	-	-	-																								

Sample Date	Units	Apr-14	Jun-14	Sep-14	Dec-14	Mar-15	Jul-15	Oct-15	Dec-15	Dec-15	Mar-16	Jul-16	Sep-16	Dec-16	Apr-17	Jun-17	Nov-17	Dec-17	Mar-18	Jul-18	Sep-18	Sep-18	Dec-18	Dec-18	Apr-19	Nov-19	Dec-19	Mar-20	Jul-20	Oct-20	Dec-20	Mar-21	Jul-21	Oct-21		
Parameters:																																				
General																																				
Chemical Oxygen Demand (COD)	mg/L	13	13	14	ND (10)	19	27	47	18	26	ND (10)	14	21	ND (10)	11	14	17	21	36	23	19	24	113	61	32	40	30	100	40	8	40	8	30	20		
Dissolved Organic Carbon	mg/L	2.72	1.4	1.4	1.92	1.48	1.96	1.48	0.99	1.48	2.61	0.98	2.01	1.67	1.94	1.67	1.94	2.78	2.78	2.78	2.78	2.78	2.78	2.78	2.78	2.78	2.78	2.78	2.78	2.78	2.78	2.78	2.78	2.78		
Conductivity, Electrical	mS/cm	437	701	1420	280	811	1620	923	489	452	679	280	932	1200	489	498	987	727	752	764	1370	986	986	844	836	714	890	748	653	1660	1000	640	653	1660		
pH	s.u.	7.05	7.47	6.82	7.11	6.62	7.01	7.07	7.23	7.24	7.02	7.34	6.56	7.01	6.83	7.07	7.05	7.92	7.58	8.29	7.99	6.82	7.25	7.18	7.36	7.34	7.00	7.68	7.69	7	6.82	6.98	7.12	6.75	6.75	
Alkalinity (Total as CaCO3)	mg/L	88	97.5	95.7	62.2	75.7	66	50.3	33	31	82.7	57.9	52.9	60.9	87.4	73.5	56.9	80.2	37.4	134	135	76.4	78.2	163	168	160	131	127	261	169	86	145	160	111	73	
Alkalinity (PP as CaCO3)	mg/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)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)		
Bicarbonate (HCO3-)	mg/L	107	119	117	75.9	92	80.5	61.3	40.2	37.8	101	70.6	64.5	74	107	89.7	69.4	97.8	395	165	165	95.1	95.1	199	205	160	160	155	318	206	100	195	335	ND (0.01)		
Calcium (as CaCO3)	mg/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)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)		
Hydroxide (OH-)	mg/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)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)		
Turbidity	NTU	3.92	4.3	2.84	0.58	1.53	3.52	2.42	2.94	0.98	0.46	1.71	1.40	0.66	3.46	0.97	1.66																			

Notes:
- No data available

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Table E3 Historic Groundwater Quality Results - Site MW-2A

Sample Date:		Units	Jul-11	Dec-11	Feb-12	Aug-12	Dec-12	Mar-13	Jun-13	Apr-14	Dec-14	Mar-15	Dec-15	Mar-16	Dec-16	Apr-17	Jun-17	Dec-17	Mar-18	Dec-18	Apr-19	Apr-19 Duplicate	Nov-19	Dec-18	Mar-20	Dec-20	Mar-21	Jul-22
Parameters:																												
General																												
Chemical Oxygen Demand (COD)	mg/L	-	-	-	-	17	30	16	169	30	46	79	133	210	173	97	162	687	166	54	56	120	70	30	70	69	100	
Dissolved Oxygen Carbon	mg/L	-	-	-	-	3.34	-	3.36	33.8	7.3	6.17	3.02	27.9	55.2	46.9	21.1	35.8	174.0	32.0	11.0	11.3	16	16.1	5.6	13.7	17.2	1010	
Conductivity, Electrical	µS/cm	-	-	-	-	190	238	469	467	223	341	232	477	492	516	676	598	961	61.3	623	622	699	621	732	566	700	762	
pH	s.u.	-	-	-	-	7.79	7.77	7.31	7.53	7.55	7.99	7.48	7.73	7.85	7.74	7.91	8.20	7.70	7.28	7.59	7.21	7.19	7.28	7.28	7.28	7.37	7.62	
Alkalinity (Total as CaCO3)	mg/L	-	-	131	-	47	90.7	40.3	171	78.9	128	53.6	211	184	204	279	228	361	221	246	248	198	172	230	177	279	-	
Alkalinity (PP as CaCO3)	mg/L	-	-	ND (0.5)	-	ND (0.5)	ND (0.5)	ND (0.5)	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 (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (5)	ND (5)	ND (5)	ND (5)	435	
Bicarbonate (HCO3)	mg/L	-	-	160	-	57	111	49.1	208	96.3	157	65.4	257	225	249	341	278	440	256	240	241	209	280	216	341	341	<6	
Carbonate (as CaCO3)	mg/L	-	-	ND (0.5)	-	ND (0.5)	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 (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (6)	ND (6)	ND (6)	ND (6)	<5	
Hydroxide (OH)	mg/L	-	-	ND (0.5)	-	ND (0.5)	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 (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (5)	ND (5)	ND (5)	ND (5)	23.4	
Turbidity	NTU	-	-	101	-	7.6	45.8	6.82	15.9	4.16	37.1	36.5	24.8	29.8	56.4	30.4	36.9	132	29.7	28.1	18.0	77.3	28	9.11	28.6	45.9	190	
Hardness (as CaCO3)	mg/L	-	-	124	-	53	79.5	148	162	91.6	126	72.9	171	194	197	232	194	368	185	165	167	180	160	280	150	210	26.9	
Nutrients																												
Ammonia	mg/L	-	-	0.36	-	0.011	0.7	0.76	1.3	0.25	1.2	0.53	1.9	0.99	3.6 (2)	3.5 (2)	2.7 (2)	4.4	7.2	10.9	11.2	11.1	6.85	0.09	5.2	9.91	<0.1	
Dissolved Nitrate (N)	mg/L	-	-	ND (0.02)	-	0.12	0.135	13.8	ND (0.020)	ND (0.020)	0.834	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)	<0.1	
Dissolved Nitrite (N)	mg/L	-	-	ND (0.005)	-	0.006	0.0952	0.0763	ND (0.0050)	0.0116	0.0125	0.018	0.0132	ND (0.0050)	0.0132 (3)	ND (0.0050)	0.0055	ND (0.0050)	0.0055	0.266	0.269	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.005)	0.235	ND (0.1)	0.72
Total Phosphorus	mg/L	-	-	ND (0.01)	-	0.035	0.234	0.0169	0.236	0.0931	0.154	0.154	0.374	0.388	0.523 (2)	0.439	0.510	0.612	0.547	0.405	0.403	0.027	0.027	0.498	0.487	<0.36	0.498	
Nitrate plus Nitrite (N)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Total Nitrogen (N)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Total Kjeldahl Nitrogen	mg/L	-	-	1.32	-	0.531	1.05	ND (0.20)	2.87	1.08	2.06	1.17	3.14	2.89	5.46	5.11	4.21	7.04	12.6 (1)	13.10	12.7	9.88	9.65	0.71	8.49	12.9	34.6	
Anions																												
Chloride	mg/L	-	-	33	-	20	16	76	32	19	21	23	27	35	35	43	51	60	38	38.6	38.6	79.5	65.2	64	37.8	57.8	<1	
Sulfate	mg/L	-	-	ND (0.5)	-	12.4	4.15	16.6	ND (0.50)	5.85	4.76	14	ND (0.50)	0.61	ND (0.50)	ND (0.50)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	<1.0	2	0.2	56.7	13.00	ND (1)	0.05	
Dissolved Metals																												
Aluminum	mg/L	-	-	0.0035	-	0.005	ND (0.0030)	0.0048	0.254	0.72	ND (0.0030)	-	0.0044	0.0044	ND (0.0030)	ND (0.0030)	ND (0.0030)	ND (0.0030)	0.0034	ND (0.0050)	0.0034	ND (0.0050)	0.001	0.003	ND (0.001)	0.01	ND (0.005)	0.0052
Antimony	mg/L	-	-	ND (0.0005)	-	ND (0.0005)	ND (0.00050)	ND (0.00050)	ND (0.00050)	ND (0.00050)	ND (0.00050)	-	ND (0.00050)	ND (0.00050)	ND (0.00050)	ND (0.00050)	0.00039	ND (0.00050)	0.00025	0.00028	0.00028	0.00028	0.00039	0.0001	0.0003	0.00055	0.011	
Arsenic	mg/L	-	-	0.00296	-	0.00044	0.0016	0.00024	0.00555	0.00188	0.00109	-	0.00379	0.00355	0.00217	0.00383	0.00267	0.00293	0.00058	0.00159	0.00156	0.0017	0.002	0.0014	0.001	0.002	0.16	
Barium	mg/L	-	-	0.0245	-	0.0109	0.0162	0.0345	0.0406	0.0219	0.0406	-	0.0228	0.0227	0.0228	0.0227	0.0227	0.0227	0.0227	0.0227	0.0227	0.0227	0.0227	0.0227	0.0227	0.0227	0.0227	
Beryllium	mg/L	-	-	ND (0.0001)	-	ND (0.0001)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	-	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	<0.0001	
Bismuth	mg/L	-	-	ND (0.0001)	-	ND (0.0001)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	-	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	1.1	
Cadmium	mg/L	-	-	0.151	-	0.124	0.141	0.213	0.236	0.123	0.182	-	0.22	0.22	0.229	0.334	0.302	0.589	0.377	0.286	0.292	0.428	0.382	0.24	0.41	0.51	0.00007	
Cadmium	mg/L	-	-	0.000108	-	0.000322	0.00014	0.000048	0.000273	0.000634	0.00148	-	0.000228	0.000011	0.000012	0.000013	0.000012	0.000012	0.000012	0.000012	0.000012	0.000012	0.000012	0.000012	0.000012	0.000012	0.000012	
Calcium	mg/L	-	-	38.7	-	16.3	0.023	0.0438	47	25.9	37.6	-	52.2	55.5	54	70.9	58.4	57.9	58.4	58.4	58.4	58.4	58.4	58.4	58.4	58.4	0.0032	
Chromium	mg/L	-	-	ND (0.001)	-	ND (0.001)	ND (0.0010)	ND (0.0010)	0.0022	ND (0.0010)	ND (0.0010)	-	ND (0.0010)	0.0014	0.0014	0.0014	0.0016	0.0033	0.0017	0.00119	0.00123	ND (0.00005)	0.00021	0.0014	0.0029	0.0021		
Cobalt	mg/L	-	-	ND (0.0005)	-	0.00115	0.00134	0.0031	0.00324	0.00187	0.00106	-	0.00326	0.00265	0.00334	0.00424	0.00337	0.00669	0.00409	0.00293	0.00293	0.00293	0.00293	0.00293	0.00293	0.00293	0.00293	
Copper	mg/L	-	-	0.0091	-	0.0091	0.00157	0.00099	0.0152	0.0106	0.00495	-	0.00137	0.00041	0.00089	0.00016	0.00016	0.00016	0.00016	0.00016	0.00016	0.00016	0.00016	0.00016	0.00016	0.00016	0.00016	
Iron	mg/L	-	-	0.0736	-	0.0166	0.0108	0.0119	3.61	1.03	0.0506	-	0.262	1.02	0.0949	1.38	0.474	3.71	6.940	0.338	0.338	0.166	0.057	0.009	0.12	0.87	0.00039	
Lead	mg/L	-	-	ND (0.0002)	-	ND (0.0002)	ND (0.00020)	ND (0.0002)	0.00072	0.00065	ND (0.00020)	-	ND (0.00020)	ND (0.00020)	ND (0.00020)	ND (0.00020)	ND (0.00020)	ND (0.00020)	ND (0.00020)	ND (0.00020)	ND (0.00020)	ND (0.00020)	ND (0.00020)	ND (0.00020)	ND (0.00020)	ND (0.00020)	0.0014	
Lithium	mg/L	-	-	ND (0.0005)	-	ND (0.0005)	ND (0.00050)	ND (0.00050)	ND (0.00050)	ND (0.00050)	ND (0.00050)	-	ND (0.00050)	ND (0.00050)	ND (0.00050)	ND (0.00050)	ND (0.00050)	ND (0.00050)	ND (0.00050)	ND (0.00050)	ND (0.00050)	ND (0.00050)	ND (0.00050)	ND (0.00050)	ND (0.00050)	ND (0.00050)	0.0005	
Magnesium	mg/L	-	-	6.56	-	2.95	0.00537	0.00939	10.9	6.56	11.6	-	9.95	13.5	11.2	13.3	11.6	19.4	9.71	9.44	9.44	9.44	9.44	9.44	9.44	9.44	0.0005	
Manganese	mg/L	-	-	4.2	-	1.8	1.36	2.25	2.34	1.12	1.31	-	2.43	2.22	1.96	2.74	2.24	5.680	2.270	1.34	1.35	1.77	1.28	0.95	1.4	0.95	<0.00001	
Mercury	mg/L	-	-	ND (0.00005)	-	ND (0.00005)	ND (0.000050)	ND (0.000050)	ND (0.000050)	ND (0.000050)	ND (0.000050)	-	ND (0.000050)	ND (0.000050)														

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Notes:
- No data available

Table E5 Historic Groundwater Quality Results - Site MW-4

Sample Date:		Mar-15	Mar-15	Jul-15	Oct-15	Dec-15	Mar-16	Jul-16	Dec-16	Apr-17	Jun-17	Nov-17	Dec-17	Mar-18	Mar-18	Jul-18	Dec-18	Apr-19	Nov-19	Dec-19	Mar-20	Mar-20	Jul-20	Oct-20	Dec-20	Mar-21	Jun-21	Oct-21	Dec-21	Dec-21	Mar-22	Sep-22	Dec-22
	Units	Duplicate												Duplicate							Duplicate									Duplicate			
Parameters:																																	
General																																	
Chemical Oxygen Demand (COD)	mg/L	ND (10)	13	ND (10)	41	16	12	16	ND (10)	ND (10)	ND (10)	19	ND (10)	ND (10)	ND (10)	49	ND (10)	ND (20)	ND (10)	ND (10)	20	10	10	ND (5)	40	11.00	-	-	9.00	ND (5.00)	9.00	-	-
Dissolved Organic Carbon	mg/L	1.99	1.11	0.91	6.1	1.03	0.86	0.96	1.86	1.27	1.50	1.95	0.97	1.31	1.28	1.6	1.1	2.19	1.9	2	1.8	2.3	1.2	2.1	2.50	2.00	-	1.70	1.90	ND (0.05)	458.00	30.00	10.00
Conductivity, Electrical	µS/cm	354	353	355	344	381	422	384	413	417	417	398	409	427	432	407	379	430	460	446	473	469	454	426	448	477.00	474.00	436.00	458.00	61.00	487.00	450.00	443.00
pH	s.s.	7.54	7.72	6.81	7.66	6.66	6.81	7.46	6.63	6.80	6.70	7.93	7.41	7.46	7.83	7.48	7.28	6.59	6.63	6.4	6.94	6.88	6.7	6.72	6.55	6.62	6.61	7.01	6.55	6.79	7.00	2.85	6.86
Alkalinity (Total as CaCO3)	mg/L	164	166	165	168	185	208	194	210	204	210	191	209	215	216	198	218	226	241	241	239	228	211	247	236	212	247.00	236.00	212.00	236.00	264.00	249.00	216.00
Alkalinity (PP as CaCO3)	mg/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)	ND (0.50)	ND (0.50)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	
Bicarbonate (HCO3)	mg/L	300	198	201	199	226	254	237	256	249	248	233	255	262	263	241	229	226	271	264	294	292	277	260	281	301.00	288.00	258.00	276.00	32.00	303.00	266.00	262.00
Carbonate (as CaCO3)	mg/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)	ND (0.50)	ND (0.50)	ND (0.50)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (6)	ND (6)	ND (6)	ND (6)	ND (6)	ND (6)	ND (6)	ND (6)	ND (6)	ND (6)	ND (6)	ND (6)	ND (6)	ND (6)	
Hydroxide (OH)	mg/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)	ND (0.50)	ND (0.50)	ND (0.50)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	
Turbidity	NTU	1.1	1.48	5.54	13.1	1.34	1.38	3.68	5.61	3.90	4.01	1.40	5.7	4.97	8.14	56.3	1.70	10.7	6.84	2.15	7.77	7.41	8.23	3.37	3.28	6.02	0.82	9.96	2.24	3.01	3.35	1.94	0.86
Iron (as CaCO3)	mg/L	138	142	137	138	155	169	152	177	165	173	170	158	176	166	172	158	184	190	190	190	190	180	200	210.00	210.00	190.00	210.00	24.00	220.00	170.00	200.00	
Nutrients																																	
Ammonia	mg/L	0.012	0.01	0.0093	0.049	0.0096	0.024	0.059	0.051	0.031	0.0340	0.074	0.310	ND (0.020)	0.14	ND (0.020)	ND (0.020)	0.067	0.06	ND (0.01)	ND (0.01)	ND (0.01)	0.03	ND (0.025)	ND (0.025)	ND (0.025)	-	ND (0.025)	ND (0.025)	ND (0.025)	ND (0.025)	ND (0.025)	
Dissolved Nitrate (N)	mg/L	ND (0.020)	ND (0.020)	ND (0.020)	0.032	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)	0.147	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.010)	ND (0.010)	ND (0.01)	ND (0.01)	ND (0.01)	0.02	0.13	ND (0.01)	ND (0.10)	ND (0.10)	-	ND (0.10)	0.20	ND (0.1)	<0.01	ND (1.0)	
Dissolved Nitrite (N)	mg/L	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	0.037	ND (0.01)	ND (0.01)	ND (0.005)	0.01	ND (0.005)	ND (0.005)	ND (0.10)	ND (0.10)	-	ND (0.10)	ND (0.10)	ND (0.1)	<0.01	ND (0.01)	
Total Phosphorus	mg/L	0.004	0.004	0.0182	0.0294	0.0246	0.0088	0.0149	0.0078	0.0052	0.0159	0.0091	0.0064	0.0113	0.0060	0.0061	0.0113	0.0060	0.0233	0.015	0.008	0.01	0.014	0.05	0.021	0.014	0.01	ND (0.005)	-	0.01	0.02	0.01	
Nitrate plus Nitrite (N)	mg/L	ND (0.020)	ND (0.020)	ND (0.020)	0.032	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)	0.147	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.01)	ND (0.01)	0.02	0.13	ND (0.01)	ND (0.20)	ND (0.20)	-	ND (0.20)	ND (0.20)	ND (0.2)	<0.020	ND (1.0)	
Total Nitrogen (N)	mg/L	0.11	0.142	0.124	0.552	0.089	0.103	0.076(2)	0.104	0.123	0.130	0.18	0.092	0.114	0.147	0.137	0.115	-	0.21	0.12	0.09	0.14	0.25	0.19	0.17	0.19	0.12	0.39	ND (0.10)	0.19	0.13	0.17	
Total Kjeldahl Nitrogen	mg/L	0.11	0.142	0.124	0.52	0.089	0.103	0.076	0.104	0.123	0.130	0.030	0.092	0.114	0.147	0.137	0.115	0.141	0.21	0.12	0.09	0.14	0.22	ND (0.07)	0.17	0.19	0.09	0.30	ND (0.10)	0.11	0.07	ND (0.07)	
Anions																																	
Chloride	mg/L	5.3	5.4	5.8	4.6	3.8	5.0	4.4	4.5	5.3	5.2	5.7	5.2	5.6	5.3	6.4	5.8	5.42	9.2	6.48	6.55	6.53	7.05	6.6	6.84	7.00	7.40	5.98	4.00	1.48	6.30	4.21	5.37
Sulfate	mg/L	8.72	9.25	10.1	10.7	7.75	7.62	6.52	7.90	7.70	6.50	12.2	5.7	6.6	7.0	7.1	7.3	7.8	8	7.1	7.4	7.4	7.7	10	6.4	7.00	8.00	9.30	6.00	1.20	6.00	10.00	10.90
Dissolved Metals																																	
Aluminum	mg/L	ND (0.0030)	ND (0.0030)	ND (0.0030)	0.0111	-	0.004	0.0034	0.0035	ND (0.0030)	ND (0.0030)	ND (0.0030)	0.0086	ND (0.0030)	ND (0.0030)	ND (0.0030)	ND (0.0030)	ND (0.0030)	ND (0.0030)	ND (0.0030)	ND (0.0030)	0.01	0.28	0.007	ND (0.001)	ND (0.001)	0.003	0.025	0.130	0.060	0.19	0.001	-
Antimony	mg/L	ND (0.0050)	ND (0.0050)	ND (0.0050)	0.00081	-	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	0.00028	0.00015	0.00016	0.0002	0.00016	0.0002	0.00028	0.00015	0.00006	0.00016	0.00009	0.00010	<0.002	0.0005	-
Arsenic	mg/L	0.00019	0.00021	0.00011	0.00029	-	0.00024	0.00015	0.00015	ND (0.0001)	0.00015	0.00015	0.0001	0.0001	0.00015	ND (0.0001)	0.0001	0.0001	0.0002	0.0002	0.0002	0.0002	0.0001	0.0004	0.0005	0.0002	0.0002	0.0001	0.0003	0.0003	0.0003	<0.002	0.0002
Barium	mg/L	0.0612	0.0581	0.0546	0.0713	-	0.0756	0.0583	0.0713	0.0651	0.0599	0.0642	0.0529	0.0653	0.0625	0.0558	0.0625	0.0635	0.05	0.0547	0.063	0.061	0.057	0.052	0.0660	0.0570	0.0470	0.0610	0.0307	0.0630	0.047	0.0430	-
Beryllium	mg/L	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	-	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	0.001	0.0005	ND (0.0005)	0.0005	ND (0.0005)	0.0005	ND (0.0005)	0.0005	0.0005	<0.0005	<0.0005	ND (0.0005)
Bismuth	mg/L	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	-	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	0.001	ND (0.001)	0.0005	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	<0.0001	<0.0005	<0.0001	-
Bromine	mg/L	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	-	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	0.0002	0.024	0.03	0.025	0.025	0.02	0.025	0.03	0.028	0.021	0.022	0.024	0.0023	0.022	0.023
Cadmium	mg/L	0.0015	0.0111	0.00071	0.0																												

Table E6 Historic Groundwater Quality Results - Site MW-4A

Sample Date:		Units	Jun-00	Dec-00	Jul-01	Dec-01	Jul-02	Oct-02	Mar-03	Mar-04	Dec-04	Mar-05	Feb-06	May-06	Sep-06	Nov-06	Apr-07	Sep-07	Nov-07	Jul-08	Dec-08	Jul-09	Nov-09	Nov-09	Aug-10	Dec-10	Jul-11	Dec-11	Feb-12	Feb-12	Aug-12	Dec-12	Mar-13	Jun-13	Apr-14	Jun-14		
Parameters:																																						
General																																						
Chemical Oxygen Demand (COD)	mg/L	19	19	-	12	-	-	-	20	ND (10)	ND (10)	-	12	ND (10)	-	ND (10)	ND (10)	-	47	-	-	11	-	-	ND (10)	15	-	-	-	24	28	-	25	22	-	45	ND (10)	ND (10)
Dissolved Organic Carbon	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6.81	2.36	0.74		
Conductivity, Electrical	µS/cm	66	43	-	46	-	-	-	56	40	38	-	42	65	-	35	89	-	43	-	55	-	-	67	66	-	748	-	193	191	-	136	99.9	206	314	315		
pH	s.u.	5.7	6.2	-	6	-	-	-	6.7	6.4	6.6	-	6.6	6.2	-	6.5	6.8	-	6.5	-	6.6	-	6.6	6.6	-	-	6.5	-	6.41	6.27	-	5.92	5.86	6.29	6.75	7.12		
Alkalinity (Total as CaCO3)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	17	-	-	-	-	-	-	-	90.9	91	-	65.9	44.3	106	142	148		
Alkalinity (PP as CaCO3)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	ND (0.5)	-	-	-	-	-	-	-	ND (0.5)	ND (0.5)	-	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)		
Bicarbonate (HCO3-)	mg/L	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20	-	-	-	-	-	-	111	80.4	111	-	80.4	130	174	181			
Carbonate (as CaCO3)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	ND (0.5)	-	-	-	-	-	-	ND (0.5)	ND (0.5)	-	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)		
Hydroxide (OH)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	ND (0.5)	-	-	-	-	-	-	ND (0.5)	ND (0.5)	-	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)		
Turbidity	NTU	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	18.5	-	-	-	-	-	-	201	165	-	16.8	81.1	23.5	26.4	13.5			
Hardness (as CaCO3)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12.7	-	-	-	-	-	-	69.5	239	-	53.7	39.5	16.7	120	122			
Nutrients																																						
Ammonia	mg/L	0.009	0.033	-	0.097	-	-	-	0.025	0.01	0.007	-	0.79	0.181	-	0.168	ND (0.005)	-	0.013	-	0.03	-	0.024	0.009	-	-	-	0.14	0.16	-	0.02	0.22	0.24	0.011	0.014			
Dissolved Nitrate (N)	mg/L	ND (0.02)	ND (0.02)	-	ND (0.02)	-	-	-	0.72	0.44	0.25	-	0.17	1.53	-	0.66	0.27	-	0.14	-	0.41	-	0.86	0.89	-	-	0.12	-	0.024	0.029	-	ND (0.02)	ND (0.0020)	ND (0.020)	ND (0.020)	ND (0.020)		
Dissolved Nitrite (N)	mg/L	0.005	ND (0.005)	-	0.005	-	-	-	0.007	ND (0.005)	ND (0.005)	-	ND (0.005)	ND (0.005)	-	ND (0.005)	ND (0.005)	-	0.012	-	ND (0.005)	-	ND (0.005)	ND (0.005)	-	0.006	-	ND (0.005)	0.006	-	ND (0.005)	ND (0.0050)	ND (0.0050)	ND (0.0050)	0.0055			
Total Phosphorus	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.031	-	-	-	-	-	-	-	0.041	ND (0.005)	-	0.0569	0.0623	0.0659	0.0237			
Nitrate plus Nitrite (N)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
Total Nitrogen (N)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
Total Kjeldahl Nitrogen	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.05	-	-	-	-	-	-	0.65	0.54	-	0.636	0.693	0.896	0.107	0.194			
Anions																																						
Chloride	mg/L	ND (1.0)	ND (1.0)	-	ND (1.0)	-	-	-	0.7	1.2	1.9	-	2.9	1.8	-	2.1	15.8	-	3.8	-	-	-	-	-	-	-	-	2.2	2	-	1.4	2	5.9	6	5.5			
Sulfate	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.8	-	-	-	-	-	-	1.18	ND (0.5)	-	0.63	3.34	ND (0.50)	9.48	7.57			
Dissolved Metals																																						
Aluminum	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.031	-	-	-	-	-	-	0.0066	0.0059	-	0.0098	0.011	0.026	0.562	0.0067			
Arsenic	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	ND (0.0005)	-	-	-	-	-	-	ND (0.0005)	ND (0.0005)	-	ND (0.0005)	ND (0.00050)	ND (0.00050)	ND (0.00050)	ND (0.00050)			
Barium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0022	-	-	-	-	-	-	0.00022	0.00023	-	0.00029	0.00036	0.0002	0.0003	ND (0.00010)			
Beryllium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.021	-	-	-	-	-	-	0.0697	0.0714	-	0.0592	0.0492	0.0157	0.0632	0.0453			
Bismuth	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	ND (0.0001)	-	-	-	-	-	-	ND (0.0001)	ND (0.0001)	-	ND (0.0001)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)			
Boron	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	ND (0.001)	-	-	-	-	-	-	ND (0.001)	ND (0.001)	-	ND (0.001)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)			
Cadmium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	ND (0.05)	-	-	-	-	-	-	ND (0.05)	ND (0.05)	-	ND (0.05)	ND (0.050)	ND (0.050)	ND (0.050)	ND (0.050)			
Calcium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.00063	-	-	-	-	-	-	0.000173	0.00023	-	0.00007	0.00056	0.00011	0.000364	0.000361			
Chromium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4.23	-	-	-	-	-	-	4.23	8.49	-	18.2	0.0133	0.00572	36.7	37.5			
Cobalt	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	ND (0.001)	-	-	-	-	-	-	ND (0.001)	ND (0.001)	-	ND (0.001)	ND (0.0010)	ND (0.0010)	0.0021	ND (0.0010)			
Copper	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	ND (0.0005)	-	-	-	-	-	-	0.0066	0.0332	-	0.018	0.0166	0.00536	0.00077	0.00065			
Iron	mg/L	1.52	0.052	-	3.82	-	-	-	0.028	0.024	0.014	-	0.008	0.006	-	0.009	0.025	-	0.008	-	0.0017	-	-	-	-	-	-	0.00135	0.00202	-	0.00227	0.00037	0.00021	0.00557	0.00308			
Lead	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	ND (0.005)	-	-	0.151	0.174	-	-	0.0292	0.045	-	0.0172	3.49	1.05	1.05	ND (0.0050)			
Lithium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	ND (0.0002)	-	-	-	-	-	-	0.001	0.001	-	-	0.001	-	-	-			
Magnesium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	ND (0.005)	-	-	-	-	-	-	ND (0.005)	ND (0.0050)	-	ND (0.005)	ND (0.0050)	ND (0.0050)	0.006	0.0052			
Manganese	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.52	-	-	-	-	-	-	1.72	2.89	-	1.97	0.00151	0.000581	6.91	6.84			
Mercury	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.003	-	-	-	-	-	-	0.003	2.79	-	1.8	1.56	0.497	1.73	2.63			
Molybdenum	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	ND (0.00005)	-	-	-	-	-	-	ND (0.00005)	-	-	-	ND (0.00005)	ND (0.000050)	ND (0.000020)	ND (0.000010)	ND (0.000010)		
Nickel	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	ND (0.001)	-	-	-	-	-	-	ND (0.001)	ND (0.001)	-	ND (0.001)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)			
Phosphorus	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	ND (0.001)	-	-	-	-	-	-	0.0193	0.0207	-	0.01	0.0096	0.0031	0.0042	0.0043			
Potassium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.22	-	-	-	-	-	-	1.53	2.08	-	2.01	0.00219	0.000617	4.08	3.7			
Selenium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	ND (0.0001)	-	-	-	-	-	-	ND (0.0001)	ND (0.0001)	-	ND (0.0001)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)			
Silicon	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.02	-	-	-	-	-	-	3.08	3.75	-	4.15	4.93	1.35	12.6	12.9			
Silver	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	ND (0.00002)	-	-	-	-	-	-	ND (0.00002)	-	-	-	ND (0.00002)	ND (0.000020)	0.00004	ND (0.000020)			
Sodium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4.93	-	-	-	-	-	-	4	4.8	-	4.1	0.00333	0.000955	14.4	15.1			
Strontium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.162	-	-	-	-	-	-	0.162	0.174	-	0.124	0.0981	0.0421	0.387	0.371			
Sulfur	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	ND (0.003)	-	-	-	-	-	-	ND (0.003)	3.8	-	ND (0.003)	ND (0.0030)	ND (0.0030)	ND (1.0)	ND (1.0)			
Tellurium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
Thallium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	ND (0.00005)	-	-	-	-	-	-	ND (0.00005)	-	-	-	ND (0.00005)	ND (0.000050)	ND (0.000050)	ND (0.000050)	ND (0.000050)		
Thorium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-</				

- No data available

Table E6 Historic Groundwater Quality Results - Site MW-4A

Sample Date:		Units	Sep-14	Dec-14	Mar-15	Jul-15	Apr-16	Dec-16	Apr-17	Jun-17	Nov-17	Dec-17	Dec-17	Mar-18	Sep-18	Dec-18	Dec-19	Oct-20	Mar-21	
Parameters:																				
General																				
Chemical Oxygen Demand (COD)	mg/L	40	17	23	50	46	27	17	51	84	96	96	ND (10)	73	62	40	91	37.00		
Dissolved Organic Carbon	mg/L	2.8	2.1	1.76	4.6	7.8	4.15	3.71	7.12	12.5	11.6	11.6	11.6	0.85	15.0	6.6	9.8	12.5	4.30	
Conductivity, Electrical	µS/cm	333	330	133	93.2	147	66.9	165	157	69.1	66.7	66.7	66.7	50.2	191	121	192.0	308	751.00	
pH	s.a.	6.44	6.57	6.67	6.66	6.19	5.82	6.39	6.99	6.19	6.32	6.32	6.16	6.31	6.48	5.9	6.17	7.00		
Alkalinity (Total as CaCO3)	mg/L	156	160	62.3	41.5	68.6	24.4	81.2	75.7	25.7	26	26	15.1	89.6	60.5	86.0	160	364.00		
Alkalinity (PP as CaCO3)	mg/L	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (1.0)	ND (1.0)	ND (1.0)	ND (0.50)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (5)	ND (5.00)		
Bicarbonate (HCO ₃)	mg/L	190	196	76	50.6	83.6	29.7	99	92.4	31.4	31.8	31.8	184	109	73.8	110.0	194	444.00		
Carbonate (as CaCO ₃)	mg/L	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (6)	ND (6)	ND (6.00)	
Hydroxide (OH)	mg/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 (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (5)	ND (5)	ND (5.00)	
Turbidity	NTU	164	1.1	48.2	67.7	15.1	78.1	56.5	20.2	22.8	20.9	20.9	58.1	39.6	19.0	64.7	1320	122.00		
Hardness (as CaCO ₃)	mg/L	138	135	49.2	34.3	45.0	18.4	59.1	60.6	18	16.4	16.4	9.12	81.5	47.1	78.0	103	170.00		
Nutrients																				
Ammonia	mg/L	0.015	0.0095	0.12	0.22	0.63	0.49	0.91	0.078	0.37	0.17	0.17	0.17	0.45	0.14	0.14	0.39	1.62	30.50	
Dissolved Nitrate (N)	mg/L	0.04	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.01)	ND (0.01)	ND (0.01)	
Dissolved Nitrite (N)	mg/L	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	0.0085	ND (0.0050)	ND (0.0050)	0.0054	0.0054	0.0054	0.0054	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.01)	ND (0.005)	ND (0.01)	
Total Phosphorus	mg/L	0.194	0.0121	0.0102	0.145	0.0542	0.0665	0.0553	0.0744	0.0756	0.0802	0.0802	0.0399	0.205	0.0845	0.0320	0.097	0.434		
Nitrate plus Nitrite (N)	mg/L	-	-	ND (0.020)	ND (0.020)	ND (0.020)	0.025	ND (0.20) (2)	ND (0.020)	0.024	0.024	0.024	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.01)	ND (0.01)	ND (0.20)	
Total Nitrogen (N)	mg/L	-	-	0.623	1.17	0.996	1.22	1.29	0.738	1.13	1.03	1.03	0.796	2.080	0.759	1.17	4.69	35.90		
Total Kjeldahl Nitrogen	mg/L	0.206	0.144	0.623	1.17	0.996	1.20	1.29	0.738	1.13	1	1	0.796	2.08	0.759	1.17	4.69	35.90		
Anions																				
Chloride	mg/L	6.3	5.1	1.7	1.7	3.5	3.4	2.4	3.4	6.2	2.9	2.9	2.9	2.8	3.6	1.5	1.6	2.13	11.60	
Sulfate	mg/L	9.62	8.33	ND (0.50)	0.85	ND	1.39	ND (0.50)	ND (1.0)	ND (0.50)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (0.1)	0.3	5.00	
Dissolved Metals																				
Aluminum	mg/L	ND (0.0030)	0.04	ND (0.0030)	-	0.0081	0.0087	ND (0.0030)	0.0048	0.0121	0.0164	0.0164	0.0151	0.0059	ND (0.0030)	0.002	0.38	ND (0.005)		
Antimony	mg/L	ND (0.00050)	ND (0.00050)	ND (0.00050)	-	ND (0.00050)	ND (0.00050)	ND (0.00050)	ND (0.00050)	ND (0.00050)	ND (0.00050)	ND (0.00050)	ND (0.00050)	ND (0.00050)	ND (0.00050)	ND (0.00050)	0.00007	0.00035	ND (0.0001)	
Arsenic	mg/L	0.00011	0.00019	0.00013	-	0.00038	0.00015	0.0002	0.00054	0.00019	0.00028	0.00028	0.00018	0.00073	0.00028	0.0005	0.0021	0.0007		
Boron	mg/L	0.0453	0.0496	0.0574	-	0.0464	0.0325	0.0544	0.0556	0.0313	0.0311	0.0311	0.024	0.0525	0.0499	0.0622	0.00015	0.13		
Beryllium	mg/L	ND (0.00010)	ND (0.00010)	ND (0.00010)	-	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00005)	ND (0.00005)	ND (0.0003)		
Bismuth	mg/L	ND (0.0010)	ND (0.0010)	ND (0.0010)	-	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0001)	ND (0.0001)	ND (0.0005)		
Boron	mg/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)	ND (0.050)	ND (0.050)	ND (0.050)	ND (0.050)	0.016	0.016	0.03		
Cadmium	mg/L	0.00015	0.00053	0.00018	-	0.00093	0.00005	0.00004	0.000076	0.000083	0.000065	0.000065	0.000051	0.000075	0.000142	0.00005	0.002	ND (0.00005)		
Calcium	mg/L	43	42	17.3	-	5.7	6.39	20.7	21.7	6.21	5.65	5.65	3.18	16.7	16.7	37	58.00	26		
Chromium	mg/L	ND (0.0010)	ND (0.0010)	ND (0.0010)	-	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.00005)	0.0012	ND (0.00003)		
Cobalt	mg/L	ND (0.00050)	0.00052	0.0104	-	0.0097	0.0084	0.0057	0.0053	0.00347	0.0053	0.0053	0.00347	0.00954	0.00957	0.02	0.00099	0.02		
Copper	mg/L	0.0016	0.0019	0.00097	-	0.0012	0.00066	0.00026	0.00142	0.00257	0.00077	0.00077	0.00057	0.00083	0.00147	ND (0.0005)	0.0088	ND (0.002)		
Iron	mg/L	0.0091	0.323	0.006	-	0.0108	0.0129	0.0059	0.263	0.207	0.343	0.343	0.0124	0.808	0.149	0.003	180	0.01		
Lead	mg/L	ND (0.00020)	0.00027	ND (0.00020)	-	ND (0.00020)	ND (0.00020)	ND (0.00020)	ND (0.00020)	ND (0.00020)	ND (0.00020)	ND (0.00020)	ND (0.00020)	ND (0.00020)	ND (0.00020)	ND (0.00020)	0.00001	0.0018	ND (0.00005)	
Lithium	mg/L	ND (0.0050)	0.005	ND (0.0050)	-	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	0.0009	0.0009	0.004	
Magnesium	mg/L	2.15	7.22	1.45	-	1.40	0.998	1.78	1.57	0.012	0.533	0.533	0.298	2.22	2.98	2.4	6.70	2.4		
Manganese	mg/L	0.136	0.799	1.07	-	1.25	0.909	1.82	0.495	0.012	0.512	0.512	0.342	1.640	0.948	1.25	1.8	5.40		
Mercury	mg/L	ND (0.000010)	ND (0.00010)	ND (0.00010)	-	ND (0.00001)	ND (0.00001)	ND (0.00001)	ND (0.00001)	ND (0.00001)	ND (0.00001)	ND (0.00001)	ND (0.000020)	0.0000025	ND (0.000020)	ND (0.00001)	ND (0.00001)	ND (0.00001)	ND (0.00001)	
Molybdenum	mg/L	ND (0.0010)	ND (0.0010)	ND (0.0010)	-	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.00002)	0.0001	ND (0.0001)		
Nickel	mg/L	0.0069	0.0023	0.0044	-	0.0024	0.0027	0.0033	0.0031	0.0025	0.0022	0.0018	0.0018	0.0027	0.0048	0.0029	0.0078	0.002		
Potassium	mg/L	4.4	4.25	2.3	-	2.34	1.05	2.8	1.8	1.49	1.87	1.87	1.25	3.41	2.30	4	8.60	4		
Selenium	mg/L	ND (0.00010)	ND (0.00010)	ND (0.00010)	-	0.00013	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.0002)	0.0004	ND (0.0001)	ND (0.0001)	
Silicon	mg/L	13	13.6	4.76	-	5.4	6.05	3.73	6.52	6.28	5.74	5.74	4.760	6.150	4.380	5.100	6.1	-		
Silver	mg/L	ND (0.000020)	ND (0.000020)	ND (0.00002)	-	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.000020)	ND (0.000020)	ND (0.000020)	ND (0.00001)	ND (0.00005)	ND (0.00005)		
Sodium	mg/L	14.8	14.7	3.79	-	3.15	2.83	3.1	5.49	3.99	4.37	4.37	3.28	3.63	4.01	4	4	27.00		
Strontium	mg/L	0.398	0.418	0.113	-	0.113	0.0486	0.117	0.119	0.0458	0.0486	0.0486	0.0237	0.145	0.098	0.1502	0.23	0.75		
Sulfur	mg/L	ND (3.0)	ND (3.0)	ND (3.0)	-	ND (3.0)	ND (3.0)	ND (3.0)	ND (3.0)	ND (3.0)	ND (3.0)	ND (3.0)	ND (3.0)	ND (3.0)	ND (3.0)	ND (0.00002)	1.1	2.30		
Thallium	mg/L	ND (0.000050)	ND (0.000050)	ND (0.000050)	-	ND (0.000050)	ND (0.000050)	ND (0.000050)	ND (0.000050)	ND (0.000050)	ND (0.000050)	ND (0.000050)	ND (0.000050)	ND (0.000050)	ND (0.000050)	0.00001	0.00003	ND (0.00005)		
Thorium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	ND (0.00005)	0.00007	ND (0.0003)	
Tin	mg/L	ND (0.0050)	ND (0.0050)	ND (0.0050)	-	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0001)	ND (0.0001)	ND (0.0005)	
Titanium	mg/L	ND (0.0050)	ND (0.0050)	ND (0.0050)	-	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)</					

Notes:
- No data available

Table E8 Historic Groundwater Quality Results - Site MW13-1 (MW99-9)

Sample Date:	Units	Jun-00	Dec-00	Jul-01	Dec-01	Jun-02	Oct-02	Mar-03	Sep-03	Mar-04	Dec-04	Mar-05	Feb-06	May-06	Sep-06	Sep-06	Nov-06	Apr-07	Sep-07	Nov-07	Jul-08	Dec-08	Jul-09	Jul-09	Nov-09	Aug-10	Dec-10	Jul-11	Dec-11	Dec-11	
																Duplicate								Duplicate							
Parameters:																															
General																															
Chemical Oxygen Demand (COD)	mg/L	76	61	87	50	57	54	60	56	41	53	38	54	31	16	16	48	28	34	216	34	46	ND (10)	31	30	46	-	52	52	-	
Dissolved Organic Carbon	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	15	8.4	10.5	-	8.9	10.1	8.93	
Conductivity, Electrical	uS/cm	2120	1990	1970	2150	1790	2150	2030	2010	1730	1920	1790	1890	1780	1710	1730	1830	2030	1540	1800	1600	1700	1300	1300	1580	-	1370	1320	1270	1240	
pH	s.u.	7	7	6.8	7.1	7.5	7.8	7.7	7.4	7.4	7.3	7.6	7.5	7.5	7.5	7.5	7.4	7.7	7.6	7.2	7.2	7.7	8	8	7.7	-	7.5	7.7	8	8	
Alkalinity (Total as CaCO3)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	780	590	590	541	526	-	540	541	526	
Alkalinity (PP as CaCO3)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	ND (0.5)	ND (0.5)	ND (0.5)	-	ND (0.5)	-	ND (0.5)	ND (0.5)	ND (0.5)	
Bicarbonate (HCO ₃ ⁻)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	950	720	720	-	700	-	680	660	642	
Carbonate (as CaCO ₃)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	ND (0.5)	ND (0.5)	ND (0.5)	-	ND (0.5)	-	ND (0.5)	ND (0.5)	ND (0.5)	
Hydroxide (OH ⁻)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	ND (0.5)	ND (0.5)	ND (0.5)	-	ND (0.5)	-	ND (0.5)	ND (0.5)	ND (0.5)	
Hardness	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	145	118	115	-	82.6	-	45.3	16.2	13.7	
Hardness (as CaCO ₃)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	371	287	261	-	239	286	249	248	256	
Nutrients																															
Ammonia	mg/L	100	61	72	114	98	ND (0.005)	75	97	104	86	107	263	45	72	71	71	135	69	96	76	50	63	64	96	190	79	61	66	64	
Dissolved Nitrate (N)	mg/L	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	0.12	ND (0.02)	0.04	ND (0.02)	0.02	0.02	25	4.25	0.35	0.3	0.05	0.07	0.3	0.11	1.32	0.16	0.12	0.85	-	6.1	5.7	5.16	6.77	
Dissolved Nitrite (N)	mg/L	ND (0.005)	ND (0.005)	ND (0.005)	0.017	ND (0.005)	ND (0.005)	0.012	ND (0.005)	0.016	0.011	0.028	0.01	0.084	2.1	0.24	0.033	0.007	0.017	0.08	0.043	0.051	0.031	0.019	0.042	-	0.109	0.075	0.126	0.172	
Total Phosphorus	mg/L	-	-	0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.258	0.28	0.289	-	0.017	-	0.059	0.0848	0.0967	
Nitrate plus Nitrite (N)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Total Nitrogen (N)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Total Kjeldahl Nitrogen	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	93	63	61	-	78	-	77	66.1	65.2	
Anions																															
Chloride	mg/L	140	130	140	117	109	111	107	104	84.6	87.3	67.4	99.5	106	84.4	83.6	99.9	87.5	75.8	97.5	70	73	50	51	63	-	51	54	60	-	
Sulfate	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4.5	-	-	-	4.7	-	5.1	5.67	-	
Dissolved Metals																															
Aluminum	mg/L	-	-	0.05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.01	0.003	-	-	ND (0.003)	0.03	0.004	0.019	0.0321	
Antimony	mg/L	-	-	ND (0.05)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	ND (0.0005)	ND (0.0005)	-	-	ND (0.0005)	0.0001	0.0005	0.00069	0.00068	
Arsenic	mg/L	-	-	0.06	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.006	0.0059	-	-	0.0041	0.0011	0.002	0.00601	0.00073	
Barium	mg/L	-	-	0.262	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.218	0.175	-	-	0.186	0.207	0.182	0.172	0.184	
Beryllium	mg/L	-	-	ND (0.0002)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	ND (0.0001)	ND (0.0001)	-	-	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	
Bismuth	mg/L	-	-	ND (0.05)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	ND (0.001)	ND (0.001)	-	-	ND (0.001)	ND (0.001)	ND (0.001)	ND (0.001)	ND (0.001)	
Boron	mg/L	-	-	0.033	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.063	0.05	-	-	ND (0.05)	0.075	ND (0.05)	0.05	-	
Cadmium	mg/L	-	-	<0.0001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.00066	0.00017	-	-	0.0003	0.00481	0.00175	0.00153	0.00152	
Calcium	mg/L	-	-	172	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	124	963	-	-	76.6	93	81.7	81.1	83.4	
Chromium	mg/L	-	-	ND (0.005)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	ND (0.001)	ND (0.001)	-	-	ND (0.001)	ND (0.001)	ND (0.001)	ND (0.001)	ND (0.001)	
Cobalt	mg/L	-	-	ND (0.005)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	ND (0.0005)	ND (0.0005)	-	-	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	
Copper	mg/L	-	-	ND (0.005)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0035	0.0005	-	-	0.0005	0.0055	0.0017	0.00367	0.00365	
Iron	mg/L	0.365	0.918	0.395	1.96	0.729	8.13	2.71	0.166	1.45	1.18	0.394	0.821	0.024	0.386	0.622	0.803	1.06	1.57	0.014	0.013	0.048	6.3	-	8.31	5.39	1.41	1.87	0.567	0.737	
Lead	mg/L	-	-	ND (0.001)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	ND (0.0002)	ND (0.0002)	-	-	ND (0.0002)	0.0003	ND (0.0002)	0.00055	ND (0.005)	
Lithium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Magnesium	mg/L	-	-	24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	15.1	11.4	-	-	11.6	13.1	11	11	11.5	
Manganese	mg/L	-	-	9.05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4.72	4.01	-	-	3.51	4.15	3.79	3.46	3.67	
Mercury	mg/L	-	-	ND (0.0005)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	ND (0.00005)	ND (0.00005)	-	-	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	
Molybdenum	mg/L	-	-	ND (0.005)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	ND (0.001)	ND (0.001)	-	-	ND (0.001)	ND (0.001)	ND (0.001)	ND (0.001)	0.0021	
Nickel	mg/L	-	-	ND (0.008)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.003	0.001	-	-	0.001	0.003	0.002	0.002	0.026	
Phosphorus	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Potassium	mg/L	-	-	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20.4	15.4	-	-	17.9	19.5	18.1	16.7	17.6	
Selenium	mg/L	-	-	ND (0.001)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.1	0.0001	-	-	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	
Silicon	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	13.1	15.3	-	-	15	14.6	15	14.8	15.5	
Silver	mg/L	-	-	ND (0.0001)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	ND (0.00002)	ND (0.00002)	-	-	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)	
Sodium	mg/L	-	-	108	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	84.7	61.3	-	-	69.1	69.1	69.1	64.1	64.1	
Strontium	mg/L	-	-	3.83	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2.99	2.18	-	-	1.97	2.36	2.18	2.13	2.3	
Sulfur	mg/L	-	-	1.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	ND (0.003)	ND (0.003)	-	-	3	ND (0.003)	ND (0.003)	ND (0.003)	ND (0.003)	
Tellurium	mg/L	-	-	ND (0.05)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Thallium	mg/L	-	-	ND (0.0001)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	ND (0.00005)	-	-	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)
Thorium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Tin	mg/L	-	-	ND (0.02)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	ND (0.005)	ND (0.005)	-	-	0.028	ND (0.005)	ND (0.005)	ND (0.005)	ND (0.005)	
Titanium	mg/L	-	-	ND (0.003)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	ND (0.005)	0.0005	-	-	ND (0.005)	0.0005	ND (0.005)	ND (0.005)	ND (0.005)	
Tungsten	mg/L</																														

Table E8 Historic Groundwater Quality Results - Site MW13-1 (MW99-9)

Sample Date:	Units	Aug-12	Aug-12	Dec-12	Dec-12	Mar-13	Mar-13	Jun-13	Jun-13	Dec-13	Apr-14	Apr-14	Jun-14	Dec-14	Mar-15	Jul-15	Jul-15	Dec-15	Apr-16	Apr-16	Jul-16	Sep-16	Sep-16	Dec-16	Apr-17	Jun-17	Nov-17	Dec-17	Mar-18	Jul-18
Parameters:																														
General																														
Chemical Oxygen Demand (COD)	mg/L	46	38	77	69	65	76	49	50	254	164	184	157	34	45	68	46	40	30	28	33	45	38	19	20	28	47	36	16	25
Dissolved Organic Carbon	mg/L	10.6	10.3			-	-	10.4	9.86	15.8	12.9	13.2	11.7	9.21	6.19	8.97	7.34	6.5	6.87	7.05	5.58	8.32	9.10	5.53	6.77	5.99	6.33	6.56	4.53	4.9
Conductivity, Electrical	uS/cm	1370	1370	1490	1470	1460	1460	1470	1488	1580	1620	1630	1500	626	650	1300	1120	1090	918	927	1000	1040	1040	891	946	1060	1030	930	817	882
pH	s.u.	7.56	7.51	7.82	7.79	7.57	7.55	7.88	7.91	7.5	7.69	7.10	7.52	7.26	7.6	7.08	7.01	7.61	7.73	7.34	7.88	7.01	6.97	7.33	7.02	7.10	8.15	8.05	7.83	7.79
Alkalinity (Total as CaCO ₃)	mg/L	587	588	621	611	615	610	612	609	640	725	721	664	267	304	580	528	498	458	446	494	480	482	453	469	501	490	474	400	423
Alkalinity (PP as CaCO ₃)	mg/L	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Bicarbonate (HCO ₃ ⁻)	mg/L	716	718	760	746	750	745	747	743	816	884	882	813	325	371	718	644	607	558	556	603	586	588	553	572	612	598	579	500	517
Carbonate (as CaCO ₃)	mg/L	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (1.0)	ND (0.5)	ND (1.0)	ND (1.0)
Hydroxide (OH ⁻)	mg/L	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (1.0)	ND (1.0)
Turbidity	NTU	44.7	48.3	91.8	96.1	56.9	59.4	70.1	61.9	2350	946	1040	199	24.2	182	109	191	91.3	21.6	25	62.1	66.2	77.9	40.9	37	74.4	52.6	95.2	110	99.2
Hardness (as CaCO ₃)	mg/L	263	270	289	276	232	231	264	262	259	267	276	221	145	126	199	210	202	231	224	197	225	220	260	230	228	186	216	210	224
Nutrients																														
Ammonia	mg/L	77	85	86	84	88	87	87	82	100	110	100	99	4.6	35	84	61	64	40	26	49	81	80	31	46 (2)	62 (2)	67 (2)	43 (2)	20.0	43.0
Dissolved Nitrate (N)	mg/L	3.17	2.56	4.63	4.6	3.37	3.58	1.21	1.37	ND (0.20)	ND (0.020)	ND (0.020)	ND (0.020)	0.07	0.07	ND (0.020)	ND (0.020)	0.020	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.20)	ND (0.20)	0.068	ND (0.020)	0.068	0.027	0.086	0.227	0.360
Dissolved Nitrite (N)	mg/L	0.0771	0.0625	0.0531	0.0577	0.644	0.621	0.172	0.116	0.087	0.0071	0.0067	0.0087	ND (0.050)	ND (0.050)	ND (0.050)	ND (0.050)	0.0094	0.0104	ND (0.050)	ND (0.050)	ND (0.050)	ND (0.050)	ND (0.050)	ND (0.050)	0.029	0.0122	ND (0.050)	0.0106	
Total Phosphorus	mg/L	0.233	0.243	0.274	0.271	0.245	0.234	0.173	0.17	2.33	1.5	1.09	1.78	0.0621	0.0487	0.449	0.235	0.228	0.186	0.186	0.207	0.251	0.258	0.168	0.182	0.221	0.149	0.186	0.184	0.171
Nitrate plus Nitrite (N)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	0.07	ND (0.020)	ND (0.020)	0.030	0.026	ND	ND (0.20) (2)	ND (0.20) (2)	0.068	ND (0.020)	ND (0.020)	0.416	0.098	0.227	0.371	
Total Nitrogen (N)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	34.9	84.7	58.6	60.6	34.8 (1)	35.5 (1)	50.3 (1)	76.3 (1)	69.0 (1)	30.1 (1)	43.6 (2)	39.2 (2)	37.2	34.7	37.6	
Total Kjeldahl Nitrogen	mg/L	97.6	78.3	80.5	78.3	81.6	76.3	75.8	80	99.7	97.4	97	102	4.86	34.8	84.7	58.6	60.6	34.7	35.3	50.3	76.3	69.0	30.1	43.6	50.9	62	37.1	34.5	37.3
Anions																														
Chloride	mg/L	60	63	65	64	71	73	63	64	74	63	64	47	13	12	39	26	28	17	17	18	20	20	16	15	20	23	12	7.5	14
Sulfate	mg/L	ND (0.5)	ND(5.0)	6.44	6.3	5.91	6.15	3.94	5.93	ND (5.0)	ND (0.50)	4.77	5	43.1	2.79	2.29	2.64	ND (0.50)	ND (0.50)	2.02	2.6	3.0	3.35	2.97	ND (0.50)	ND (0.50)	ND (0.50)	4.2	4.4	4.0
Dissolved Metals																														
Aluminum	mg/L	0.0065	0.0132	0.0038	ND (0.003)	ND (0.0030)	ND (0.0030)	-	-	ND (0.0030)	ND (0.0030)	ND (0.0030)	0.0041	0.208	0.149	ND (0.0030)	ND (0.0030)	-	0.0038	0.0031	0.0033	ND (0.0030)	ND (0.0030)	ND (0.0030)	ND (0.0030)	ND (0.0030)	ND (0.0030)	ND (0.0030)	ND (0.0030)	ND (0.0030)
Antimony	mg/L	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	-	-	ND (0.00050)	ND (0.00050)	ND (0.00050)	ND (0.00050)	0.00086	ND (0.00050)	0.00086	ND (0.00050)	-	ND (0.00050)	ND (0.00050)	ND (0.00050)	ND (0.00050)	ND (0.00050)	ND (0.00050)	ND (0.00050)	ND (0.00050)	ND (0.00050)	ND (0.00050)	ND (0.00050)	ND (0.00050)
Arsenic	mg/L	0.0013	0.0002	0.00177	0.00149	0.00086	0.00085	-	-	0.00458	0.013	0.0164	0.0236	0.00287	0.00115	0.00163	0.00142	-	0.0003	0.00784	0.00345	0.00683	0.00556	0.00098	0.00054	0.00054	0.00054	0.00054	0.00054	0.00054
Barium	mg/L	0.21	0.214	0.205	0.206	0.194	0.191	-	-	0.223	0.21	0.21	0.198	0.104	0.0725	0.132	0.114	-	0.0821	0.0798	0.102	0.117	0.115	0.0757	0.0771	0.1	0.103	0.0777	0.0736	0.0808
Beryllium	mg/L	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.00010)	ND (0.00010)	-	-	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	-	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)
Bismuth	mg/L	ND (0.001)	ND (0.001)	ND (0.001)	ND (0.001)	ND (0.0010)	ND (0.0010)	-	-	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	-	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)
Boron	mg/L	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.050)	ND (0.050)	-	-	0.15	0.23	0.12	0.18	0.21	0.18	0.11	0.118	0.14	0.111	0.118	0.14	0.109	0.105	0.103	0.149	0.163	0.169	0.173	0.169	0.173
Cadmium	mg/L	0.000835	0.000787	0.000162	0.000199	0.000407	0.000421	-	-	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	0.000186	0.000267	0.00011	0.00091	-	ND (0.00011)	ND (0.00011)	ND (0.00011)	ND (0.00011)	ND (0.00011)	0.00091	ND (0.00010)	0.000012	0.000029	0.000012	ND (0.00010)	ND (0.00010)
Calcium	mg/L	85.9	88.4	93.1	88.9	74	73.6	86.2	85.8	81.7	84.4	86.7	69.1	47.8	41.8	67.1	66.1	-	75.3	72.9	60.2	73.1	70.8	81.7	73.7	73.9	58.6	68.7	68.5	75.9
Chromium	mg/L	ND (0.001)	ND (0.001)	ND (0.001)	ND (0.001)	ND (0.0010)	ND (0.0010)	-	-	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	-	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)
Cobalt	mg/L	ND (0.0005)	ND (0.0005)	0.00056	0.00057	ND (0.00050)	ND (0.00050)	-	-	0.00173	0.0012	0.0103	0.0158	0.00408	0.00366	0.00739	0.00441	-	0.00371	0.00369	0.00389	0.00357	0.00361	0.00357	0.00375	0.00331	0.00325	0.00334	0.00425	0.00425
Copper	mg/L	0.00108	0.00105	0.00045	0.00049	0.00155	0.00148	-	-	ND (0.00020)	ND (0.00020)	0.00021	0.00103	0.00282	0.00096	0.00046	-	ND (0.00020)	ND (0.00020)	ND (0.00020)	ND (0.00020)	ND (0.00020)	ND (0.00020)	0.00021	ND (0.00020)	0.00097	0.00026	0.00026	ND (0.00020)	ND (0.00020)
Iron	mg/L	4.54	4.43	2.12	0.932	1.06	0.979	4.27	4.65	0.266	5.04	9.85	9.27	4.33	0.0917	0.019	0.017	-	12	11.6	1.98	9.95	9.63	9.57	0.0112	2.84	0.0346	3.63	3.60	0.0231
Lead	mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.00020)	ND (0.00020)	-	-	ND (0.00020)	ND (0.00020)	ND (0.00020)	ND (0.00020)	0.00041	ND (0.00020)	ND (0.00020)	ND (0.00020)	-	ND (0.00020)	ND (0.00020)	ND (0.00020)	ND (0.00020)	ND (0.00020)	ND (0.00020)	ND (0.00020)	ND (0.00020)	ND (0.00020)	ND (0.00020)	ND (0.00020)	ND (0.00020)
Lithium	mg/L	ND (0.005)	ND (0.005)	ND (0.005)	ND (0.005)	ND (0.0050)	ND (0.0050)	-	-	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	0.0194	ND (0.0050)	ND (0.0050)	ND (0.0050)	-	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	0.0021	0.0022	0.0025	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)
Magnesium	mg/L	11.7	11.9	13.7	13.2	11.3	11.5	11.8	11.5	13.4	13.6	14.5	11.8	6.27	5.29	11.4	11	-	10.5	10.3	11.3	10.3	14.4	13.5	11.2	10.5	9.65	10.7	9.53	8.41
Manganese	mg/L	4.08	4.13	4.36	4.16	3.7	3.69	-	-	4.63	4.98	5.26	4.36	5.7	3.09	3.89	3.99	-	5.7	5.79	4.74	5.02	4.98	5.46	5.46	3.58	4.73	5.59		

Table E8 Historic Groundwater Quality Results - Site MW13-1 (MW99-9)

Sample Date:		Units	Sep-18	Dec-18	Apr-19	Nov-19	Nov-19	Dec-19	Mar-20	Jul-20	Oct-20	Dec-20	Dec-20	Mar-21	Jun-21	Oct-21	Dec-21	Mar-22	Jul-22	Sep-22	Dec-22
		Units					Duplicate						Duplicate								
Parameters:																					
General																					
Chemical Oxygen Demand (COD)	mg/L	25	39	34	50	110	40	30	30	23	70	70	13	30	20	27	17	17	40	40	30
Dissolved Organic Carbon	mg/L	6.45	5.2	6.27	6.6	8.2	6	5.6	4.1	6.6	7.1	5.9	5.1	4.8	2.8	3.1	5.8	499	1159	1080	978
Conductivity, Electrical	uS/cm	1060	1060		1048	1105	1018	846	411	901	1065	897	765	933	1467	507	986	499	1159	1080	978
pH	s.u.	7.36	7.65	7.46	7.14	7.13	7.13	7.45	6.78	7.29	7.04	7.02	7.12	7.21	6.9	7.43	6.99	7.38	7.2	7.29	
Alkalinity (Total as CaCO3)	mg/L	471	478	528	498	523	475	596	411	596	438	377	448	115	473	598	598	241	482	441	
Alkalinity (PP as CaCO3)	mg/L	ND (1.0)	ND (1.0)	ND (1.0)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	<5	<5	<5	<5
Bicarbonate (HCO ₃ ⁻)	mg/L	574	168	528	608	638	579	501	133	508	617	534	460	546	140	269	552	296	614	587	537
Carbonate (as CaCO ₃)	mg/L	ND (1.0)	ND (1.0)	ND (1.0)	ND (6)	ND (6)	ND (6)	ND (6)	ND (6)	ND (6)	ND (6)	ND (6)	ND (6)	ND (6)	ND (6)	ND (6)	ND (6)	<6	<6	<6	<6
Hydroxide (OH ⁻)	mg/L	ND (1.0)	ND (1.0)	ND (1.0)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	<5	<5	<5	<5
Turbidity	NTU	133	60.8	101	87.4	81.8	84.4	84	81.3	87.9	189	165	64.4	83.4	11.3	18.1	94.9	72.5	71.6	59.3	
Hardness (as CaCO ₃)	mg/L	196	197	231	200	200	190	200	86	160	210	210	210	180	680	109	210	160	220	340	340
Nutrients																					
Ammonia	mg/L	60.0	62.0	52.7	63	72.7	55.7	35.2	3.19	53.4	41.7	59.3	41.7	31.7	46.9	0.07	35.8	54.6	16.2	66.6	70.7
Dissolved Nitrate (N)	mg/L	0.428	0.684	ND (0.010)	0.1	ND (0.1)	ND (0.01)	ND (0.01)	0.3	0.05	0.7	0.31	0.52	0.6	ND (0.1)	ND (0.1)	0.91	0.2	0.5	<0.1	<0.1
Dissolved Nitrite (N)	mg/L	ND (0.0050)	0.0433	0.109	ND (0.1)	ND (0.1)	ND (0.01)	ND (0.005)	0.01	0.1	ND (0.005)	ND (0.005)	ND (0.1)	ND (0.1)	ND (0.1)	0.053	ND (0.1)	<0.1	<0.1	<0.1	<0.1
Total Phosphorus	mg/L	0.220	0.138	0.202	0.206	0.131	0.167	0.17	0.17	0.247	0.307	0.28	0.114	0.007	0.237	0.245	0.125	0.187	0.2	0.188	
Nitrate plus Nitrite (N)	mg/L	0.428	0.727	-	-	ND (0.020)	0.3	0.05	0.31	0.52	0.6	ND (0.1)	ND (0.2)	0.96	0.2	0.5	0.5	<-0.20	<-0.20	0.2	
Total Nitrogen (N)	mg/L	68.0	47.9	-	-	65.6	44	3.31	65.1	60.3	48	36.8	54.2	0.26	33.9	64.3	15.9	72.5	71.6	59.3	
Total Kjeldahl Nitrogen	mg/L	67.6	47.2	52.8	65.4	55.4	65.5	43.7	3.34	64.3	60	47.5	36.1	54.7	0.26	33	64.2	15.7	72.5	71.5	59.2
Anions																					
Chloride	mg/L	22	24	17.4	20.8	22.2	21	8.96	20.1	24.1	29.5	19.7	13.4	14.6	131	12	22.2	7.5	39.7	27.5	23.9
Sulfate	mg/L	ND (1.0)	4.6	3.2	3	3	3	3.4	61.4	3	3	3	3	560	ND (1)	2	2	3	4	4	
Dissolved Metals																					
Aluminum	mg/L	ND (0.0030)	ND (0.0030)	ND (0.0050)	0.002	ND (0.001)	ND (0.001)	ND (0.001)	ND (0.001)	0.58	0.006	0.006	ND (0.005)	ND (0.001)	ND (0.001)	0.008	0.002	0.18	0.2	0.218	0.003
Antimony	mg/L	ND (0.00050)	ND (0.00050)	ND (0.00020)	0.00019	0.00023	0.00008	0.00008	0.00022	0.00048	0.0001	0.0002	0.0002	0.0005	0.0003	0.00018	0.00021	0.00016	0.0002	0.00004	
Arsenic	mg/L	0.00237	0.00082	0.00014	0.0007	0.0009	0.0011	0.0026	0.0014	0.0073	0.002	0.001	ND (0.0005)	0.0005	0.0002	0.0007	0.0013	0.0004	0.0008	0.0005	
Barium	mg/L	0.0967	0.0896	0.0845	0.0908	0.1129	0.0954	0.059	0.059	0.13	0.086	0.075	0.077	0.074	0.05	0.077	0.11	0.047	0.15	0.139	0.02
Beryllium	mg/L	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.0005)	ND (0.0001)	ND (0.0001)	ND (0.0005)	0.0003	0.0003	ND (0.0003)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	<0.00005	<0.00005	<0.0001	<0.0001
Bismuth	mg/L	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	0.0005	0.0005	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	<0.0001	<0.0001	<0.0001	<0.0001
Boron	mg/L	0.115	0.083	0.126	0.089	0.094	0.088	0.082	0.14	0.07	0.08	0.068	0.083	0.11	0.084	0.085	0.084	0.069	0.085	0.069	0.14
Cadmium	mg/L	ND (0.00010)	0.000011	ND (0.00010)	0.00001	0.00001	0.00001	0.00001	0.00001	0.00005	0.00005	0.00005	ND (0.0005)	ND (0.0001)	0.0003	0.00002	0.00002	0.00002	0.00004	0.00005	
Calcium	mg/L	62.5	62.3	75.2	63	65	62	65	28	53	69	69	68	59	220	35	68	55	72	110	
Chromium	mg/L	ND (0.00010)	ND (0.00010)	ND (0.00050)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	0.0003	0.0006	0.0003	0.0003	0.0003	0.0009	0.0003	0.0009	0.00017	0.00033	<0.0005	0.00037	
Cobalt	mg/L	0.0037	0.00354	0.00425	0.00316	0.00303	0.00331	0.0032	0.012	0.0031	0.0035	0.0033	0.0038	0.0039	0.0034	0.0015	0.0031	0.0025	0.0041	0.003	0.054
Copper	mg/L	ND (0.00020)	0.00073	0.00040	0.0005	0.0008	0.0007	ND (0.00040)	0.0005	0.00073	ND (0.0005)	0.00022	0.002	ND (0.0002)	ND (0.0005)	ND (0.0005)	0.0008	0.0008	0.001	0.0018	
Iron	mg/L	15	0.0257	ND (0.010)	0.01	0.011	0.009	2.1	0.005	12	0.01	0.01	ND (0.002)	1.8	4.9	7.1	14	9.5	19	14.2	0.022
Lead	mg/L	ND (0.00020)	ND (0.00020)	0.00003	ND (0.00001)	0.00003	ND (0.00001)	0.0003	0.00003	0.0003	0.0003	0.0003	ND (0.0001)	ND (0.0001)	ND (0.0001)	0.00021	0.00036	0.0004	0.0004	0.0003	
Lithium	mg/L	ND (0.0020)	ND (0.0020)	0.00182	0.002	0.0034	0.0021	0.0055	0.0002	0.002	0.002	0.003	ND (0.0005)	ND (0.0005)	ND (0.0005)	0.0017	0.0014	0.0018	0.0019	0.002	<0.002
Magnesium	mg/L	9.57	9.99	10.4	9.6	9.9	9.2	9.2	3.8	7.6	10	9.9	9.5	8.2	33	5.1	9.9	6.7	10	19	
Manganese	mg/L	4.530	4.030	6.21	4.46	4.27	5.4	6.21	5.6	5.6	5.6	5.6	6.1	5.2	15	5.1	5.1	4.5	6.4	2.4	
Mercury	mg/L	ND (0.000020)	ND (0.000020)	ND (0.000010)	ND (0.00001)	ND (0.00001)	ND (0.00001)	ND (0.00001)	ND (0.00001)	ND (0.00001)	ND (0.00001)	ND (0.00001)	ND (0.00001)	ND (0.00001)	ND (0.00001)	ND (0.00001)	ND (0.00001)	<0.00001	<0.00005	<0.00001	0.00001
Molybdenum	mg/L	ND (0.0010)	ND (0.0010)	0.00065	0.00054	0.00057	0.00068	0.0005	0.00041	0.00055	0.00056	0.00055	0.0005	0.00065	0.00059	0.00031	0.00054	0.00045	0.00061	<0.001	
Nickel	mg/L	0.0021	0.0022	0.00208	0.0021	0.0034	0.0022	0.0018	0.012	0.0021	0.002	0.002	0.003	0.0025	0.0012	0.0012	0.002	0.0011	0.0025	0.0022	0.0017
Phosphorus	mg/L	15.3	14.5	ND (0.050)	15	16	14	10	3.8	13	13	10	194	0.114	0.007	0.237	0.245	0.125	0.187	0.2	0.34
Potassium	mg/L	15.3	14.5	ND (0.050)	15	16	14	10	3.8	13	13	10	194	0.114	0.007	0.237	0.245	0.125	0.187	0.2	0.34
Selenium	mg/L	ND (0.00010)	ND (0.00010)	ND (0.00050)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	0.0003	ND (0.0002)	0.001	0.001	ND (0.001)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	<0.0002	<0.0002	<0.0002	<0.0002
Silicon	mg/L	13.900	14.300	14.4	13	13	13	13	8.3	11	13	13	13	13	12	7.4	15	11	15	84	
Silver	mg/L	ND (0.00020)	ND (0.00020)	ND (0.00050)	ND (0.00001)	ND (0.00001)	ND (0.00001)	ND (0.00001)	ND (0.00001)	ND (0.00001)	0.00005	0.00005	ND (0.00005)	ND (0.00001)	ND (0.00001)	ND (0.00001)	0.00002	<0.00001	0.00004	<0.00001	<0.00001
Sodium	mg/L	35.5	35.5	36.3	37	40	35	26	34	28	31	28	25	18	35	14	34	34	50	50	
Strontium	mg/L	1.250	1.030	1.37	0.9913	1.07	1.075	0.9	0.53	1	1.2	0.92	0.91	1.1	3.6	0.61	1.2	0.62	1.5	1.23	0.4
Sulfur	mg/L	ND (3.0)	ND (3.0)	1.6	1.7	1.2	1.7	1.8													

Table E9 Historic Groundwater Quality Results - Site MW 13-2 (MW99-8)

Sample Date:		Jun-00	Dec-00	Apr-01	Jul-01	Dec-01	Jun-02	Oct-02	Mar-03	Sep-03	Mar-04	Dec-04	Mar-05	May-06	Nov-06	Apr-07	Sep-07	Nov-07	Jul-08	Dec-08	Jul-09	Nov-09	Aug-10	Dec-10	Jul-11	Dec-11	Dec-13	Apr-14	Jun-14	Jun-14	
	Units																													Duplicate	
Parameters:																															
General																															
Chemical Oxygen Demand (COD)	mg/L	65	23	36	31	15	27	23	32	63	19	30	19	ND (10)	ND (10)	ND (10)	ND (10)	71	ND (10)	11	12	ND (10)	ND (10)	-	41	27	127	59	174	212	
Dissolved Organic Carbon	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4.3	-	5.1	-	4.7	4.05	21.1	5.73	6.29	6.12	
Conductivity, Electrical	µS/cm	1060	995	976	898	857	814	904	885	822	742	726	766	794	700	641	764	720	700	650	650	584	674	600	704	627	714	652	823	826	
pH	s.u.	6.8	7.2	7.1	6.7	6.9	7.4	7.6	7.6	7.5	7.3	7.4	7.4	7.2	7.3	7.4	7.2	7	7	7.5	7.9	7.6	7.7	7.23	7.51	7.8	6.89	7.1	6.83	6.81	
Alkalinity (Total as CaCO3)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	300	280	310	179	200	280	266	353	306	396	391	
Alkalinity (PP as CaCO3)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	ND (0.5)	ND (0.5)	-	ND (0.5)	-	ND (0.5)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	
Bicarbonate (HCO3-)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	370	340	-	370	-	340	324	431	374	483	477	
Carbonate (as CaCO3)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	ND (0.5)	ND (0.5)	-	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	
Hydroxide (OH)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	ND (0.5)	ND (0.5)	-	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	
Turbidity	NTU	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	129	205	-	5.5	-	130	7.98	>4000	256	>4000	>4000	
Hardness (as CaCO3)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	226	201	-	215	-	179	227	200	222	211	254	246
Nutrients																															
Ammonia	mg/L	0.531	0.162	0.241	0.737	0.978	1.24	ND (0.005)	5.3	1.58	2	5.78	2.15	3.7	7.5	4.67	7.7	8.3	8.1	9	6.8	8.31	ND (0.005)	9.5	8.65	13	15	12	20	19	
Dissolved Nitrate (N)	mg/L	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	0.04	ND (0.02)	ND (0.02)	0.09	0.13	ND (0.02)	ND (0.02)	ND (0.02)	0.02	0.79	0.09	0.53	5.5	6.1	1.67	4.5	4.6	3.3	9.4	5.1	5.63	ND (0.20)	ND (0.020)	ND (0.020)	ND (0.020)	
Dissolved Nitrite (N)	mg/L	ND (0.005)	ND (0.005)	ND (0.005)	ND (0.005)	ND (0.005)	ND (0.005)	ND (0.005)	0.009	0.011	0.011	0.009	0.015	0.009	0.071	0.02	0.013	0.07	0.258	0.232	0.437	0.152	0.121	0.122	0.101	0.043	0.159	ND (0.0050)	ND (0.0050)	ND (0.0050)	
Total Phosphorus	mg/L	-	-	-	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.073	0.065	-	0.008	-	0.031	0.0216	3.05	0.406	4.61	6.11	
Nitrate plus Nitrite (N)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Total Nitrogen (N)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Total Kjeldahl Nitrogen	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8.8	6.9	-	9.1	-	11.9	-	14.2	11.4	19.2	18.3	
Anions																															
Chloride	mg/L	57	63	57	53	48	39.3	45.9	39.2	31.9	28.6	25.8	27.5	35.5	32.1	30.9	35.4	32.8	28	26	26	22	26	27	29	25	13	13	16	19	
Sulfate	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.7	3.5	-	2.5	-	3.1	2.94	1.84	7.54	16.7	14.3	
Dissolved Metals																															
Aluminum	mg/L	-	-	-	0.05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.01	0.006	-	0.033	0.026	0.004	0.0176	ND (0.0030)	ND (0.0030)	0.0058	0.0042	
Antimony	mg/L	-	-	-	ND (0.05)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	ND (0.0005)	ND (0.0005)	-	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.00050)	ND (0.00050)	ND (0.00050)	ND (0.00050)	ND (0.00050)	
Arsenic	mg/L	-	-	-	0.003	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0003	0.0002	-	0.0004	0.0002	0.0001	0.0036	0.00152	0.00684	0.00609	0.00609	
Barium	mg/L	-	-	-	0.043	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.041	0.043	-	0.047	0.034	0.061	0.0405	0.144	0.201	0.203	0.205	
Beryllium	mg/L	-	-	-	ND (0.0002)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	ND (0.0001)	ND (0.0001)	-	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	
Bismuth	mg/L	-	-	-	ND (0.05)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	ND (0.001)	ND (0.001)	-	ND (0.001)	ND (0.001)	ND (0.001)	ND (0.001)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	
Boron	mg/L	-	-	-	0.147	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.124	0.153	-	0.157	0.0137	0.155	0.14	0.261	0.251	0.314	0.326	
Cadmium	mg/L	-	-	-	0.0012	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.00135	0.00037	-	0.00022	0.00184	0.00044	0.000283	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	
Calcium	mg/L	-	-	-	105	-	-	-	-	-	-	-	-	-	-	-	-	-	-	75.2	67	-	69.3	74.7	74.7	65.8	73.8	82.1	87.2	80.1	
Chromium	mg/L	-	-	-	ND (0.005)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	ND (0.001)	ND (0.001)	-	ND (0.001)	ND (0.001)	ND (0.001)	ND (0.001)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	
Cobalt	mg/L	-	-	-	ND (0.005)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0014	0.0008	-	0.0013	0.0008	0.0011	0.00114	0.00437	ND (0.00050)	0.0045	0.00464	
Copper	mg/L	-	-	-	ND (0.005)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0056	0.0049	-	0.0022	0.0037	0.0047	0.00363	ND (0.00020)	ND (0.00020)	0.00063	ND (0.00020)	
Iron	mg/L	0.028	0.059	0.13	0.134	0.036	0.107	1.26	0.094	0.053	0.086	0.234	0.369	0.028	0.202	0.05	0.339	0.005	0.007	0.006	0.031	0.104	0.039	0.12	0.024	0.14	16.8	10.5	19.3	17.9	
Lead	mg/L	-	-	-	ND (0.001)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	ND (0.0002)	ND (0.0002)	-	0.0004	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.00020)	ND (0.00020)	ND (0.00020)	ND (0.00020)	
Lithium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6.98	6.21	-	7.77	5.77	7.77	6.61	14.4	13.2	17.4	18	
Magnesium	mg/L	-	-	-	14.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9.19	8.2	-	9.76	8.32	9.72	8.73	9.16	8.66	11.8	11.2	
Manganese	mg/L	-	-	-	7.44	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4.95	4.23	-	5.09	4.37	5.37	6.46	6.08	6.48	6.57	6.57	
Mercury	mg/L	-	-	-	ND (0.00005)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	ND (0.00005)	ND (0.00005)	-	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.000010)	ND (0.000010)	ND (0.000010)	ND (0.000010)	ND (0.000010)	
Molybdenum	mg/L	-	-	-	ND (0.005)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	ND (0.001)	ND (0.001)	-	ND (0.001)	ND (0.001)	ND (0.001)	ND (0.001)	ND (0.001)	ND (0.0010)	ND (0.0010)	ND (0.000010)	
Nickel	mg/L	-	-	-	ND (0.008)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.002	0.001	-	0.001	0.001	0.001	0.0012	0.0159	0.0016	0.0445	0.0438	
Phosphorus	mg/L	-	-																												

Table E9 Historic Groundwater Quality Results - Site MW 13-2 (MW99-8)

Sample Date:	Units	Dec-14	Mar-15	Jul-15	Oct-15	Dec-15	Mar-16	Jul-16	Jul-16	Sep-16	Dec-16	Apr-17	Jun-17	Nov-17	Dec-17	Mar-18	Jul-18	Sep-18	Dec-18	Apr-19	Nov-19	Dec-19	Dec-19	Mar-20	Jul-20	Oct-20	Dec-20	Mar-21	Jun-21	Oct-21	Dec-21	
Parameters:																																
General																																
Chemical Oxygen Demand (COD)	mg/L	27	33	42	50	33	45	59	52	46	31	25	30	16	48	19	39	154	23	73	50	40	30	40	80	30	80	21	60	40	33	
Dissolved Organic Carbon	µg/cm	6.88	5.86	6.5	0.78	2.84	6.18	7.70	7.97	8.64	7.54	7.34	4.93	0.71	9.46	5.56	6.7	9.33	3.3	5.00	5.3	3.7	3.6	6.7	8.5	7.7	6.2	5.6	6.4	8	6.8	
Conductivity, Electrical	µS/cm	482	651	841	65.1	595	548	745	743	935	543	595	599	251	537	441	726	939	420	622	636	516	612	906	1043	661	543	819	849	709		
pH	s.u.	6.86	7.29	6.73	7.61	6.78	7.00	7.59	7.53	6.77	6.80	6.59	6.63	7.17	7.84	6.99	7.59	7.07	7.44	7.05	6.56	6.47	6.61	6.92	6.95	6.83	6.59	6.75	6.77	6.73	6.49	
Alkalinity (Total as CaCO3)	mg/L	210	298	413	29.8	286	268	368	369	447	261	268	269	337	439	230	337	439	202	315	324	256	264	289	434	531	329	272	378	314		
Alkalinity (PP as CaCO3)	mg/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)	ND (0.50)	ND (0.50)	ND (0.50)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	
Bicarbonate (HCO3)	mg/L	281	363	503	36.4	349	328	449	448	546	318	327	328	104	303	268	411	536	246	315	396	312	324	353	529	647	401	332	479	461	386	
Carbonate (as CaCO3)	mg/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)	ND (0.50)	ND (0.50)	ND (0.50)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (6)	ND (6)	ND (6)	ND (6)	ND (6)	ND (6)	ND (6)	ND (6)	ND (6)	ND (6)	ND (6)	
Hydroxide (OH)	mg/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)	ND (0.50)	ND (0.50)	ND (0.50)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	
Turbidity	NTU	10.2	56.6	79.2	57.1	46.8	12.1	86.8	70.4	89.3	15.4	14.9	13.2	109	114	169	3400	31.5	801	57.7	89.1	190	102	548	242	136	36.9	181	112	78.6		
Hardness (as CaCO3)	mg/L	177	212	260	50.2	210	186	237	248	182	198	196	198	226	279	162	226	279	162	205	220	180	190	210	250	300	240	200	240	300	250	
Nutrients																																
Ammonia	mg/L	1	3	3	0.056	8.1	6.2	11	11	24	20	6	7.8 (2)	2.7 (2)	6.8 (2)	8.2	14	22	4.4	6.82	7.01	3.85	4.22	4.91	21.4	23.8	3.6	4.2	14.4	16.9	7.81	
Dissolved Nitrate (N)	mg/L	ND (0.020)	ND (0.020)	0.031	0.066	ND (0.20)	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.20)	ND (0.20)	ND (0.020)	0.038	0.024	0.080	ND (0.020)	0.080	ND (0.020)	0.138	ND (0.01)	ND (0.01)	ND (0.01)	0.02	ND (0.01)	ND (0.1)	ND (0.1)	0.13	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	
Dissolved Nitrite (N)	mg/L	0.0163	0.0096	ND (0.0050)	ND (0.0050)	0.0068	ND (0.0050)	ND (0.0050)	ND (0.0050)	0.0118	0.0062	ND (0.0050)	0.0053	0.0077	0.0080	ND (0.0050)	0.0080	ND (0.0050)	0.048	ND (0.01)	ND (0.01)	ND (0.01)	0.1	0.1	ND (0.005)	ND (0.11)	ND (0.1)	ND (0.005)	ND (0.11)	ND (0.1)	ND (0.1)	
Total Phosphorus	mg/L	0.105	0.214	0.188	0.472	0.174	0.200	0.203	0.209	0.373	0.144	0.159	0.263	0.0629	0.183	0.172	0.134	1.440	0.732	0.76	0.214	0.385	0.084	0.94	0.599	0.289	0.087	0.268	0.409	0.575	0.215	
Nitrate plus Nitrite (N)	mg/L	-	ND (0.020)	0.031	0.066	ND (0.20)	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.20) (2)	ND (0.020)	ND (0.020)	0.044	0.032	ND (0.020)	0.089	ND (0.020)	0.138	-	ND (0.20)	ND (0.020)	ND (0.020)	0.02	0.2	0.2	0.13	ND (0.2)	ND (0.2)	ND (0.01)	ND (0.2)	ND (0.2)	
Total Nitrogen (N)	mg/L	-	10.9	11.6	0.82	7.9	7.37 (1)	10.0 (1)	9.21 (1)	21.9 (1)	6.71 (1)	6.91 (2)	7.4 (2)	6.89	7.99	10.9	19.9	2.56	-	6.19	3.95	4.74	8.63	21.6	25.9	5.29	5.23	13.9	16.1	9.86		
Total Kjeldahl Nitrogen	mg/L	5.79	10.9	11.5	0.754	7.9	7.37	10.0	9.21	21.9	6.71	6.91	6.8	7.4	6.86	7.99	10.8	19.9	2.42	7.79	6.17	3.94	4.74	8.61	21.5	25.9	5.16	5.13	13.9	16.1	9.85	
Anions																																
Chloride	mg/L	11	13	15	4	10	9.1	10	11	17	11	15	15	18	22	14	17	20	6.3	8.08	7.8	3.8	5.19	23.3	25.8	27.2	21.2	18.6	26.8	24.5	24.6	
Sulfate	mg/L	8.18	9.19	15.5	7.85	9.11	7.00	14.5	15.4	13	10.3	16.8	6.55	3.3	5.3	4.2	6.7	ND (1.0)	8.1	11.7	12	13	11.8	0.8	6	5	7	5	7	36	10	
Dissolved Metals																																
Aluminum	mg/L	0.229	ND (0.0030)	0.0032	2.03	-	0.0037	ND (0.0030)	0.0034	ND (0.0030)	ND (0.0030)	ND (0.0030)	ND (0.0030)	ND (0.0030)	ND (0.0030)	ND (0.0030)	ND (0.0030)	ND (0.0030)	ND (0.0030)	ND (0.0030)	ND (0.0050)	0.002	ND (0.001)	ND (0.001)	ND (0.001)	ND (0.001)	2	0.007	ND (0.005)	ND (0.001)	0.018	0.82
Antimony	mg/L	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	-	ND (0.0050)	ND (0.0050)	0.0059	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0020)	0.0009	0.0014	0.0001	0.0001	0.0002	0.0002	0.0001	ND (0.001)	0.0001	0.00015	0.00022
Arsenic	mg/L	0.00299	0.00021	0.0005	0.00174	-	0.00246	0.00127	0.00147	0.00371	0.00325	0.00035	0.00074	0.00045	0.0017	0.00246	0.00033	0.00049	ND (0.0050)	0.0004	0.0005	0.0004	0.0005	0.0005	0.0007	0.0006	0.0006	0.0006	0.0008	0.0005		
Barium	mg/L	0.095	0.0961	0.122	0.0612	-	0.09	0.115	0.119	0.183	0.085	0.097	0.0869	0.0582	0.0991	0.0889	0.096	0.096	0.096	0.096	0.096	0.096	0.096	0.096	0.096	0.096	0.096	0.096	0.096	0.096	0.096	
Beryllium	mg/L	ND (0.00010)	ND (0.00010)	ND (0.00010)	0.0013	-	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	0.0005	0.0003	ND (0.0003)	ND (0.0005)	ND (0.0005)	ND (0.0005)	
Bismuth	mg/L	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	-	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	0.0005	ND (0.0005)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
Boron	mg/L	0.162	0.275	0.273	ND (0.050)	-	0.174	0.205	0.216	0.33	0.15	0.231	0.159	ND (0.050)	0.191	0.182	0.281	0.378	0.071	0.178	0.129	0.043	0.053	0.14	0.32	0.37	0.093	0.14	0.27	0.29	0.23	
Cadmium	mg/L	0.000168	0.000027	0.00016	0.00002	-	ND (0.0001)	0.000021	0.000016	ND (0.0001)	0.00015	0.00012	0.000072	0.000058	0.00001	0.000014	0.000037	0.000037	0.000033	0.00023	0.00002	0.00003	0.00002	0.00002	0.00001	0.0003	0.00005	ND (0.00005)	ND (0.0001)	ND (0.0001)	0.00003	
Calcium	mg/L	59.5	70.2	91.2	59.1	-	67.5	72.5	88.5	72.5	64.6	65.8	65.8	65.8	65.8	65.8	65.8	65.8	65.8	65.8	65.8	65.8	65.8	65.8	65.8	65.8	65.8	65.8	65.8	65.8	65.8	
Chromium	mg/L	0.0016	ND (0.0010)	ND (0.0010)	0.0027	-	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.001.												

Table E9 Historic Groundwater Quality Results - Site MW 13-2 (MW99-8)

Sample Date:	Units	Jul-22	Sep-22	Dec-22
Parameters:				
General				
Chemical Oxygen Demand (COD)	mg/L			
Dissolved Organic Carbon	mg/L	50	60	110
Conductivity, Electrical	µS/cm	715	872	731
pH	s.u.	6.64		6.84
Alkalinity (Total as CaCO3)	mg/L	326	324	271
Alkalinity (FP as CaCO3)	mg/L	<5	<5	<5
Bicarbonate (HCO3-)	mg/L	397	395	331
Carbonate (as CaCO3)	mg/L	<6	<6	<6
Hydroxide (OH)	mg/L	<5	<5	<5
Turbidity	NTU	56.1	63.9	103
Hardness (as CaCO3)	mg/L	220		250
Nutrients				
Ammonia	mg/L	6.6	11.0	11.40
Dissolved Nitrate (N)	mg/L	<0.1	<0.1	<0.1
Dissolved Nitrite (N)	mg/L	<0.1	<0.1	<0.1
Total Phosphorus	mg/L	0.347	0.242	0.103
Nitrate plus Nitrite (N)	mg/L	<0.20	<0.20	<0.20
Total Nitrogen (N)	mg/L	7.55	11.4	11.2
Total Kjeldahl Nitrogen	mg/L	7.53	11.4	11.2
Anions				
Chloride	mg/L	18.2	34.9	36.8
Sulfate	mg/L	20	75	46
Dissolved Metals				
Aluminum	mg/L	0.031	0.177	ND (0.001)
Antimony	mg/L	0.00008	0.0004	0.00021
Arsenic	mg/L	0.005	0.0077	0.003
Barium	mg/L	0.12	0.162	0.1
Beryllium	mg/L	<0.00005	<0.0001	<0.0001
Bismuth	mg/L	<0.0001	<0.0005	<0.0001
Boron	mg/L	0.15	0.257	0.17
Cadmium	mg/L	0.00001	0.00001	ND 0.00001
Calcium	mg/L	72	82	
Chromium	mg/L	0.00033	0.0007	0.00015
Cobalt	mg/L	0.00033	0.0091	0.0054
Copper	mg/L	0.0009	0.001	0.0000018
Iron	mg/L	42	31.6	0.009
Lead	mg/L	0.00018	0.0003	0.00001
Lithium	mg/L	0.0018	0.003	0.0019
Magnesium	mg/L	9.6	12.9	12
Manganese	mg/L	8	8.53	7.9
Mercury	mg/L	<0.00001	<0.000005	<0.00001
Molybdenum	mg/L	0.00052	<0.001	0.00026
Nickel	mg/L	0.0011	0.0105	0.0055
Phosphorus	mg/L	0.347	0.242	0.34
Potassium	mg/L	10	13.7	14
Selenium	mg/L	0.0003	<0.0002	-
Silicon	mg/L	12	13.4	13
Silver	mg/L	<0.00001	<0.00001	<0.00001
Sodium	mg/L	23	33.8	23
Strontium	mg/L	0.94	1.28	1.1
Sulfur	mg/L	11	30.5	15
Tellurium	mg/L	-	-	-
Thallium	mg/L	<0.00001	<0.00005	<0.00001
Thorium	mg/L	<0.00005	-	<0.00005
Tin	mg/L	<0.0001	<0.001	<0.0001
Titanium	mg/L	0.0015	0.008	<0.0002
Tungsten	mg/L	-	-	<0.0002
Uranium	mg/L	0.00024	0.0007	0.00047
Vanadium	mg/L	0.0008	0.0013	0.0001
Zinc	mg/L	0.0055	0.02	0.0033
Zincium	mg/L	<0.0001	<0.001	<0.00001
Volatile Organic Compounds				
1,1,1,2-tetrachloroethane	mg/L	ND (0.0001)	ND (0.0001)	ND (0.0001)
1,1,1-trichloroethane	mg/L	ND (0.0001)	ND (0.0001)	ND (0.0001)
1,1,2,2-tetrachloroethane	mg/L	ND (0.0001)	ND (0.0001)	ND (0.0001)
1,1,2-Trichloro-1,2,2,2-tetrafluoroethane	mg/L			
1,1,2-trichloroethane	mg/L	ND (0.0001)	ND (0.0001)	ND (0.0001)
1,1-dichloroethane	mg/L	ND (0.0001)	ND (0.0001)	ND (0.0001)
1,1-dichloroethene	mg/L	ND (0.0005)	ND (0.0005)	ND (0.0005)
1,2,3-trichlorobenzene	mg/L	ND (0.0001)	ND (0.0001)	ND (0.0001)
1,2,4-trichlorobenzene	mg/L	ND (0.0001)	ND (0.0001)	ND (0.0001)
1,2-dibromoethane	mg/L	ND (0.0001)	ND (0.0001)	ND (0.0001)
1,2-dichlorobenzene	mg/L	ND (0.0001)	ND (0.0001)	ND (0.0001)
1,2-dichloroethane	mg/L	ND (0.0005)	ND (0.0005)	ND (0.0005)
1,2-dichloropropane	mg/L	ND (0.0001)	ND (0.0001)	ND (0.0001)
1,3,5-trimethylbenzene	mg/L	ND (0.0001)	ND (0.0001)	ND (0.0001)
1,3-Butadiene	mg/L			
1,3-dichlorobenzene	mg/L	ND (0.0001)	ND (0.0001)	ND (0.0001)
1,3-dichloropropane	mg/L	ND (0.0001)	ND (0.0001)	ND (0.0001)
1,4-dichlorobenzene	mg/L	0.0004	0.0003	0.0003
Benzene	mg/L	0.0008	0.0005	0.001
Bromobenzene	mg/L	ND (0.0001)	ND (0.0001)	ND (0.0001)
Bromodichloromethane	mg/L	ND (0.0001)	ND (0.0001)	ND (0.0001)
Bromoform	mg/L	ND (0.0001)	ND (0.0001)	ND (0.0001)
Bromomethane	mg/L	ND (0.001)	ND (0.001)	ND (0.001)
Dibromomethane	mg/L	ND (0.0001)	ND (0.0001)	ND (0.0001)
Carbon tetrachloride	mg/L	ND (0.0005)	ND (0.0005)	ND (0.0005)
Chlorobenzene	mg/L	0.0014	0.001	0.0017
Chlorodibromomethane	mg/L	-	-	-
Chloroethane	mg/L	0.002	0.002	ND (0.001)
Chloroform	mg/L	ND (0.0001)	ND (0.0001)	ND (0.0001)
Chloromethane	mg/L	ND (0.001)	ND (0.001)	ND (0.001)
cis-1,2-dichloroethene	mg/L	ND (0.0001)	ND (0.0001)	ND (0.0001)
cis-1,3-dichloropropene	mg/L	ND (0.0001)	ND (0.0001)	ND (0.0001)
Dibromomethane	mg/L			
Dichlorodifluoromethane	mg/L	ND (0.001)	ND (0.001)	ND (0.001)
Dichloromethane	mg/L	-	-	-
Ethylbenzene	mg/L	ND (0.0001)	ND (0.0001)	ND (0.0001)
Hexachlorobutadiene	mg/L	ND (0.0001)	ND (0.0001)	ND (0.0001)
Isopropylbenzene	mg/L	0.0006	0.0001	0.0003
m & p-Xylene	mg/L	ND (0.0001)	ND (0.0001)	ND (0.0001)
Methyl-tert-butylether (MTBE)	mg/L	0.0007	0.0007	0.0007
o-Xylene	mg/L	ND (0.0001)	ND (0.0001)	ND (0.0001)
Styrene	mg/L	ND (0.0001)	ND (0.0001)	ND (0.0001)
Tetrachloroethene	mg/L	ND (0.0005)	ND (0.0005)	ND (0.0005)
Toluene	mg/L	ND (0.0001)	ND (0.0001)	ND (0.0001)
trans-1,2-dichloroethene	mg/L	ND (0.0001)	ND (0.0001)	ND (0.0001)
trans-1,3-dichloropropene	mg/L	ND (0.0001)	ND (0.0001)	ND (0.0001)
Trichloroethene	mg/L	ND (0.0005)	ND (0.0005)	ND (0.0005)
Trichlorofluoromethane	mg/L	ND (0.0001)	ND (0.0001)	ND (0.0001)
VH C6-C10	mg/L	ND (0.05)	ND (0.05)	ND (0.05)
Vinyl chloride	mg/L	ND (0.0005)	ND (0.0005)	ND (0.0005)
VPH (VTHW to 10 - BTEX)	mg/L	ND (0.05)	ND (0.05)	ND (0.05)
Xylenes (Total)	mg/L	ND (0.0001)	ND (0.0001)	ND (0.0001)
Notes:				
- No data available				

Sample Date:		Units	Jun-00	Dec-00	Apr-01	Jul-01	Dec-01	Jun-02	Oct-02	Mar-03	Sep-03	Mar-04	Dec-04	Mar-05	Feb-06	May-06	Sep-06	Nov-06	Apr-07	Sep-07	Nov-07	Jul-08	Dec-08	Jul-09	Nov-09	Aug-10	Dec-10	Jul-11	Dec-11	Aug-12	
Parameters:																															
General																															
Chemical Oxygen Demand (COD)	mg/L	-	103	80	83	102	62	69	73	71	67	60	50	41	39	51	32	12	ND (10)	30	59	ND (10)	42	31	26	55	-	138	82	64	
Dissolved Organic Carbon	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8.3	-	8.1	8.21	8.33	
Conductivity, Electrical	µS/cm	-	2380	2360	2470	2300	2300	2230	2210	2260	2180	1760	1940	1920	1790	1750	1690	1660	1640	1530	1500	1500	1350	1340	1390	1350	1340	1240	1290	1220	
pH	mg/L	-	6.7	6.6	6.6	6.4	6.6	6.9	7.2	7	7.1	6.8	6.9	7	7	6.9	7.1	6.9	7.4	7.1	6.9	6.9	7.4	7.6	7.6	6.6	7.3	7.7	7.7	7.34	
Alkalinity (Total as CaCO ₃)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	600	588	620	671	628	
Alkalinity (PP as CaCO ₃)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	ND (0.5)	-	-	ND (0.5)	-	ND (0.5)	ND (0.5)	ND (0.5)	
Bicarbonate (HCO ₃)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	920	-	-	740	-	760	819	767	
Carbonate (as CaCO ₃)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	ND (0.5)	-	-	ND (0.5)	-	ND (0.5)	ND (0.5)	ND (0.5)	
Hydroxide (OH)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	ND (0.5)	-	-	ND (0.5)	-	ND (0.5)	ND (0.5)	ND (0.5)	
Turbidity	NTU	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Hardness (as CaCO ₃)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	376	-	-	37.7	-	150	207	410	
Nutrients																							587	531	-	545	588	536	545	506	
Ammonia	mg/L	-	1	0.583	0.751	0.962	1.16	1.66	1.5	13.4	1.19	1.34	1.25	1.6	2.02	1.36	1.25	1.1	1.83	1.32	1.6	1.52	1.8	-	0.83	2.4	0.8	1.14	0.64	0.89	
Dissolved Nitrate (N)	mg/L	-	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	0.86	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	0.03	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	0.04	0.03	ND (0.02)	-	0.03	ND (0.02)	ND (0.02)	0.09	ND (0.02)	ND (0.02)	
Dissolved Nitrite (N)	mg/L	-	ND (0.005)	ND (0.005)	ND (0.005)	ND (0.005)	0.005	ND (0.005)	0.005	ND (0.005)	ND (0.005)	ND (0.005)	ND (0.005)	0.005	0.005	ND (0.005)	ND (0.005)	ND (0.005)	0.005	0.006	0.017	0.06	ND (0.05)	-	ND (0.05)	ND (0.05)	0.006	ND (0.05)	ND (0.05)	ND (0.05)	
Total Phosphorus	mg/L	-	-	-	-	0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.405	0.65	-	0.016	-	1.05	0.014	1.1	
Nitrate plus Nitrite (N)	mg/L	-	-	-	-																										

Notes:
- No data available

Table E10 Historic Groundwater Quality Results - Site MW13-3 (MW99-7)

Sample Date:	Units	Dec-12	Mar-13	Jun-13	Dec-13	Apr-14	Jun-14	Jun-14	Dec-14	Mar-15	Mar-15	Jul-15	Oct-15	Oct-15	Dec-15	Mar-16	Jul-16	Sep-16	Dec-16	Apr-17	Jun-17	Nov-17	Dec-17	Mar-18	Jul-18	Sep-18	Dec-18	Apr-19	
Parameters:								Duplicate						Duplicate															
General																													
Chemical Oxygen Demand (COD)	mg/L	36	29	45	294	309	136	104	104	32	173	164	204	627	723	61	25	65	51	66	27	106	38	38	16	50	37	44	135
Dissolved Organic Carbon	mg/L	-	-	6.93	4.41	22.9	10.8	7.23	4.81	7.75	6.2	6.19	5.87	8.2	8.4	8.64	6.42	11.2	9.10	7.15	9.27	3.76	4.42	5.55	3.7	5.57	4.5	6.15	
Conductivity, Electrical	uS/cm	1240	1240	1510	1230	1490	1060	1130	1540	478	928	927	1000	926	943	893	563	903	883	329	535	643	559	440	659	478	626	719	708
pH	s.u.	7.55	7.22	7.68	6.99	6.97	6.82	6.77	7.33	7.19	7.15	6.84	6.7	7.24	6.92	6.73	7.10	7.58	6.63	6.92	6.8	6.71	7.3	7.55	7.11	7.06	7.04	6.90	
Alkalinity (Total as CaCO ₃)	mg/L	631	648	627	760	751	864	583	699	229	394	403	413	423	300	359	624	213	337	195	178	237	142	260	142	237	306	295	
Bicarbonate (HCO ₃)	mg/L	770	790	765	928	916	689	711	853	280	481	509	598	492	503	516	76.1	366	438	132	260	289	237	317	173	289	374	295	
Carbonate (as CaCO ₃)	mg/L	ND (0.5)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	
Hydroxide (OH)	mg/L	ND (0.5)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	
Turbidity	NTU	183	90.2	29.7	218	230	208	184	194	23.6	521	405	437	>4000	>4000	2.96	109	122	25.9	75	393	33.3	81.7	103	73.7	40.0	52.1	1180	
Hardness (as CaCO ₃)	mg/L	532	498	477	298	301	215	186	186	113	188	187	216	206	274	227	107	237	232	60.5	162	185	119	196	118	177	218	213	
Nutrients																													
Ammonia	mg/L	0.86	0.92	0.91	1.3	1.4	3	1.9	2	21	2.5	2.1	1.8	1.6	2.4	2.8	0.25	1.1	1.6	2.9	6.9 (2)	5.8 (2)	2.6 (2)	3.6 (2)	6.5	4.0	3.8	5.9	6.17
Dissolved Nitrate (N)	mg/L	ND (0.02)	ND (0.020)	0.066	ND (0.50)	ND (0.20)	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.020)	ND (0.020)	ND (0.20)	0.027	0.051	ND (0.020)	ND (0.020)	0.028	0.054	0.090	0.034	ND (0.020)	0.022
Dissolved Nitrite (N)	mg/L	ND (0.05)	0.0107	0.011	0.083	0.055	0.0067	0.0062	0.0092	0.0065	0.0057	0.0062	ND (0.050)	ND (0.050)	ND (0.050)	0.087	ND (0.050)	ND (0.050)	0.0099	ND (0.050)	ND (0.050)	ND (0.050)	ND (0.050)	0.0138	0.0129	ND (0.050)	0.106	0.106	
Total Phosphorus	mg/L	0.12	0.0582	0.211	0.56	0.582	0.625	0.615	0.0739	0.94	0.814	1.42	3.74	5.97	0.252	0.0314	0.205	0.264	0.136	0.129	0.535 (2)	0.0892	0.064	0.0461	0.0575	0.0862	0.138	1.15	
Nitrate plus Nitrite (N)	mg/L	-	-	-	-	-	-	-	-	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.020)	ND (0.020)	ND (0.20)	0.037	0.051	ND (0.020)	ND (0.020)	0.028	0.054	0.104	0.047	ND (0.020)	-	
Total Nitrogen (N)	mg/L	-	-	-	-	-	-	-	-	3.11	2.96	2.77	5.2	3.53	6.42	3.45	0.650	2.35	2.51	3.53	6.13 (2)	6.65 (2)	3.18 (2)	4.2	5.76	4.24	4.6	5.40	
Total Kjeldahl Nitrogen	mg/L	1.33	1.6	1.22	2.5	2.85	2.81	2.55	22.2	3.11	2.96	2.77	5.2	6.42	3.45	0.650	2.35	2.51	3.49	6.07	6.65	3.18	4.17	5.71	4.13	4.56	5.40	6.93	
Anions																													
Chloride	mg/L	31	39	31	16	61	18	18	18	8.5	19	17	20	18	19	15	13	53	23	9.2	15	14	22	11	15	16	15	17.8	
Sulfate	mg/L	6.11	6.91	6.52	12.2	0.72	63.7	4.71	ND (0.50)	29.1	54.1	63.7	86.2	85.3	23.1	66.7	82.1	83	40.0	32.7	66.7	60.4	52.2	66.7	83.0	65.1	55.5	60.2	
Dissolved Metals																													
Aluminum	mg/L	0.0048	ND (0.0030)	-	ND (0.0030)	0.0092	ND (0.0030)	0.0042	0.0083	0.379	0.0039	ND (0.0030)	0.0038	0.124	16.9	-	0.0039	0.0037	ND (0.0030)	0.0032	ND (0.0030)	ND (0.0030)	ND (0.0030)	ND (0.0030)	ND (0.0030)	ND (0.0030)	ND (0.0030)	ND (0.0030)	ND (0.0030)
Antimony	mg/L	ND (0.0005)	ND (0.00050)	-	ND (0.00050)	ND (0.00050)	ND (0.00050)	0.00053	0.00067	ND (0.00050)	ND (0.00050)	ND (0.00050)	ND (0.00050)	ND (0.00050)	ND (0.00050)	-	ND (0.00050)	ND (0.00050)	0.00062	0.00071	ND (0.00050)	0.00051	ND (0.00050)	ND (0.00050)	ND (0.00050)	ND (0.00050)	ND (0.00050)	ND (0.00050)	ND (0.00050)
Arsenic	mg/L	0.0086	0.00882	-	0.00283	0.00369	0.00869	0.00976	0.00972	0.00212	0.00156	0.00106	0.00118	0.00166	0.00083	0.00182	0.00083	0.00132	0.00166	0.00083	0.00132	0.00098	0.00175	0.00099	0.00419	0.00132	0.00128	0.00055	0.0007
Barium	mg/L	0.127	0.121	-	0.232	0.242	0.168	0.151	0.147	0.0773	0.0872	0.0925	0.0909	0.149	0.77	-	0.067	0.127	0.111	0.0417	0.0957	0.0912	0.0931	0.0726	0.116	0.075	0.0975	0.097	0.112
Beryllium	mg/L	ND (0.0001)	ND (0.00010)	-	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	0.00167	-	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)
Bismuth	mg/L	ND (0.001)	ND (0.0010)	-	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	-	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)
Boron	mg/L	0.469	0.481	-	0.073	0.071	0.137	0.105	0.102	ND (0.50)	0.116	0.111	0.1	0.109	0.093	-	0.119	0.121	0.103	0.085	0.175	0.158	0.095	0.094	0.16	0.154	0.151	0.178	0.178
Cadmium	mg/L	0.00153	0.00139	-	ND (0.000010)	ND (0.000010)	ND (0.000010)	ND (0.000010)	ND (0.000010)	0.000679	0.000141	0.000099	0.000011	0.000031	0.00055	-	0.000123	0.000012	ND (0.00001)	0.00004	0.00003	0.000019	0.000035	0.000012	0.000098	0.000015	0.000012	0.00012	0.00012
Calcium	mg/L	168	154	148	100	71.9	61.5	61.4	38.9	63.6	78.1	78.1	38.9	63.6	78.1	-	76.0	78.1	78.1	53.3	62.2	50.9	39.2	63.6	70.5	70.4	70.4	70.4	70.4
Chromium	mg/L	ND (0.001)	ND (0.0010)	-	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	0.0021	ND (0.0010)	ND (0.0010)	ND (0.0010)	0.0316	-	-	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)
Cobalt	mg/L	0.00332	0.00356	-	0.018	0.0193	0.0182	0.01	0.0107	0.00398	0.00991	0.00966	0.00443	0.00572	0.036	-	0.0328	0.00947	0.00314	0.00282	0.00211	0.00519	0.0105	0.0034	0.00262	0.00019	0.00918	0.00306	0.00232
Copper	mg/L	0.00509	0.0038	-	0.00059	0.00098	ND (0.00020)	ND (0.00020)	0.00143	0.00993	0.00172	0.00111	ND (0.00020)	0.00117	0.00037	-	0.00039	ND (0.00020)	ND (0.00020)	0.0004	0.00066	0.0003	0.00055	0.00029	0.00048	0.00055	0.00107	0.00043	0.00043
Iron	mg/L	0.0201	0.0173	0.0182	74.7	78.1	69.7	57.8	58.5	6.0097	0.009	8.98	46.6	95.9	-	-	ND (0.0020)	5.7	19.8	0.17	0.015	0.0475	0.0212	5.04	17.2000	0.0126	0.0258	0.0292	0.043
Lead	mg/L	ND (0.0002)	ND (0.00020)	-	ND (0.00020)	ND (0.00020)	ND (0.00020)	ND (0.00020)	0.00088	ND (0.00020)	ND (0.00020)	ND (0.00020)	ND (0.00020)	0.00029	0.0061	-	ND (0.00020)	ND (0.00020)	ND (0.00020)	ND (0.00020)	ND (0.00020)	ND (0.00020)	ND (0.00020)	ND (0.00020)	ND (0.00020)	ND (0.00020)	ND (0.00020)	ND (0.00020)	ND (0.00020)
Lithium	mg/L	ND (0.005)	ND (0.0050)	-	0.0051	ND (0.0050)	0.0172	0.0137	0.0173	ND (0.0050)	0.0173	0.013	0.0134	0.0141	0.014	-	0.0096	0.0487	0.0368	0.0151	0.0152	0.0133	0.0129	0.0108	0.0084	0.0096	0.0084	0.0096	0.0084
Magnesium	mg/L	27.5	27.7	26.4	12.7	8.13	7.98	12.3	13.6	8.21	7.98	8.21	13.6	8.21	13.6	-	8.21	9.04	9.04	6.96	7.26	6.02	4.81	9.05	9.05	9.05	9.05	9.05	9.05
Manganese	mg/L	4.59	4.36	-	15.4	15.2	10.7	10	9.97	2.42	8.41	8.25	9.08	9.07	10.6	-	3.7	7.43	7.73	2.48	4.84	6.9	5.3	4.64	7.770	6.430	8.560	8.51	8.51
Mercury	mg/L	ND (0.00005)	ND (0.000050)	-	ND (0.010)	ND (0.010)	ND (0.000010)	ND (0.000010)	ND (0.000010)	ND (0.000010)	ND (0.000010)	ND (0.000010)	ND (0.000010)	ND (0.000010)	ND (0.000010)	-	ND (0.000010)	ND (0.000010)	ND (0.000010)	ND (0.000010)	ND (0.000010)	ND (0.000010)	ND (0.000010)	ND (0.000010)	ND (0.000010)	ND (0.000010)	ND (0.000010)	ND (0.000010)	ND (0.000010)
Molybdenum	mg/L	0.0032	0.0034	-	0.0034	0.0032	0.0012	ND (0.0010)	ND (0.0010)	0.0031	0.0025	0.0272	0.0142	0.0014	-	-	ND (0.0010)	0.0155	0.0069	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	0.0011	ND (0.0010)	0.00065

Table E10 Historic Groundwater Quality Results - Site MW13-3 (MW99-7)

Sample Date:	Units	Nov-19	Dec-19	Mar-20	Jul-20	Jul-20 Duplicate	Oct-20	Oct-20	Dec-20	Mar-21 Duplicate	Jun-21	Oct-21	Dec-21	Mar-22	Jul-22	Sep-22	Dec-22
Parameters:																	
General																	
Chemical Oxygen Demand (COD)	mg/L	110	40	40	40	150	36	32	60	18	ND (5)	30	60	32	27	30	-
Dissolved Organic Carbon	mg/L	6	7.5	5	6.4	0.6	5.6	6.5	6.1	3.2	ND (0.5)	4	14	5.1	-	4	30
Conductivity, Electrical	µS/cm	819	795	552	990	54	720	1006	745	279	58	458	483	633	478	458	497
pH	s.u.	6.63	6.6	6.87	7.3	7.05	6.7	6.88	6.56	6.65	7.01	6.52	6.54	6.5	7.12	6.52	6.71
Alkalinity (Total as CaCO ₃)	mg/L	374	358	220	469	23	360	506	353	68	26	142	240	280	220	142	126
Alkalinity (PP as CaCO ₃)	mg/L	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	<5	<5
Bicarbonate (HCO ₃)	mg/L	456	436	268	571	28	439	617	431	83	31	173	293	353	268	173	154
Carbonate (as CaCO ₃)	mg/L	ND (6)	ND (6)	ND (6)	ND (6)	ND (6)	ND (6)	ND (6)	ND (6)	ND (6)	ND (6)	ND (6)	ND (6)	ND (6)	<6	ND (6)	<6
Hydroxide (OH)	mg/L	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	<5	ND (5)	<5
Turbidity	NTU	80.4	84	166	175	60	100	43.5	6.78	119	55.6	63	199	119	182	166	166
Hardness (as CaCO ₃)	mg/L	230	230	150	180	17	150	280	270	74	21	108	160	220	200	108	98
Nutrients																	
Ammonia	mg/L	6.27	5.94	4.37	55.6	0.03	3.6	23.7	5.11	3	ND (0.025)	3.56	2.43	4.95	4.53	3.56	2.01
Dissolved Nitrate (N)	mg/L	ND (0.1)	0.06	ND (0.01)	0.1	0.11	0.1	0.1	ND (0.01)	0.05	0.11	ND (0.1)	0.04	ND (0.1)	<0.1	ND (0.1)	0.1
Dissolved Nitrite (N)	mg/L	ND (0.1)	ND (0.01)	ND (0.005)	0.1	ND (0.01)	0.1	0.1	ND (0.005)	ND (0.001)	ND (0.001)	ND (0.1)	0.006	ND (0.1)	<0.1	ND (0.1)	0.02
Total Phosphorus	mg/L	0.92	0.229	0.254	0.43	ND (0.005)	0.268	0.517	0.386	0.147	0.018	0.007	0.352	0.435	0.375	0.007	0.077
Nitrate plus Nitrite (N)	mg/L	ND (0.20)	0.06	ND (0.01)	0.1	0.11	0.2	0.2	ND (0.01)	0.05	0.11	ND (0.2)	0.04	ND (0.2)	<0.20	ND (0.2)	0.1
Total Nitrogen (N)	mg/L	6.32	6.96	5.51	61.1	0.32	6.13	25.9	7.16	3.65	0.13	3.48	3.94	6.49	5.89	3.48	2.68
Total Kjeldahl Nitrogen	mg/L	6.32	6.94	5.5	61	0.2	5.94	25.9	7.15	3.59	ND (0.07)	3.39	3.9	6.49	5.78	3.39	2.55
Anions																	
Chloride	mg/L	17.1	16	17.5	19.3	1.92	12.9	27.5	18.5	17	1.71	21.8	9.9	19.6	13	21.8	19.8
Sulfate	mg/L	45	41.6	43	3	1.3	20	4	33	38.3	1.4	58	3	12	10	58	9
Dissolved Metals																	
Aluminum	mg/L	0.002	ND (0.001)	ND (0.001)	ND (0.001)	ND (0.001)	0.56	0.45	0.006	ND (0.005)	ND (0.001)	ND (0.001)	1.4	0.31	1.1	0.19	0.1
Antimony	mg/L	0.00013	0.00015	0.00017	0.00014	0.00017	0.00019	0.0001	0.0002	0.0004	0.0004	0.00025	0.00014	ND (0.0002)	0.00034	0.0003	0.0003
Arsenic	mg/L	0.0008	0.0012	0.0024	0.0008	ND (0.0001)	0.0077	0.0069	0.0006	ND (0.0005)	ND (0.0001)	0.0024	0.0039	0.0066	0.005	0.02	0.0097
Barium	mg/L	0.0832	0.0928	0.088	0.08	0.0011	0.12	0.24	0.081	0.051	0.014	0.066	0.098	0.11	0.14	0.098	0.052
Beryllium	mg/L	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	0.0003	ND (0.0003)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	<0.0001
Bismuth	mg/L	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	0.0005	ND (0.0001)	0.0005	ND (0.0005)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	<0.0005
Boron	mg/L	0.185	0.173	0.15	0.1	ND (0.002)	0.19	0.32	0.17	0.17	ND (0.002)	0.14	0.13	0.18	0.16	0.16	0.151
Cadmium	mg/L	ND (0.00001)	ND (0.00001)	ND (0.00001)	ND (0.00001)	ND (0.00001)	0.02	0.05	0.0005	0.0001	0.00002	0.00005	0.00002	ND (0.0001)	0.00002	0.0001	0.00002
Calcium	mg/L	76	49	58	51	92	51	92	25	7.1	36	74	8.2	74	32	74	68
Chromium	mg/L	ND (0.00005)	ND (0.00005)	0.0001	ND (0.00005)	0.00009	0.00059	0.00089	0.0003	ND (0.0003)	0.00009	0.00007	0.0013	0.00048	0.001	0.00037	<0.0005
Cobalt	mg/L	0.00093	0.0012	0.0033	0.0028	0.0041	0.0013	0.0013	0.0084	ND (0.00002)	0.013	0.0078	0.0028	0.0016	0.00089	0.0275	0.0082
Copper	mg/L	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.00005)	ND (0.0005)	0.0026	0.002	0.002	ND (0.002)	ND (0.0005)	ND (0.0005)	0.004	0.0008	<0.005	0.0012	0.001
Iron	mg/L	3.99	9.5	0.009	0.009	ND (0.002)	43	36	13	ND (0.01)	0.004	0.004	39	52	50	56	21.6
Lead	mg/L	0.00001	ND (0.00001)	ND (0.00001)	ND (0.00001)	0.013	0.0011	0.00005	ND (0.00005)	0.00003	ND (0.00001)	0.0014	0.00033	0.0011	0.00028	0.0002	0.00001
Lithium	mg/L	0.0073	0.0072	0.0063	0.0019	ND (0.0005)	0.0073	0.0021	0.006	0.0052	ND (0.0005)	0.0055	0.007	0.0047	0.006	0.0056	0.009
Magnesium	mg/L	8.9	8.9	8.7	8.4	12	8.9	12	8.7	8.2	4.6	9.2	7.8	6.1	4.6	4.8	4.7
Manganese	mg/L	8.58	8.6	5.3	5.1	ND (0.001)	8.5	7.5	9.2	2.6	ND (0.001)	1.3	5.4	7.1	6.8	8.3	4.81
Mercury	mg/L	ND (0.00001)	ND (0.00001)	ND (0.00001)	ND (0.00001)	ND (0.00001)	ND (0.00001)	ND (0.00001)	ND (0.00001)	ND (0.00001)	ND (0.00001)	ND (0.00001)	ND (0.00001)	ND (0.00001)	ND (0.00001)	ND (0.00001)	<0.000005
Molybdenum	mg/L	0.0006	0.00083	0.0006	0.00065	0.00006	0.00073	0.00057	0.0004	ND (0.0001)	0.00007	0.00056	0.00017	0.00018	<0.0002	0.0036	<0.001
Nickel	mg/L	0.0026	0.0033	0.0054	0.0023	0.0003	0.0029	0.0028	0.003	0.0064	ND (0.0002)	0.013	0.0037	0.0018	0.002	0.0034	0.0276
Phosphorus	mg/L	-	-	-	0.43	ND (0.05)	-	-	0.147	0.018	0.007	0.352	0.435	0.375	0.152	0.092	0.5
Potassium	mg/L	6.5	6.7	5.5	13	0.56	4.4	18	6.2	4.3	6.1	5.5	6.9	4.6	4.8	4.7	4.7
Selenium	mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	0.0003	0.0003	ND (0.0002)	0.001	ND (0.001)	ND (0.0002)	ND (0.0002)	0.0003	ND (0.0002)	<0.002	<0.0002	<0.0002
Silicon	mg/L	12	13	11	11	6.8	8.6	12	12	8.9	8.3	10	10	13	11	14	13.6
Silver	mg/L	ND (0.00001)	ND (0.00001)	ND (0.00001)	ND (0.00001)	ND (0.00001)	ND (0.00001)	0.00016	0.00005	ND (0.00005)	ND (0.00001)	ND (0.00001)	ND (0.00001)	ND (0.00001)	ND (0.00001)	ND (0.00001)	<0.00001
Sodium	mg/L	39	40	33	29	2.9	23	34	32	28	2.9	35	18	27	25	34	32.9
Strontium	mg/L	1.291	1.327	0.9	1.1	0.039	1.3	1.5	1.4	0.39	0.038	0.65	0.82	1.2	1.2	1.3	0.786
Sulfur	mg/L	15	16	13	1.4	0.48	9.3	2.5	32	15	0.53	18	4.3	5	4.9	6.4	3.4
Tellurium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thallium	mg/L	0.00001	ND (0.00001)	ND (0.00001)	ND (0.00001)	ND (0.00001)	ND (0.00001)	ND (0.00001)	0.00005	ND (0.00005)	ND (0.00001)	0.00003	0.00001	ND (0.00001)	ND (0.00001)	ND (0.00001)	<0.00005
Thorium	mg/L	ND (0.00005)	0.00012	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	0.00011	0.0003	ND (0.00003)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	<0.0005	<0.00005	-
Tin	mg/L	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	0.0002	0.0001	0.0005	0.0003	ND (0.00003)	0.0003	0.0001	0.0002	0.0001	0.0002	0.0001	ND (0.0001)
Titanium	mg/L	ND (0.0001)	0.0005	0.0001	ND (0.0001)	ND (0.0001)	0.014	0.022	0.002	ND (0.0005)	ND (0.0001)	ND (0.0001)	0.053	0.015	0.042	0.0086	0.0041
Tungsten	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Uranium	mg/L	0.00078	0.00237	0.00071	0.00024	0.00042	0.00021	0.0002	0.00005	ND (0.00001)	0.00097	0.00025	0.0003	0.0002	0.0041	<0.0005	0.00006
Vanadium	mg/L	ND (0.00005)	ND (0.00005)	0.00018	ND (0.00005)	0.00022	0.0018	0.0022	0.0003	ND (0.0003)	0.00062	0.00019	0.0037	0.0017	0.0029	0.0013	0.0003
Zinc	mg/L	0.0104	0.0091	0.0068	0.0091	0.017	0.018	0.0098	0.033	0.014	0.029	1.5	0.014	0.35	0.017	0.124	0.02
Zirconium	mg/L	ND (0.0001)	0.0002	ND (0.0001)	ND (0.0001)	ND (0.0001)	0.0002	0.0003	0.0005	ND (0.0005)	ND (0.0001)	ND (0.0001)	0.0003	0.0002	<0.001	0.0001	<0.001
Volatile Organic Compounds																	
1,1,1,2-tetrachloroethane	mg/L	-	-	-	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	-	-	ND (0.0001)	ND (0.0001)	ND (0.0001)	<0.0001	<0.0001	<0.001
1,1,1,2-trichloroethane	mg/L	-	-	-	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	-	-	ND (0.0001)	ND (0.0001)	ND (0.0001)	<0.0001	<0.0001	<0.001
1,1,2,2-tetrachloroethane	mg/L	-	-	-	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	-	-	ND (0.0001)	ND (0.0001)	ND (0.0001)	<0.0001	<0.0001	<0.001
1,1,2Trichloro-1,2,2Trifluoroethane	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,1,2-trichloroethane	mg/L	-	-	-	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	-	-	ND (0.0001)	ND (0.0001)	ND (0.0001)	<0.0001	<0.0001	<0.0001
1,1-dichloroethane	mg/L	-	-	-	0.0003	ND (0.0001)	ND (0.0001)	0.0002	0.0002	-	-	0.0002	0.0002	0.0002	0.0003	0.0002	0.0002
1,1-dichloroethene	mg/L	-	-	-	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	-	-	ND (0.0005)	ND (0.0005)	ND (0.0005)	<0.0005	<0.0005	<0.0005
1,2,3-trichlorobenzene	mg/L	-	-	-	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	-	-	ND (0.0001)					

Sample Date:	Units	Dec-13	Apr-14	Jun-14	Dec-14	Mar-15	Jul-15	Dec-15	Mar-16	Jul-16	Sep-16	Dec-16	Apr-17	Jun-17	Dec-17	Mar-18	Jul-18	Sep-18	Dec-18	Apr-19	Nov-19	Dec-19	Mar-20	Jul-20	Oct-20	Dec-20	Mar-21	Jun-21	Oct-21	Dec-21	Mar-22	Jul-22	Sep-22	Dec-22	
Parameters:																																			
General																																			
Chemical Oxygen Demand (COD)	mg/L	378	45	60	135	ND (10)	11	80	23	66	58	65	12	30	20	ND (10)	ND (5.0)	40	38	ND (20)	60	ND (10)	30	60	ND (5)	ND (10)	ND (5)	ND (10)	ND (5)	ND (10)	ND (5)	30	<5	30	30
Dissolved Organic Carbon	mg/L	249	2.06	2.38	1.75	ND (0.5)	0.5	0.95	0.58	ND (0.50)	0.67	0.92	0.99	ND (0.50)	0.81	ND (0.50)	1.50	1.39	ND (0.50)	ND (0.5)	ND (0.5)	0.7	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	0.7	ND (0.5)	ND (0.5)	ND (0.5)	30	-		
Conductivity, Electrical	uS/cm	74.5	71.4	113	74.2	58	56.4	63.6	56.4	50.4	55.4	56.5	55.1	52.1	55.2	54.4	52.2	53.4	40.1	50.2	62	66	54	56	57	66	54	56	57	65	53	60	62		
pH	unit	6.68	7.16	7.28	7.2	7.4	7.4	6.99	7.30	7.50	6.72	6.98	7.11	7.36	7.62	6.71	7.36	7.62	6.71	7.28	7.14	6.82	6.66	7.22	7.03	6.89	6.72	6.72	6.97	6.68	7.08	6.72	6.96	6.96	6.2
Alkalinity (Total as CaCO3)	mg/L	32.8	28.9	49.6	34.9	22.7	25.4	26.3	26.3	31.9	22.6	24.5	27.4	22.8	24.4	24.2	24.1	23.2	29.6	22.4	25	25	26	30	54	24	22	26	21	23	25	29	29		
Alkalinity (PP as CaCO3)	mg/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)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)		
Bicarbonate (HCO3-)	mg/L	4.6	3.2	40	12.4	31	32.1	28.7	27.5	29.4	27.5	28.4	27.4	27.8	28.4	28.6	28.4	28.4	36.1	22.4	31	29	29	33	36	28	22	27	21	23	25	31	35	35	
Carbonate (as CaCO3)	mg/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)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)		
Hydroxide (OH-)	mg/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)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)		
Turbidity (NTU)	NTU	<4000	129	2630	827	0.61	0.67	150	56.8	100	249	451	115	268	102	220	424	646	97.3	464	33.9	33.4	2.26	3.68	12.9	40.3	10.9	2.24	14.4	3.25	10.9	10.9	2.24		
Hardness (as CaCO3)	mg/L	28.3	27.8	2.34	21.5	19.4	21.5	105	18.8	16.4	17.7	18.6	16.5	18.9	18.7	17.7	17.3	21.2	21.2	17.5	19	21	21	23	17	19	20	22	17	19	25	<5	25	23	
Nutrients																																			
Ammonia	mg/L	0.009	0.017	0.022	0.047	0.009	0.0092	0.06	0.032	0.065	0.31	0.10	0.044	0.026	0.046	ND (0.020)	0.022	0.035	0.020	ND (0.020)	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.02)	ND (0.025)	ND (0.025)	ND (0.025)	ND (0.01)	ND (0.025)	ND (0.025)	ND (0.025)	ND (0.025)	ND (0.025)		
Dissolved Nitrate (N)	mg/L	ND (0.020)	ND (0.020)	ND (0.020)	0.037	0.089	0.063	ND (0.20)	0.079	0.108	0.088	0.120	0.09	0.089	0.109	0.084	0.133	0.160	0.082	0.121	0.09	0.15	0.11	0.15	0.11	0.15	0.11	0.16	0.17	0.16	0.17	0.16	0.17	0.16	
Dissolved Nitrite (N)	mg/L	ND (0.0050)	ND (0.0050)	0.0069	0.0139	ND (0.0050)	0.0058	0.138	0.011	ND (0.0050)	0.0058	ND (0.0050)	0.0058	ND (0.0050)	0.0058	ND (0.0050)	0.0058	ND (0.0050)	0.0058	ND (0.0050)	0.0058	ND (0.0050)	0.0058	ND (0.0050)	0.0058	ND (0.0050)	0.0058	ND (0.0050)	0.0058	ND (0.0050)	0.0058	ND (0.0050)	0.0058	ND (0.0050)	
Total Phosphorus	mg/L	2.51	0.271	0.599	1.24	0.0178	0.0264	1.16	0.0288	0.855 (1)	0.622 (1)	0.450	0.162	0.355	0.164	0.0504	0.0292	0.127	0.192	0.039	0.116	0.078	0.024	0.05	0.067	0.137	0.015	0.05	0.054	0.023	0.015	0.347	0.327	0.09	
Ortho-phosphate (N)	mg/L	1.9	4.74	0.011	0.26	0.009	0.068	ND (0.20)	0.108	0.088	0.120	0.09	0.089	0.13	0.084	0.133	0.189	0.062	0.15	0.11	0.15	0.11	0.11	0.16	0.12	0.16	0.12	0.16	0.12	0.16	0.12	0.16	0.12	0.16	
Total Nitrogen (N)	mg/L	-	-	-	-	0.135	0.139	0.837	0.162	0.157	0.748	0.366	0.326	0.377	0.33 (2)	0.252	0.196	0.271	0.371	-	0.17	0.15	0.2	0.2	0.3	0.19	0.14	0.12	0.17	0.18	0.2	ND (0.20)	ND (0.20)	ND (0.20)	
Total Kjeldahl Nitrogen	mg/L	1.23	0.257	8.4	1.84	0.046	0.071	0.84	0.072	0.049	0.660	0.245	0.236	0.288	0.2	0.168	0.063	0.082	0.339	0.056	ND (0.07)	ND (0.07)	ND (0.07)	0.08	0.15	0.09	ND (0.07)	ND (0.07)	ND (0.07)	ND (0.07)	ND (0.07)	ND (0.07)	ND (0.07)		
Trace Metals																																			
Chloride	mg/L	7.8	2.3	1.8	2	2.2	2.2	1.5	1.8	3.2	3.1	1.9	2	2	2.2	2.3	1.5	2.8	1.8	1.56	2.4	2.03	1.73	1.93	2.07	2.05	1.69	1.67	1.7	1.51	1.37	1.6	2		
Sulfate	mg/L	11.8	2.9	7.62	2.5	1.74	2.44	2.11	5.00	2.7	2.30	2.64	1.87	2.5	2.9	2.7	3.1	1.9	1.4	1.3	1.9	1.4	1.5	1.5	1.5	1.5	1.4	ND (1)	1.4	1.3	1.7	1.6			
Dissolved Metals																																			
Aluminum	mg/L	0.0052	1.53	0.0454	3.88	ND (0.0050)	ND (0.0050)	-	0.0038	0.0055	0.0039	0.0082	0.0034	ND (0.0030)	0.0036	0.0079	0.0153	ND (0.0030)	0.0041	ND (0.0050)	0.001	0.012	0.006	ND (0.001)	ND (0.00023)	0.0007	0.001	0.002	0.001	0.062	0.053	0.82	2.22	0.003	
Antimony	mg/L	ND (0.00050)	ND (0.00050)	ND (0.00050)	ND (0.00050)	ND (0.00050)	ND (0.00050)	-	ND (0.00050)	ND (0.00050)	ND (0.00050)	ND (0.00050)	ND (0.00050)	ND (0.00050)	ND (0.00050)	ND (0.00050)	ND (0.00050)	0.00055	ND (0.00050)	0.00055	ND (0.00050)	0.00006	0.00012	0.00007	0.00006	0.00011	0.0001	0.0007	0.00005	0.00008	0.00007	0.00005	0.00011		
Arsenic	mg/L	0.00154	0.0039	0.00084	0.00054	0.00012	0.00013	-	0.0002	0.00021	0.0001	ND (0.00010)	0.00014	0.00011	0.0001	0.0001	ND (0.00010)	ND (0.00010)	ND (0.00010)	0.0001	ND (0.00010)	0.0001	ND (0.00010)	0.0001	ND (0.00010)	0.0001	0.0002	0.00005	ND (0.0001)	0.0001	0.0001	0.0001	0.0001		
Boron	mg/L	0.0037	0.0432	0.0015	0.256	0.0025	0.0024	0.0024	0.0025	0.0024	0.0024	0.0027	0.0019	0.0018	0.002	0.0015	ND (0.0010)	ND (0.0010)	ND (0.0010)	0.0017	0.0014	0.0023	0.0014	0.0027	ND (0.0001)	0.0002	0.0004	0.0007	ND (0.0001)	0.0002	0.0004	0.0001	0.0011		
Bromine	mg/L	ND (0.00010)	ND (0.00010)	ND (0.00010)	0.00332	ND (0.00010)	ND (0.00010)	-	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	0.0006	0.0003	ND (0.00050)	0.00006	0.0003	ND (0.00050)	ND (0.00050)		
Bismuth	mg/L	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	-	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	0.0005	ND (0.0001)	ND (0.0001)	0.0005	ND (0.0001)	ND (0.0001)	ND (0.0001)		
Cadmium	mg/L	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	-	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	0.0005	ND (0.0001)	ND (0.0001)	0.0005	ND (0.0001)	ND (0.0001)	ND (0.0001)		
Cadmium	mg/L	ND (0.000010)	0.000094	0.000094	0.000094	0.000094	0.000094	-	0.000178	0.000025	0.000049	0.000045	0.000044	0.0000725	0.00003	0.000035	0.000045	0.000018	0.00002	0.00001	</														

Table E13 Historic Groundwater Quality Results - Site MW17-01

Sample Date:	Units	Mar-18	Mar-20	Mar-20
				Duplicate
Parameters:				
General				
Chemical Oxygen Demand (COD)	mg/L	115	50	10
Dissolved Organic Carbon	mg/L	6.56	7.4	2.3
Conductivity, Electrical	µS/cm	1000	879	469
pH	s.u.	7.61	7.3	6.88
Alkalinity (Total as CaCO3)	mg/L	470	426	239
Alkalinity (PP as CaCO3)	mg/L	ND (1.0)	ND (5)	ND (5)
Bicarbonate (HCO ₃)	mg/L	573	520	292
Carbonate (as CaCO ₃)	mg/L	ND (1.0)	ND (6)	ND (6)
Hydroxide (OH)	mg/L	ND (1.0)	ND (5)	ND (5)
Turbidity	NTU	2450	285.0	7.4
Hardness (as CaCO ₃)	mg/L	177	160	190
Nutrients				
Ammonia	mg/L	49.0	40.5	0.0
Dissolved Nitrate (N)	mg/L	ND (0.050)	ND (0.01)	ND (0.01)
Dissolved Nitrite (N)	mg/L	ND (0.050)	ND (0.005)	ND (0.005)
Total Phosphorus	mg/L	1.790	0.287	0.014
Nitrate plus Nitrite (N)	mg/L	ND (0.020)	ND (0.01)	ND (0.01)
Total Nitrogen (N)	mg/L	43.7	54.2	0.1
Total Kjeldahl Nitrogen	mg/L	43.7	54.2	0.1
Anions				
Chloride	mg/L	14	15	7
Sulfate	mg/L	29.9	1.30	7.40
Dissolved Metals				
Aluminum	mg/L	ND (0.0030)	ND (0.001)	ND (0.001)
Antimony	mg/L	ND (0.00050)	0.00007	0.00016
Arsenic	mg/L	0.00177	0.0013	0.0002
Barium	mg/L	0.161	0.11	0.061
Beryllium	mg/L	ND (0.00010)	ND (0.00005)	ND (0.00005)
Bismuth	mg/L	ND (0.0010)	ND (0.0001)	ND (0.0001)
Boron	mg/L	ND (0.050)	0.029	0.025
Cadmium	mg/L	ND (0.000010)	ND (0.00001)	0.00032
Calcium	mg/L	59.6	52	60
Chromium	mg/L	ND (0.0010)	ND (0.00005)	ND (0.00005)
Cobalt	mg/L	0.00313	0.0025	0.011
Copper	mg/L	ND (0.00020)	ND (0.0005)	0.0006
Iron	mg/L	7.72	2.7	1.5
Lead	mg/L	ND (0.00020)	ND (0.00001)	ND (0.00001)
Lithium	mg/L	0.0050	0.0044	0.0050
Magnesium	mg/L	6.97	6.5	9.8
Manganese	mg/L	5.24	5.4	4.2
Mercury	mg/L	ND (0.0000020)	ND (0.00001)	ND (0.00001)
Molybdenum	mg/L	0.0011	0.0012	0.0001
Nickel	mg/L	0.0058	0.0039	0.0032
Potassium	mg/L	10.7	10	4.6
Selenium	mg/L	0.00012	ND (0.0002)	ND (0.0002)
Silicon	mg/L	12.10	10.00	12.00
Silver	mg/L	ND (0.000020)	ND (0.00001)	ND (0.00001)
Sodium	mg/L	64.0	36.0	14.0
Strontium	mg/L	0.993	0.89	0.64
Sulfur	mg/L	9.5	0.93	2.7
Thallium	mg/L	ND (0.000010)	ND (0.00001)	ND (0.00001)
Tin	mg/L	ND (0.0050)	ND (0.0001)	ND (0.0001)
Titanium	mg/L	ND (0.0050)	ND (0.0001)	ND (0.0001)
Uranium	mg/L	0.00117	0.00036	0.0002
Vanadium	mg/L	ND (0.0050)	ND (0.00005)	ND (0.00005)
Zinc	mg/L	ND (0.0050)	0.0051	0.013
Zirconium	mg/L	ND (0.00010)	ND (0.0001)	ND (0.0001)
Volatile Organic Compounds				
1,1,1,2-tetrachloroethane	mg/L	ND (0.00050)	ND (0.0001)	ND (0.0002)
1,1,1-trichloroethane	mg/L	ND (0.00050)	ND (0.0001)	ND (0.0001)
1,1,2,2-tetrachloroethane	mg/L	ND (0.00050)	ND (0.0001)	ND (0.0001)
1,1,2Trichloro-1,2,2Trifluoroethane	mg/L	ND (0.0020)	-	-
1,1,2-trichloroethane	mg/L	ND (0.00050)	ND (0.0001)	ND (0.0001)
1,1-dichloroethane	mg/L	ND (0.00050)	0.0001	ND (0.0001)
1,1-dichloroethene	mg/L	ND (0.00050)	ND (0.0005)	ND (0.0005)
1,2,3-trichlorobenzene	mg/L	ND (0.0020)	ND (0.0001)	ND (0.0001)
1,2,4-trichlorobenzene	mg/L	ND (0.0020)	ND (0.0001)	ND (0.0001)
1,2-dibromoethane	mg/L	ND (0.00020)	ND (0.0001)	ND (0.0001)
1,2-dichlorobenzene	mg/L	ND (0.00050)	ND (0.0001)	ND (0.0001)
1,2-dichloroethane	mg/L	ND (0.00050)	ND (0.0005)	ND (0.0005)
1,2-dichloropropane	mg/L	ND (0.00050)	ND (0.0001)	ND (0.0001)
1,3,5-trimethylbenzene	mg/L	ND (0.0020)	ND (0.0001)	ND (0.0001)
1,3-dichlorobenzene	mg/L	ND (0.00050)	ND (0.0001)	ND (0.0001)
1,3-dichloropropane	mg/L	ND (0.0010)	ND (0.0001)	ND (0.0001)
1,4-dichlorobenzene	mg/L	ND (0.00050)	ND (0.0001)	0.0002
Benzene	mg/L	0.00081	0.0006	0.0007
Bromobenzene	mg/L	ND (0.0020)	ND (0.0001)	ND (0.0001)
Bromodichloromethane	mg/L	ND (0.0010)	ND (0.0001)	ND (0.0001)
Bromoform	mg/L	ND (0.0010)	ND (0.0001)	ND (0.0001)
Bromomethane	mg/L	ND (0.0010)	ND (0.001)	ND (0.001)
Carbon tetrachloride	mg/L	ND (0.00050)	ND (0.0005)	ND (0.0005)
Chlorobenzene	mg/L	ND (0.00050)	0.0004	0.0037
Chlorodibromomethane	mg/L	ND (0.0010)	-	-
Chloroethane	mg/L	ND (0.0010)	ND (0.001)	ND (0.001)
Chloroform	mg/L	ND (0.0010)	ND (0.0001)	ND (0.0001)
Chloromethane	mg/L	ND (0.0010)	ND (0.001)	ND (0.001)
cis-1,2-dichloroethene	mg/L	ND (0.0010)	ND (0.0001)	ND (0.0001)
cis-1,3-dichloropropene	mg/L	ND (0.0010)	ND (0.0001)	ND (0.0001)
Dichlorodifluoromethane	mg/L	ND (0.0020)	ND (0.001)	ND (0.001)
Dichloromethane	mg/L	ND (0.0020)	-	-
Ethylbenzene	mg/L	ND (0.00040)	ND (0.0001)	ND (0.0001)
Hexachlorobutadiene	mg/L	ND (0.00050)	ND (0.0001)	ND (0.0001)
Isopropylbenzene	mg/L	ND (0.0020)	0.0001	ND (0.0001)
m & p-Xylene	mg/L	ND (0.00040)	-	-
Methyl-tert-butylether (MTBE)	mg/L	ND (0.0040)	0.0016	0.0019
o-Xylene	mg/L	ND (0.00040)	-	-
Styrene	mg/L	ND (0.00050)	ND (0.0001)	ND (0.0001)
Tetrachloroethene	mg/L	ND (0.00050)	ND (0.0005)	ND (0.0005)
Toluene	mg/L	ND (0.00040)	0.0106	ND (0.0001)
trans-1,2-dichloroethene	mg/L	ND (0.0010)	ND (0.0001)	ND (0.0001)
trans-1,3-dichloropropene	mg/L	ND (0.0010)	ND (0.0001)	ND (0.0001)
Trichloroethene	mg/L	ND (0.00050)	ND (0.0005)	ND (0.0005)
Trichlorofluoromethane	mg/L	ND (0.0040)	ND (0.0001)	ND (0.0001)
VH C6-C10	mg/L	ND (0.30)	-	-
Vinyl chloride	mg/L	ND (0.00050)	ND (0.0005)	ND (0.0005)
VPH (VHW6 to 10 - BTEX)	mg/L	ND (0.30)	-	-
Xylenes (Total)	mg/L	ND (0.00040)	ND (0.0001)	ND (0.0001)
Notes:				
- No data available				

Table E12 Historic Groundwater Quality Results - Site MW13-5

Sample Date:	Units	Dec-13	Sep-14
Parameters:			
General			
Chemical Oxygen Demand (COD)	mg/L	-	436
Dissolved Organic Carbon	mg/L	-	1.69
Conductivity, Electrical	µS/cm	-	71.3
pH	s.u.	-	7.02
Alkalinity (Total as CaCO3)	mg/L	-	30.8
Alkalinity (PP as CaCO3)	mg/L	-	ND (0.50)
Bicarbonate (HCO ₃)	mg/L	-	37.6
Carbonate (as CaCO ₃)	mg/L	-	ND (0.50)
Hydroxide (OH)	mg/L	-	ND (0.50)
Turbidity	NTU	-	>4000
Hardness (as CaCO ₃)	mg/L	-	27.1
Nutrients			
Ammonia	mg/L	-	0.05
Dissolved Nitrate (N)	mg/L	-	ND (0.020)
Dissolved Nitrite (N)	mg/L	-	0.0178
Total Phosphorus	mg/L	-	1.8
Nitrate plus Nitrite (N)	mg/L	-	-
Total Nitrogen (N)	mg/L	-	-
Total Kjeldahl Nitrogen	mg/L	-	0.981
Anions			
Chloride	mg/L	-	2
Sulfate	mg/L	-	4.35
Dissolved Metals			
Aluminum	mg/L	-	ND (0.0030)
Antimony	mg/L	-	ND (0.00050)
Arsenic	mg/L	-	0.00039
Barium	mg/L	-	0.0055
Beryllium	mg/L	-	ND (0.00010)
Bismuth	mg/L	-	ND (0.0010)
Boron	mg/L	-	ND (0.050)
Cadmium	mg/L	-	0.000013
Calcium	mg/L	-	8.57
Chromium	mg/L	-	ND (0.0010)
Cobalt	mg/L	-	0.00075
Copper	mg/L	-	0.00029
Iron	mg/L	-	ND (0.0050)
Lead	mg/L	-	ND (0.00020)
Lithium	mg/L	-	ND (0.0050)
Magnesium	mg/L	-	1.37
Manganese	mg/L	-	0.189
Mercury	mg/L	-	ND (0.000010)
Molybdenum	mg/L	-	ND (0.0010)
Nickel	mg/L	-	0.0019
Potassium	mg/L	-	0.621
Selenium	mg/L	-	ND (0.00010)
Silicon	mg/L	-	8.71
Silver	mg/L	-	ND (0.000020)
Sodium	mg/L	-	5.79
Strontium	mg/L	-	0.0565
Sulfur	mg/L	-	ND (3.0)
Thallium	mg/L	-	ND (0.000050)
Tin	mg/L	-	ND (0.0050)
Titanium	mg/L	-	ND (0.0050)
Uranium	mg/L	-	ND (0.00010)
Vanadium	mg/L	-	ND (0.0050)
Zinc	mg/L	-	ND (0.0050)
Zirconium	mg/L	-	ND (0.00050)
Volatile Organic Compounds			
1,1,1,2-tetrachloroethane	mg/L	-	ND
1,1,1-trichloroethane	mg/L	-	ND
1,1,2,2-tetrachloroethane	mg/L	-	ND
1,1,2Trichloro-1,2,2Trifluoroethane	mg/L	-	ND
1,1,2-trichloroethane	mg/L	-	ND
1,1-dichloroethane	mg/L	-	ND
1,1-dichloroethene	mg/L	-	ND
1,2,3-trichlorobenzene	mg/L	-	-
1,2,4-trichlorobenzene	mg/L	-	-
1,2-dibromoethane	mg/L	-	-
1,2-dichlorobenzene	mg/L	-	ND
1,2-dichloroethane	mg/L	-	ND
1,2-dichloropropane	mg/L	-	ND
1,3,5-trimethylbenzene	mg/L	-	
1,3-Butadiene	mg/L	-	ND
1,3-dichlorobenzene	mg/L	-	ND
1,3-dichloropropane	mg/L	-	-
1,4-dichlorobenzene	mg/L	-	ND
Benzene	mg/L	-	ND
Bromobenzene	mg/L	-	ND
Bromodichloromethane	mg/L	-	ND
Bromoform	mg/L	-	ND
Bromomethane	mg/L	-	ND
Carbon tetrachloride	mg/L	-	ND
Chlorobenzene	mg/L	-	ND
Chlorodibromomethane	mg/L	-	ND
Chloroethane	mg/L	-	ND
Chloroform	mg/L	-	ND
Chloromethane	mg/L	-	ND
cis-1,2-dichloroethene	mg/L	-	ND
cis-1,3-dichloropropene	mg/L	-	ND
Dibromomethane	mg/L	-	ND
Dichlorodifluoromethane	mg/L	-	ND
Dichloromethane	mg/L	-	ND
Ethylbenzene	mg/L	-	ND
Hexachlorobutadiene	mg/L	-	-
Isopropylbenzene	mg/L	-	-
m & p-Xylene	mg/L	-	ND
Methyl-tert-butylether (MTBE)	mg/L	-	ND
o-Xylene	mg/L	-	ND
Styrene	mg/L	-	ND
Tetrachloroethene	mg/L	-	ND
Toluene	mg/L	-	ND
trans-1,2-dichloroethene	mg/L	-	ND
trans-1,3-dichloropropene	mg/L	-	ND
Trichloroethene	mg/L	-	ND
Trichlorofluoromethane	mg/L	-	ND
VH C6-C10	mg/L	-	ND
Vinyl chloride	mg/L	-	ND
VPH (VHW6 to 10 - BTEX)	mg/L	-	ND
Xylenes (Total)	mg/L	-	ND
Notes:			
- No data available			

Table E14 Historic Surface Water Quality Results - Site A Upper Chapman Creek

Sample Date:	Units	Apr-16	Jul-16	Sep-16	Dec-16	Apr-17	Jun-17	Nov-17	Dec-17	Dec-17	Mar-18	Jun-18	Sep-18	Dec-18	Apr-19	Apr-19	Nov-19	Dec-19
										Duplicate						Duplicate		
Parameters:																		
General																		
Chemical Oxygen Demand (COD)	mg/L	11	12	17	35	17	11	16	17	17	ND (10)	ND (10)	11	24	23	ND (20)	11	10
Dissolved Organic Carbon	mg/L	3.47	1.82	4.65	2.34	4.99	3.6	5.13	4.96	4.82	3.10	2.76	2.08	5.4	6.31	6.24	4.3	3.9
Conductivity, Electrical	µS/cm	24.1	23.1	23.6	21.4	11	10.1	13.8	17.9	17.5	18.5	12.8	21.1	10.8	10.4	10.6	21	19
pH	s.u.	5.00	7.37	7.25	7.13	6.75	6.89	6.45	6.62	6.59	7.09	6.83	7.03	6.46	5.99	5.88	6.9	6.49
Hardness (as CaCO ₃)	mg/L	4.59	9.20	9.37	8.29	4.58	5.1	4.53	6.47	5.66	7.05	4.89	7.98	3.73	4.85	4.71	8	7
Alkalinity (Total as CaCO3)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Alkalinity (PP as CaCO3)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bicarbonate (HCO ₃)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Carbonate (as CaCO ₃)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hydroxide (OH)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Turbidity	NTU	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nutrients											-	-	-	-				
Ammonia	mg/L	0.0309	0.012	0.019	0.040	0.047	0.022	0.027	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)	0.021	ND (0.020)	ND (0.025)	ND (0.01)
Dissolved Nitrate (N)	mg/L	ND (0.020)	0.042	0.029	0.070	0.027	ND (0.020)	0.104	0.054	0.05	0.041	ND (0.020)	0.048	0.030	0.014	0.012	0.04	0.02
Dissolved Nitrite (N)	mg/L	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.010)	ND (0.010)	ND (0.01)	ND (0.01)
Nitrate plus Nitrite (N)	mg/L	ND (0.020)	0.042	0.029	0.070	ND (0.020)	0.104	0.054	0.05	0.05	0.041	ND (0.020)	0.048	0.030	-	-	0.04	0.02
Total Nitrogen (N)	mg/L	0.082	0.144	0.116	0.193	0.1	0.404	0.186	0.169	0.169	0.237	0.147	0.182	0.243	-	-	0.14	0.2
Total Kjeldahl Nitrogen	mg/L	0.082	0.102	0.087	0.124	-	-	-	-	-	-	-	0.135	0.213	0.157	0.195	0.1	0.17
Anions																		
Chloride	mg/L	0.66	0.60	1.1	0.66	0.78	0.7	1.6	ND (1.0)	1.5	ND (1.0)	ND (1.0)	1.7	ND (1.0)	0.23	0.23	0.55	0.6
Sulfate	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Metals																		
Aluminum	mg/L	0.191	0.0629	0.139	0.126	0.35	0.187	0.311	0.213	0.191	0.145	0.135	0.126	0.275	0.385	0.332	0.143	0.143
Antimony	mg/L	ND (0.00050)	ND (0.00050)	ND (0.00050)	ND (0.00050)	ND (0.00050)	ND (0.00050)	ND (0.00050)	ND (0.00050)	ND (0.00050)	ND (0.00050)	ND (0.00050)	ND (0.00050)	ND (0.00050)	ND (0.00020)	ND (0.00020)	0.00008	0.00005
Arsenic	mg/L	0.00011	0.0001	0.00016	ND (0.00010)	0.00018	ND (0.00010)	0.00012	0.00014	0.00012	ND (0.00010)	0.0001	0.00014	ND (0.00010)	ND (0.00050)	ND (0.00050)	0.0001	0.0001
Barium	mg/L	0.0018	0.0038	0.0034	0.0034	0.003	0.002	0.0041	0.0034	0.003	0.0029	0.0020	0.0032	0.0030	ND (0.0050)	ND (0.0050)	0.0028	0.0025
Beryllium	mg/L	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00005)	ND (0.00005)
Bismuth	mg/L	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.00010)	ND (0.00010)	ND (0.0001)	ND (0.0001)
Boron	mg/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)	ND (0.050)	ND (0.050)	ND (0.050)	ND (0.050)	0.0108	0.006	ND (0.002)	ND (0.002)
Cadmium	mg/L	0.000039	0.000031	0.000047	0.000031	0.00003	0.000094	0.000079	0.00139	0.000606	0.000208	0.000074	0.000039	0.00012	0.000054	0.00003	0.00006	ND (0.00001)
Calcium	mg/L	1.60	3.11	3.13	2.67	1.5	1.79	1.45	2.11	1.89	2.32	1.69	2.69	1.23	1.62	1.6	2.7	2.4
Chromium	mg/L	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	0.0013	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.00050)	ND (0.00050)	0.00006	0.00007
Cobalt	mg/L	ND (0.00050)	ND (0.00050)	ND (0.00050)	ND (0.00050)	ND (0.00050)	ND (0.00020)	ND (0.00020)	ND (0.00020)	ND (0.00020)	ND (0.00020)	ND (0.00020)	ND (0.00020)	ND (0.00020)	ND (0.00010)	ND (0.00010)	0.00002	0.00004
Copper	mg/L	ND (0.00050)	0.00065	ND (0.00050)	ND (0.00050)	0.00081	0.00051	0.00052	0.00136	0.00079	0.00065	0.00064	0.00107	0.00075	0.00054	0.00059	ND (0.0005)	ND (0.0005)
Iron	mg/L	0.056	0.049	0.081	0.08	0.151	0.063	0.143	0.081	0.066	0.055	0.056	0.069	0.102	0.195	0.152	0.047	0.046
Lead	mg/L	ND (0.00020)	ND (0.00020)	ND (0.00020)	ND (0.00020)	0.00024	ND (0.00020)	ND (0.00020)	ND (0.00020)	ND (0.00020)	ND (0.00020)	ND (0.00020)	ND (0.00020)	ND (0.00020)	ND (0.00020)	ND (0.00020)	0.00005	0.00004
Lithium	mg/L	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0020)	ND (0.0020)	ND (0.0020)	ND (0.0020)	ND (0.0020)	ND (0.0020)	ND (0.0020)	ND (0.0020)	0.00022	0.00018	ND (0.0005)	ND (0.0005)
Magnesium	mg/L	0.146	0.347	0.377	0.391	0.207	0.153	0.221	0.29	0.232	0.308	0.161	0.306	0.161	0.192	0.174	0.42	0.25
Manganese	mg/L	0.0013	0.0012	0.0017	0.0043	0.0057	0.002	0.0073	0.003	0.003	0.0013	0.0027	0.0021	0.0043	0.00844	0.00672	0.002	0.003
Mercury	mg/L	ND (0.00001)	ND (0.00001)	ND (0.00001)	ND (0.00001)	ND (0.00001)	ND (0.00001)	ND (0.00001)	ND (0.00001)	ND (0.00001)	ND (0.000020)	ND (0.000020)	ND (0.000020)	0.000026	ND (0.00010)	ND (0.00010)	ND (0.00001)	ND (0.00001)
Molybdenum	mg/L	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	0.0011	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.00010)	ND (0.00010)	0.00009	0.0001
Nickel	mg/L	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.00040)	ND (0.00040)	0.0002	0.0002
Phosphorus	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	ND (0.050)	ND (0.050)	-	-
Potassium	mg/L	0.072	0.131	0.157	0.168	0.255	0.065	0.151	0.475	0.387	0.128	0.101	0.146	0.085	ND (0.10)	ND (0.10)	0.35	0.1
Selenium	mg/L	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00050)	ND (0.00050)	ND (0.0002)	ND (0.0002)
Silicon	mg/L	1.27	2.42	3.29	3.07	1.29	1.4	1.87	2.56	2.45	2.640	1.080	2.380	1.390	1.6	1.5	2.2	2.4
Silver	mg/L	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.000020)	ND (0.000020)	ND (0.000020)	ND (0.000020)	ND (0.000050)	ND (0.000050)	ND (0.00001)	ND (0.00001)
Sodium	mg/L	0.467	0.896	1.13	1.09	2.49	0.426	0.727	1.01	0.773	0.992	0.457	0.895	0.576	0.53	0.51	1.9	0.9
Strontium	mg/L	0.0051	0.0118	0.0122	0.0119	0.0066	0.0051	0.008	0.0093	0.0097	0.0103	0.0057	0.0101	0.0062	0.0062	0.0059	0.0096	0.0091
Sulfur	mg/L	ND (3.0)	ND (3.0)	ND (3.0)	ND (3.0)	ND (3.0)	ND (3.0)	ND (3.0)	ND (3.0)	ND (3.0)	ND (3.0)	ND (3.0)	ND (3.0)	ND (3.0)	ND (3.0)	ND (3.0)	0.48	0.42
Tellurium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	ND (0.00050)	ND (0.00050)	-	-
Thallium	mg/L	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.000010)	ND (0.000010)	ND (0.000010)	ND (0.000010)	ND (0.000010)	ND (0.000010)	ND (0.000010)	ND (0.000010)	ND (0.000010)	ND (0.000010)	ND (0.00001)	ND (0.00001)
Thorium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	ND (0.00010)	ND (0.00010)	ND (0.00005)	0.00005
Tin	mg/L	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.00020)	ND (0.00020)	ND (0.0001)	ND (0.0001)
Titanium	mg/L	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	0.0054	ND (0.0050)	0.0009	0.0004
Tungsten	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	ND (0.0010)	ND (0.0010)	-	-
Uranium	mg/L	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	0.000054	0.000048	0.00006	0.00005
Vanadium	mg/L	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	0.0014	0.0011	0.0002	0.0002
Zinc	mg/L	ND (0.0050)	0.0051	ND (0.0050)	ND (0.0050)	0.0071	ND (0.0050)	ND (0.0050)	0.0074	0.0058	0.0061	ND (0.0050)	0.0077	ND (0.0050)	0.0041	ND (0.0040)	0.0047	0.0015
Zirconium	mg/L	ND (0.00050)	ND (0.00050)	ND (0.00050)	ND (0.00050)	ND (0.00050)	ND (0.00050)	ND (0.00050)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.0001)	ND (0.0001)
Notes:																		
- No data available																		



Table E14 Historic Surface Water Quality Results - Site A Upper Chapman Creek

Sample Date:	Units	Mar-20	Jul-20	Oct-20	Dec-20	Mar-21		Jun-21	Oct-21	Dec-21	Mar-22	Jul-22		Sep-22		Dec-22
							Duplicate						Duplicate		Duplicate	
Parameters:																
General																
Chemical Oxygen Demand (COD)	mg/L	ND (10)	20	20	19	34	9	10	15	8						
Dissolved Organic Carbon	mg/L	4.8	1.6	4.5	6.2	3.6	3.6	3	4.8	3	30	20	20	20		20
Conductivity, Electrical	µS/cm	15	29	18	12	19	18	11	21	16	12	14	66	27		27
pH	s.u.	6.71	7.34	6.77	6.43	6.85	6.85	6.77	6.57	6.8	6.59	6.63	7.34	-		6.79
Hardness (as CaCO ₃)	mg/L	5.7	9.8	6.3	5.3	7	7	ND (5)	8	6	<5	<5	22	10		-
Alkalinity (Total as CaCO3)	mg/L	-	-	-	-											
Alkalinity (PP as CaCO3)	mg/L	-	-	-	-											
Bicarbonate (HCO ₃)	mg/L	-	-	-	-											
Carbonate (as CaCO ₃)	mg/L	-	-	-	-											
Hydroxide (OH)	mg/L	-	-	-	-											
Turbidity	NTU	-	-	-	-											
Nutrients																
Ammonia	mg/L	0.02	ND (0.01)	0.05	ND (0.025)	ND (0.025)	ND (0.025)	ND (0.01)	ND (0.025)	ND (0.025)	<0.025	<0.025	<0.025	<0.025		<0.025
Dissolved Nitrate (N)	mg/L	0.02	0.08	0.03	0.02	0.04	0.04	ND (0.01)	0.04	0.04	0.02	0.02	0.15	0.04		0.08
Dissolved Nitrite (N)	mg/L	ND(0.005)	ND (0.005)	ND (0.005)	ND (0.005)	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	<0.01	<0.01	<0.01	<0.01		<0.01
Nitrate plus Nitrite (N)	mg/L	0.02	0.08	0.03	0.02	0.04	0.04	ND (0.020)	0.04	0.04	0.02	0.02	0.15	0.04		0.08
Total Nitrogen (N)	mg/L	0.16	0.29	0.41	0.16	0.15	0.1	0.07	0.32	ND (0.10)	0.13	<0.10	0.29	<0.10		0.19
Total Kjeldahl Nitrogen	mg/L	0.14	0.2	0.39	0.13	0.1	ND (0.07)	0.07	0.27	ND (0.07)	0.12	<0.10	0.11	<0.07		0.12
Anions																
Chloride	mg/L	0.39	0.42	0.48	0.5	0.63	0.48	0.23	1.01	0.53	0.25	0.23	3.72	0.38	-	0.77
Sulfate	mg/L	-	-	-	-											
Total Metals																
Aluminum	mg/L	0.27	0.048	0.17	0.22	0.48	0.2	0.17	0.4	0.17	0.47	0.14		0.115	0.103	0.081
Antimony	mg/L	0.00007	ND (0.00002)	0.00004	0.00003	0.00007	0.00004	0.00003	0.00014	0.00003	0.00005	0.00003		<0.0001	<0.0001	0.00005
Arsenic	mg/L	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	0.0002	0.0001	0.0001	0.0002	ND (0.0001)	0.0002	0.0001		0.00012	0.00019	<0.0001
Barium	mg/L	0.0029	0.0039	0.0003	0.022	0.005	0.0032	0.002	0.0047	0.0026	0.0042	0.0023		0.0039	0.0039	0.0034
Beryllium	mg/L	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	<0.00005		<0.00005	<0.00005	<0.00005
Bismuth	mg/L	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	<0.0001	<0.0001		<0.0001	<0.0001	<0.0001
Boron	mg/L	ND (0.002)	ND (0.002)	ND (0.002)	ND (0.002)	ND (0.002)	ND (0.002)	ND (0.002)	ND (0.002)	ND (0.003)	<0.002	<0.002		0.004	0.003	<0.002
Cadmium	mg/L	0.00003	ND (0.00001)	ND (0.00001)	0.00008	0.00002	ND (0.00001)	0.00006	0.00003	0.00015	0.0013	0.00002		0.00001	0.00002	0.00001
Calcium	mg/L	1.9	3.3	2.1	1.6	2.6	2.4	1.5	2.5	2	1.6	1.8		3.84	3.98	3.3
Chromium	mg/L	0.00013	0.00013	0.00016	0.00011	0.00024	0.00008	0.00009	0.00035	0.00012	0.00026	0.00016		<0.0005	0.0008	0.00017
Cobalt	mg/L	0.00006	ND (0.00002)	0.00004	0.00034	0.00018	0.00004	0.00004	0.00012	0.00004	0.00013	0.00005		<0.0001	0.0001	0.00002
Copper	mg/L	0.0004	ND (0.0002)	0.0003	0.0008	0.0007	0.0005	0.0009	0.001	0.0005	0.0007	0.0003		0.0004	0.0023	0.0005
Iron	mg/L	0.14	0.04	0.078	0.14	0.46	0.12	0.063	0.23	0.085	0.28	0.069		0.149	0.867	0.058
Lead	mg/L	0.0001	0.00002	0.0001	0.00018	0.00029	0.00009	0.0001	0.00038	0.00009	0.0002	0.00008		<0.0001	<0.0001	0.00003
Lithium	mg/L	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	<0.0005	<0.0005		<0.0005	<0.0005	<0.0005
Magnesium	mg/L	0.26	0.4	0.25	0.31	0.4	0.33	0.16	0.37	0.29	0.22	0.13		0.43	0.42	0.47
Manganese	mg/L	0.005	0.002	0.003	0.036	0.022	0.004	0.003	0.029	0.003	0.009	0.002		0.0087	0.0107	0.001
Mercury	mg/L	ND (0.00001)	ND (0.00001)	ND (0.00001)	ND (0.00001)	ND (0.00001)	ND (0.00001)	ND (0.00001)	ND (0.00001)	ND (0.00001)	<0.00001	<0.00001		0.000007	<0.000005	<0.00001
Molybdenum	mg/L	0.0001	0.0003	0.00011	ND (0.00002)	0.00015	0.00012	0.00007	0.00011	0.00011	0.00006	0.00009		0.00031	0.00039	0.00024
Nickel	mg/L	0.0006	0.0012	ND (0.0002)	0.0014	0.0005	ND (0.0002)	0.0004	0.0004	0.0007	0.0003	<0.0002		<0.0002	0.001	<0.0002
Phosphorus	mg/L	-				-	-	-	-	-	-	-		-	-	-
Potassium	mg/L	0.15	0.19	0.15	0.21	0.13	0.12	0.08	0.18	0.13	<0.04	0.18		0.3	0.2	0.12
Selenium	mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	<0.0002	<0.0002		<0.0001	<0.0001	<0.0002
Silicon	mg/L	2	2.2	2	3.7	2.8	2.5	1.1	2.1	2.7	1.8	1.2		2.35	2.38	3.3
Silver	mg/L	0.00002	0.00003	ND (0.00001)	ND (0.00001)	ND (0.00001)	ND (0.00001)	ND (0.00001)	0.00007	ND (0.00001)	<0.00001	0.00003		<0.00005	<0.00005	<0.00001
Sodium	mg/L	0.8	1.1	0.8	1.4	1	1	0.4	0.9	0.9	0.6	0.5		1.1	1.1	1.4
Strontium	mg/L	0.0086	0.013	0.0091	0.024	0.01	0.0095	0.0053	0.017	0.0097	0.0072	0.0059		0.0127	0.0124	0.013
Sulfur	mg/L	0.35	0.58	0.31	0.39	0.38	0.38	0.31	0.73	0.36	0.28	0.36		0.55	0.54	0.55
Tellurium	mg/L	-	-	-	-	-	-	-	-	-	-	-		-	-	-
Thallium	mg/L	ND (0.00001)	ND (0.00001)	ND (0.00001)	ND (0.00001)	ND (0.00001)	ND (0.00001)	ND (0.00001)	ND (0.00001)	ND (0.00001)	<0.00001	<0.00001		<0.00001	<0.00001	<0.00001
Thorium	mg/L	0.00019	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	<0.00005	<0.00005		<0.00001	<0.00001	<0.00005
Tin	mg/L	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	0.0004	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	<0.0001	0.0001		<0.0001	0.0001	0.0002
Titanium	mg/L	0.003	ND (0.002)	ND (0.002)	0.004	0.011	0.003	ND (0.02)	0.01	ND (0.002)	0.012	0.0019		0.0031	0.0027	0.0008
Tungsten	mg/L	-	-	-	-	-	-	-	-	-	-	-		-	-	-
Uranium	mg/L	0.00006	0.00003	0.00005	ND (0.00001)	0.00009	0.00006	0.00003	0.00005	0.00005	0.00006	0.00003		0.00003	0.00004	0.00006
Vanadium	mg/L	0.00046	0.00025	0.00041	0.00056	0.00069	0.00019	0.00013	0.00051	0.00025	0.00076	0.00009		0.0005	0.0004	0.00033
Zinc	mg/L	0.0031	0.0019	0.0024	0.024	0.01	0.0048	0.0053	0.012	0.0038	0.0047	0.0032		0.0023	0.0022	0.003
Zirconium	mg/L	0.0003	ND (0.0001)	ND (0.0001)	ND (0.0001)	0.0001	ND (0.0001)	ND (0.0001)	0.0001	ND (0.0001)	0.0001	<0.0001		<0.0005	<0.0005	0.0001
Notes:																
- No data available																

Table E15 Historic Surface Water Quality Results - Site B Lower Chapman Creek

Sample Date:	Units	Jun-00	Dec-00	Jul-01	Dec-01	Dec-01	Jun-02	Oct-02	Mar-03	Sep-03	Sep-03	Mar-04	Mar-04	Dec-04	Dec-04	Mar-05	Feb-06	May-06	Sep-06	Nov-06	Apr-07	Sep-07	Nov-07	Jul-08	Dec-08	Dec-08	Jul-09	Nov-09	Aug-10
						Duplicate					Duplicate		Duplicate		Duplicate											Duplicate			
Parameters:																													
General																													
Chemical Oxygen Demand (COD)	mg/L	27	15	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	12	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	19	ND (10)	31	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	42	42	11	ND (10)	ND (10)
Dissolved Organic Carbon	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Conductivity, Electrical	µS/cm	8	24	16	18	34	12	31	16	29	25	18	19	19	18	19	17	9	9	33	16	30	15	19	18	16	32	19	32
pH	s.u.	6.6	7	7	6.8	6.8	6.9	7.2	6.9	7.5	7.3	7	6.9	6.9	6.8	6.7	6.8	6.5	6.7	7.2	7	7.3	6.8	7	6.8	6.8	7.6	7	7.3
Hardness (as CaCO ₃)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Alkalinity (Total as CaCO ₃)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Alkalinity (PP as CaCO ₃)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bicarbonate (HCO ₃)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Carbonate (as CaCO ₃)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hydroxide (OH)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Turbidity	NTU	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nutrients																													
Ammonia	mg/L	0.01	0.005	0.008	0.005	ND (0.005)	0.01	ND (0.005)	ND (0.005)	ND (0.005)	ND (0.005)	0.014	0.013	ND (0.005)	ND (0.005)	ND (0.005)	ND (0.005)	0.057	0.017	ND (0.005)	ND (0.005)	ND (0.005)	ND (0.005)	ND (0.005)	0.05	0.02	0.035	0.021	ND (0.005)
Dissolved Nitrate (N)	mg/L	ND (0.02)	0.06	0.03	0.1	0.34	ND (0.02)	0.05	0.04	0.04	0.03	0.05	0.05	0.05	0.05	ND (0.02)	0.02	0.02	ND (0.02)	-	0.02	0.09	0.05	0.04	0.12	0.12	0.07	0.04	0.05
Dissolved Nitrite (N)	mg/L	ND (0.005)	ND (0.005)	ND (0.005)	ND (0.005)	ND (0.005)	ND (0.005)	ND (0.005)	ND (0.005)	ND (0.005)	ND (0.005)	ND (0.005)	ND (0.005)	ND (0.005)	ND (0.005)	-	ND (0.005)	ND (0.005)	ND (0.005)	-	ND (0.005)	ND (0.005)	ND (0.005)	ND (0.005)	ND (0.005)	ND (0.005)	0.07	0.04	ND (0.005)
Nitrate plus Nitrite (N)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Nitrogen (N)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Kjeldahl Nitrogen	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Anions																													
Chloride	mg/L	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	1.8	0.7	0.9	0.9	0.6	0.6	0.6	1.1	0.7	0.6	ND (1.0)	0.7	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	0.9	1	0.6	0.8	1.3	0.9	ND (0.5)
Sulfate	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Metals																													
Aluminum	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Antimony	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Arsenic	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Barium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Beryllium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bismuth	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boron	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cadmium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Calcium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cobalt	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Copper	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Iron	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lead	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.059	0.058	0.026	0.055	0.027
Lithium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Magnesium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Manganese	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mercury	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Molybdenum	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nickel	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phosphorus	mg/L	-	-	0.1	-	0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Potassium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Selenium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Silicon	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Silver	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sodium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Strontium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulfur	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tellurium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thallium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thorium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tin	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Titanium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tungsten	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Uranium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zinc	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zirconium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Notes:																													
-	No data available																												

Table E15 Historic Surface Water Quality Results - Site B Lower Chapman Creek

Sample Date:	Units	Dec-10	Jul-11	Jul-11	Dec-11	Jul-12	Jul-12	Dec-12	Dec-12	Mar-13	Mar-13	Jun-13	Sep-13	Sep-13	Dec-13	Dec-13	Apr-14	Apr-14	Jun-14	Jun-14	Sep-13	Sep-14	Dec-14	Mar-15	Jul-15	Jul-15	Oct-15	Nov-15	Mar-16
				Duplicate			Duplicate		Duplicate		Duplicate			Duplicate		Duplicate		Duplicate		Duplicate		Duplicate				Duplicate			
Parameters:																													
General																													
Chemical Oxygen Demand (COD)	mg/L	21	ND (10)	ND (10)	25	ND (10)	ND (10)	14	37	ND (10)	11	13	12	ND (10)	ND (10)	ND (10)	12	10	ND (10)	12	ND (10)	ND (10)	20	18	ND (10)	ND (10)	17	ND (10)	10
Dissolved Organic Carbon	mg/L	-	-	-	-	-	-	-	-	-	-	2.62	1.91	1.53	-	-	5.34	5.57	2.47	2.27	4	2.1	4.98	4.82	1.77	0.7	1.7	2.6	-
Conductivity, Electrical	µS/cm	11	12	11	60	27.2	26.4	12	12.2	22	21.6	12.1	45.2	47.6	29.9	29.3	14.2	14.3	17.9	17.9	45.7	45.9	11.3	55.3	44.2	44.6	80.4	55.1	15.9
pH	s.u.	6	7	6.7	7.4	7.4	7.31	6.65	6.65	6.94	7.1	6.9	7.36	7.51	7.27	7.24	6.91	6.85	7.21	7.31	7.57	7.51	6.64	7.46	7.31	7.54	7.69	7.49	6.82
Hardness (as CaCO ₃)	mg/L	-	-	-	-	-	-	4.46	4.45	-	-	4.42	17	17.5	11.2	10.5	5.49	5.33	7.08	6.84	17.7	17.8	4.7	13.6	16.6	16.8	34.5	19.1	6.35
Alkalinity (Total as CaCO ₃)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Alkalinity (PP as CaCO ₃)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bicarbonate (HCO ₃)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Carbonate (as CaCO ₃)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hydroxide (OH)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Turbidity	NTU	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nutrients																													
Ammonia	mg/L	0.005	0.009	0.01	ND (0.005)	0.007	0.006	0.0096	0.012	0.019	0.026	0.044	0.0076	0.016	0.016	0.0052	0.013	0.014	0.013	0.019	0.015	0.014	0.17	0.04	0.0061	0.0076	0.012	0.007	0.016
Dissolved Nitrate (N)	mg/L	ND (0.02)	ND (0.02)	ND (0.02)	0.05	0.08	0.07	0.05	0.054	0.081	0.082	ND (0.020)	0.132	0.131	0.182	0.179	0.041	0.041	ND (0.020)	ND (0.020)	0.063	0.063	0.028	0.285	0.077	0.084	0.173	0.228	0.039
Dissolved Nitrite (N)	mg/L	ND (0.005)	ND (0.005)	ND (0.005)	ND (0.005)	ND (0.005)	ND (0.005)	ND (0.005)	ND (0.005)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)
Nitrate plus Nitrite (N)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.285	0.077	0.084	0.173	0.228	0.039
Total Nitrogen (N)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.869	0.249	0.2	0.323	0.299	0.165
Total Kjeldahl Nitrogen	mg/L	-	-	-	-	-	-	-	-	-	-	0.12	0.144	0.134	-	-	0.083	0.089	0.066	0.074	0.18	0.158	0.353	0.584	0.172	0.116	0.151	0.071	0.126
Anions																													
Chloride	mg/L	ND (0.5)	ND (0.5)	ND (0.5)	0.8	0.77	0.89	0.8	0.75	1.2	1.3	ND (0.50)	1.6	1.3	1.1	1	0.72	0.73	ND (0.50)	1.2	1.3	1.3	0.81	3.1	0.87	1	6.9	2.7	0.60
Sulfate	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Metals																													
Aluminum	mg/L	-	-	-	-	-	-	0.211	0.217	-	-	0.169	0.0369	0.0346	0.129	0.126	0.201	0.203	0.0882	0.0898	0.0247	0.026	0.303	0.323	0.0357	0.0377	0.609	0.0352	0.149
Antimony	mg/L	-	-	-	-	-	-	ND (0.0005)	ND (0.0005)	-	-	ND (0.00050)	ND (0.00050)	ND (0.00050)	ND (0.00050)	ND (0.00050)	ND (0.00050)	ND (0.00050)	ND (0.00050)	ND (0.00050)	ND (0.00050)	ND (0.00050)	ND (0.00050)	ND (0.00050)	ND (0.00050)	ND (0.00050)	ND (0.00050)	ND (0.00050)	ND (0.00050)
Arsenic	mg/L	-	-	-	-	-	-	ND (0.0005)	ND (0.0005)	-	-	ND (0.00010)	0.00015	0.00014	0.00012	0.00013	0.00012	0.00014	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	0.0002	0.00014	0.00014	0.00013	0.00022	ND (0.00010)	ND (0.00010)
Barium	mg/L	-	-	-	-	-	-	0.0025	0.0025	-	-	0.002	0.0025	0.0051	0.0035	0.0072	0.0026	0.0026	0.0025	0.0028	0.0049	0.005	0.0028	0.0062	0.0048	0.0046	0.0108	0.0042	0.0025
Beryllium	mg/L	-	-	-	-	-	-	ND (0.0001)	ND (0.0001)	-	-	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)
Bismuth	mg/L	-	-	-	-	-	-	ND (0.001)	ND (0.001)	-	-	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)
Boron	mg/L	-	-	-	-	-	-	ND (0.05)	ND (0.05)	-	-	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)	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)
Cadmium	mg/L	-	-	-	-	-	-	0.000078	0.000073	-	-	0.000015	ND (0.000010)	ND (0.000010)	0.000044	0.000054	ND (0.000010)	0.00001	ND (0.000010)	ND (0.000010)	ND (0.000010)	ND (0.000010)	0.00036	0.000512	ND (0.00001)	ND (0.00001)	0.000092	0.000027	0.000052
Calcium	mg/L	-	-	-	-	-	-	1.45	1.45	-	-	1.51	5.52	5.69	3.59	3.4	1.8	1.76	2.35	2.27	5.62	5.69	1.55	4.11	5.35	5.46	10.1	5.72	2.11
Chromium	mg/L	-	-	-	-	-	-	ND (0.001)	ND (0.001)	-	-	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)
Cobalt	mg/L	-	-	-	-	-	-	ND (0.0005)	ND (0.0005)	-	-	ND (0.00050)	ND (0.00050)	ND (0.00050)	ND (0.00050)	ND (0.00050)	ND (0.00050)	ND (0.00050)	ND (0.00050)	ND (0.00050)	ND (0.00050)	ND (0.00050)	ND (0.00050)	ND (0.00050)	ND (0.00050)	ND (0.00050)	ND (0.00050)	ND (0.00050)	ND (0.00050)
Copper	mg/L	-	-	-	-	-	-	0.00045	0.00034	-	-	0.00034	0.00028	0.00023	0.00056	0.00033	ND (0.00050)	ND (0.00050)	ND (0.00050)	ND (0.00050)	ND (0.00050)	ND (0.00050)	0.00089	0.00335	ND (0.00050)	ND (0.00050)	0.00181	ND (0.00050)	0.00054
Iron	mg/L	0.071	0.04	0.044	0.027	0.0556	0.0544	0.0584	0.0637	0.0627	0.0632	0.0584	0.086	0.0921	0.104	0.0969	0.083	0.083	0.048	0.081	0.078	0.115	0.392	0.093	0.082	0.716	0.048	0.0466	
Lead	mg/L	-	-	-	-	-	-	ND (0.0002)	ND (0.0002)	-	-	ND (0.00020)	ND (0.00020)	ND (0.00020)	ND (0.00020)	ND (0.00020)	ND (0.00020)	ND (0.00020)	ND (0.00020)	ND (0.00020)	ND (0.00020)	ND (0.00020)	0.00047	ND (0.00020)	ND (0.00020)	ND (0.00020)	0.00033	ND (0.00020)	ND (0.00020)
Lithium	mg/L	-	-	-	-	-	-	ND (0.005)	ND (0.005)	-	-	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)
Magnesium	mg/L	-	-	-	-	-	-	0.204	0.204	-	-	0.155	0.786	0.803	0.529	0.487	0.243	0.23	0.295	0.282	0.89	0.86	0.202	0.802	0.785	0.771	2.27	1.16	0.265
Manganese	mg/L	-	-	-	-	-	-	0.0034	0.0034	-	-	0.0018	0.0022	0.0023	0.0026	0.0023	0.0012	0.0012	0.0014	0.0011	ND (0.0010)	ND (0.0010)	0.0026	0.0217	0.0079	0.0022	0.0245	0.0024	ND (0.0010)
Mercury	mg/L	-	-	-	-	-	-	ND (0.00005)	ND (0.00005)	-	-	ND (0.000050)	ND (0.000050)	ND (0.000050)	ND (0.000010)	ND (0.000010)	0.000012	ND (0.000010)	ND (0.000010)	ND (0.000010)	ND (0.000010)	ND (0.000010)	ND (0.000010)	ND (0.000010)	ND (0.000010)	ND (0.000010)	ND (0.000010)	ND (0.000010)	-
Molybdenum	mg/L	-	-	-	-	-	-	ND (0.001)	ND (0.001)	-	-	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)
Nickel	mg/L	-	-	-	-	-	-	ND (0.001)	ND (0.001)	-	-	ND (0.0010)	ND (0.0010)	ND (0.0010)	0.002	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	0.0011	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)
Phosphorus	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Potassium	mg/L	-	-	-	-	-	-	0.099	0.103	-	-	0.061	0.323	0.323	0.2	0.175	0.079	0.09	0.119	0.112	0.34	0.34	0.067	0.698	0.352	0.374	0.645	0.393	0.107
Selenium	mg/L	-	-	-	-	-	-	ND (0.0001)	ND (0.0001)	-	-	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)
Silicon	mg/L	-	-	-	-	-	-	1.97	1.98	-																			

Table E15 Historic Surface Water Quality Results - Site B Lower Chapman Creek

Sample Date:	Units	Apr-16	Jul-16	Jul-16	Sep-16	Sep-16	Dec-16	Apr-17	Apr-17	Jun-17	Nov-17	Dec-17	Mar-18	Jun-18	Sep-18	Sep-18	Dec-18	Apr-19	Nov-19	Dec-19	Jul-20	Jul-20	Oct-20	Oct-20	Dec-20	Mar-21	Jun-21	Oct-21	Dec-21	
				Duplicate		Duplicate			Duplicate							Duplicate						Duplicate		Duplicate				Duplicate		Duplicate
Parameters:																														
General																														
Chemical Oxygen Demand (COD)	mg/L	12	12	ND (10)	17	15	ND (10)	ND (10)	14	ND (10)	13	18	ND (10)	ND (10)	22	11	26	ND (20)	20	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	16	9	ND (10)	ND (10)	9	10
Dissolved Organic Carbon	mg/L	3.18	1.84	2.23	4.47	4.48	2.50	2.52	5.03	3.83	5.12	4.56	3.27	1.51	3.05	3.28	5.7	6.52	2.6	2.4	1.8	4.5	4.6	6.8	3.2	3.2	4	3.2	3.2	
Conductivity, Electrical	µS/cm	11.9	26.5	26.7	26.3	26.1	24.8	41.9	13.2	10.8	15.8	17.6	22.4	13.0	23.0	22.6	10.6	10.3	30	58	35	35	19	17	11	21	12	15	33	
pH	s.u.	6.80	7.40	7.37	7.26	7.18	7.15	7.3	6.85	7.07	6.61	6.81	7.32	6.83	7.07	7.07	6.46	5.94	7.04	7	7.4	7.39	6.84	6.83	6.42	6.88	6.73	6.65	6.87	
Hardness (as CaCO ₃)	mg/L	4.80	10.9	9.80	11.1	10.2	9.04	12.7	4.38	5.34	5.35	7.16	7.88	5.53	8.83	8.85	3.77	5.18	11	18	11.8	11.9	7.3	6.4	3.5	8	ND (5)	ND (5)	7	
Alkalinity (Total as CaCO ₃)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Alkalinity (PP as CaCO ₃)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Bicarbonate (HCO ₃)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Carbonate (as CaCO ₃)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Hydroxide (OH)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Turbidity	NTU	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Nutrients																														
Ammonia	mg/L	0.0309	0.016	0.030	0.014	0.014	0.038	0.032	0.034	0.024	0.029	0.035	ND (0.020)	ND (0.020)	0.10	ND (0.020)	ND (0.020)	0.021	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	0.04	ND (0.025)	ND (0.025)	ND (0.01)	ND (0.01)	ND (0.025)	ND (0.025)
Dissolved Nitrate (N)	mg/L	ND (0.020)	0.065	0.065	0.031	0.025	0.115	0.219	0.03	ND (0.020)	0.124	0.1	0.079	0.033	0.036	0.034	0.029	0.014	0.04	0.12	0.07	0.08	0.05	0.03	0.03	0.07	ND (0.01)	ND (0.01)	0.04	0.11
Dissolved Nitrite (N)	mg/L	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.010)	ND (0.01)	ND (0.01)	ND (0.005)	ND (0.005)	ND (0.005)	ND (0.005)	ND (0.005)	ND (0.001)	ND (0.001)	ND (0.001)	ND (0.001)	
Nitrate plus Nitrite (N)	mg/L	ND (0.020)	0.065	0.065	0.031	0.025	0.115	0.219	0.03	ND (0.020)	0.124	0.1	0.079	0.033	0.036	0.034	0.029	-	0.04	0.12	0.07	0.08	0.05	0.03	0.03	0.07	ND (0.020)	ND (0.020)	0.04	0.11
Total Nitrogen (N)	mg/L	0.105	0.123	0.132	0.123	0.132	0.224	0.356	0.172	0.098	0.342	0.214	0.287	0.132	0.145	0.150	0.222	-	0.85	0.24	0.12	0.12	0.43	0.32	0.21	0.12	ND (0.06)	0.08	0.15	0.18
Total Kjeldahl Nitrogen	mg/L	0.105	0.058	0.067	0.092	0.107	0.109	-	-	-	-	-	-	-	0.110	0.117	0.193	0.145	0.81	0.08	ND (0.07)	ND (0.07)	0.38	0.29	0.18	ND (0.07)	ND (0.07)	ND (0.07)	0.08	ND (0.07)
Anions																														
Chloride	mg/L	0.66	0.71	1.0	1.3	ND (0.5)	0.78	3.4	1.7	0.6	1.6	1	1.1	ND (1.0)	2.4	1.0	ND (1.0)	0.22	0.72	3.85	0.67	0.69	0.56	0.51	0.41	0.56	0.26	0.28	0.55	2.03
Sulfate	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Metals																														
Aluminum	mg/L	0.183	0.0525	0.0512	0.14	0.134	0.125	0.0923	0.358	0.204	0.218	0.203	0.134	0.122	0.106	0.121	0.288	0.501	0.079	0.025	0.045	0.044	0.3	0.24	1	0.14	0.15	0.16	0.19	0.14
Antimony	mg/L	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.00020)	0.00005	ND (0.00002)	ND (0.00002)	ND (0.00002)	0.00004	0.00005	0.00004	0.00002	ND (0.00002)	0.00003	0.00002	ND (0.00002)
Arsenic	mg/L	ND (0.0010)	ND (0.0010)	ND (0.0010)	0.00019	0.00017	ND (0.0010)	ND (0.0010)	0.00013	ND (0.0010)	0.00012	0.00012	0.0001	0.00011	0.00013	0.00012	0.00010	ND (0.00050)	0.0001	ND (0.0001)	ND (0.0001)	ND (0.0001)	0.0002	0.0002	0.0002	0.0001	0.0001	0.0001	0.0001	ND (0.0001)
Barium	mg/L	0.0018	0.0036	0.0036	0.0037	0.0035	0.0031	0.0042	0.0031	0.002	0.0036	0.0031	0.0031	0.0021	0.0031	0.0031	0.0028	ND (0.0050)	0.0033	0.004	0.004	0.0041	0.0044	0.0034	0.016	0.0028	0.0029	0.0031	0.0026	0.003
Beryllium	mg/L	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)
Bismuth	mg/L	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
Boron	mg/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)	ND (0.050)	ND (0.050)	ND (0.050)	ND (0.050)	ND (0.050)	ND (0.050)	ND (0.050)	0.0092	0.002	0.003	ND (0.002)	ND (0.002)	ND (0.002)	0.003	ND (0.002)	0.003	ND (0.002)	0.003	0.003	0.003
Cadmium	mg/L	0.000022	0.00001	ND (0.00001)	0.000028	0.000022	0.00003	0.000021	0.000015	0.000025	0.000015	0.000386	0.00001	0.000012	ND (0.000010)	ND (0.000010)	ND (0.000010)	0.000017	0.00002	ND (0.00001)	ND (0.00001)	ND (0.00001)	ND (0.00001)	ND (0.00001)	0.00002	ND (0.00001)	0.00002	0.00001	0.00002	0.00002
Calcium	mg/L	1.66	3.61	3.26	3.67	3.33	2.93	3.93	1.44	1.86	1.77	2.32	2.58	1.95	2.95	2.98	1.24	1.71	3.7	5.5	3.9	2.4	2.2	0.8	2.6	1.6	1.6	2.1	2.3	3.4
Chromium	mg/L	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.00050)	ND (0.00005)	ND (0.00005)	0.00012	0.00013	0.00024	0.00033	0.00054	0.0001	0.00011	0.00019	0.00011	0.0001
Cobalt	mg/L	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	0.00014	0.00002	ND (0.00002)	ND (0.00002)	ND (0.00002)	0.00006	0.00006	0.00002	ND (0.00002)	0.00003	0.00003	0.00004	0.00003
Copper	mg/L	ND (0.00050)	0.00089	ND (0.00050)	0.0006	0.00068	ND (0.00050)	0.00081	ND (0.00050)	ND (0.00050)	ND (0.00050)	ND (0.00050)	ND (0.00050)	ND (0.00050)	ND (0.00050)	ND (0.00050)	ND (0.00050)	0.0005	ND (0.0005)	ND (0.0005)	ND (0.0002)	0.0006	0.001	0.0017	ND (0.0002)	0.0004	0.0008	0.0003	0.0003	0.0003
Iron	mg/L	0.05	0.057	0.051	0.088	0.085	0.082	0.084	0.171	0.063	0.101	0.077	0.056	0.050	0.057	0.057	0.100	0.294	0.035	0.019	0.05	0.051	0.18	0.14	0.62	0.06	0.064	0.074	0.071	0.067
Lead	mg/L	ND (0.00020)	ND (0.00020)	ND (0.00020)	ND (0.00020)	ND (0.00020)	ND (0.00020)	ND (0.00020)	0.00031	ND (0.00020)	ND (0.00020)	ND (0.00020)	ND (0.00020)	ND (0.00020)	ND (0.00020)	ND (0.00020)	ND (0.00020)	0.00022	0.00003	ND (0.00001)	ND (0.00001)	ND (0.00001)	0.00026	0.00011	0.00047	0.00004	0.00006	0.00015	0.00005	0.00005
Lithium	mg/L	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	0.00027	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)
Magnesium	mg/L	0.160	0.465	0.407	0.465	0.453	0.421	0.696	0.191	0.168	0.227	0.331	0.349	0.163	0.358	0.341	0.166	0.222	0.51	1	0.53	0.54	0.32	0.24	0.36	0.34	0.16	0.15	0.24	0.37
Manganese	mg/L	ND (0.0010)	0.0012	0.0011	0.0016	0.0016	0.0018	0.0044	0.0058	0.0013	0.0039	0.0017	ND (0.0010)	0.0015	0.0015	0.0014	0.0038	0.0134	0.001	ND (0.001)	0.002	0.002	0.01	0.005	0.053	0.001	0.002	0.003	0.004	0.002
Mercury	mg/L	ND (0.00001)	ND (0.00001)	ND (0.00001)	ND (0.00001)	ND (0.00001)	ND (0.00001)	ND (0.00001)	ND (0.00001)	ND (0.00001)	ND (0.00001)	ND (0.00001)	ND (0.00001)	ND (0.00001)	ND (0.00001)	ND (0.00001)	ND (0.00001)	0.0000049	0.0000027	ND (0.000010)	ND (0.00001)	ND (0.00001)	ND (0.00001)	ND (0.00001)	ND (0.00001)	ND (0.00001)	ND (0.00001)	ND (0.00001)	ND (0.00001)	ND (0.00001)
Molybdenum	mg/L	ND (0.0010)</																												

Table E15 Historic Surface Water Quality Results - Site B Lower Chapman Creek

Sample Date:	Units	Mar-22		Jul-22	Sep-22	Dec-22	
			Duplicate				Duplicate
Parameters:							
General							
Chemical Oxygen Demand (COD)	mg/L						
Dissolved Organic Carbon	mg/L	20.00	<10	10.0	20.00	20.00	20.00
Conductivity, Electrical	µS/cm	13.00	13.00	14.0	33.00	30.000	30.000
pH	s.u.	6.53	6.51	6.78	-	6.83	6.83
Hardness (as CaCO ₃)	mg/L	4.90	5.20	<5	12.0	-	-
Alkalinity (Total as CaCO ₃)	mg/L						
Alkalinity (PP as CaCO ₃)	mg/L						
Bicarbonate (HCO ₃)	mg/L						
Carbonate (as CaCO ₃)	mg/L						
Hydroxide (OH)	mg/L						
Turbidity	NTU						
Nutrients							
Ammonia	mg/L	ND (0.025)	ND (0.025)	ND (0.025)	ND (0.025)	ND (0.025)	ND (0.025)
Dissolved Nitrate (N)	mg/L	0.03	0.07	0.02	0.03	0.17	0.17
Dissolved Nitrite (N)	mg/L	ND (0.001)	ND (0.001)	ND (0.001)	ND (0.001)	ND (0.001)	ND (0.001)
Nitrate plus Nitrite (N)	mg/L	0.03	0.07	0.02	0.03	0.17	0.17
Total Nitrogen (N)	mg/L	0.33	0.16	0.17	<0.10	0.13	0.13
Total Kjeldahl Nitrogen	mg/L	0.29	0.08	0.15	<0.07	<0.07	<0.07
Anions							
Chloride	mg/L	0.35	0.28	0.24	0.54	0.9	0.9
Sulfate	mg/L						
Total Metals							
Aluminum	mg/L	0.23	0.24	0.15	0.033	0.082	0.091
Antimony	mg/L	<0.00002	<0.00002	0.00002	<0.0001	0.00003	0.00002
Arsenic	mg/L	0.0001	0.0001	0.0001	0.00012	<0.0001	<0.0001
Barium	mg/L	0.002	0.002	0.0024	0.0034	0.0037	0.0038
Beryllium	mg/L	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Bismuth	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Boron	mg/L	<0.002	<0.002	<0.002	0.007	<0.002	<0.002
Cadmium	mg/L	<0.00001	0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Calcium	mg/L	1.7	1.7	1.9	4.4	3.8	3.8
Chromium	mg/L	0.00009	0.00011	0.00029	<0.0005	0.00015	0.00016
Cobalt	mg/L	0.00003	0.00004	0.00004	<0.0001	0.00002	0.00003
Copper	mg/L	0.0003	0.0003	0.001	0.0002	0.0003	0.0006
Iron	mg/L	0.07	0.09	0.077	0.052	0.058	0.066
Lead	mg/L	0.00008	0.00007	0.00008	<0.0001	0.00004	0.00005
Lithium	mg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Magnesium	mg/L	0.17	0.20	0.19	0.51	0.59	0.55
Manganese	mg/L	0.003	0.002	0.002	0.0017	0.003	0.003
Mercury	mg/L	<0.00001	<0.00001	<0.00001	<0.000005	<0.00001	<0.00001
Molybdenum	mg/L	0.00006	0.00006	0.00010	0.00037	0.00024	0.00025
Nickel	mg/L	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0003
Phosphorus	mg/L	-	-	-	-	-	-
Potassium	mg/L	<0.04	0.06	0.1	0.3	0.21	0.21
Selenium	mg/L	<0.0002	<0.0002	<0.0002	<0.0001	<0.0002	<0.0002
Silicon	mg/L	1.7	1.8	1.3	2.8	4	4
Silver	mg/L	<0.00001	<0.00001	0.00003	<0.00005	<0.00001	<0.00001
Sodium	mg/L	0.7	0.7	0.6	1.4	1.7	1.7
Strontium	mg/L	0.01	0.01	0.007	0.0153	0.015	0.015
Sulfur	mg/L	0.27	0.28	0.34	0.56	0.56	0.59
Tellurium	mg/L	-	-	-	-	-	-
Thallium	mg/L	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Thorium	mg/L	<0.00005	<0.00005	<0.00005	<0.00001	<0.00005	<0.00005
Tin	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Titanium	mg/L	0.00200	0.00190	0.00	<0.0005	0.0011	0.0012
Tungsten	mg/L	-	-	-	-	-	ND (0.0002)
Uranium	mg/L	0.00004	0.00004	0.00003	0.00004	0.00006	0.00007
Vanadium	mg/L	0.00033	0.00030	0.00014	0.0003	0.00037	0.00039
Zinc	mg/L	0.0016	0.0028	0.0100	<0.0010	0.0016	0.0028
Zirconium	mg/L	<0.0001	<0.0001	<0.0001	<0.0005	<0.0001	<0.0001
Notes:							
-	No data available						

Sample Date:		Apr-17	Jun-17	Jun-17	Nov-17	Dec-17	Mar-18	Mar-18	Jun-18	Jun-18	Sep-18	Dec-18	Apr-19	Nov-19	Nov-19	Dec-19	Mar-20	Jul-20	Oct-20	Dec-20	Mar-21	Jun-21	Oct-21	Dec-21	Mar-22	Jul-22	Dec-22
Parameters:				Duplicate				Duplicate		Duplicate					Duplicate												
General																											
Chemical Oxygen Demand (COD)	mg/L	15	ND (10)	ND (10)	29	17	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	24	ND (20)	20	20	ND (10)	ND (10)	20	ND (10)	15	ND (5)	ND (10)	19	9	-	-	-
Dissolved Organic Carbon	mg/L	4.3	2.67	3.04	6.27	3.41	2.60	2.31	1.37	0.84	1.18	4.9	4.1	1.7	1.8	3.8	2	1.9	3.4	4.4	2.2	2.7	5.9	3.3	<10	<10	10
Conductivity, Electrical	µS/cm	23.2	60.9	61.6	31.7	39.3	40.2	40.4	63.1	63.7	75.8	32.8	53.8	65	65	22	45	77	54	40	44	73	35	33	36	65	72
pH	s.u.	7.21	7.61	7.75	6.77	7.91	7.40	7.40	7.48	7.26	7.35	7.09	6.84	7.32	7.32	6.65	7.19	7.44	7.3	7.04	7.17	7.5	7.05	7.04	7.02	7.28	7.16
Hardness (as CaCO ₃)	mg/L	4.91	25.5	24.5	9.7	11.3	12.9	13.1	21.3	21.6	25.8	10.1	17.5	22	22	8	15	24	18	2.6	15	24	12	12	11	19	-
Alkalinity (Total as CaCO ₃)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Alkalinity (PP as CaCO ₃)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bicarbonate (HCO ₃ ⁻)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Carbonate (as CaCO ₃)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hydroxide (OH ⁻)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Turbidity	NTU	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nutrients																											
Ammonia	mg/L	0.028	0.023	0.011	0.024	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)	0.071	ND (0.020)	ND (0.020)	0.022	0.56	ND (0.01)	0.01	ND (0.02)	0.06	ND (0.02)	ND (0.025)	ND (0.025)	ND (0.01)	ND (0.025)	ND (0.025)	ND (0.025)	ND (0.025)	ND (0.025)
Dissolved Nitrate (N)	mg/L	0.038	0.175	0.175	0.514	0.299	0.172	0.170	0.167	0.176	0.258	0.121	0.192	0.13	0.13	0.02	0.15	0.27	0.39	0.2	0.13	0.22	0.14	0.19	0.05	0.14	0.2
Dissolved Nitrite (N)	mg/L	ND (0.0050)	ND (0.0050)	ND (0.0050)	0.0053	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.010)	ND (0.01)	ND (0.01)	ND (0.01)	ND(0.005)	ND (0.005)	ND (0.005)	ND (0.005)	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)
Nitrate plus Nitrite (N)	mg/L	0.038	0.175	0.175	0.519	0.299	0.172	0.170	0.167	0.176	0.258	0.121	-	0.13	0.13	0.02	0.15	0.27	0.39	0.2	0.13	0.22	0.14	0.19	0.05	0.14	0.2
Total Nitrogen (N)	mg/L	0.235	0.244	0.296	0.962	0.378	0.243	0.233	0.376	0.362	0.326	0.305	-	0.37	0.22	0.14	0.39	0.45	0.77	0.38	0.17</						

Sample Date:			Dec-13	Apr-14	Jun-14	Sep-14	Dec-14	Mar-15	Nov-15	Mar-16	Mar-16	Dec-16	Apr-17	Nov-17	Nov-17	Dec-17	Mar-18	Dec-18	Dec-18	Apr-19	Nov-19	Dec-19	Mar-20	Oct-20	Dec-20	Dec-20	Mar-21	Oct-21	Dec-21	Mar-22		
Parameters:											Duplicate				Duplicate																	
General																																
Chemical Oxygen Demand (COD)	mg/L	11	ND (10)	ND (10)	ND (10)					ND (10)	17	10	ND (10)	13	13	13	ND (10)	12	15	ND (20)	ND (5)	ND (10)	10	10		21	17	ND (5)	13	11	11	-
Dissolved Organic Carbon	mg/L	-	3.91	1.36	2.18	2.12	2.72	2.35	1.35	-	2.10	1.72	2.19	4.87	4.26	1.89	2.17	3.9	3.8	2.27	1.6	2	1.6	2.3	3.5	7.8	1.8	1.8	3	2.5	10	
Conductivity, Electrical	uS/cm	27.2	24.4	20.9	73.8	21.3	23.2	23.2	63.5	22.8	24.6	24.5	23.1	21.3	24.6	23.9	21.4	22	27.4	37	26	21	32	23	11	22	26	19	26	19	26	
Hardness (as CaCO3)	mg/L	709	713	728	776	703	701	709	771	689	674	685	713	728	716	685	664	678	644	657	659	657	659	657	659	657	659	657	659	657	659	
Hardness (as CaCO3)	mg/L	9.23	7.11	28.7	28.7	7.06	7.69	24.7	6.3	6.78	15.5	7.62	6.3	6.78	6.72	6.53	6.3	5.24	8.91	13	8	7.3	8.6	7	7	8	7	8	7	6	6	
Alkalinity (Total as CaCO3)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Alkalinity (PP as CaCO3)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Bicarbonate (HCO3-)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Carbonate (as CaCO3)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Hydroxide (OH)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Turbidity	NTU	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Nutrients																																
Ammonia	mg/L	0.0069	0.032	0.012	0.012	0.21	0.012	0.012	0.01	0.0099	0.030	0.026	0.037	ND (0.020)	0.023	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)	0.027	ND (0.01)	ND (0.01)	ND (0.02)	ND (0.025)	ND (0.025)	ND (0.025)	ND (0.025)	ND (0.025)	ND (0.025)	ND (0.025)	
Dissolved Nitrate (N)	mg/L	0.292	0.085	0.104	0.106	0.118	0.139	0.125	0.100	0.264	0.236	0.1	0.358	0.373	0.18	0.062	0.053	0.061	0.091	0.11	0.07	0.1	0.31	0.11	0.1	0.07	0.11	0.1	0.12	0.06	0.06	
Dissolved Nitrite (N)	mg/L	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.010)	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.005)	ND (0.005)	ND (0.005)	0.05	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	
Nitrate plus Nitrite (N)	mg/L	-	-	-	-	-	0.139	0.																								

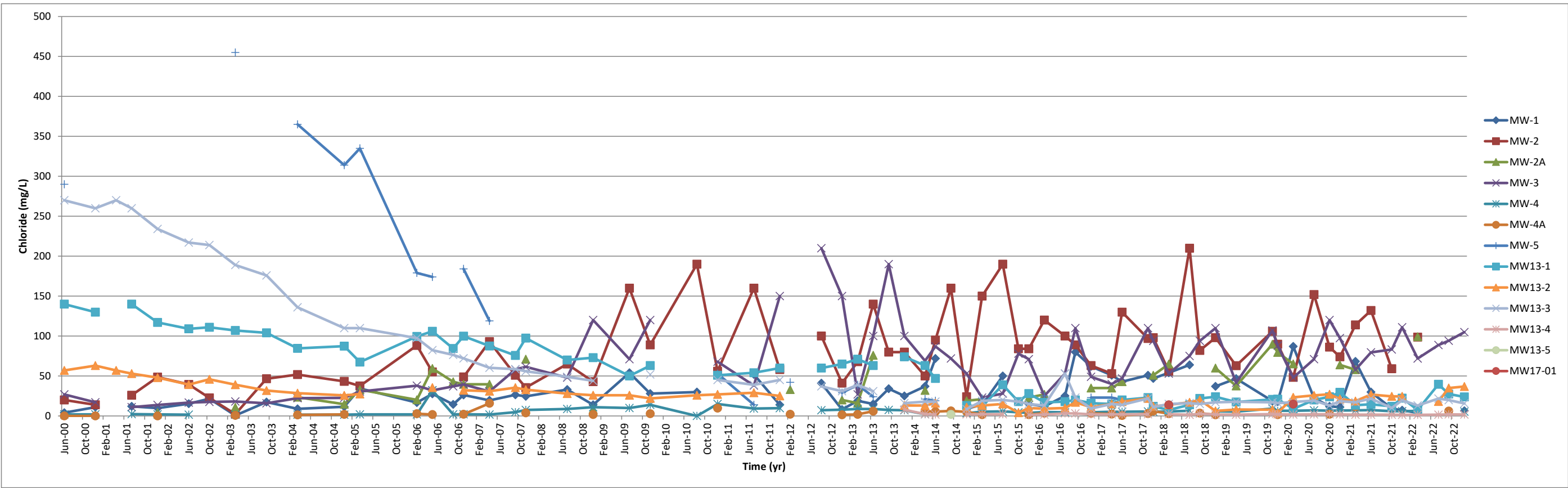


Figure E1
Monitoring Well Locations - Historic Chloride Concentrations
Sechelt Landfill

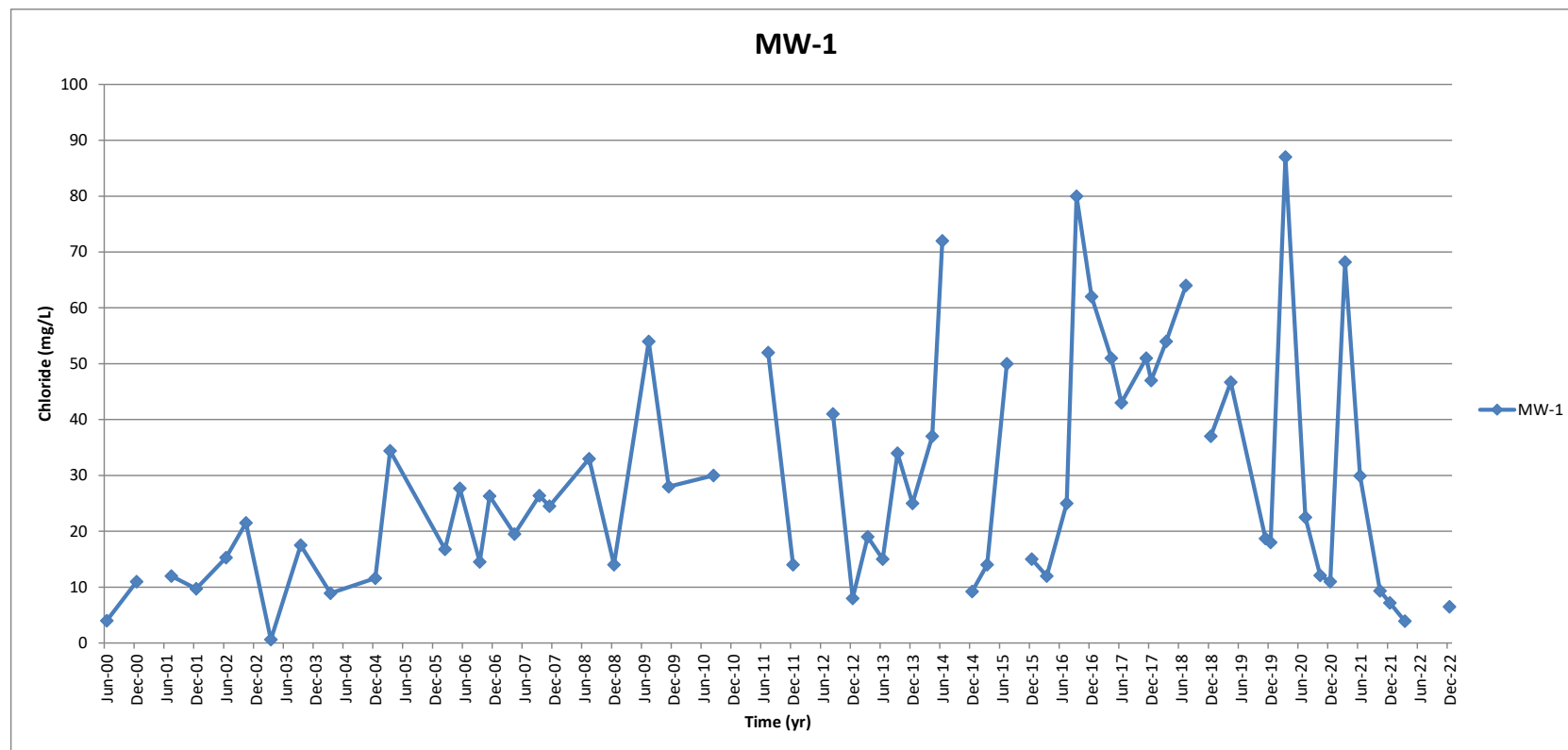


Figure E2
Groundwater Monitoring Well Locations - Historic Chloride Concentrations
Sechelt Landfill

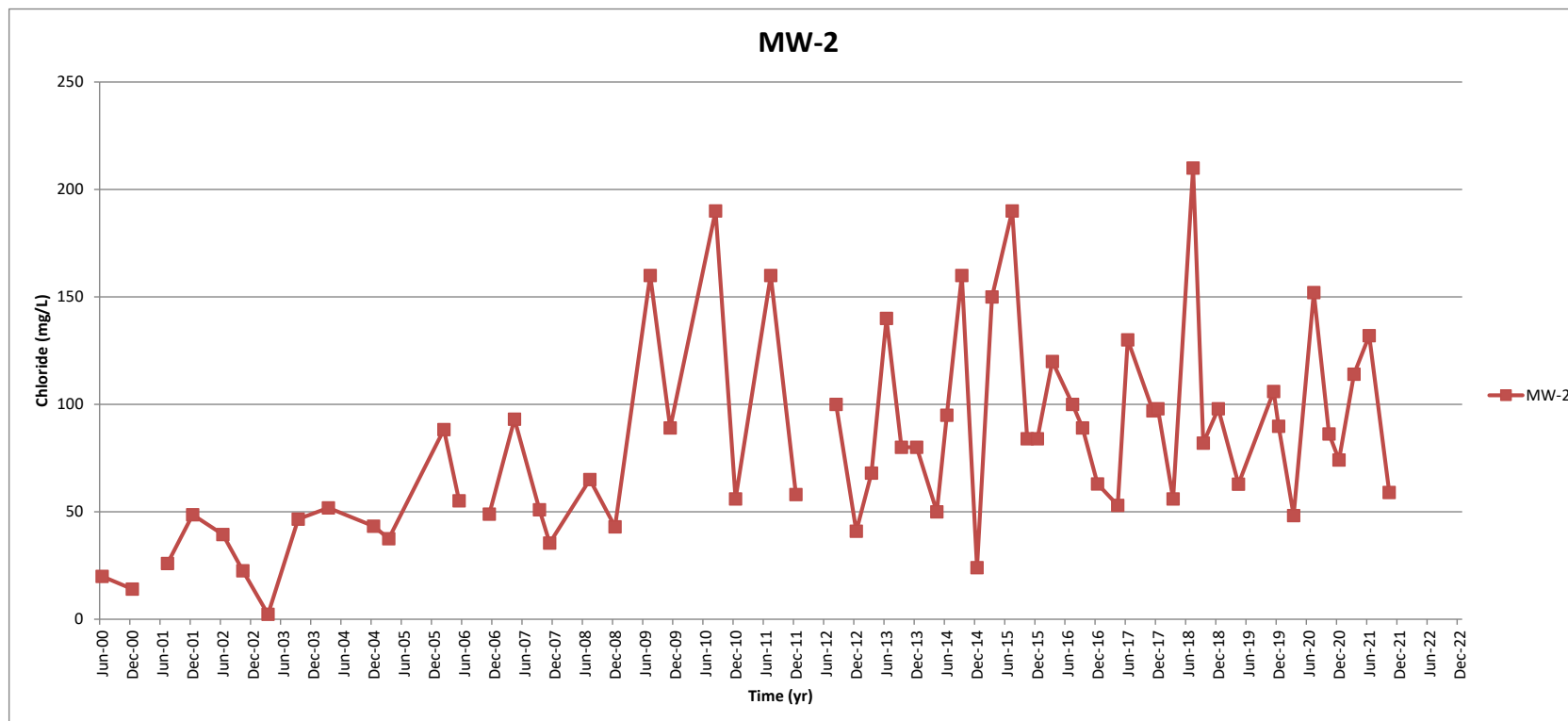


Figure E3
Groundwater Monitoring Well Locations - Historic Chloride Concentrations
Sechelt Landfill

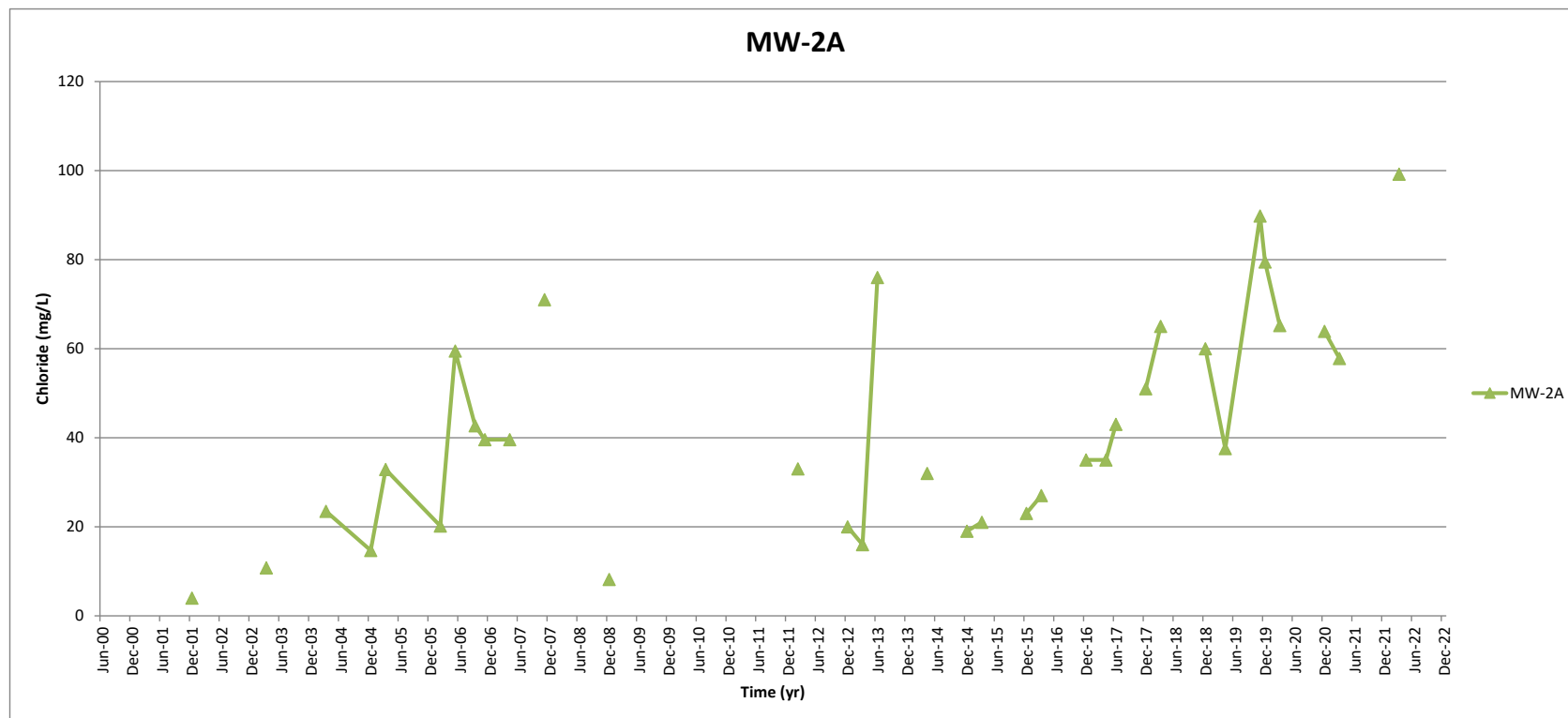


Figure E4
Groundwater Monitoring Well Locations - Historic Chloride Concentrations
Sechelt Landfill

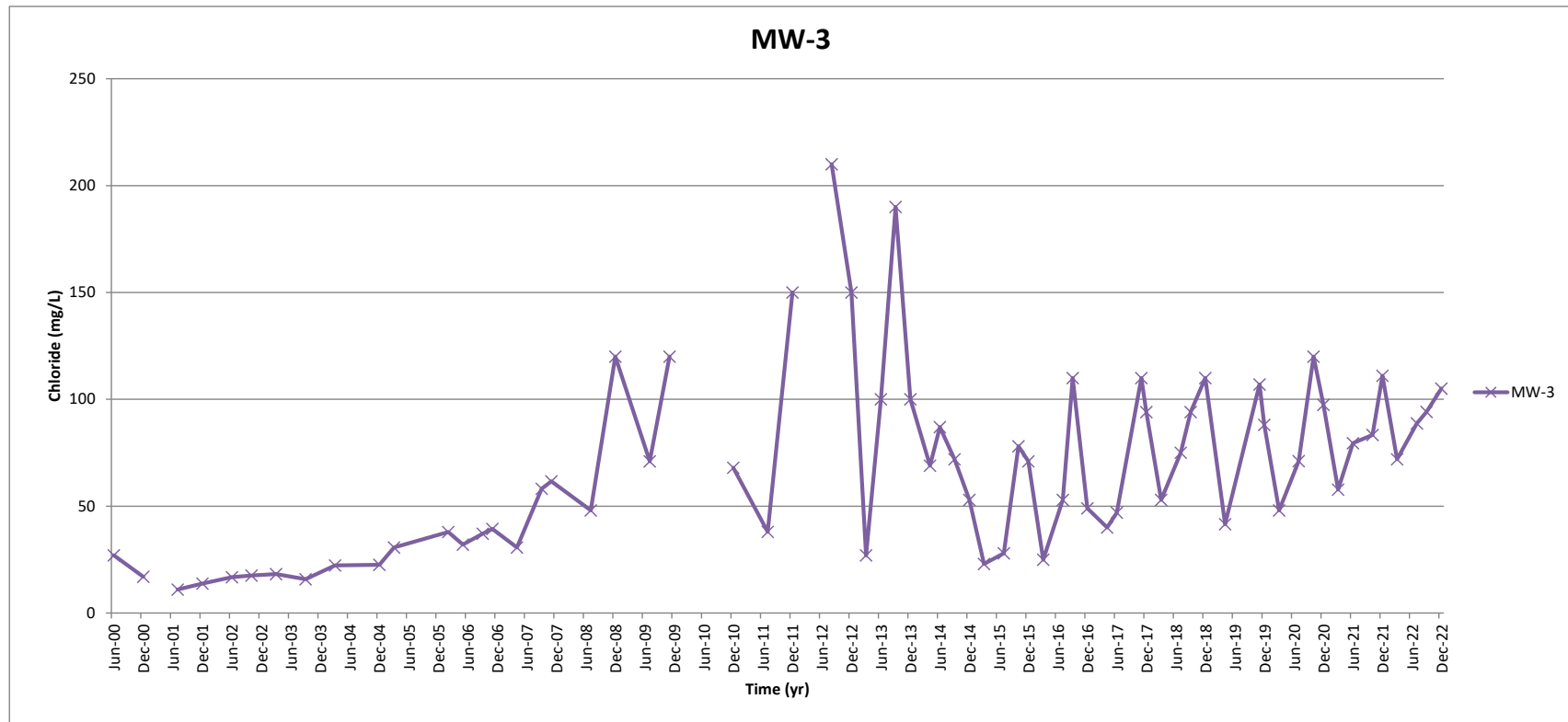


Figure E5
Groundwater Monitoring Well Locations - Historic Chloride Concentrations
Sechelt Landfill

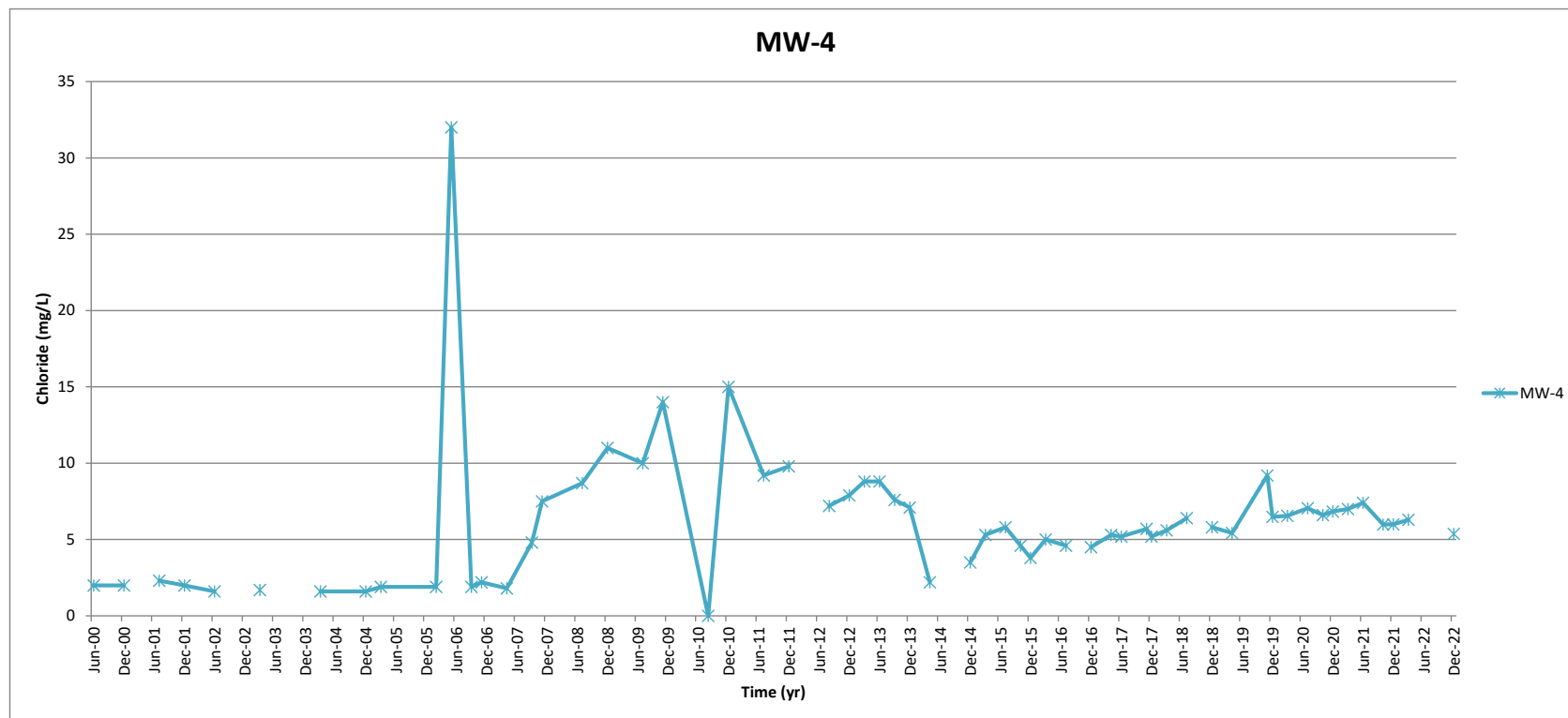


Figure E6
Groundwater Monitoring Well Locations - Historic Chloride Concentrations
Sechelt Landfill

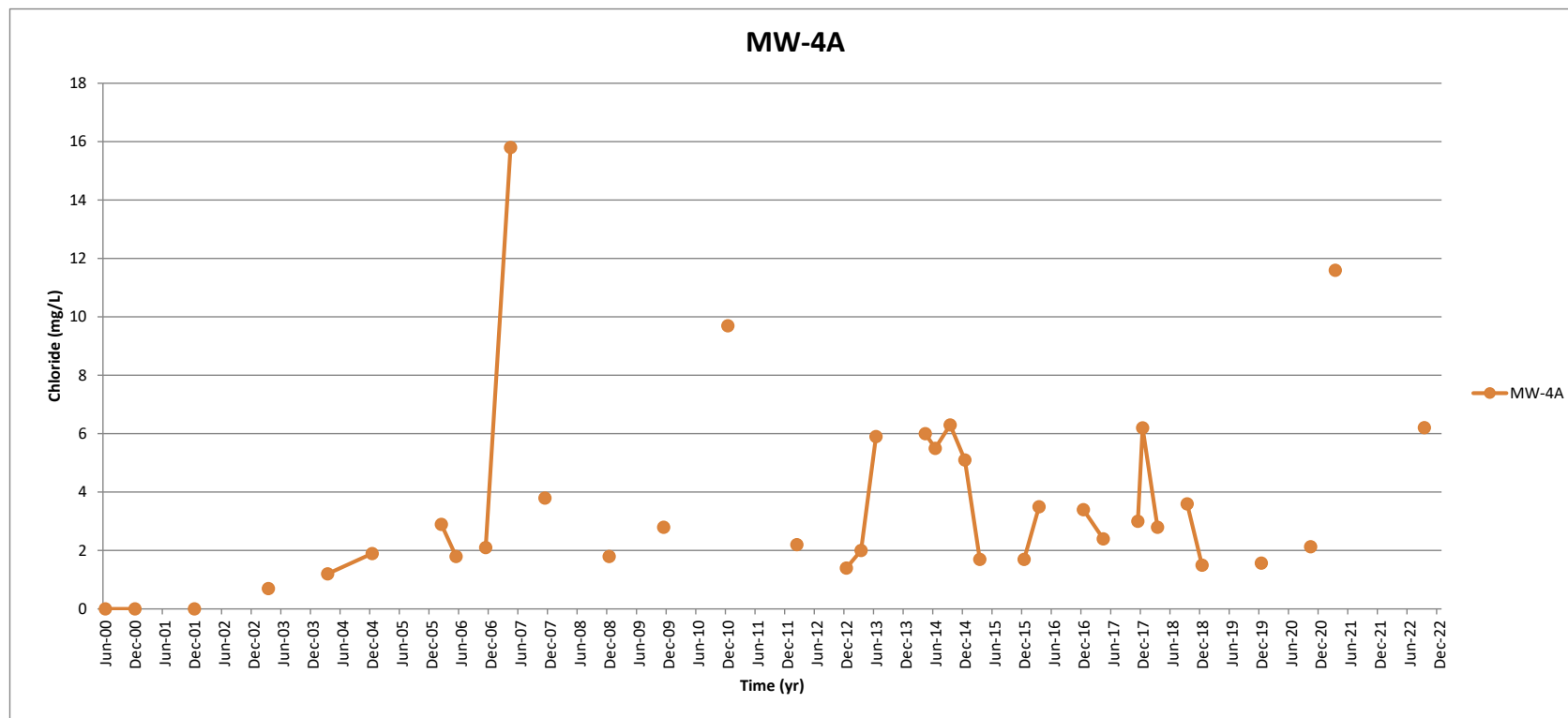


Figure E7
Groundwater Monitoring Well Locations - Historic Chloride Concentrations
Sechelt Landfill

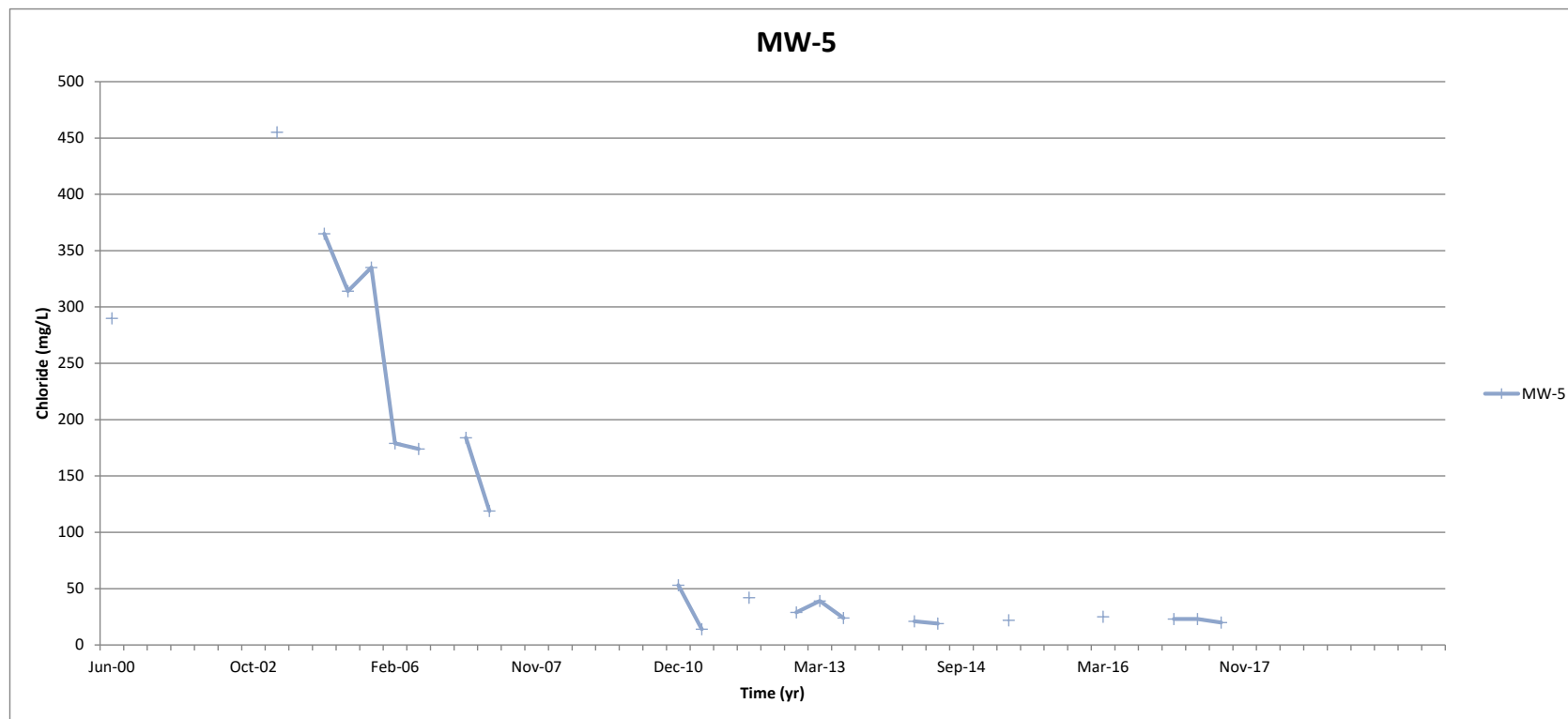


Figure E8
Groundwater Monitoring Well Locations - Historic Chloride Concentrations
Sechelt Landfill

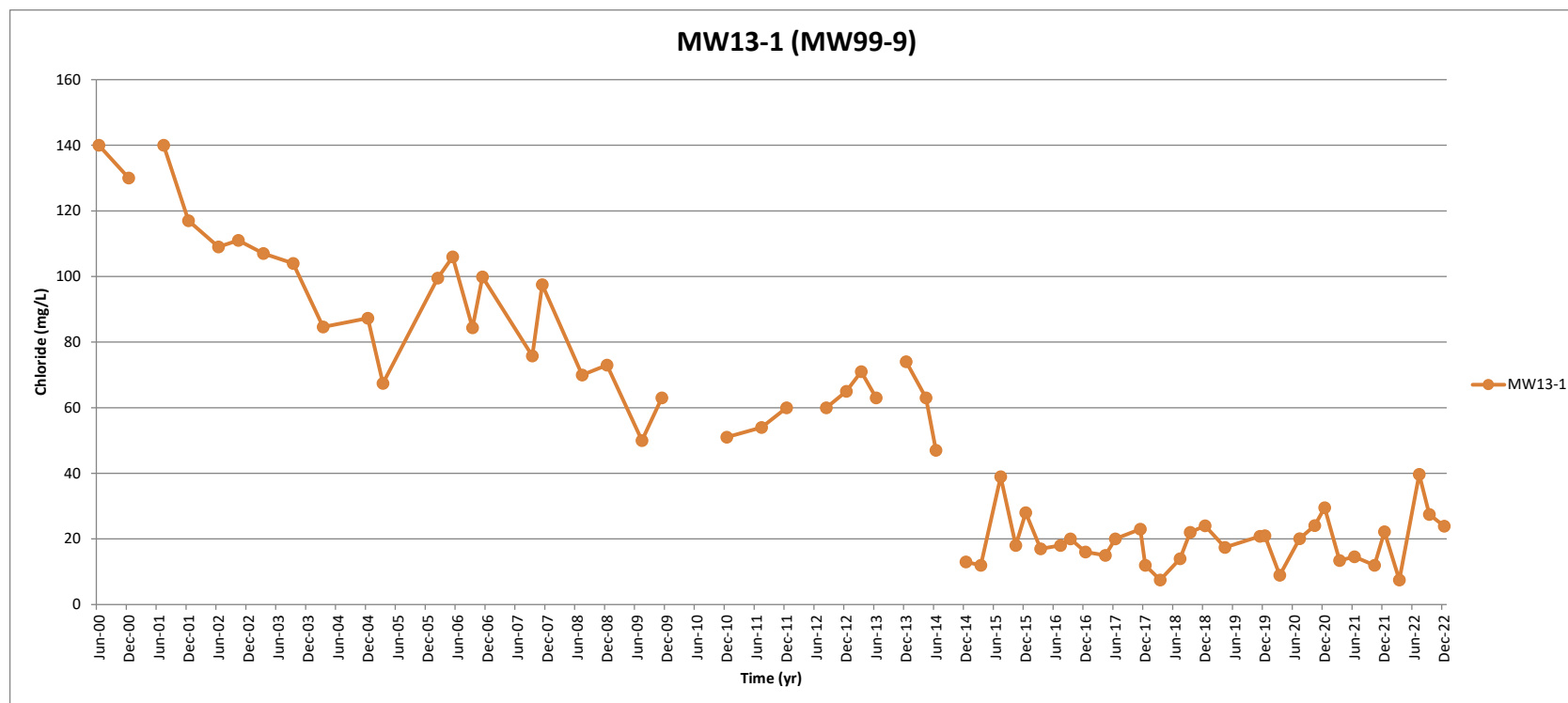


Figure E9
Groundwater Monitoring Well Locations - Historic Chloride Concentrations
Sechelt Landfill

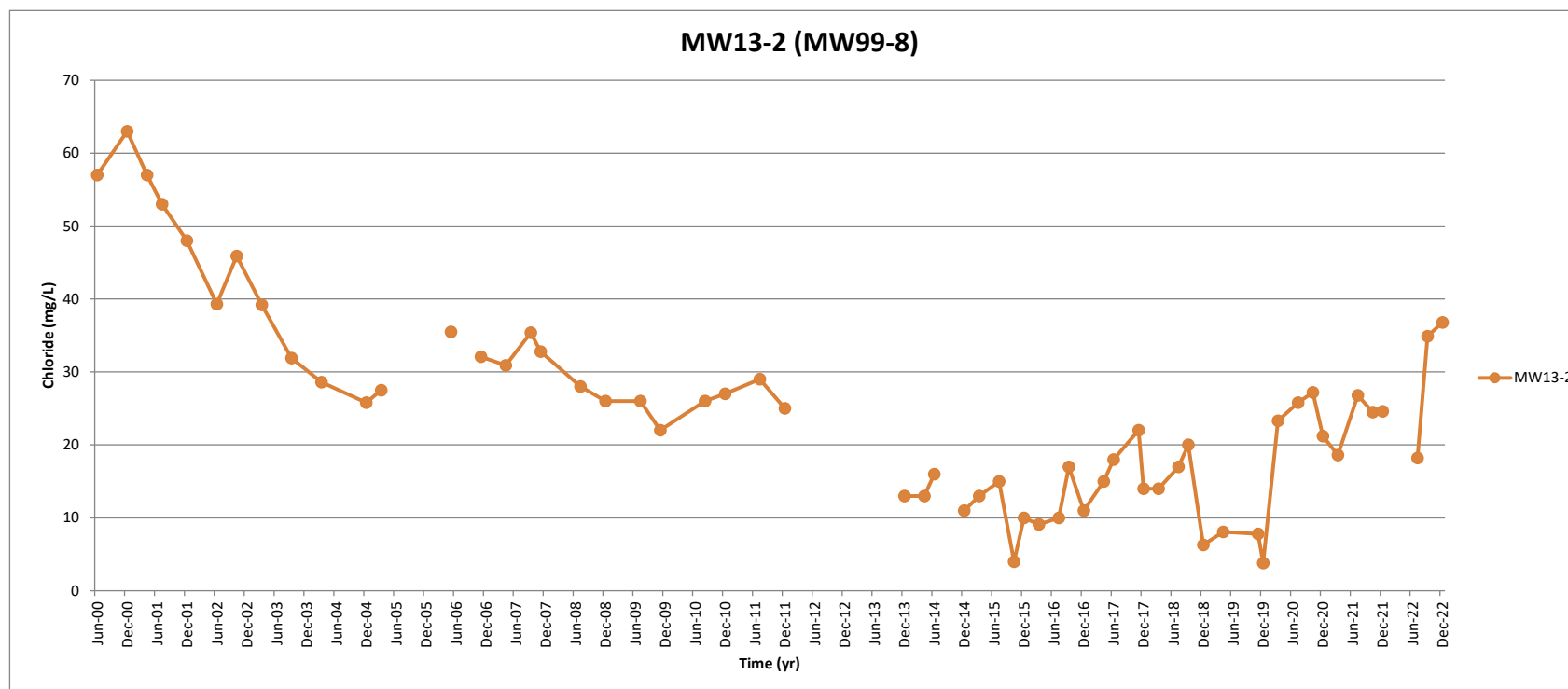


Figure E10
Groundwater Monitoring Well Locations - Historic Chloride Concentrations
Sechelt Landfill

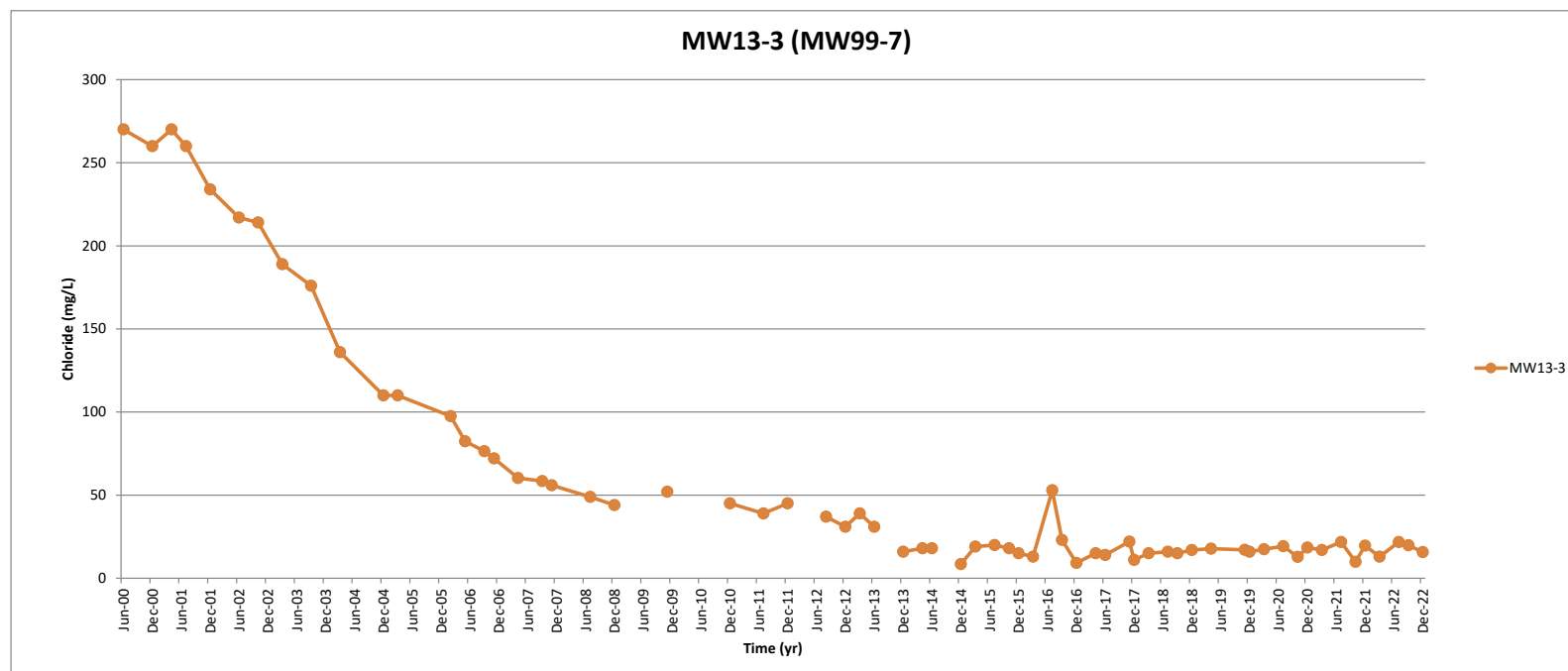


Figure E11
Groundwater Monitoring Well Locations - Historic Chloride Concentrations
Sechelt Landfill

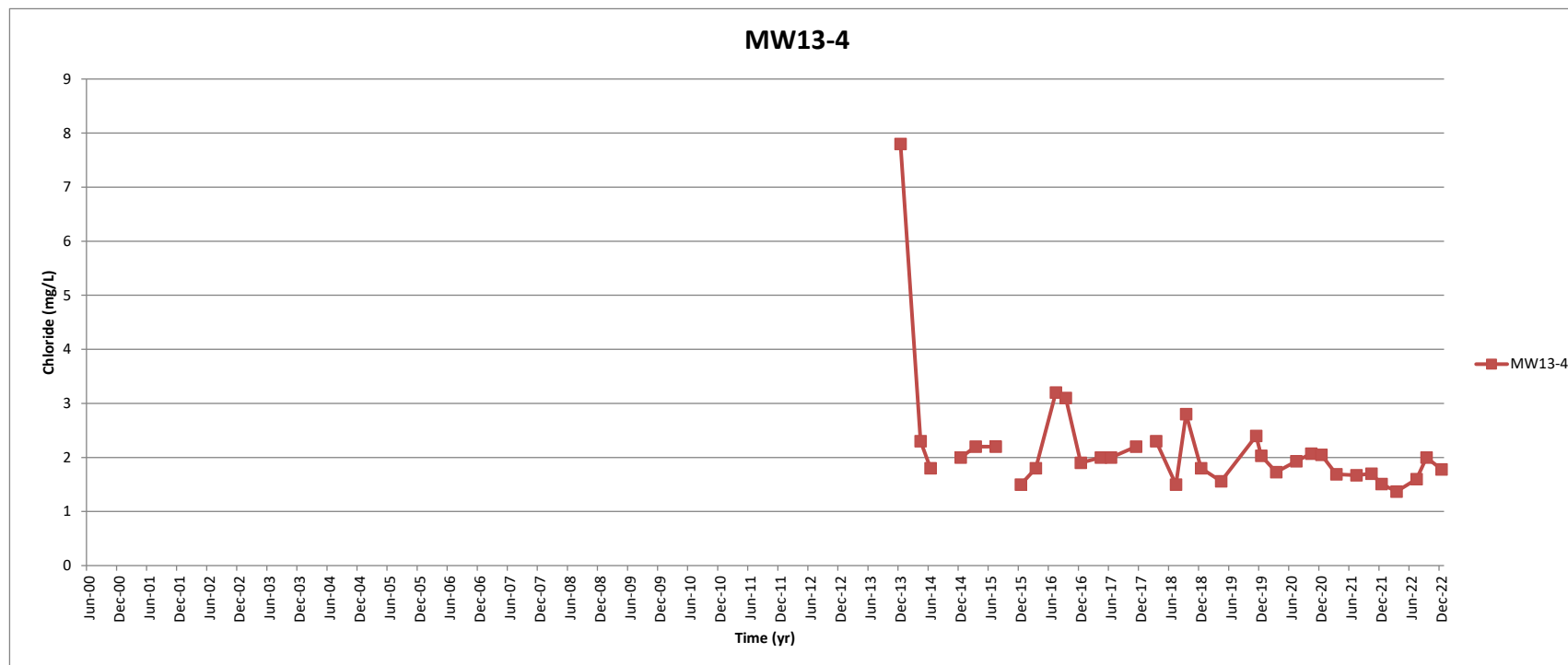


Figure E12
Groundwater Monitoring Well Locations - Historic Chloride Concentrations
Sechelt Landfill

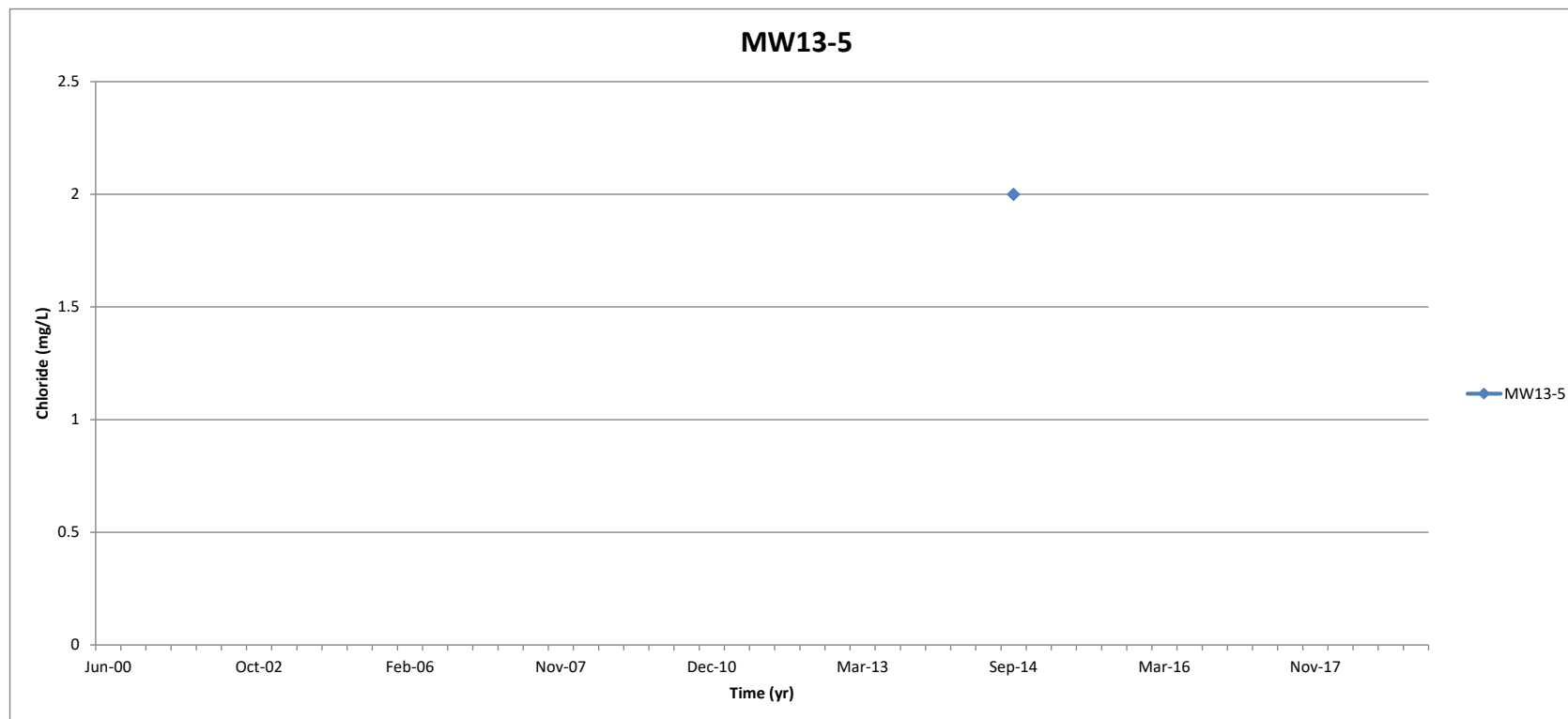


Figure E13
Groundwater Monitoring Well Locations - Historic Chloride Concentrations
Sechelt Landfill

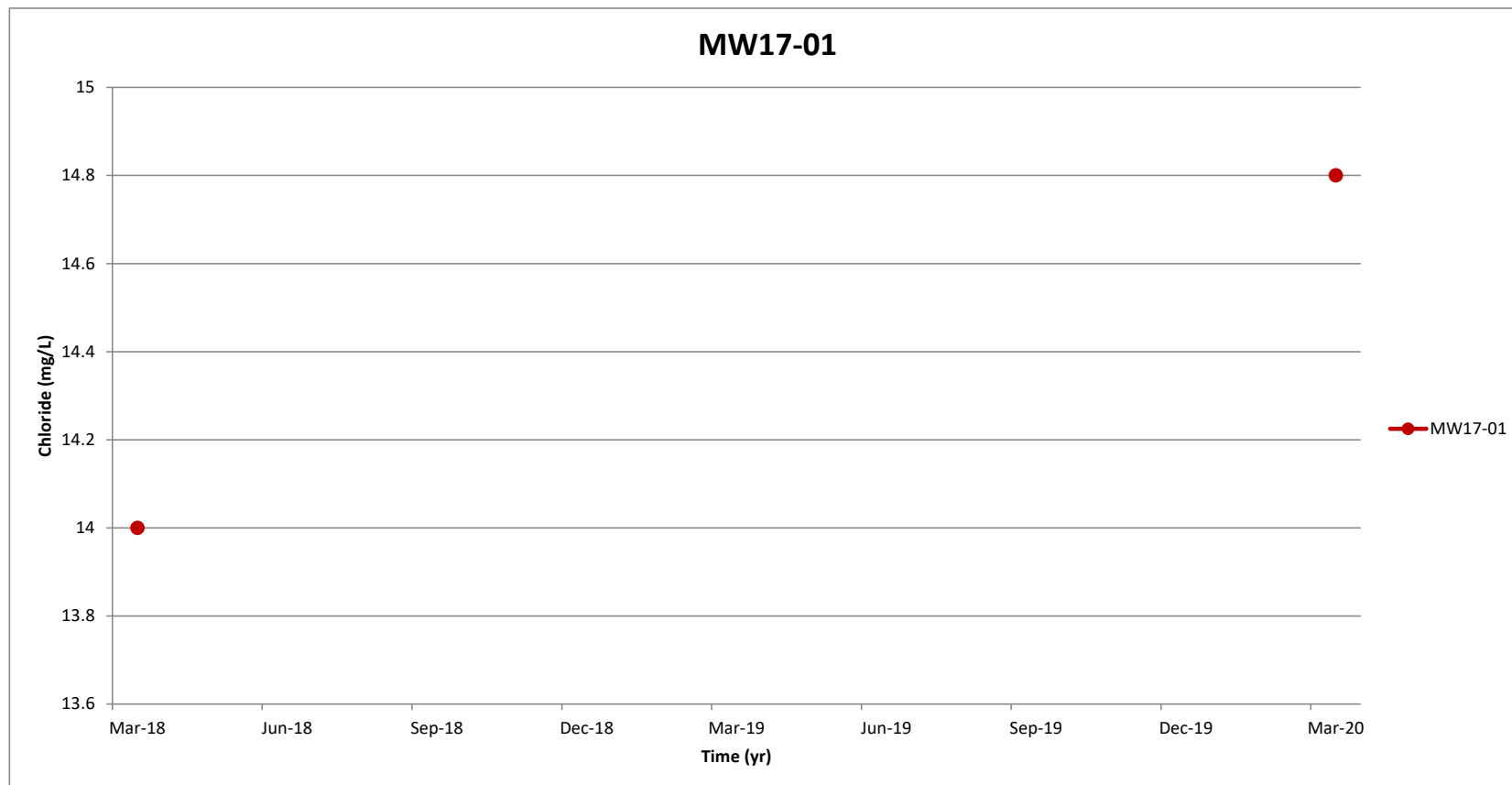


Figure E14
Monitoring Well Locations - Historic Chloride Concentrations
Sechelt Landfill

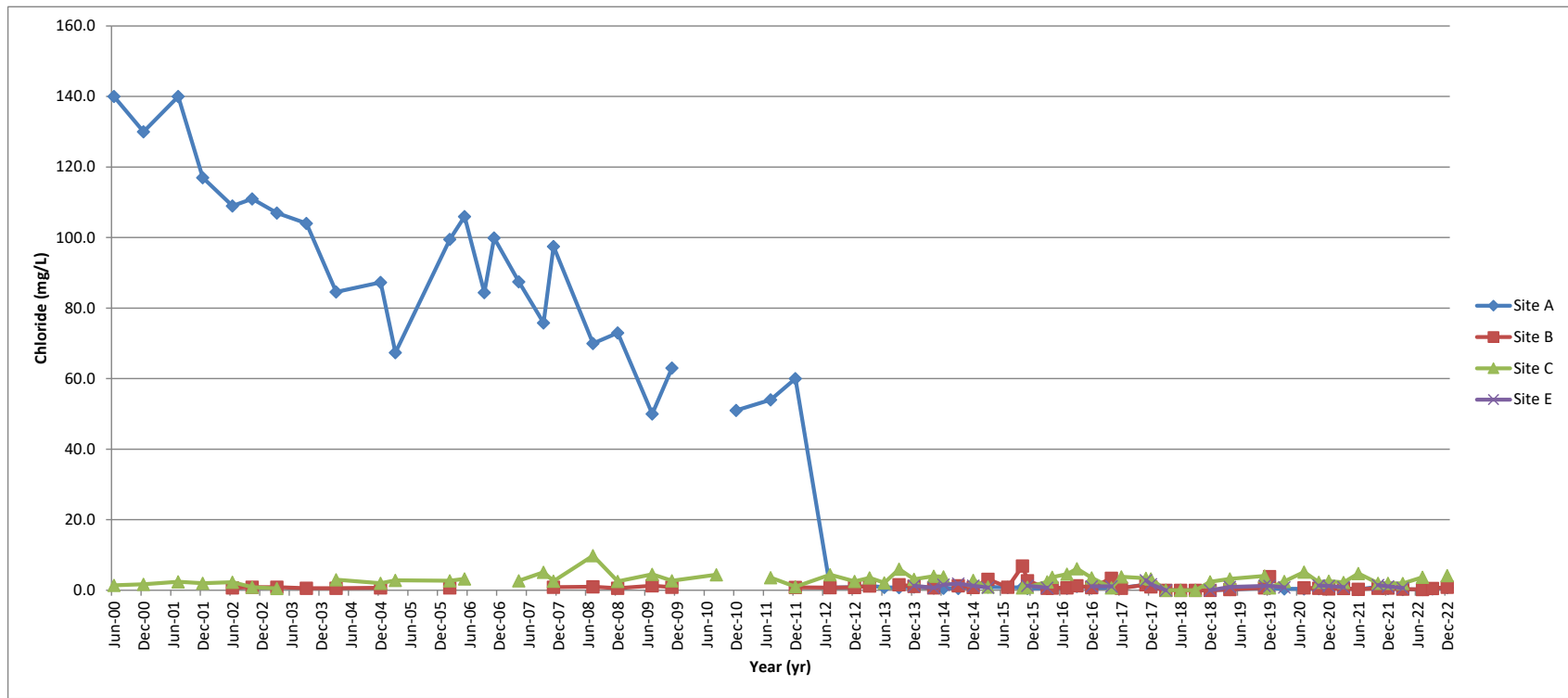


Figure E15
Surface Water Monitoring Locations - Historic Chloride Concentrations
Sechelt Landfill

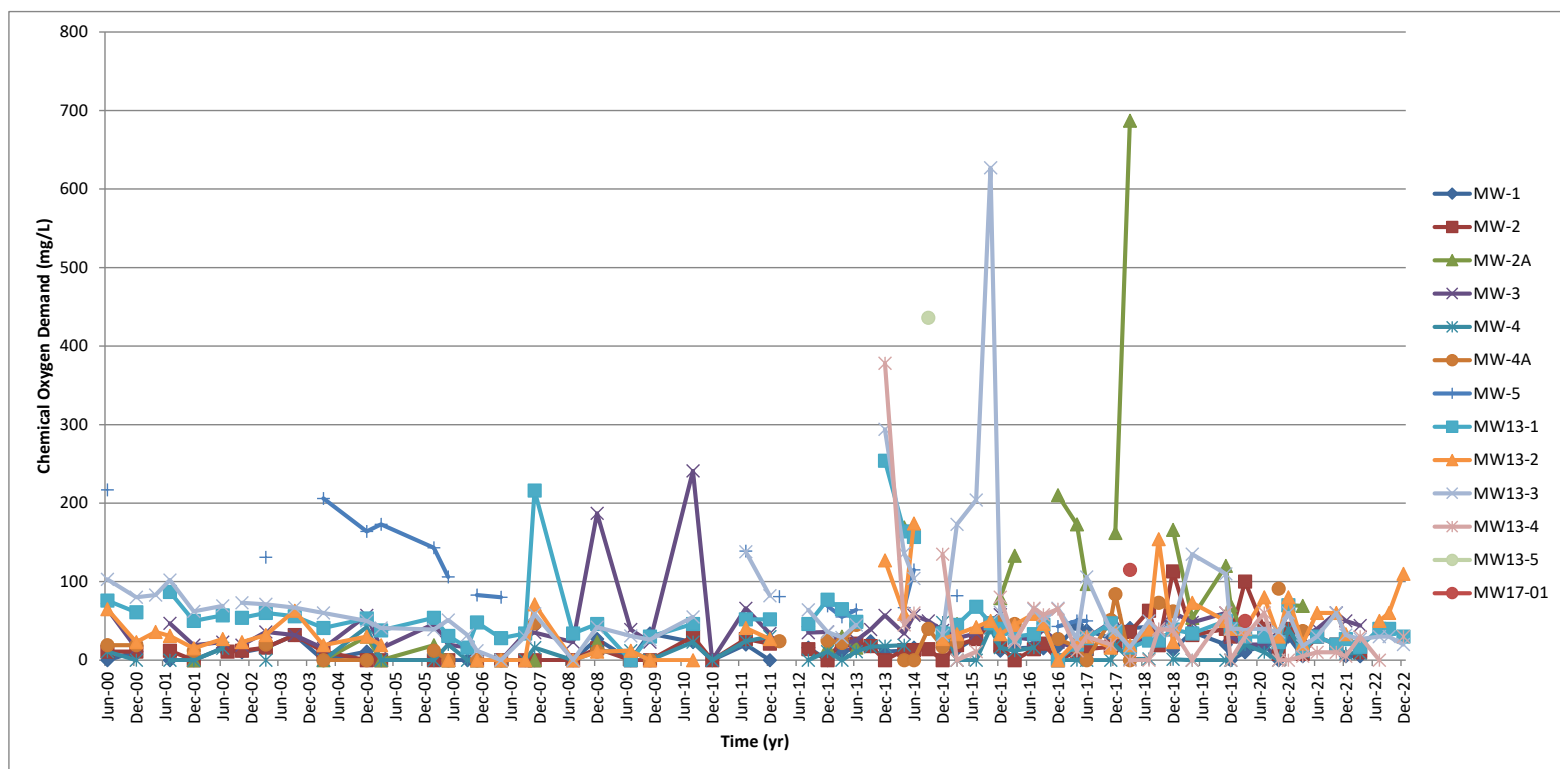


Figure E16
Groundwater Monitoring Well Locations - Historic Chemical Oxygen Demand
Sechelt Landfill

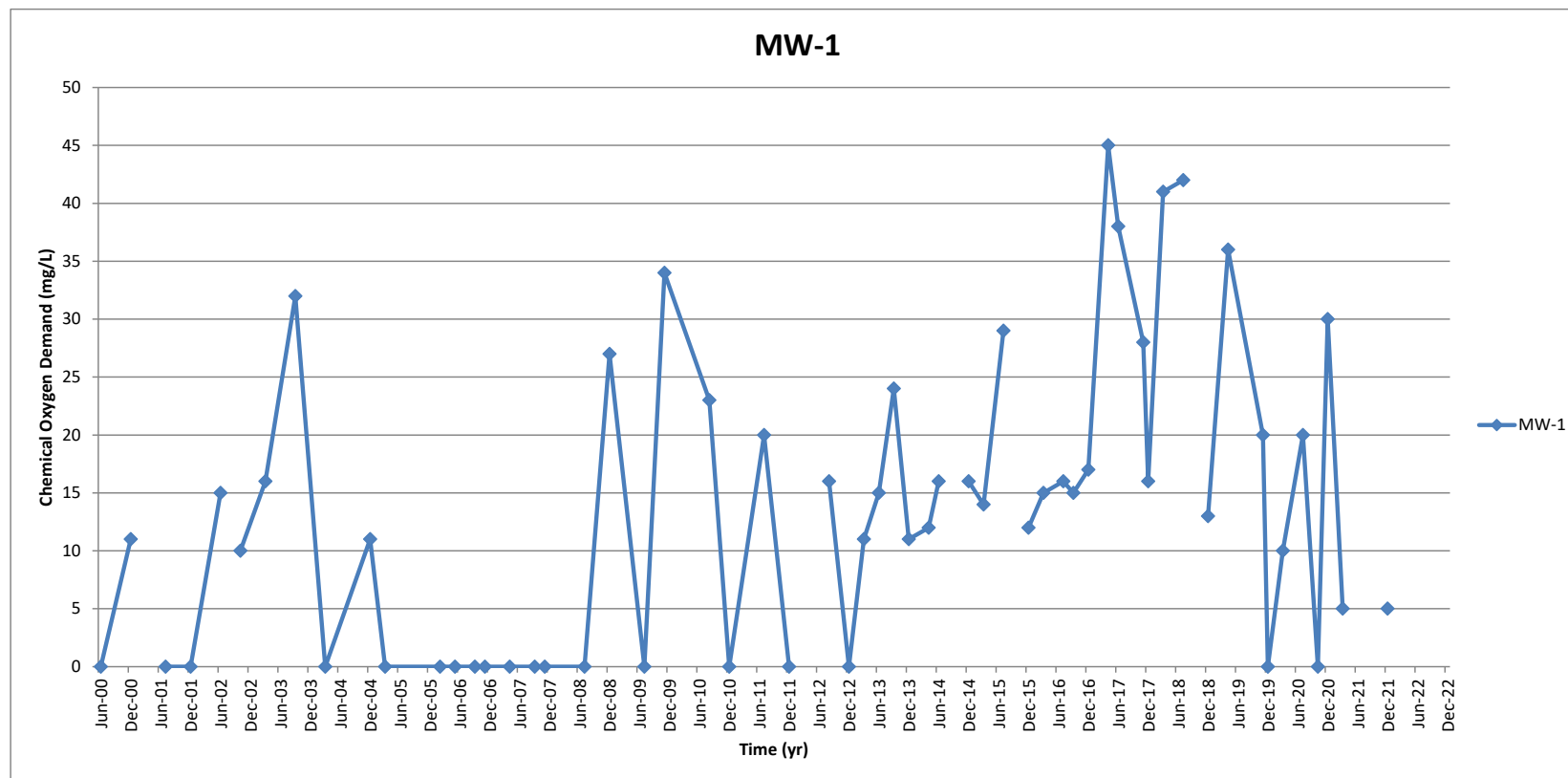


Figure E17
Groundwater Monitoring Well Locations - Historic Chemical Oxygen Demand
Sechelt Landfill

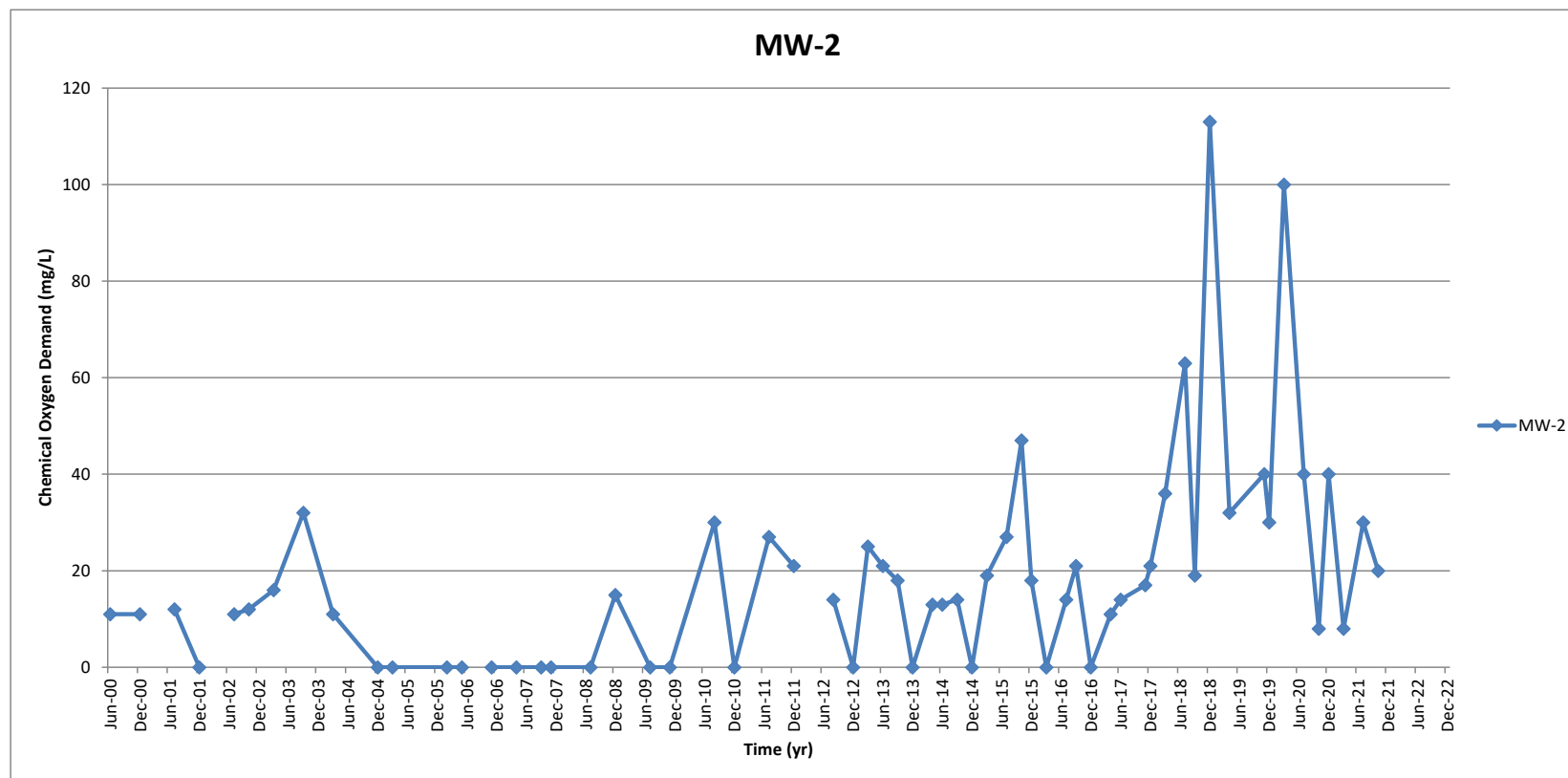


Figure E18
Groundwater Monitoring Well Locations - Historic Chemical Oxygen Demand
Sechelt Landfill

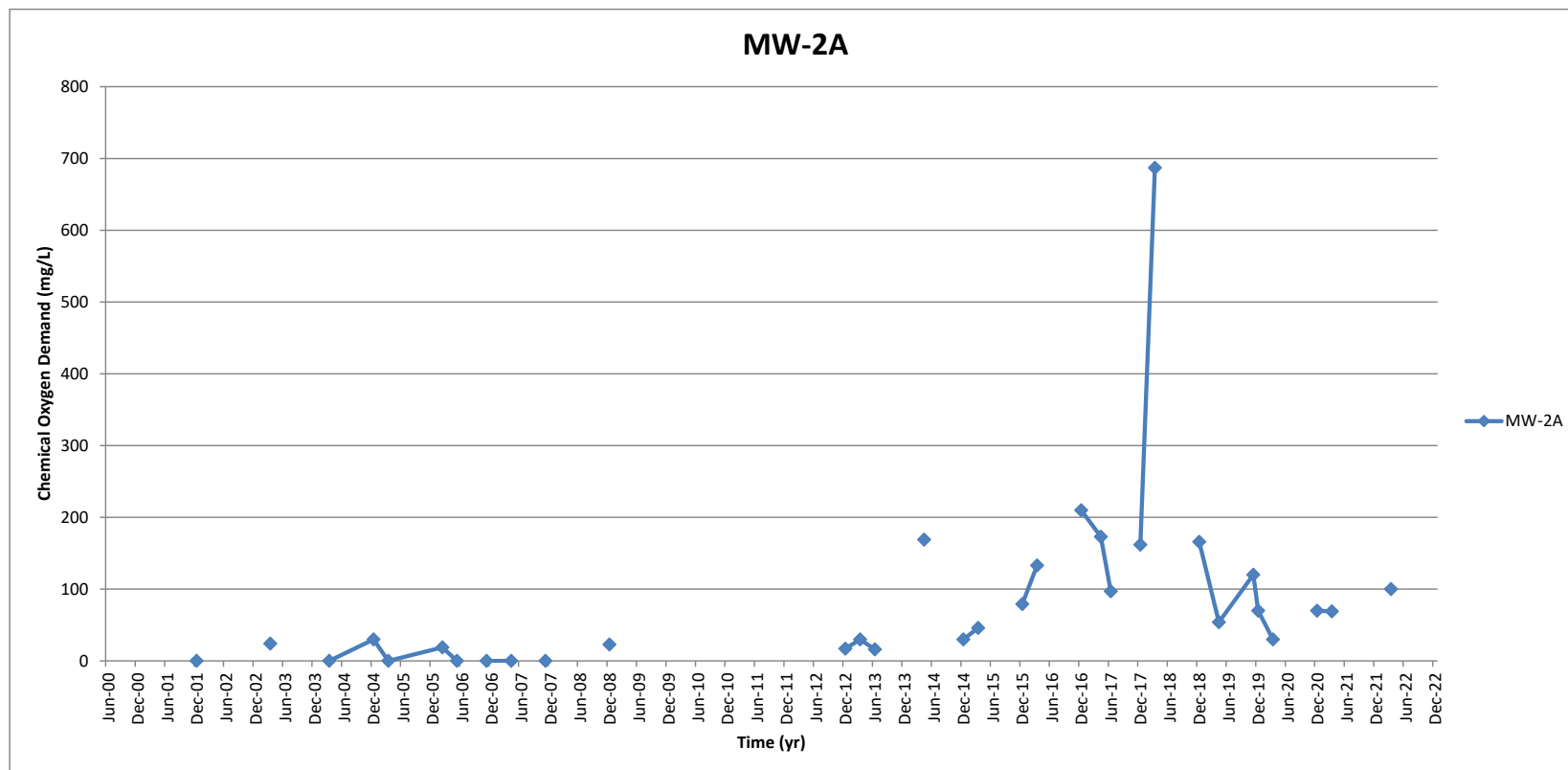


Figure E19
Groundwater Monitoring Well Locations - Historic Chemical Oxygen Demand
Sechelt Landfill

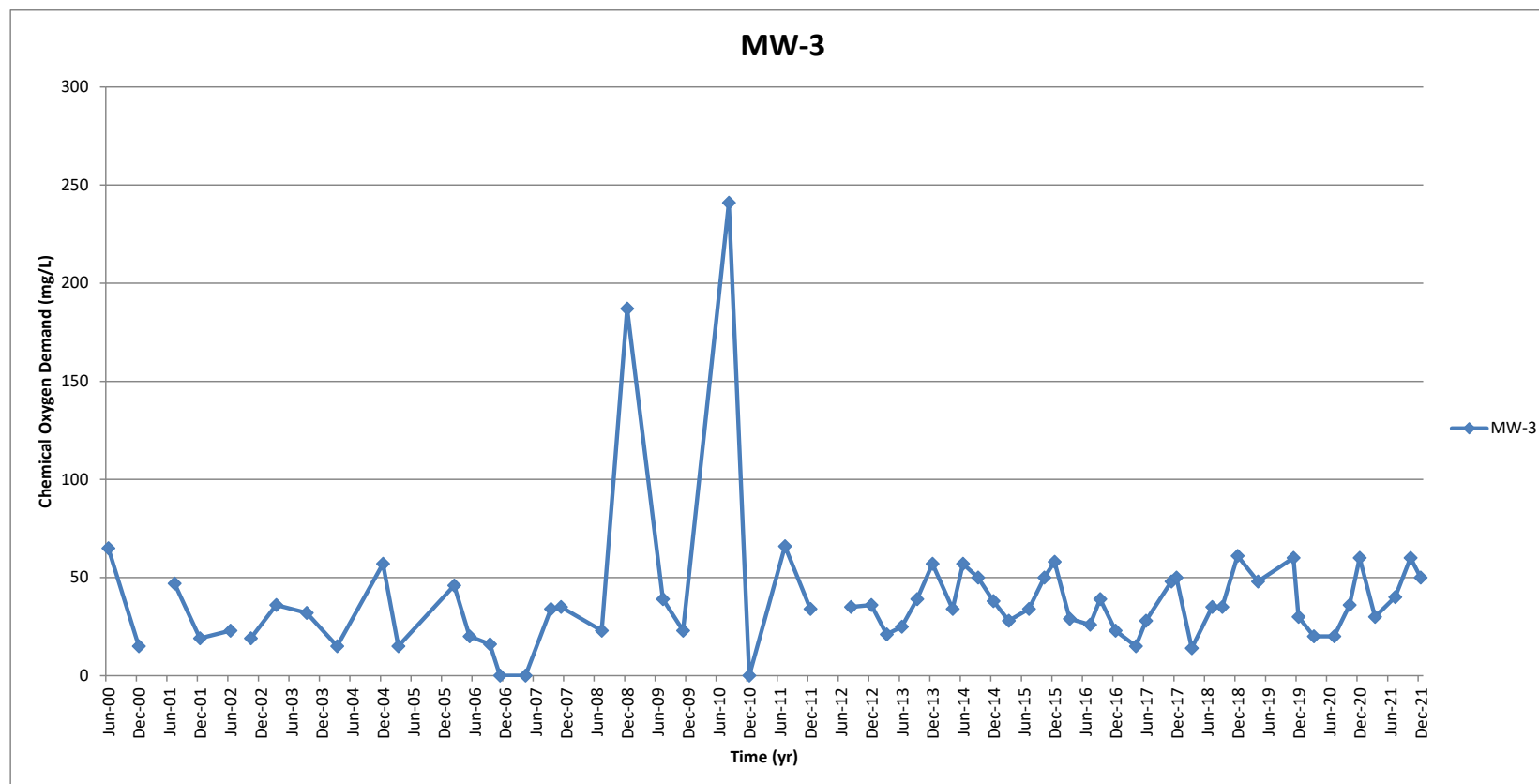


Figure E20
Groundwater Monitoring Well Locations - Historic Chemical Oxygen Demand
Sechelt Landfill

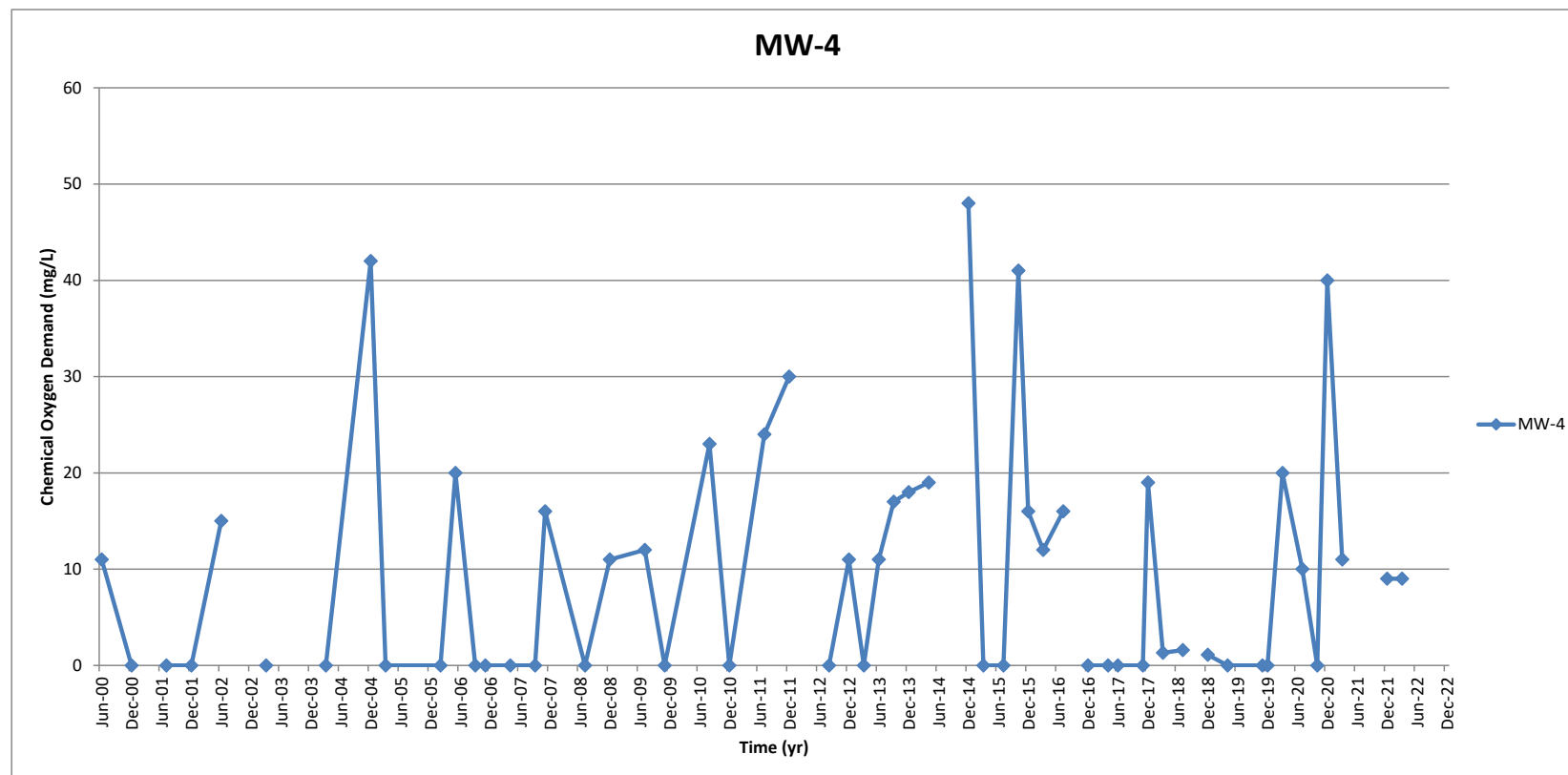


Figure E21
Groundwater Monitoring Well Locations - Historic Chemical Oxygen Demand
Sechelt Landfill

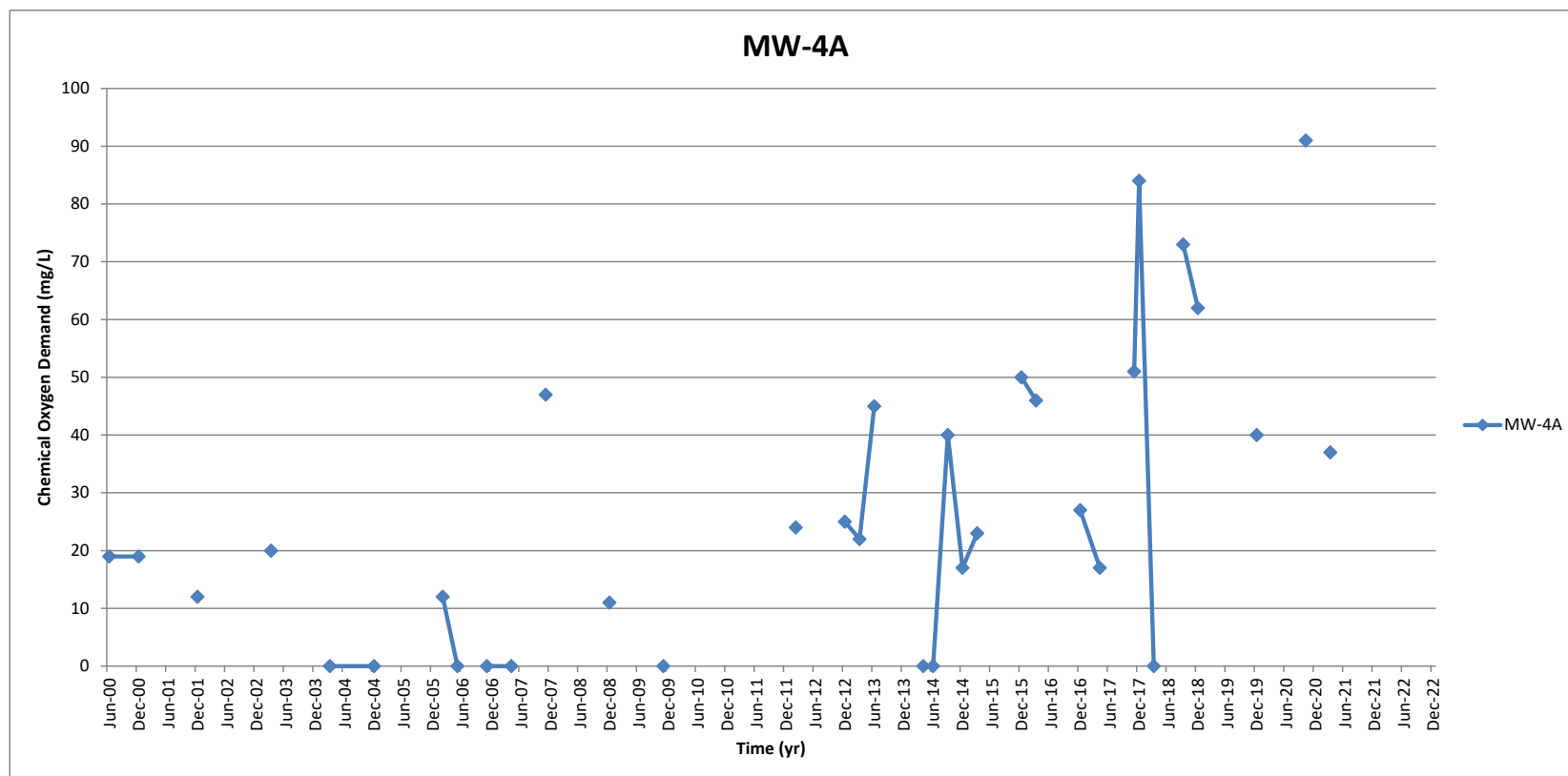


Figure E22
Groundwater Monitoring Well Locations - Historic Chemical Oxygen Demand
Sechelt Landfill

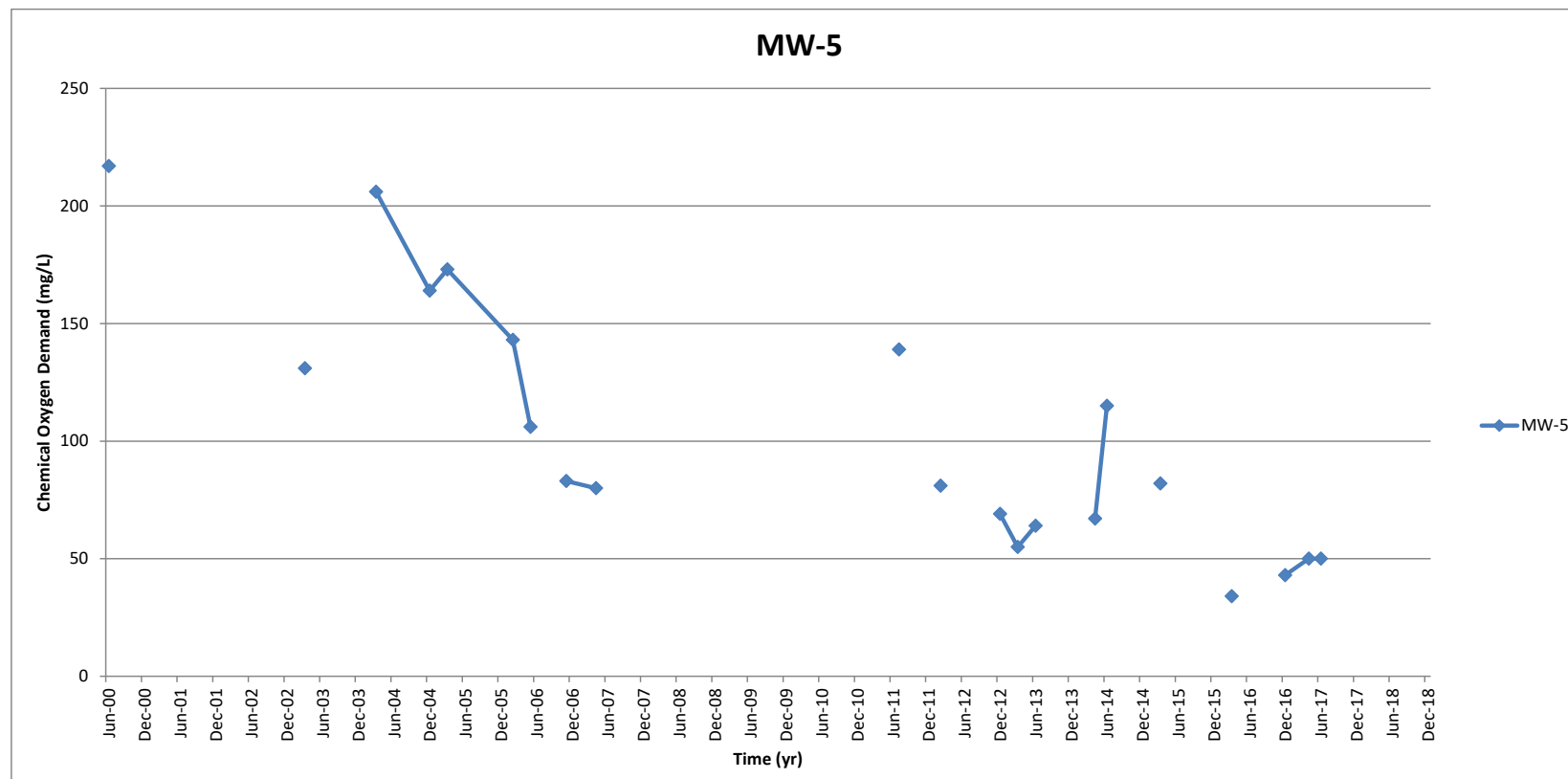


Figure E23
Groundwater Monitoring Well Locations - Historic Chemical Oxygen Demand
Sechelt Landfill

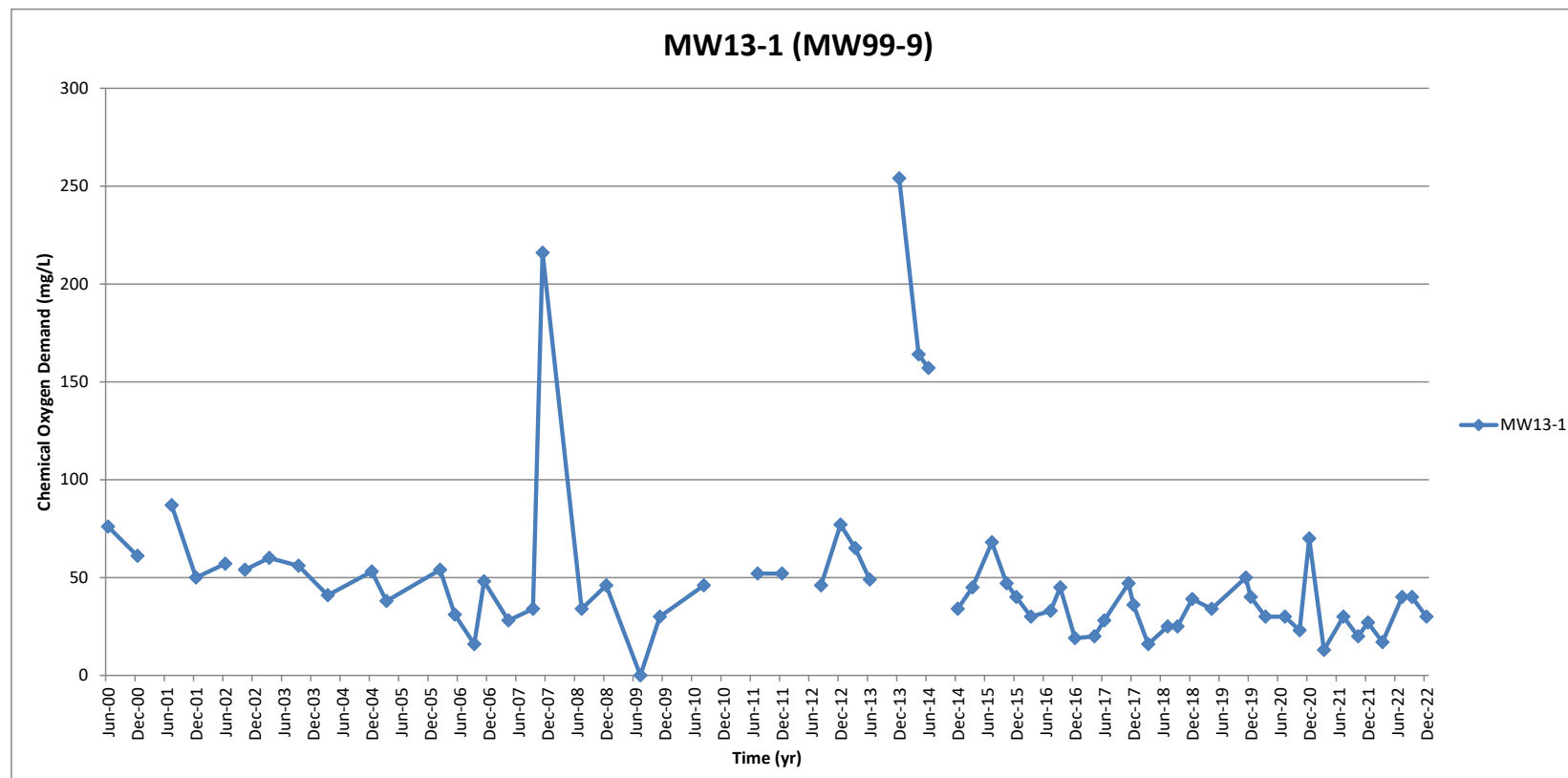


Figure E24
Groundwater Monitoring Well Locations - Historic Chemical Oxygen Demand
Sechelt Landfill

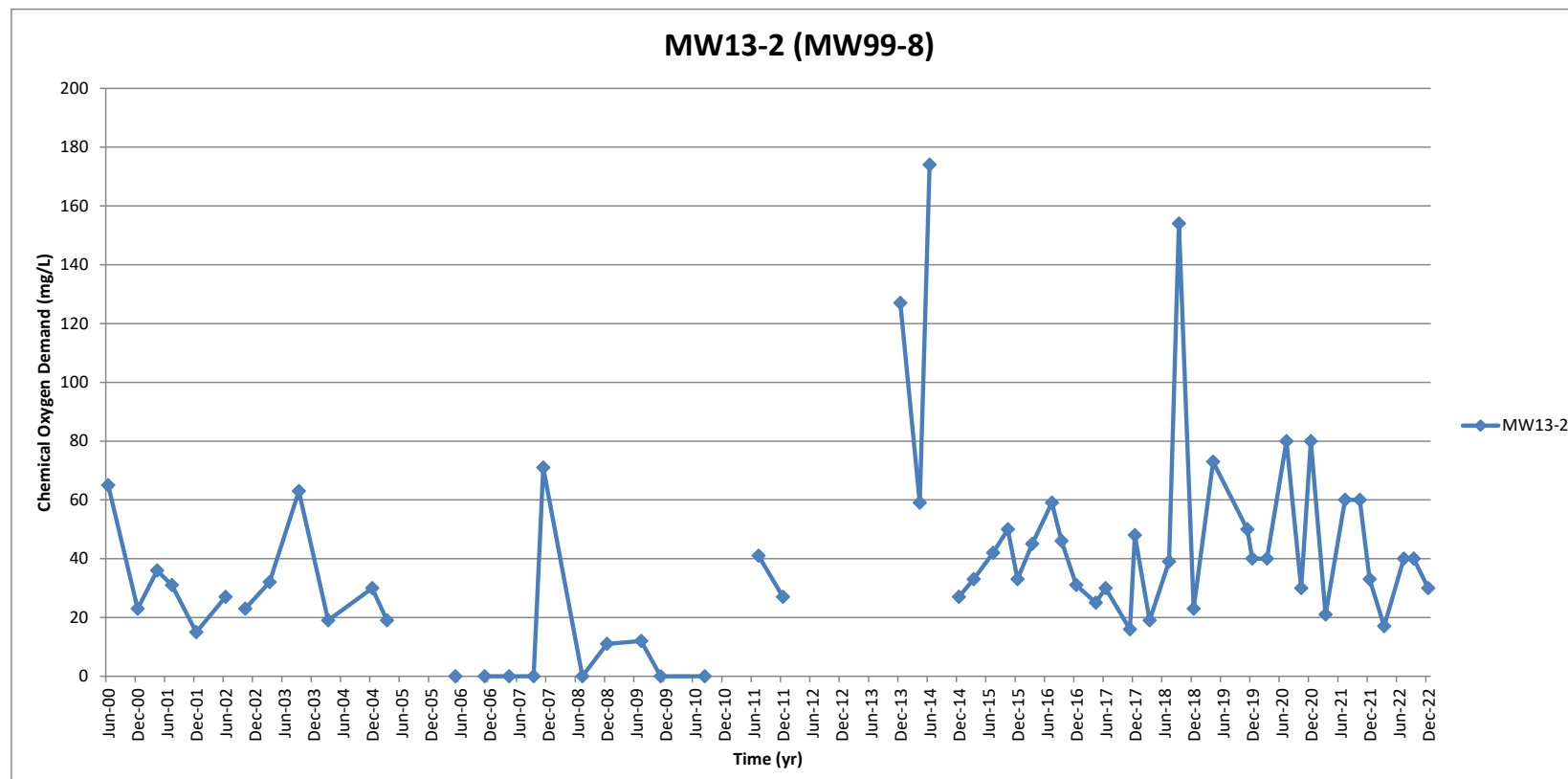


Figure E25
Groundwater Monitoring Well Locations - Historic Chemical Oxygen Demand
Sechelt Landfill

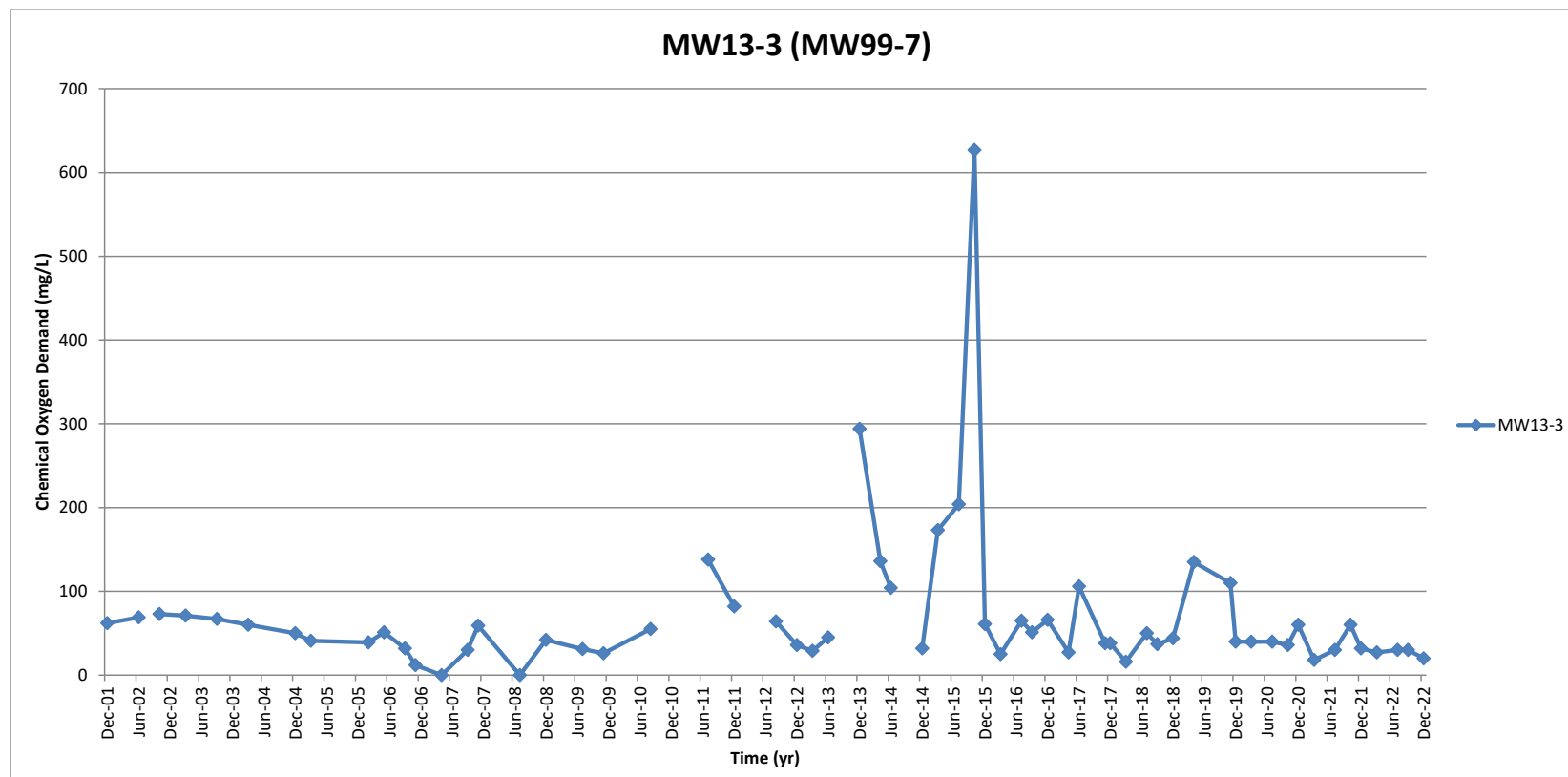


Figure E26
Groundwater Monitoring Well Locations - Historic Chemical Oxygen Demand
Sechelt Landfill

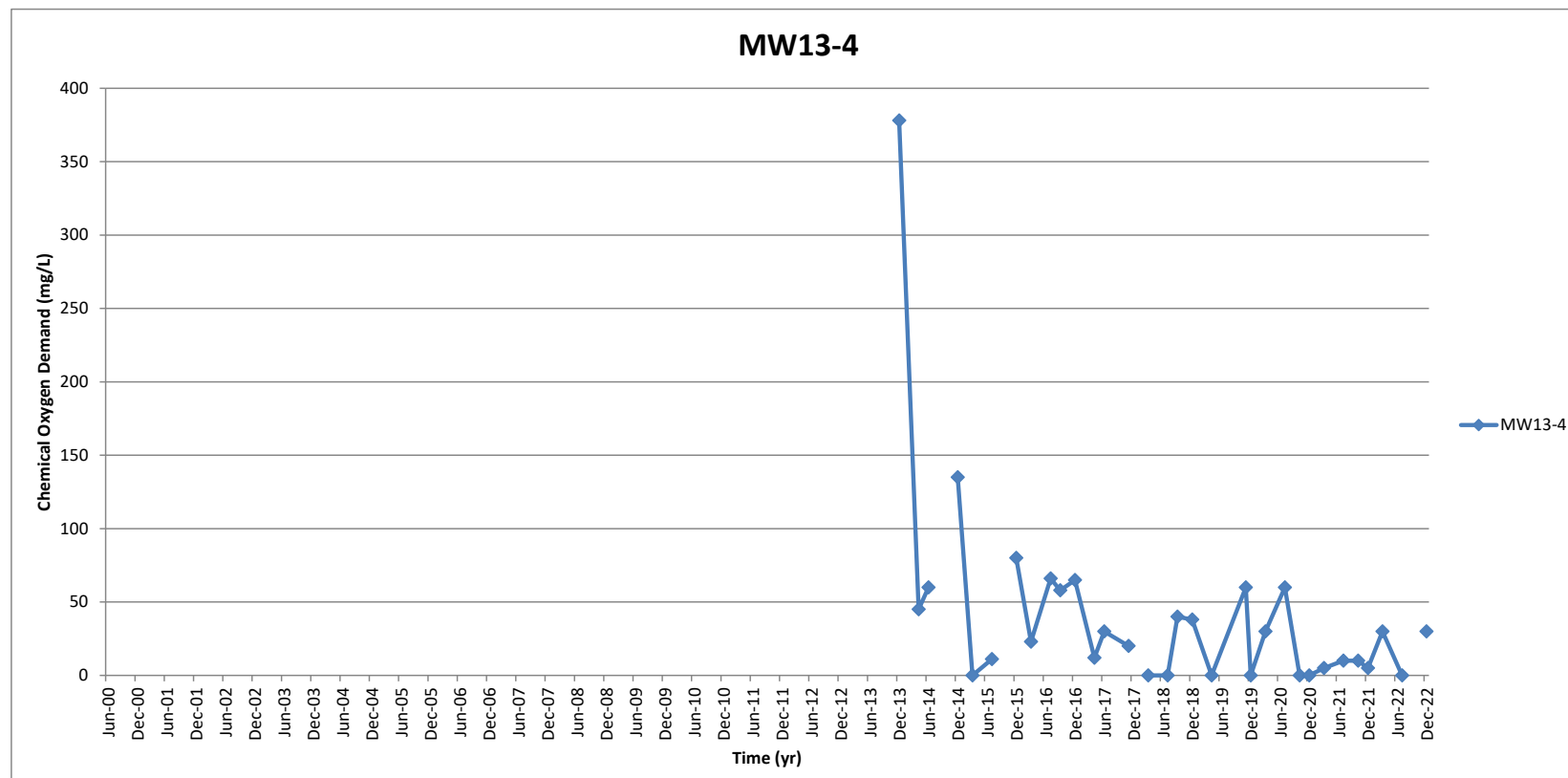


Figure E27
Groundwater Monitoring Well Locations - Historic Chemical Oxygen Demand
Sechelt Landfill

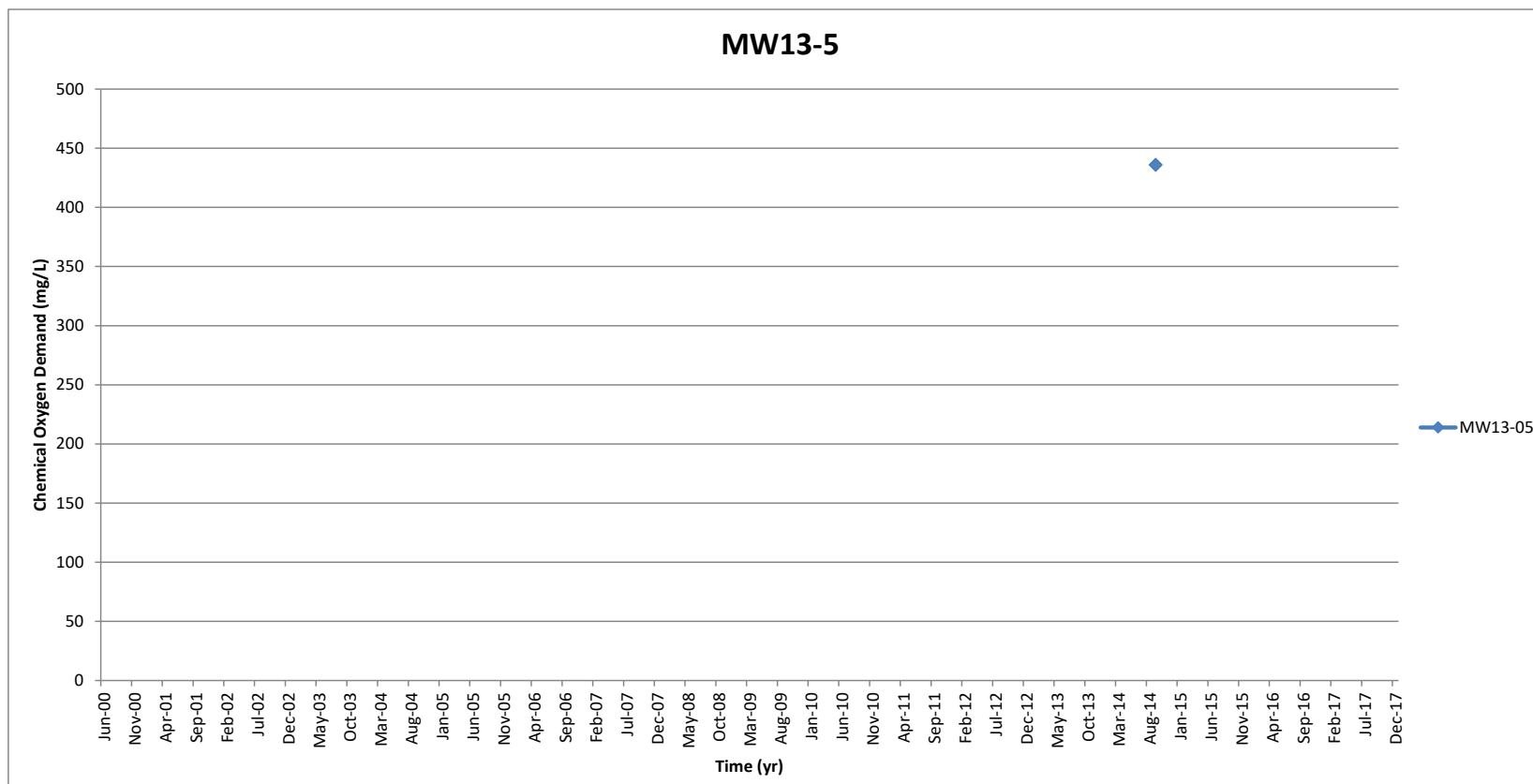


Figure E28
Groundwater Monitoring Well Locations - Historic Chemical Oxygen Demand
Sechelt Landfill

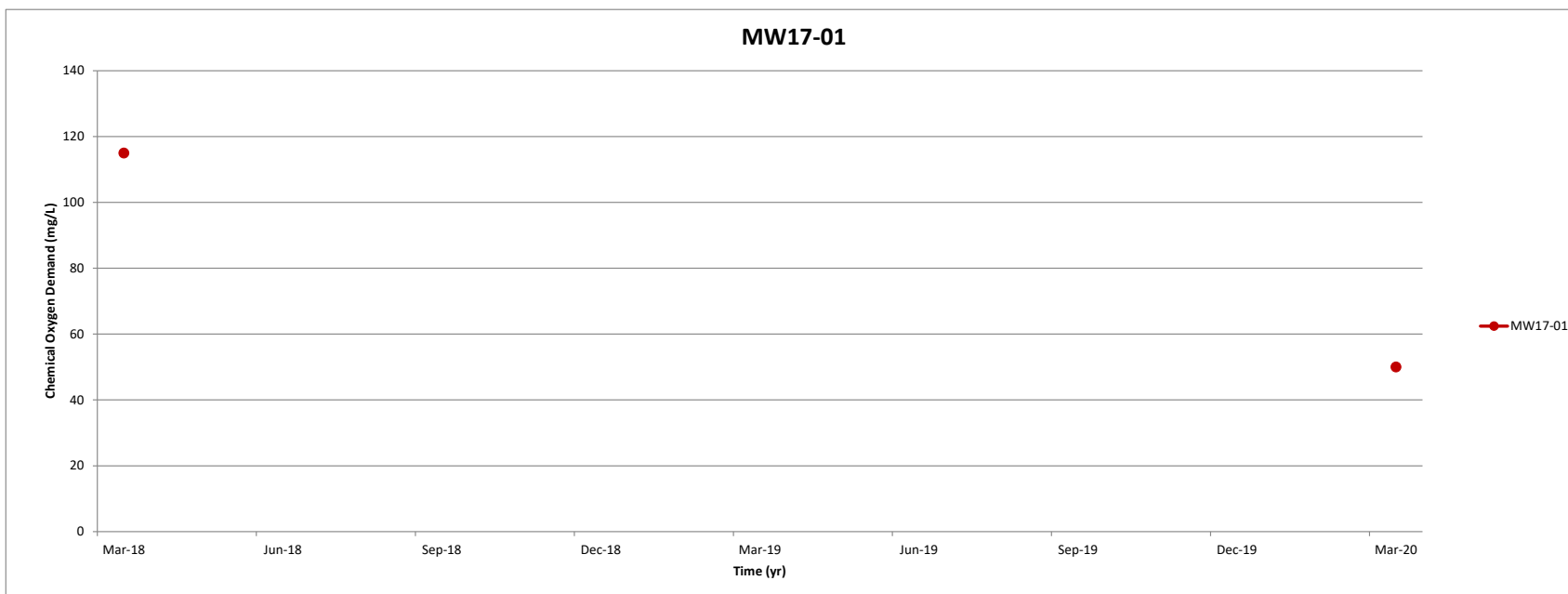


Figure E29
Groundwater Monitoring Well Locations - Historic Chemical Oxygen Demand
Sechelt Landfill

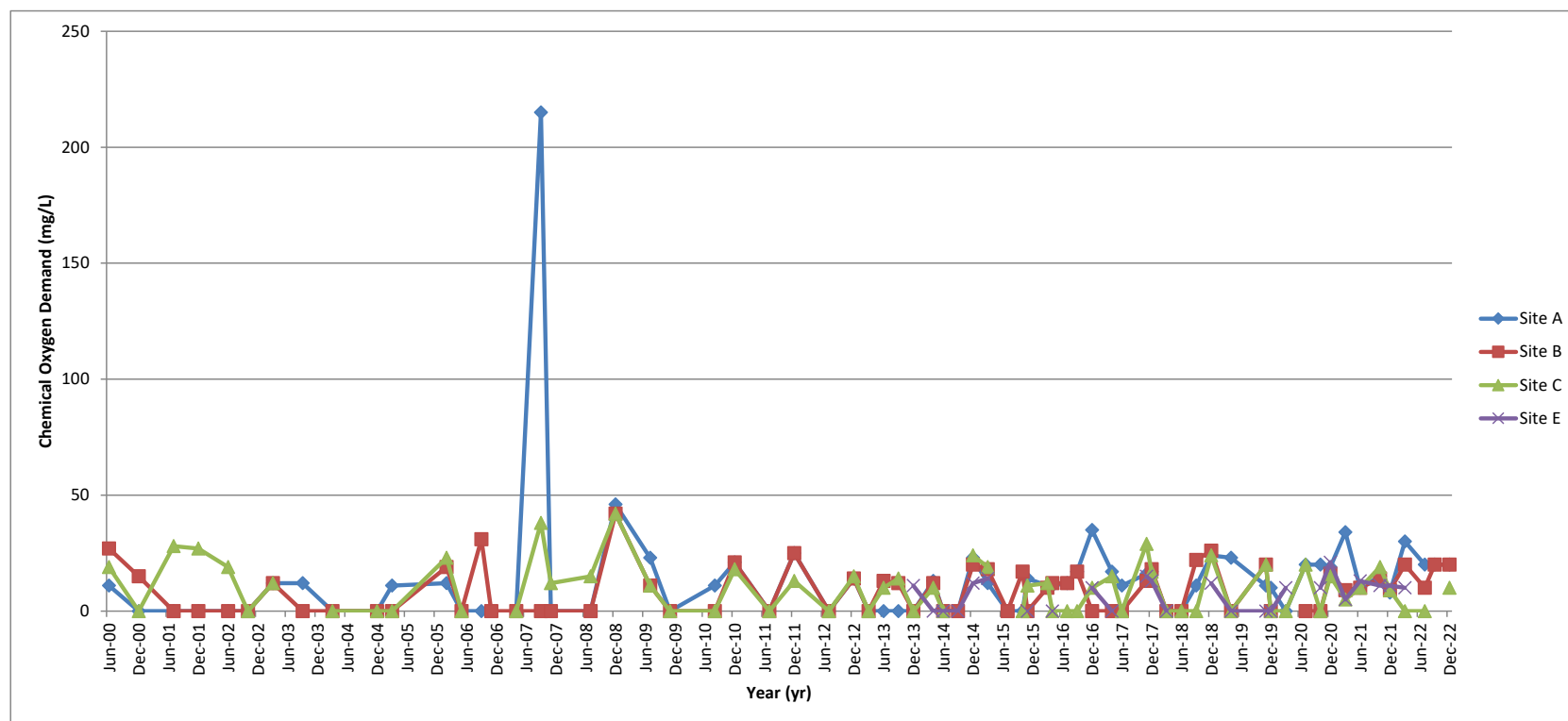


Figure E30
Surface Water Monitoring Locations - Historic Chemical Oxygen Demand
Sechelt Landfill

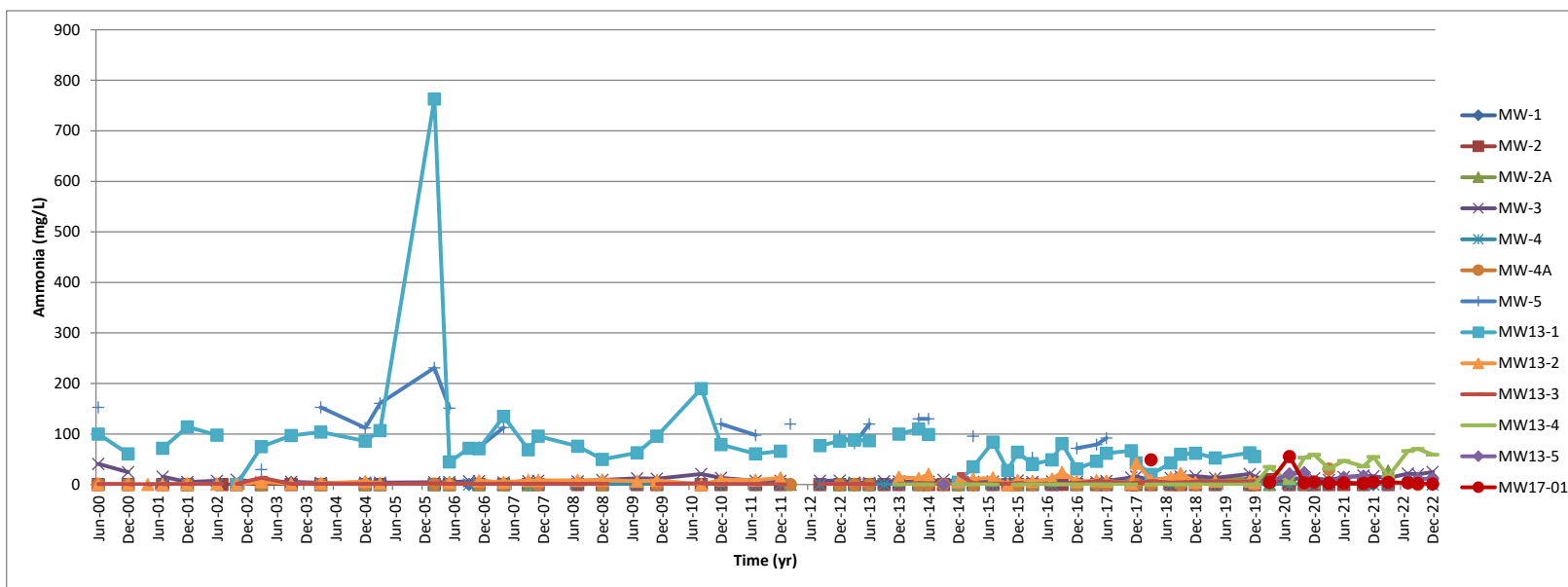


Figure E31
Monitoring Well Locations - Historic Ammonia Concentrations
Sechelt Landfill

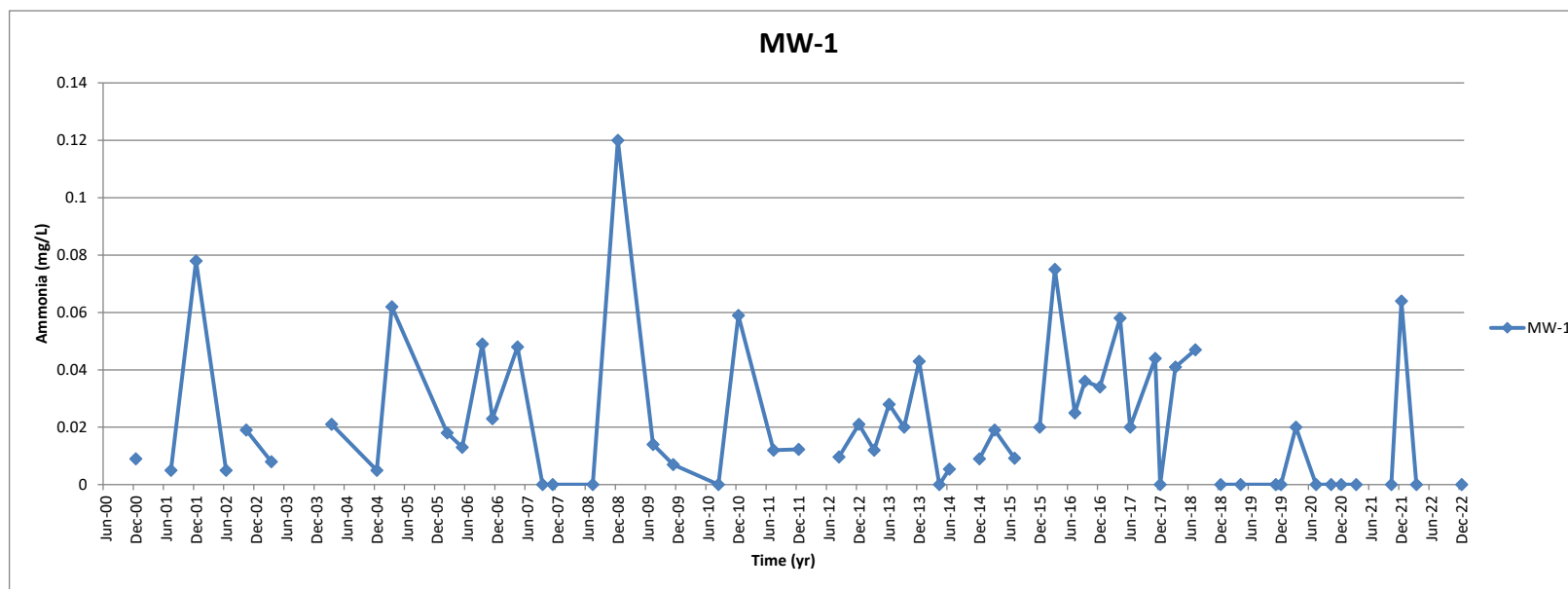


Figure E32

Groundwater Monitoring Well Locations - Historic Ammonia Concentrations

Sechelt Landfill

June 2000 concentration of 0.98 mg/L and September 2003 concentration of 4.4 mg/L omitted from graph to improve the resolution of the remaining data.

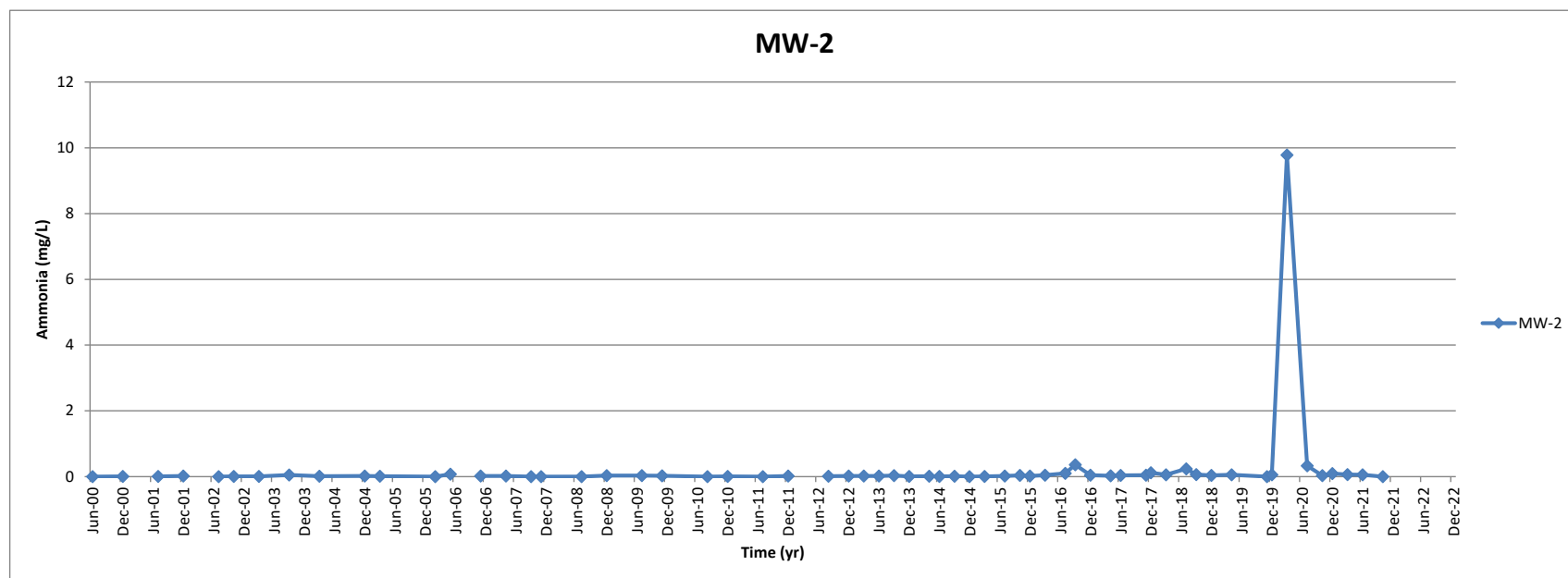


Figure E33
Groundwater Monitoring Well Locations - Historic Ammonia Concentrations
Sechelt Landfill

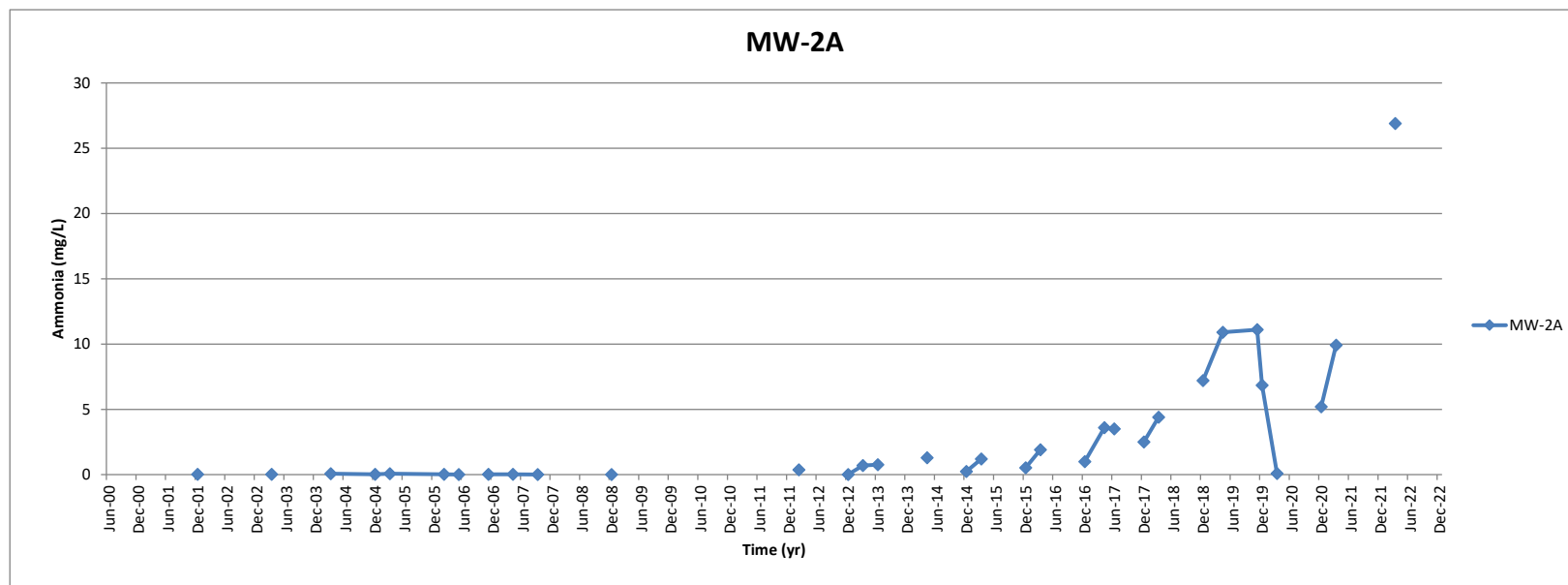


Figure E34
Groundwater Monitoring Well Locations - Historic Ammonia Concentrations
Sechelt Landfill

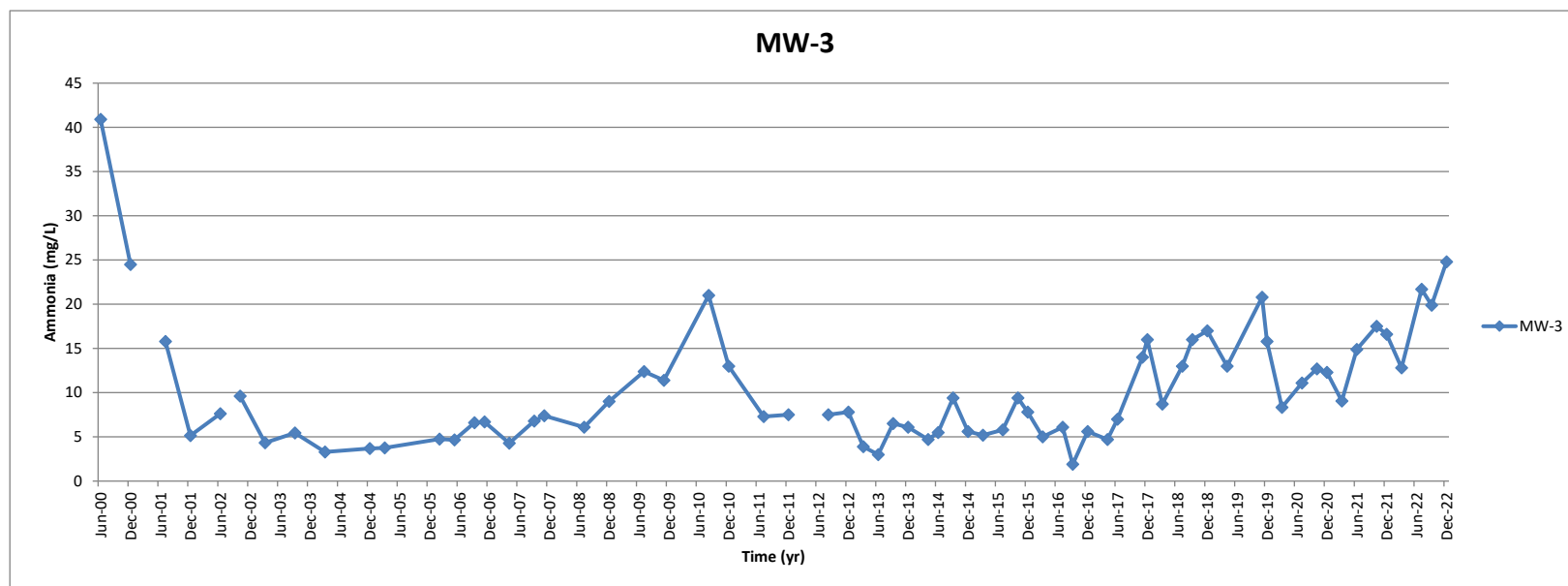


Figure E35
Groundwater Monitoring Well Locations - Historic Ammonia Concentrations
Sechelt Landfill

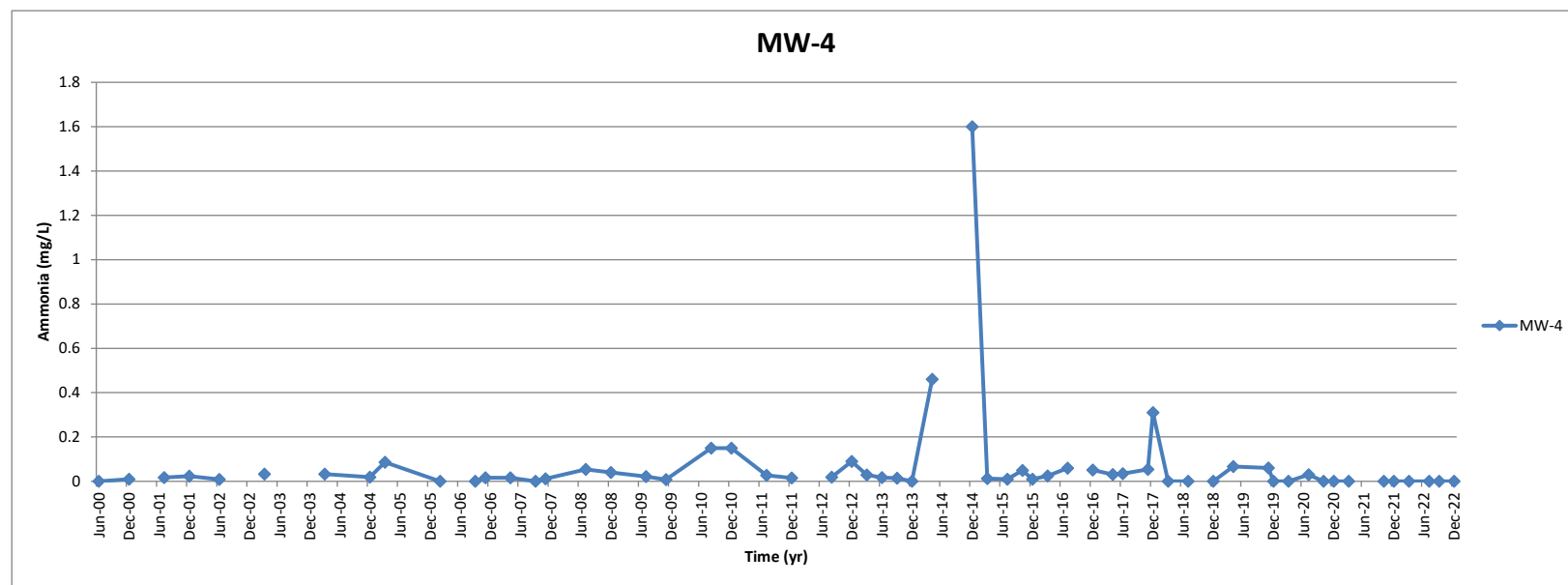


Figure E36

**Groundwater Monitoring Well Locations - Historic Ammonia Concentrations
Sechelt Landfill**

May 2006 concentration of 4.66 mg/L omitted from graph to improve the resolution of the remaining data.

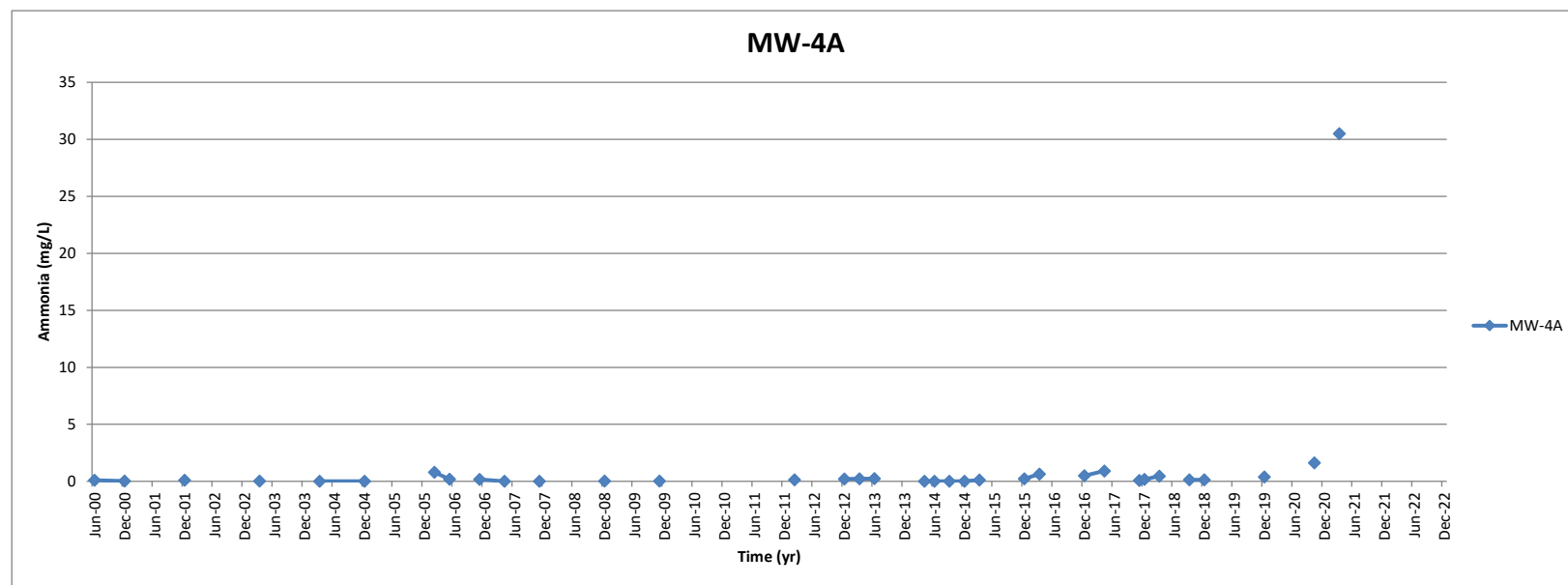


Figure E37
Monitoring Well Locations - Historic Ammonia Concentrations
Sechelt Landfill

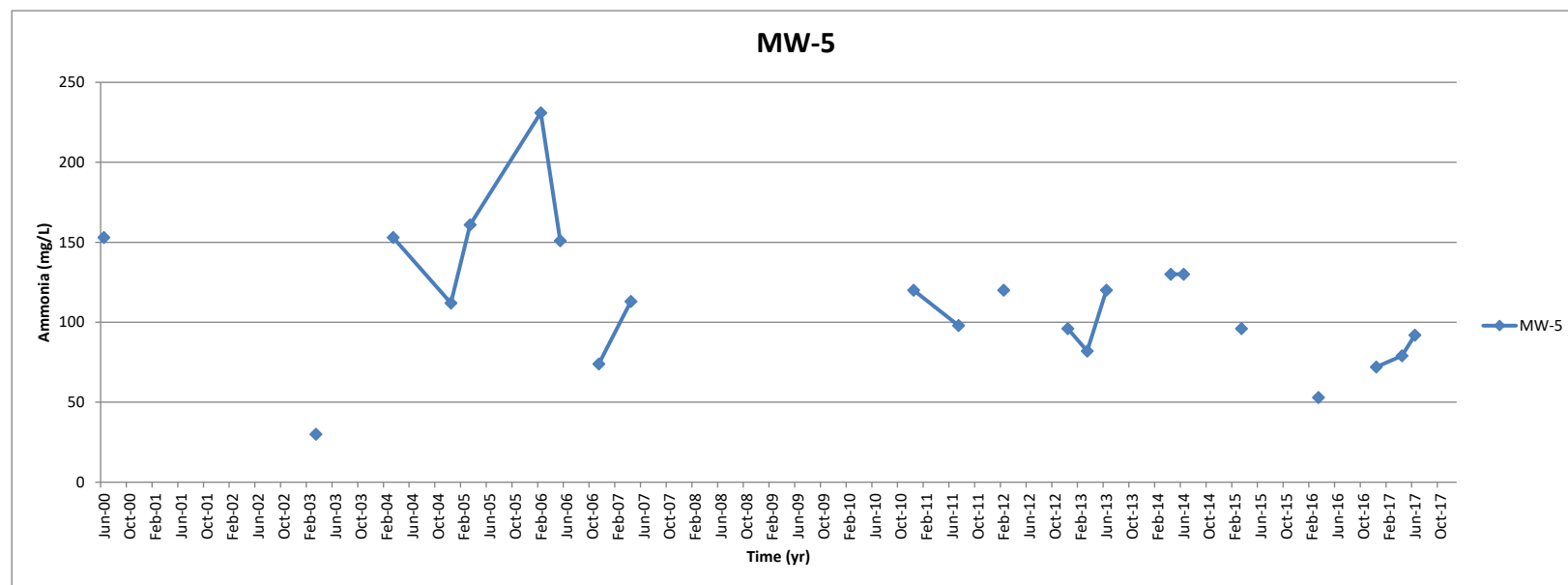


Figure E38
Groundwater Monitoring Well Locations - Historic Ammonia Concentrations
Sechelt Landfill

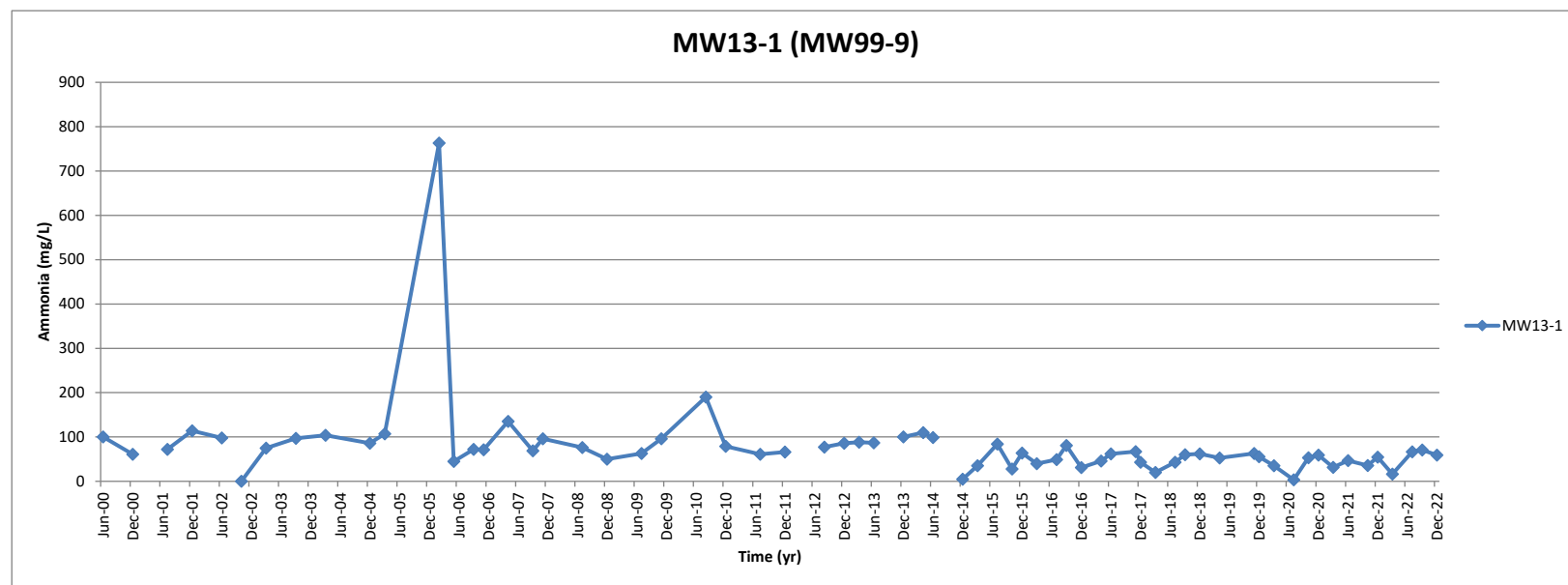


Figure E39
Groundwater Monitoring Well Locations - Historic Ammonia Concentrations
Sechelt Landfill

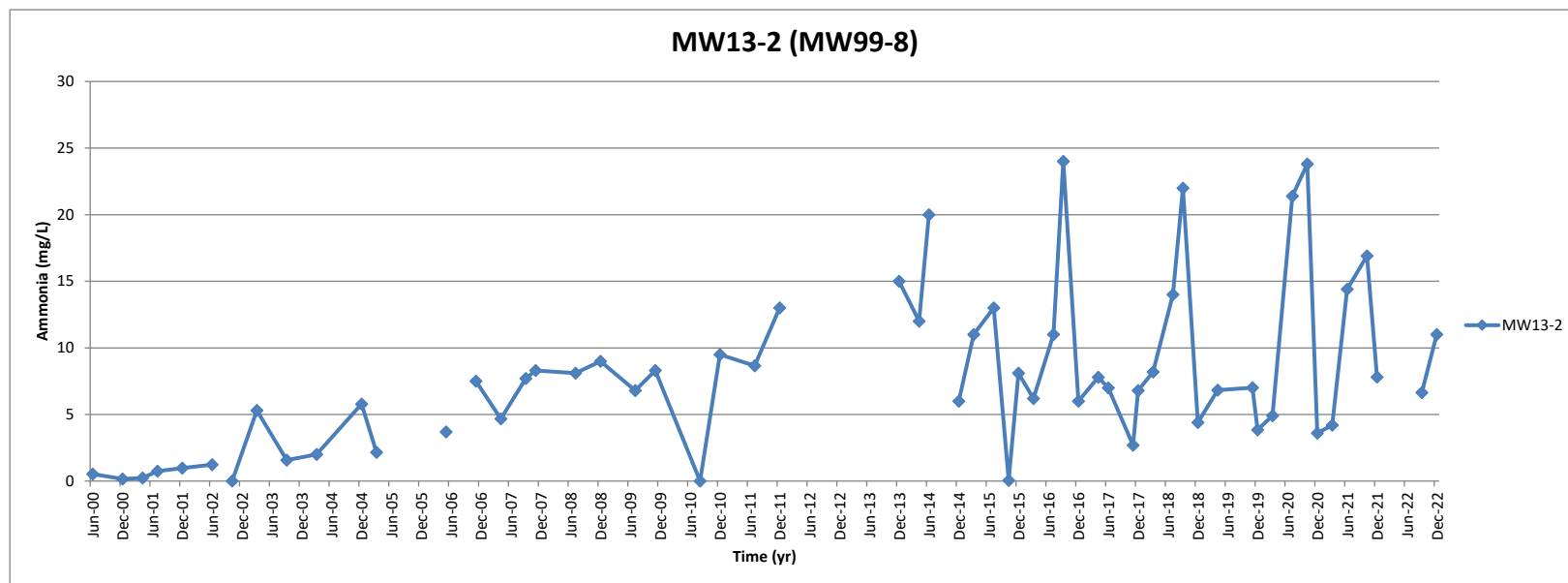


Figure E40
Groundwater Monitoring Well Locations - Historic Ammonia Concentrations
Sechelt Landfill

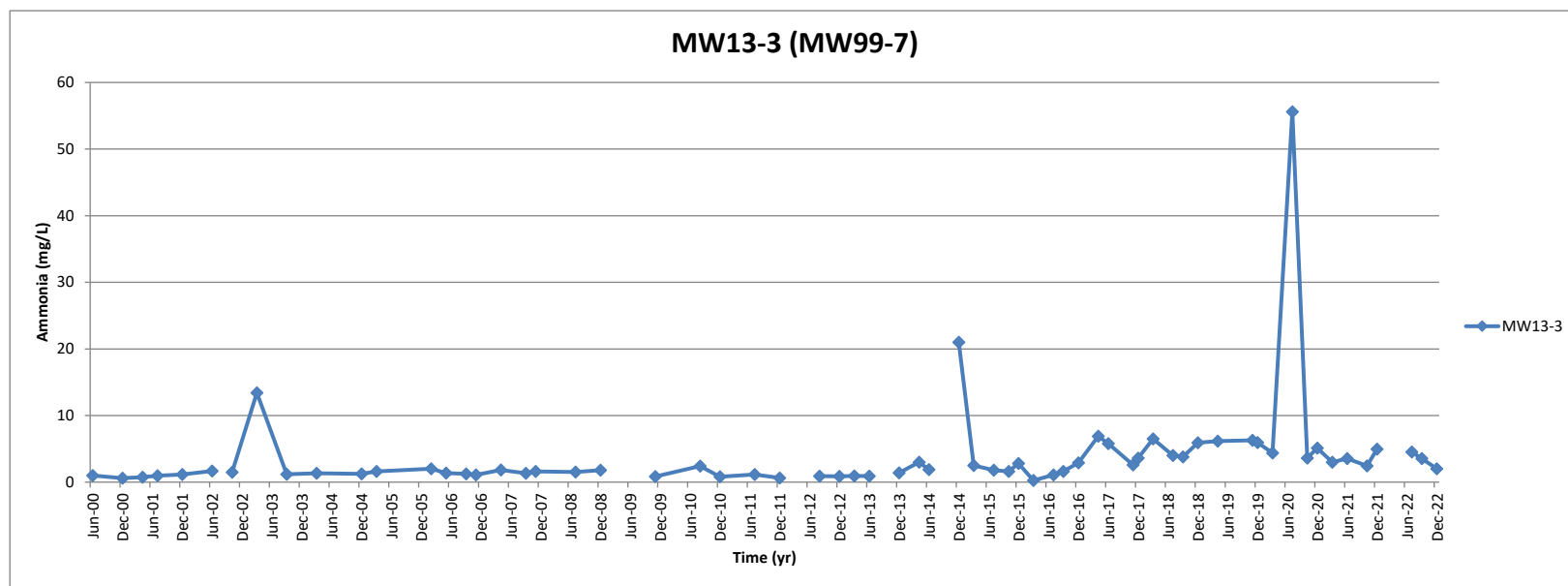


Figure E41
Groundwater Monitoring Well Locations - Historic Ammonia Concentrations
Sechelt Landfill

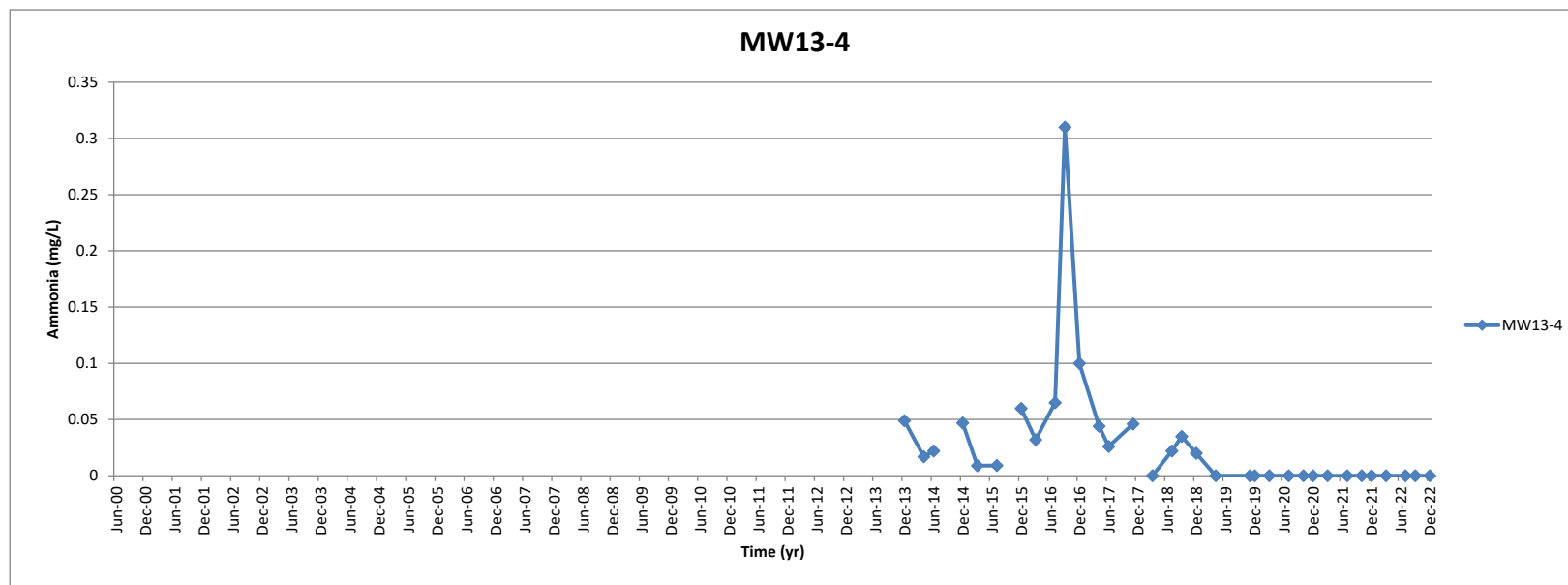


Figure E42
Groundwater Monitoring Well Locations - Historic Ammonia Concentrations
Sechelt Landfill

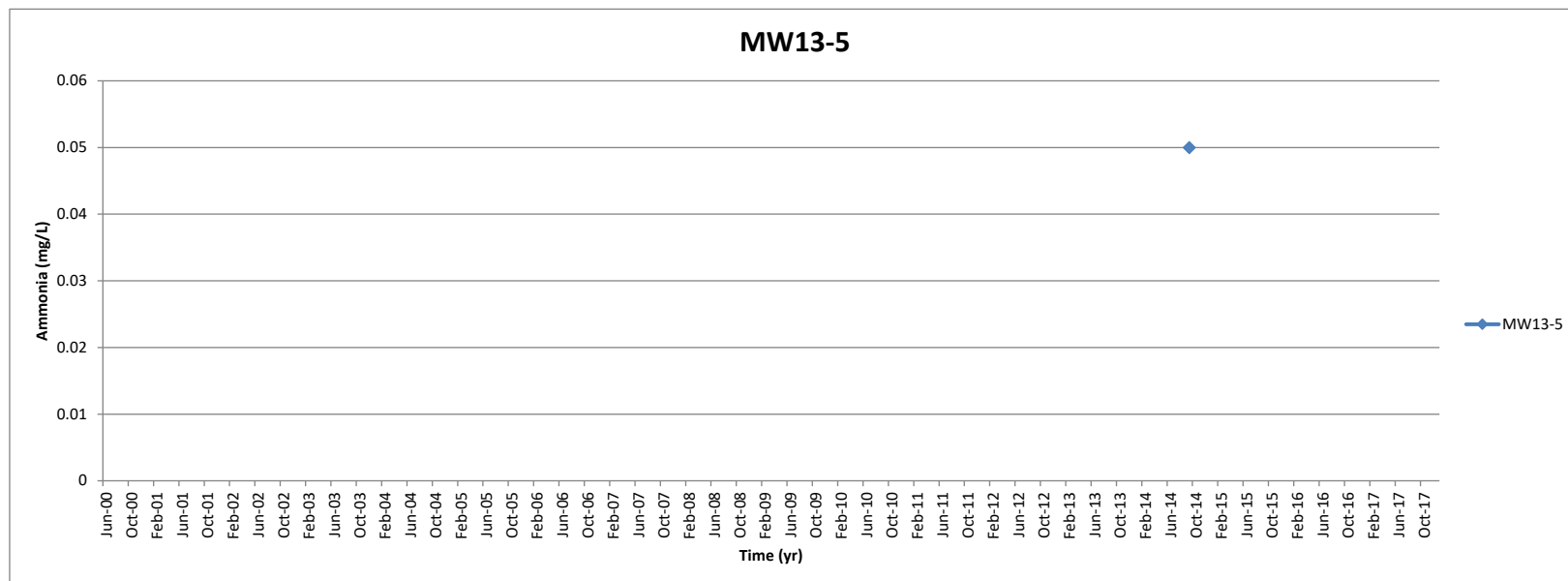


Figure E43
Groundwater Monitoring Well Locations - Historic Ammonia Concentrations
Sechelt Landfill

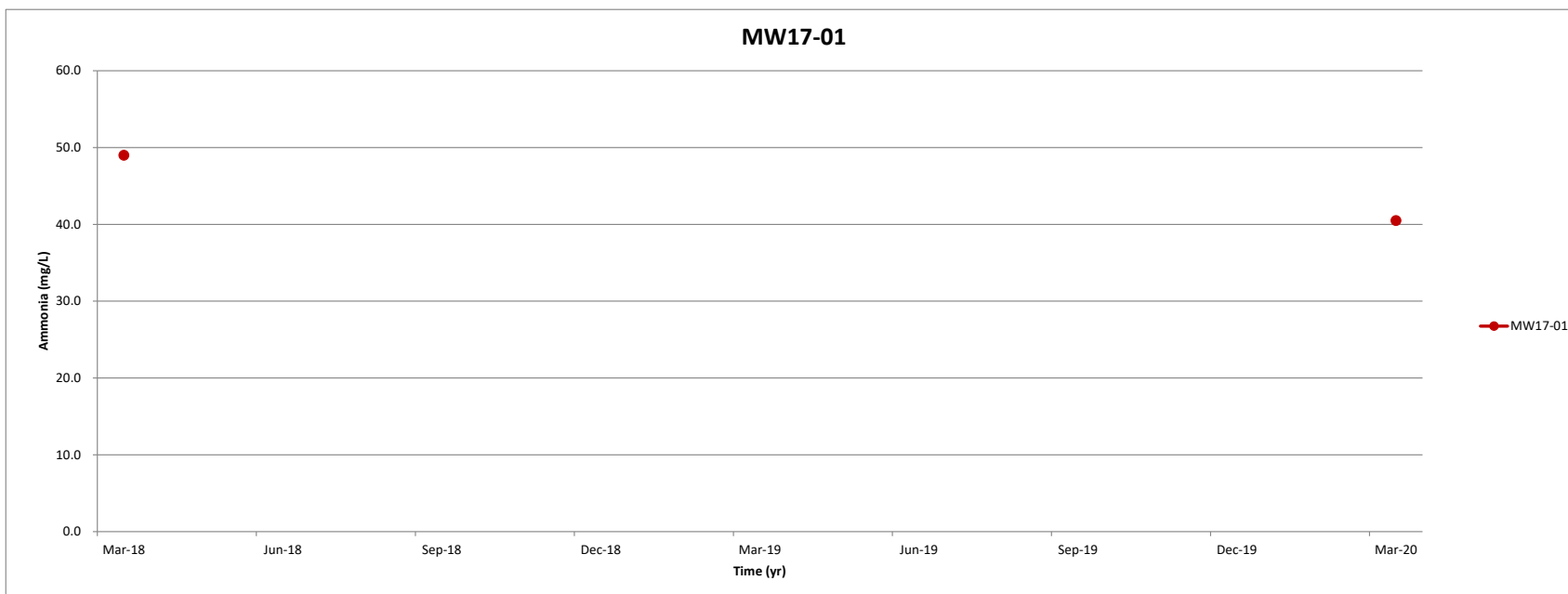


Figure E44
Groundwater Monitoring Well Locations - Historic Ammonia Concentrations
Sechelt Landfill

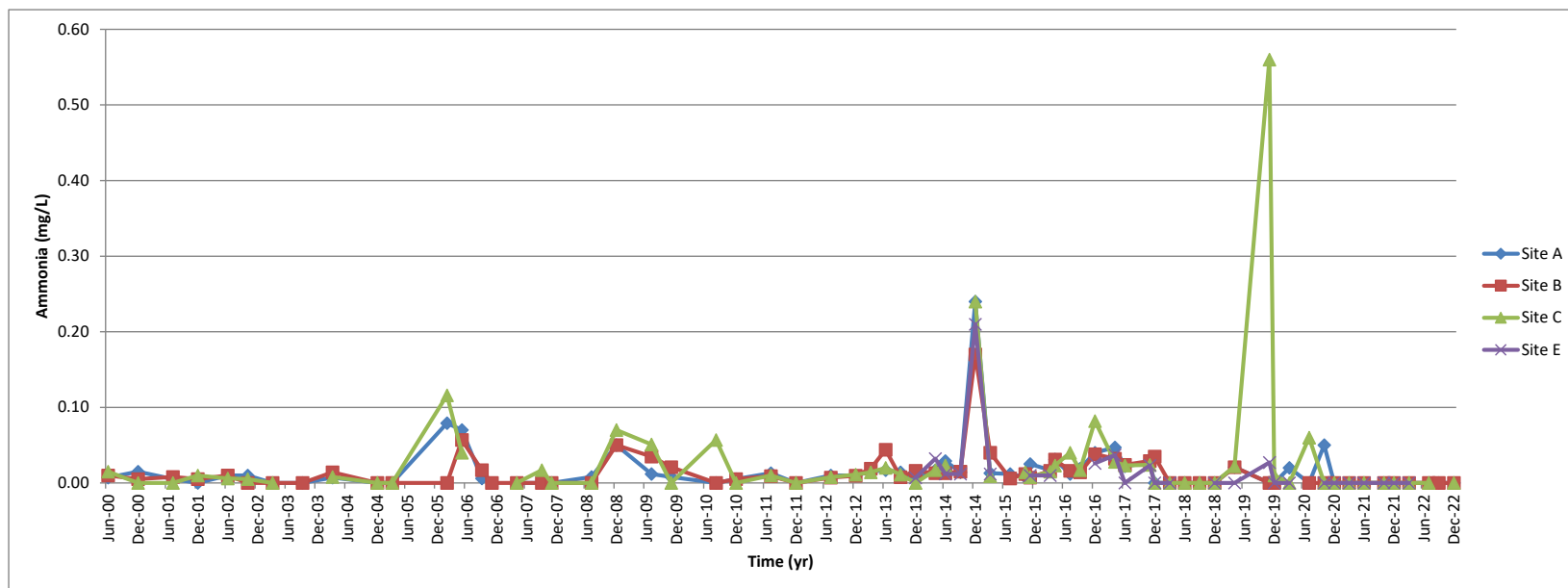


Figure E45
Surface Water Monitoring Locations - Historic Ammonia Concentrations
Sechelt Landfill



APPENDIX F
CERTIFICATES OF LABORATORY ANALYSES

Report Transmission Cover Page

Bill To: Sunshine Coast Regional District 1975 Field Road Sechelt, BC, Canada V0N 3A1	Project ID: SP100543 Project Name: Sechelt Landfill Surface Water Project Location: Sechelt LSD: P.O.: 3003873 Proj. Acct. code:	Lot ID: 1562784 Control Number: Date Received: Apr 1, 2022 Date Reported: Apr 7, 2022 Report Number: 2734215
Attn: Accounts Payable Sampled By: Sandi Bandara Company: SCR D		

Contact	Company	Address
Accounts Payable	Sunshine Coast Regional District	1975 Field Road Sechelt, BC V0N 3A1 Phone: (604) 885-6800 Fax: Email: accounts.payable@scrd.ca
<u>Delivery</u>	<u>Format</u>	<u>Deliverables</u>
Email - Single Report	PDF	Invoice
Sandi Bandara	Sunshine Coast Regional District	1975 Field Road Sechelt, BC V0N 3A1 Phone: (604) 885-6800 Fax: Email: sandi.bandara@scrd.ca
<u>Delivery</u>	<u>Format</u>	<u>Deliverables</u>
Email - Multiple Reports By Lot	PDF	COC / Test Report
Email - Multiple Reports By Lot	Sunshine Coast	Test Report
Email - Single Report	PDF	COA

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Analytical Report

Bill To: Sunshine Coast Regional District	Project ID: SP100543	Lot ID: 1562784
1975 Field Road	Project Name: Sechelt Landfill Surface	Control Number:
Sechelt, BC, Canada	Water	Date Received: Apr 1, 2022
VON 3A1	Project Location: Sechelt	Date Reported: Apr 7, 2022
Attn: Accounts Payable	LSD:	Report Number: 2734215
Sampled By: Sandi Bandara	P.O.: 3003873	
Company: SCRD	Proj. Acct. code:	

		Reference Number	1562784-1	1562784-2	1562784-3	
		Sample Date	Mar 30, 2022	Mar 30, 2022	Mar 30, 2022	
		Sample Time	10:42	10:10	11:23	
		Sample Location				
		Sample Description	SL-A / Surface Water / 13.7 °C	SL-E / Surface Water / 13.7 °C	SL-C / Surface Water / 13.7 °C	
		Matrix	Water	Water	Water	
Analyte		Units	Results	Results	Results	Nominal Detection Limit
Aggregate Organic Constituents						
Chemical Oxygen Demand		mg/L	30	10	<10	10
Inorganic Nonmetallic Parameters						
Ammonia - N		mg/L	<0.025	<0.025	<0.025	0.025
Ammonium/Ammonia Preservation			Yes	Yes	Yes	
Kjeldahl Nitrogen	Total	mg/L	0.12	0.11	0.16	0.1
Nitrogen	Total	mg/L	0.13	0.21	0.25	0.1
Organic Carbon	Dissolved Nonpurgeable	mg/L	4.2	1.8	2.4	0.5
Metals Total						
Calcium	Total	mg/L	1.6	1.8	3.7	0.01
Magnesium	Total	mg/L	0.22	0.32	0.69	0.02
Potassium	Total	mg/L	<0.04	0.11	0.34	0.04
Silicon	Total	mg/L	1.8	3.5	5.1	0.005
Sulfur	Total	mg/L	0.28	0.43	0.64	0.02
Sodium	Total	mg/L	0.6	1.4	2.5	0.1
Titanium	Total	mg/L	0.012	<0.002	0.004	0.002
Mercury	Total	mg/L	<0.00001	<0.00001	<0.00001	0.00005
Routine Water						
Digestion	Dissolved		Lab filtered & preserved	Lab filtered & preserved	Lab filtered & preserved	
pH - Holding Time			Exceeded	Exceeded	Exceeded	
pH	at 25 °C		6.59	6.67	7.02	0.01
Electrical Conductivity		µS/cm at 25 °C	12	20	36	1
Chloride	Dissolved	mg/L	0.25	0.62	1.92	0.05
Nitrate - N	Dissolved	mg/L	0.02	0.06	0.05	0.01
Nitrite - N	Dissolved	mg/L	<0.01	<0.01	<0.01	0.01
Nitrate and Nitrite - N	Dissolved	mg/L	0.02	0.06	0.05	0.01
Hardness	as CaCO ₃ (dissolved)	mg/L	<5	6	11	5
Hardness	Total	mg CaCO ₃ /L	5.0	5.8	12.2	1
Trace Metals Total						
Aluminum	Total	mg/L	0.47	0.053	0.090	0.001
Antimony	Total	mg/L	0.00005	<0.00002	0.00002	0.00002
Arsenic	Total	mg/L	0.0002	<0.0001	<0.0001	0.0001
Barium	Total	mg/L	0.0042	0.0023	0.0033	0.0001
Beryllium	Total	mg/L	<0.00005	<0.00005	<0.00005	0.00005
Bismuth	Total	mg/L	<0.0001	<0.0001	<0.0001	0.0001
Boron	Total	mg/L	<0.002	<0.002	<0.002	0.002
Cadmium	Total	mg/L	0.0013	<0.00001	0.00004	0.00001

Analytical Report

Bill To: Sunshine Coast Regional District	Project ID: SP100543	Lot ID: 1562784
1975 Field Road	Project Name: Sechelt Landfill Surface	Control Number:
Sechelt, BC, Canada	Water	Date Received: Apr 1, 2022
V0N 3A1	Project Location: Sechelt	Date Reported: Apr 7, 2022
Attn: Accounts Payable	LSD:	Report Number: 2734215
Sampled By: Sandi Bandara	P.O.: 3003873	
Company: SCRD	Proj. Acct. code:	

		Reference Number	1562784-1	1562784-2	1562784-3	
		Sample Date	Mar 30, 2022	Mar 30, 2022	Mar 30, 2022	
		Sample Time	10:42	10:10	11:23	
		Sample Location				
		Sample Description	SL-A / Surface Water / 13.7 °C	SL-E / Surface Water / 13.7 °C	SL-C / Surface Water / 13.7 °C	
		Matrix	Water	Water	Water	
Analyte		Units	Results	Results	Results	Nominal Detection Limit
Trace Metals Total - Continued						
Chromium	Total	mg/L	0.00026	0.00010	0.00010	0.00005
Cobalt	Total	mg/L	0.00013	<0.00002	0.00003	0.00002
Copper	Total	mg/L	0.0007	0.0002	0.0003	0.0002
Iron	Total	mg/L	0.28	0.007	0.061	0.002
Lead	Total	mg/L	0.00020	<0.00001	0.00003	0.00001
Lithium	Total	mg/L	<0.0005	<0.0005	<0.0005	0.0005
Manganese	Total	mg/L	0.009	<0.001	0.003	0.001
Molybdenum	Total	mg/L	0.00006	0.00008	0.00014	0.00002
Nickel	Total	mg/L	0.0003	<0.0002	<0.0002	0.0002
Selenium	Total	mg/L	<0.0002	<0.0002	<0.0002	0.0002
Silver	Total	mg/L	<0.00001	<0.00001	<0.00001	0.00001
Strontium	Total	mg/L	0.0072	0.011	0.020	0.0001
Thallium	Total	mg/L	<0.00001	<0.00001	<0.00001	0.00001
Thorium	Total	mg/L	<0.00005	<0.00005	<0.00005	0.00005
Tin	Total	mg/L	<0.0001	<0.0001	<0.0001	0.0001
Titanium	Total	mg/L	0.011	0.0002	0.0038	0.0001
Uranium	Total	mg/L	0.00006	0.00004	0.00006	0.00001
Vanadium	Total	mg/L	0.00076	0.00043	0.00070	0.00005
Zinc	Total	mg/L	0.0047	0.0009	0.0020	0.0005
Zirconium	Total	mg/L	0.0001	<0.0001	<0.0001	0.0001

Analytical Report

Bill To: Sunshine Coast Regional District	Project ID: SP100543	Lot ID: 1562784
1975 Field Road	Project Name: Sechelt Landfill Surface	Control Number:
Sechelt, BC, Canada	Water	Date Received: Apr 1, 2022
V0N 3A1	Project Location: Sechelt	Date Reported: Apr 7, 2022
Attn: Accounts Payable	LSD:	Report Number: 2734215
Sampled By: Sandi Bandara	P.O.: 3003873	
Company: SCRD	Proj. Acct. code:	

		Reference Number	1562784-4	1562784-5	
		Sample Date	Mar 30, 2022	Mar 30, 2022	
		Sample Time	12:07	NA	
		Sample Location			
		Sample Description	SL-B / Surface Water / 13.7 °C	Duplicate / Surface Water / 13.7 °C	
		Matrix	Water	Water	
Analyte		Units	Results	Results	Nominal Detection Limit
Aggregate Organic Constituents					
Chemical Oxygen Demand		mg/L	20	<10	10
Inorganic Nonmetallic Parameters					
Ammonia - N		mg/L	<0.025	<0.025	0.025
Ammonium/Ammonia			Yes	Yes	
Preservation					
Kjeldahl Nitrogen	Total	mg/L	0.29	0.08	0.1
Nitrogen	Total	mg/L	0.33	0.16	0.1
Organic Carbon	Dissolved Nonpurgeable	mg/L	4.0	5.1	0.5
Metals Total					
Calcium	Total	mg/L	1.7	1.7	0.01
Magnesium	Total	mg/L	0.17	0.20	0.02
Potassium	Total	mg/L	<0.04	0.06	0.04
Silicon	Total	mg/L	1.7	1.8	0.005
Sulfur	Total	mg/L	0.27	0.28	0.02
Sodium	Total	mg/L	0.7	0.7	0.1
Titanium	Total	mg/L	0.003	0.003	0.002
Mercury	Total	mg/L	<0.00001	<0.00001	0.00005
Routine Water					
Digestion	Dissolved		Lab filtered & preserved	Lab filtered & preserved	
pH - Holding Time			Exceeded	Exceeded	
pH	at 25 °C		6.53	6.51	0.01
Electrical Conductivity		µS/cm at 25 °C	13	13	1
Chloride	Dissolved	mg/L	0.35	0.28	0.05
Nitrate - N	Dissolved	mg/L	0.03	0.07	0.01
Nitrite - N	Dissolved	mg/L	<0.01	<0.01	0.01
Nitrate and Nitrite - N	Dissolved	mg/L	0.03	0.07	0.01
Hardness	as CaCO ₃ (dissolved)	mg/L	5	5	5
Hardness	Total	mg CaCO ₃ /L	4.9	5.2	1
Trace Metals Total					
Aluminum	Total	mg/L	0.23	0.24	0.001
Antimony	Total	mg/L	<0.00002	<0.00002	0.00002
Arsenic	Total	mg/L	0.0001	0.0001	0.0001
Barium	Total	mg/L	0.0024	0.0024	0.0001
Beryllium	Total	mg/L	<0.00005	<0.00005	0.00005
Bismuth	Total	mg/L	<0.0001	<0.0001	0.0001
Boron	Total	mg/L	<0.002	<0.002	0.002
Cadmium	Total	mg/L	<0.00001	0.00001	0.00001

Analytical Report

Bill To: Sunshine Coast Regional District	Project ID: SP100543	Lot ID: 1562784
1975 Field Road	Project Name: Sechelt Landfill Surface	Control Number:
Sechelt, BC, Canada	Water	Date Received: Apr 1, 2022
V0N 3A1	Project Location: Sechelt	Date Reported: Apr 7, 2022
Attn: Accounts Payable	LSD:	Report Number: 2734215
Sampled By: Sandi Bandara	P.O.: 3003873	
Company: SCRD	Proj. Acct. code:	

Reference Number	1562784-4	1562784-5
Sample Date	Mar 30, 2022	Mar 30, 2022
Sample Time	12:07	NA
Sample Location		
Sample Description	SL-B / Surface Water / 13.7 °C	Duplicate / Surface Water / 13.7 °C
Matrix	Water	Water

Analyte	Units	Results	Results	Results	Nominal Detection Limit
Trace Metals Total - Continued					
Chromium	Total	mg/L	0.00009	0.00011	0.00005
Cobalt	Total	mg/L	0.00003	0.00004	0.00002
Copper	Total	mg/L	0.0003	0.0003	0.0002
Iron	Total	mg/L	0.072	0.087	0.002
Lead	Total	mg/L	0.00008	0.00007	0.00001
Lithium	Total	mg/L	<0.0005	<0.0005	0.0005
Manganese	Total	mg/L	0.003	0.002	0.001
Molybdenum	Total	mg/L	0.00006	0.00006	0.00002
Nickel	Total	mg/L	<0.0002	<0.0002	0.0002
Selenium	Total	mg/L	<0.0002	<0.0002	0.0002
Silver	Total	mg/L	<0.00001	<0.00001	0.00001
Strontium	Total	mg/L	0.0068	0.0072	0.0001
Thallium	Total	mg/L	<0.00001	<0.00001	0.00001
Thorium	Total	mg/L	<0.00005	<0.00005	0.00005
Tin	Total	mg/L	<0.0001	<0.0001	0.0001
Titanium	Total	mg/L	0.0020	0.0019	0.0001
Uranium	Total	mg/L	0.00004	0.00004	0.00001
Vanadium	Total	mg/L	0.00033	0.00030	0.00005
Zinc	Total	mg/L	0.0016	0.0028	0.0005
Zirconium	Total	mg/L	<0.0001	<0.0001	0.0001

Approved by:



Benjamin Morris, B.Sc
Operations Manager

Data have been validated by Analytical Quality Control and Element's Integrated Data Validation System (IDVS).

Generation and distribution of the report, and approval by the digitized signature above, are performed through a secure and controlled automatic process.

Methodology and Notes

Bill To: Sunshine Coast Regional District	Project ID: SP100543	Lot ID: 1562784
1975 Field Road	Project Name: Sechelt Landfill Surface	Control Number:
Sechelt, BC, Canada	Water	Date Received: Apr 1, 2022
V0N 3A1	Project Location: Sechelt	Date Reported: Apr 7, 2022
Attn: Accounts Payable	LSD:	Report Number: 2734215
Sampled By: Sandi Bandara	P.O.: 3003873	
Company: SCRD	Proj. Acct. code:	

Method of Analysis

Method Name	Reference	Method	Date Analysis Started	Location
Alk, pH, EC, Turb in water (BC)	APHA	* Conductivity, 2510 B	Apr 1, 2022	Element Vancouver
Alk, pH, EC, Turb in water (BC)	APHA	* pH - Electrometric Method, 4500-H+ B	Apr 1, 2022	Element Vancouver
Ammonium-N in Water	APHA	* Automated Phenate Method, 4500-NH3 G	Apr 7, 2022	Element Edmonton - Roper Road
Anions by IEC in water (VAN)	APHA	* Ion Chromatography with Chemical Suppression of Eluent Cond., 4110 B	Apr 1, 2022	Element Vancouver
Anions by IEC in water (VAN)	APHA	* Single-Column Ion Chromatography with Electronic Suppression, 4110 C	Apr 1, 2022	Element Vancouver
Carbon Organic (Dissolved) in water (DOC)	APHA	High-Temperature Combustion Method, 5310 B	Apr 6, 2022	Element Edmonton - Roper Road
Chemical Oxygen Demand (water-VAN)	APHA	* Closed Reflux, Colorimetric Method, 5220 D	Apr 1, 2022	Element Vancouver
Mercury Low Level (Total) in water (VAN)	EPA	* Mercury in Water by Cold Vapor Atomic Fluorescence Spectrometry, 245.7	Apr 5, 2022	Element Vancouver
Metals SemiTrace (Dissolved) in water (VAN)	US EPA	* Metals & Trace Elements by ICP-AES, 6010C	Apr 5, 2022	Element Vancouver
Metals SemiTrace (Total) in Water (VAN)	US EPA	* Metals & Trace Elements by ICP-AES, 6010C	Apr 4, 2022	Element Vancouver
Total and Kjeldahl Nitrogen (Total) in Water	ISO	* Water Quality - Determination of nitrogen, ISO/TR 11905-2	Apr 4, 2022	Element Edmonton - Roper Road
Trace Metals (Total) in Water (VAN)	US EPA	* Determination of Trace Elements in Waters and Wastes by ICP-MS, 200.8	Apr 4, 2022	Element Vancouver

* Reference Method Modified

References

APHA	Standard Methods for the Examination of Water and Wastewater
EPA	Environmental Protection Agency Test Methods - US
ISO	International Organization for Standardization
US EPA	US Environmental Protection Agency Test Methods

Please direct any inquiries regarding this report to our Client Services group.

Results relate only to samples as submitted.

The test report shall not be reproduced except in full, without the written approval of the laboratory.

Report Transmission Cover Page

Bill To: Sunshine Coast Regional District 1975 Field Road Sechelt, BC, Canada V0N 3A1	Project ID: SP100543 Project Name: Sechelt Landfill Groundwater Project Location: Sechelt LSD: P.O.: 3003873 Proj. Acct. code:	Lot ID: 1562799 Control Number: Date Received: Apr 1, 2022 Date Reported: Apr 13, 2022 Report Number: 2734229
Attn: Accounts Payable Sampled By: Sandi Bandara Company: SCRD		

Contact	Company	Address
Accounts Payable	Sunshine Coast Regional District	1975 Field Road Sechelt, BC V0N 3A1 Phone: (604) 885-6800 Fax: Email: accounts.payable@scrd.ca

Delivery	Format	Deliverables
Email - Single Report	PDF	Invoice
Sandi Bandara	Sunshine Coast Regional District	1975 Field Road Sechelt, BC V0N 3A1 Phone: (604) 885-6800 Fax: Email: sandi.bandara@scrd.ca

Delivery	Format	Deliverables
Email - Multiple Reports By Lot	PDF	COC / Test Report
Email - Multiple Reports By Lot	Sunshine Coast	Test Report
Email - Single Report	PDF	COA

Notes To Clients:

- Apr 04, 2022 - Reduction of analytical volume was necessary for anion analysis due to matrix effects in lot 1562799. Detection limits are adjusted accordingly.
- Apr 04, 2022 - Sample 1562799-5; 7999172: Reduction of analytical volume was necessary for metals to bring results within the analytical range for sample 1562799-5 & -6. Detection limits are adjusted accordingly.
- Apr 05, 2022 - Reduction of analytical volume was necessary for metals due to matrix effects in sample 1562799. Detection limits are adjusted accordingly.
- Apr 05, 2022 - Reduction of analytical volume was necessary for metals to bring results within the analytical range for sample 1562799. Detection limits are adjusted accordingly.
- Apr 07, 2022 - TKN was less than ammonium for sample 1562799-7. The results were verified and are within expected measurement uncertainty.

***This lab report has been marked up to reflect a correction to a sample ID that was incorrectly labelled.**

Analytical Report

Bill To: Sunshine Coast Regional District	Project ID: SP100543	Lot ID: 1562799
1975 Field Road	Project Name: Sechelt Landfill	Control Number:
Sechelt, BC, Canada	Groundwater	Date Received: Apr 1, 2022
V0N 3A1	Project Location: Sechelt	Date Reported: Apr 13, 2022
Attn: Accounts Payable	LSD:	Report Number: 2734229
Sampled By: Sandi Bandara	P.O.: 3003873	
Company: SCRD	Proj. Acct. code:	

		Reference Number	1562799-1	1562799-2	1562799-3
		Sample Date	Mar 28, 2022	Mar 28, 2022	Mar 28, 2022
		Sample Time	10:12	10:42	11:07
		Sample Location			
		Sample Description	MW 13-4 / Groundwater / 16.8 °C	MW 4 / Groundwater / 16.8 °C	MW 1 / Groundwater / 16.8 °C
		Matrix	Water	Water	Water
Analyte		Units	Results	Results	Results
Aggregate Organic Constituents					
Chemical Oxygen Demand		mg/L	<5	9	5
Inorganic Nonmetallic Parameters					
Ammonia - N		mg/L	<0.025	<0.025	<0.025
Ammonium/Ammonia			Yes	Yes	Yes
Preservation					
Kjeldahl Nitrogen	Total	mg/L	<0.07	0.11	0.12
Nitrogen	Total	mg/L	0.20	0.13	0.68
Phosphorus	Total - Low Level	mg/L	0.015	0.008	0.017
Organic Carbon	Dissolved Nonpurgeable	mg/L	<0.5	1.7	0.8
Metals Dissolved					
Mercury	Dissolved	mg/L	<0.00001	<0.00001	<0.00001
Physical and Aggregate Properties					
Turbidity		NTU	0.63	3.35	3.33
Routine Water					
pH - Holding Time			Exceeded	Exceeded	Exceeded
pH	at 25 °C		6.96	7.00	6.70
Electrical Conductivity		µS/cm at 25 °C	65	487	190
Calcium	Dissolved	mg/L	8.5	70	27
Magnesium	Dissolved	mg/L	1.1	11	2.7
Potassium	Dissolved	mg/L	0.61	5.3	0.89
Silicon	Dissolved	mg/L	8.6	13	7.1
Sodium	Dissolved	mg/L	3.3	14	4.8
Sulfur	Dissolved	mg/L	0.50	2.9	15
Bicarbonate		mg/L	35	303	35
Carbonate		mg/L	<6	<6	<6
Hydroxide		mg/L	<5	<5	<5
P-Alkalinity	as CaCO ₃	mg/L	<5	<5	<5
T-Alkalinity	as CaCO ₃	mg/L	29	249	29
Chloride	Dissolved	mg/L	1.37	6.3	3.91
Nitrate - N	Dissolved	mg/L	0.09	<0.1	0.40
Nitrite - N	Dissolved	mg/L	<0.01	<0.1	<0.01
Nitrate and Nitrite - N	Dissolved	mg/L	0.09	<0.20	0.40
Sulfate (SO ₄)	Dissolved	mg/L	1.3	6	49.5
Hardness	as CaCO ₃ (dissolved)	mg/L	25	220	78
Salinity	Dissolved	g/L	0.0083	0.035	0.012
Mono-Aromatic Hydrocarbons - Water					
4-Bromofluorobenzene	Surrogate	%	100	100	100

Analytical Report

Bill To: Sunshine Coast Regional District	Project ID: SP100543	Lot ID: 1562799
1975 Field Road	Project Name: Sechelt Landfill	Control Number:
Sechelt, BC, Canada	Groundwater	Date Received: Apr 1, 2022
V0N 3A1	Project Location: Sechelt	Date Reported: Apr 13, 2022
Attn: Accounts Payable	LSD:	Report Number: 2734229
Sampled By: Sandi Bandara	P.O.: 3003873	
Company: SCRD	Proj. Acct. code:	

		Reference Number	1562799-1	1562799-2	1562799-3	
		Sample Date	Mar 28, 2022	Mar 28, 2022	Mar 28, 2022	
		Sample Time	10:12	10:42	11:07	
		Sample Location				
		Sample Description	MW 13-4 / Groundwater / 16.8 °C	MW 4 / Groundwater / 16.8 °C	MW 1 / Groundwater / 16.8 °C	
		Matrix	Water	Water	Water	
Analyte	Units	Results	Results	Results	Nominal Detection Limit	
Mono-Aromatic Hydrocarbons - Water - Continued						
Toluene-d8	Surrogate	%	108	107	107	70-130
Volatile Petroleum Hydrocarbons - Water						
VHw6-10	mg/L	<0.05	<0.05	<0.05	0.05	
VPHw (VHw6-10 minus BTEX)	mg/L	<0.05	<0.05	<0.05	0.05	
VOC Screen - Drinking Water						
Benzene	mg/L	<0.0001	0.0004	<0.0001	0.0001	
Bromobenzene	mg/L	<0.0001	<0.0001	<0.0001	0.0001	
Bromochloromethane	mg/L	<0.0001	<0.0001	<0.0001	0.0001	
Bromodichloromethane	mg/L	<0.0001	<0.0001	<0.0001	0.0001	
Bromoform	mg/L	<0.0001	<0.0001	<0.0001	0.0001	
Bromomethane	mg/L	<0.001	<0.001	<0.001	0.001	
n-Butylbenzene	mg/L	<0.0001	<0.0001	<0.0001	0.0001	
sec-Butylbenzene	mg/L	<0.0001	<0.0001	<0.0001	0.0001	
tert-Butylbenzene	mg/L	<0.0001	<0.0001	<0.0001	0.0001	
Carbon Tetrachloride	mg/L	<0.0005	<0.0005	<0.0005	0.0005	
Chlorobenzene	mg/L	<0.0001	0.0043	<0.0001	0.0001	
Chloroethane	mg/L	<0.001	<0.001	<0.001	0.001	
Chloroform	mg/L	<0.0001	<0.0001	<0.0001	0.0001	
Chloromethane	mg/L	<0.001	<0.001	<0.001	0.001	
2-Chlorotoluene	mg/L	<0.0001	<0.0001	<0.0001	0.0001	
4-Chlorotoluene	mg/L	<0.0001	<0.0001	<0.0001	0.0001	
1,2-Dibromo-3-Chloropropane	mg/L	<0.0001	<0.0001	<0.0001	0.0001	
1,2-Dibromoethane	mg/L	<0.0001	<0.0001	<0.0001	0.0001	
Dibromomethane	mg/L	<0.0001	<0.0001	<0.0001	0.0001	
1,2-Dichlorobenzene	mg/L	<0.0001	<0.0001	<0.0001	0.0001	
1,3-Dichlorobenzene	mg/L	<0.0001	<0.0001	<0.0001	0.0001	
1,4-Dichlorobenzene	mg/L	<0.0001	0.0003	<0.0001	0.0001	
1,1-Dichloroethane	mg/L	<0.0001	<0.0001	<0.0001	0.0001	
Dibromochloromethane	mg/L	<0.0001	<0.0001	<0.0001	0.0001	
1,2-Dichloroethane	mg/L	<0.0005	<0.0005	<0.0005	0.0005	
1,1-Dichloroethene	mg/L	<0.0005	<0.0005	<0.0005	0.0005	
1,2-Dichloroethene(cis)	mg/L	<0.0001	<0.0001	<0.0001	0.0001	
1,2-Dichloroethene(trans)	mg/L	<0.0001	<0.0001	<0.0001	0.0001	
Dichlorodifluoromethane	mg/L	<0.001	<0.001	<0.001	0.001	
1,2-Dichloropropane	mg/L	<0.0001	<0.0001	<0.0001	0.0001	
1,3-Dichloropropane	mg/L	<0.0001	<0.0001	<0.0001	0.0001	

Analytical Report

Bill To: Sunshine Coast Regional District	Project ID: SP100543	Lot ID: 1562799
1975 Field Road	Project Name: Sechelt Landfill	Control Number:
Sechelt, BC, Canada	Groundwater	Date Received: Apr 1, 2022
V0N 3A1	Project Location: Sechelt	Date Reported: Apr 13, 2022
Attn: Accounts Payable	LSD:	Report Number: 2734229
Sampled By: Sandi Bandara	P.O.: 3003873	
Company: SCRD	Proj. Acct. code:	

		Reference Number	1562799-1	1562799-2	1562799-3
		Sample Date	Mar 28, 2022	Mar 28, 2022	Mar 28, 2022
		Sample Time	10:12	10:42	11:07
		Sample Location			
		Sample Description	MW 13-4 / Groundwater / 16.8 °C	MW 4 / Groundwater / 16.8 °C	MW 1 / Groundwater / 16.8 °C
		Matrix	Water	Water	Water
Analyte	Units	Results	Results	Results	Nominal Detection Limit
VOC Screen - Drinking Water - Continued					
1,1-Dichloropropene	mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,3-Dichloropropene(cis)	mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,3-Dichloropropene(trans)	mg/L	<0.0001	<0.0001	<0.0001	0.0001
Ethylbenzene	mg/L	<0.0001	<0.0001	<0.0001	0.0001
Hexachlorobutadiene	mg/L	<0.0001	<0.0001	<0.0001	0.0001
p-Isopropyltoluene	mg/L	<0.001	<0.001	<0.001	0.001
Methylene Chloride	mg/L	<0.01	<0.01	<0.01	0.01
Methyl t-Butyl Ether	mg/L	<0.0001	0.0021	<0.0001	0.0001
iso-Propylbenzene	mg/L	<0.0001	<0.0001	<0.0001	0.0001
n-Propylbenzene	mg/L	<0.0001	<0.0001	<0.0001	0.0001
Styrene	mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,1,1,2-Tetrachloroethane	mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,1,2,2-Tetrachloroethane	mg/L	<0.0001	<0.0001	<0.0001	0.0001
Tetrachloroethene	mg/L	<0.0005	<0.0005	<0.0005	0.0005
Toluene	mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,2,3-Trichlorobenzene	mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,2,4-Trichlorobenzene	mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,1,1-Trichloroethane	mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,1,2-Trichloroethane	mg/L	<0.0001	<0.0001	<0.0001	0.0001
Trichloroethene	mg/L	<0.0005	<0.0005	<0.0005	0.0005
Trichlorofluoromethane	mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,2,3-Trichloropropane	mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,2,4-Trimethylbenzene	mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,3,5-Trimethylbenzene	mg/L	<0.0001	<0.0001	<0.0001	0.0001
Total Xylenes (m,p,o)	mg/L	<0.0001	<0.0001	<0.0001	0.0001
Vinyl Chloride	mg/L	<0.0005	<0.0005	<0.0005	0.0005
Xylene-m&p	mg/L	<0.0001	<0.0001	<0.0001	0.0001
Xylene-o	mg/L	<0.0001	<0.0001	<0.0001	0.0001
VOC - Drinking Water - Surrogate Recovery					
Dibromofluoromethane	EPA Surrogate	%	127	131	124
Toluene-d8	EPA Surrogate	%	101	102	104
Bromofluorobenzene	EPA Surrogate	%	93	95	93
Trace Metals Dissolved					
Aluminum	Dissolved	mg/L	0.053	0.060	0.27
Antimony	Dissolved	mg/L	0.00007	0.00010	0.00005
Arsenic	Dissolved	mg/L	<0.0001	0.0003	0.0001
Barium	Dissolved	mg/L	0.0022	0.061	0.011

Analytical Report

Bill To: Sunshine Coast Regional District	Project ID: SP100543	Lot ID: 1562799
1975 Field Road	Project Name: Sechelt Landfill	Control Number:
Sechelt, BC, Canada	Groundwater	Date Received: Apr 1, 2022
V0N 3A1	Project Location: Sechelt	Date Reported: Apr 13, 2022
Attn: Accounts Payable	LSD:	Report Number: 2734229
Sampled By: Sandi Bandara	P.O.: 3003873	
Company: SCRD	Proj. Acct. code:	

		Reference Number	1562799-1	1562799-2	1562799-3	
		Sample Date	Mar 28, 2022	Mar 28, 2022	Mar 28, 2022	
		Sample Time	10:12	10:42	11:07	
		Sample Location				
		Sample Description	MW 13-4 / Groundwater / 16.8 °C	MW 4 / Groundwater / 16.8 °C	MW 1 / Groundwater / 16.8 °C	
		Matrix	Water	Water	Water	
Analyte		Units	Results	Results	Results	Nominal Detection Limit
Trace Metals Dissolved - Continued						
Beryllium	Dissolved	mg/L	<0.00005	<0.00005	0.00007	0.00005
Bismuth	Dissolved	mg/L	<0.0001	<0.0001	<0.0001	0.0001
Boron	Dissolved	mg/L	<0.002	0.023	0.075	0.002
Cadmium	Dissolved	mg/L	0.00002	0.00034	0.00003	0.00001
Chromium	Dissolved	mg/L	0.00015	0.00011	0.00023	0.00005
Cobalt	Dissolved	mg/L	0.00003	0.0090	0.00018	0.00002
Copper	Dissolved	mg/L	<0.0005	0.0016	0.0012	0.0005
Iron	Dissolved	mg/L	0.047	1.2	0.25	0.002
Lead	Dissolved	mg/L	0.00014	0.00011	0.00025	0.00001
Lithium	Dissolved	mg/L	<0.0005	0.0048	<0.0005	0.0005
Manganese	Dissolved	mg/L	0.003	3.5	0.020	0.001
Molybdenum	Dissolved	mg/L	<0.00002	<0.00002	0.00006	0.00002
Nickel	Dissolved	mg/L	<0.0002	0.0021	0.0004	0.0002
Selenium	Dissolved	mg/L	<0.0002	<0.0002	<0.0002	0.0002
Silver	Dissolved	mg/L	0.00005	0.00001	0.00001	0.00001
Strontium	Dissolved	mg/L	0.053	0.68	0.18	0.0001
Thallium	Dissolved	mg/L	<0.00001	<0.00001	<0.00001	0.00001
Thorium	Dissolved	mg/L	<0.00005	<0.00005	<0.00005	0.00005
Tin	Dissolved	mg/L	<0.0001	<0.0001	<0.0001	0.0001
Titanium	Dissolved	mg/L	0.0015	0.0026	0.015	0.0001
Uranium	Dissolved	mg/L	<0.00001	0.00026	0.00008	0.00001
Vanadium	Dissolved	mg/L	0.0010	0.00006	0.00026	0.00005
Zinc	Dissolved	mg/L	0.0065	0.014	0.0064	0.0005
Zirconium	Dissolved	mg/L	<0.0001	<0.0001	<0.0001	0.0001

Analytical Report

Bill To: Sunshine Coast Regional District	Project ID: SP100543	Lot ID: 1562799
1975 Field Road	Project Name: Sechelt Landfill	Control Number:
Sechelt, BC, Canada	Groundwater	Date Received: Apr 1, 2022
V0N 3A1	Project Location: Sechelt	Date Reported: Apr 13, 2022
Attn: Accounts Payable	LSD:	Report Number: 2734229
Sampled By: Sandi Bandara	P.O.: 3003873	
Company: SCRD	Proj. Acct. code:	

		Reference Number	1562799-4	1562799-5	1562799-6	
		Sample Date	Mar 28, 2022	Mar 28, 2022	Mar 28, 2022	
		Sample Time	11:26	15:08	15:24	
		Sample Location	MW2-21			
		Sample Description	MW 3 / Groundwater / 16.8 °C	MW 2 / Groundwater / 16.8 °C	MW 13 - 3 / Groundwater / 16.8 °C	
		Matrix	Water	Water	Water	
Analyte	Units	Results	Results	Results	Nominal Detection Limit	
Aggregate Organic Constituents						
Chemical Oxygen Demand	mg/L	44	10	27	5	
Inorganic Nonmetallic Parameters						
Ammonia - N	mg/L	12.8	<0.025	4.53	0.025	
Ammonium/Ammonia		Yes	Yes	Yes		
Preservation						
Kjeldahl Nitrogen	Total	mg/L	14.7	0.15	5.78	0.1
Nitrogen	Total	mg/L	14.8	0.28	5.89	0.1
Phosphorus	Total - Low Level	mg/L	0.058	0.248	0.375	0.005
Organic Carbon	Dissolved Nonpurgeable	mg/L	12.5	1.1	3.7	0.5
Metals Dissolved						
Mercury	Dissolved	mg/L	<0.00001	<0.00001	<0.00001	0.00005
Physical and Aggregate Properties						
Turbidity	NTU	30.7	203	199	0.1	
Routine Water						
pH - Holding Time		Exceeded	Exceeded	Exceeded		
pH	at 25 °C	7.66	7.18	7.12	0.01	
Electrical Conductivity	µS/cm at 25 °C	890	1141	478	1	
Calcium	Dissolved	mg/L	70	210	68	0.01
Magnesium	Dissolved	mg/L	14	24	7.8	0.02
Potassium	Dissolved	mg/L	24	2.8	6.1	0.04
Silicon	Dissolved	mg/L	3.8	15	11	0.005
Sodium	Dissolved	mg/L	68	13	25	0.1
Sulfur	Dissolved	mg/L	1.6	120	4.9	0.02
Bicarbonate		mg/L	425	110	268	5
Carbonate		mg/L	<6	<6	<6	6
Hydroxide		mg/L	<5	<5	<5	5
P-Alkalinity	as CaCO ₃	mg/L	<5	<5	<5	5
T-Alkalinity	as CaCO ₃	mg/L	348	94	220	5
Chloride	Dissolved	mg/L	72.0	98.7	13.0	0.05
Nitrate - N	Dissolved	mg/L	<0.1	<0.1	<0.1	0.01
Nitrite - N	Dissolved	mg/L	<0.1	<0.1	<0.1	0.01
Nitrate and Nitrite - N	Dissolved	mg/L	<0.20	<0.20	<0.20	0.01
Sulfate (SO ₄)	Dissolved	mg/L	1	393	10	0.1
Hardness	as CaCO ₃ (dissolved)	mg/L	230	620	200	5
Salinity	Dissolved	g/L	0.17	0.033	0.063	0.0001
Mono-Aromatic Hydrocarbons - Water						
4-Bromofluorobenzene	Surrogate	%	100	100	100	70-130

Analytical Report

Bill To: Sunshine Coast Regional District	Project ID: SP100543	Lot ID: 1562799
1975 Field Road	Project Name: Sechelt Landfill	Control Number:
Sechelt, BC, Canada	Groundwater	Date Received: Apr 1, 2022
V0N 3A1	Project Location: Sechelt	Date Reported: Apr 13, 2022
Attn: Accounts Payable	LSD:	Report Number: 2734229
Sampled By: Sandi Bandara	P.O.: 3003873	
Company: SCRD	Proj. Acct. code:	

		Reference Number	1562799-4	1562799-5	1562799-6	
		Sample Date	Mar 28, 2022	Mar 28, 2022	Mar 28, 2022	
		Sample Time	11:26	15:08	15:24	
		Sample Location	MW2-21			
		Sample Description	MW 3 / Groundwater / 16.8 °C	MW 2 / Groundwater / 16.8 °C	MW 13 - 3 / Groundwater / 16.8 °C	
		Matrix	Water	Water	Water	
Analyte	Units	Results	Results	Results	Nominal Detection Limit	
Mono-Aromatic Hydrocarbons - Water - Continued						
Toluene-d8	Surrogate	%	108	108	108	70-130
Volatile Petroleum Hydrocarbons - Water						
VHw6-10	mg/L	<0.05	<0.05	<0.05	0.05	
VPHw (VHw6-10 minus BTEX)	mg/L	<0.05	<0.05	<0.05	0.05	
VOC Screen - Drinking Water						
Benzene	mg/L	0.0003	<0.0001	0.0014	0.0001	
Bromobenzene	mg/L	<0.0001	<0.0001	<0.0001	0.0001	
Bromochloromethane	mg/L	<0.0001	<0.0001	<0.0001	0.0001	
Bromodichloromethane	mg/L	<0.0001	<0.0001	<0.0001	0.0001	
Bromoform	mg/L	<0.0001	<0.0001	<0.0001	0.0001	
Bromomethane	mg/L	<0.001	<0.001	<0.001	0.001	
n-Butylbenzene	mg/L	<0.0001	<0.0001	<0.0001	0.0001	
sec-Butylbenzene	mg/L	<0.0001	<0.0001	<0.0001	0.0001	
tert-Butylbenzene	mg/L	<0.0001	<0.0001	<0.0001	0.0001	
Carbon Tetrachloride	mg/L	<0.0005	<0.0005	<0.0005	0.0005	
Chlorobenzene	mg/L	<0.0001	<0.0001	0.0030	0.0001	
Chloroethane	mg/L	<0.001	<0.001	0.002	0.001	
Chloroform	mg/L	<0.0001	<0.0001	<0.0001	0.0001	
Chloromethane	mg/L	<0.001	<0.001	<0.001	0.001	
2-Chlorotoluene	mg/L	<0.0001	<0.0001	<0.0001	0.0001	
4-Chlorotoluene	mg/L	<0.0001	<0.0001	<0.0001	0.0001	
1,2-Dibromo-3-Chloropropane	mg/L	<0.0001	<0.0001	<0.0001	0.0001	
1,2-Dibromoethane	mg/L	<0.0001	<0.0001	<0.0001	0.0001	
Dibromomethane	mg/L	<0.0001	<0.0001	<0.0001	0.0001	
1,2-Dichlorobenzene	mg/L	<0.0001	<0.0001	<0.0001	0.0001	
1,3-Dichlorobenzene	mg/L	<0.0001	<0.0001	<0.0001	0.0001	
1,4-Dichlorobenzene	mg/L	<0.0001	<0.0001	0.0009	0.0001	
1,1-Dichloroethane	mg/L	<0.0001	<0.0001	0.0003	0.0001	
Dibromochloromethane	mg/L	<0.0001	<0.0001	<0.0001	0.0001	
1,2-Dichloroethane	mg/L	<0.0005	<0.0005	<0.0005	0.0005	
1,1-Dichloroethene	mg/L	<0.0005	<0.0005	<0.0005	0.0005	
1,2-Dichloroethene(cis)	mg/L	<0.0001	<0.0001	0.0001	0.0001	
1,2-Dichloroethene(trans)	mg/L	<0.0001	<0.0001	<0.0001	0.0001	
Dichlorodifluoromethane	mg/L	<0.001	<0.001	<0.001	0.001	
1,2-Dichloropropane	mg/L	<0.0001	<0.0001	<0.0001	0.0001	
1,3-Dichloropropane	mg/L	<0.0001	<0.0001	<0.0001	0.0001	

Analytical Report

Bill To: Sunshine Coast Regional District	Project ID: SP100543	Lot ID: 1562799
1975 Field Road	Project Name: Sechelt Landfill	Control Number:
Sechelt, BC, Canada	Groundwater	Date Received: Apr 1, 2022
V0N 3A1	Project Location: Sechelt	Date Reported: Apr 13, 2022
Attn: Accounts Payable	LSD:	Report Number: 2734229
Sampled By: Sandi Bandara	P.O.: 3003873	
Company: SCRD	Proj. Acct. code:	

Reference Number	1562799-4	1562799-5	1562799-6
Sample Date	Mar 28, 2022	Mar 28, 2022	Mar 28, 2022
Sample Time	11:26	15:08	15:24
Sample Location	MW2-21		
Sample Description	MW 3 / Groundwater / 16.8 °C	MW 2 / Groundwater / 16.8 °C	MW 13 - 3 / Groundwater / 16.8 °C

		Matrix	Water	Water	Water	
Analyte		Units	Results	Results	Results	Nominal Detection Limit
VOC Screen - Drinking Water - Continued						
1,1-Dichloropropene		mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,3-Dichloropropene(cis)		mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,3-Dichloropropene(trans)		mg/L	<0.0001	<0.0001	<0.0001	0.0001
Ethylbenzene		mg/L	0.0001	<0.0001	<0.0001	0.0001
Hexachlorobutadiene		mg/L	<0.0001	<0.0001	<0.0001	0.0001
p-Isopropyltoluene		mg/L	<0.001	<0.001	<0.001	0.001
Methylene Chloride		mg/L	<0.01	<0.01	<0.01	0.01
Methyl t-Butyl Ether		mg/L	<0.0001	<0.0001	0.0005	0.0001
iso-Propylbenzene		mg/L	0.0002	<0.0001	0.0003	0.0001
n-Propylbenzene		mg/L	<0.0001	<0.0001	0.0002	0.0001
Styrene		mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,1,1,2-Tetrachloroethane		mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,1,2,2-Tetrachloroethane		mg/L	<0.0001	<0.0001	<0.0001	0.0001
Tetrachloroethene		mg/L	<0.0005	<0.0005	<0.0005	0.0005
Toluene		mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,2,3-Trichlorobenzene		mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,2,4-Trichlorobenzene		mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,1,1-Trichloroethane		mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,1,2-Trichloroethane		mg/L	<0.0001	<0.0001	<0.0001	0.0001
Trichloroethene		mg/L	<0.0005	<0.0005	<0.0005	0.0005
Trichlorofluoromethane		mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,2,3-Trichloropropane		mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,2,4-Trimethylbenzene		mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,3,5-Trimethylbenzene		mg/L	<0.0001	<0.0001	<0.0001	0.0001
Total Xylenes (m,p,o)		mg/L	0.0002	<0.0001	<0.0001	0.0001
Vinyl Chloride		mg/L	<0.0005	<0.0005	<0.0005	0.0005
Xylene-m&p		mg/L	0.0002	<0.0001	<0.0001	0.0001
Xylene-o		mg/L	<0.0001	<0.0001	<0.0001	0.0001
VOC - Drinking Water - Surrogate Recovery						
Dibromofluoromethane	EPA Surrogate	%	135	129	139	50-140
Toluene-d8	EPA Surrogate	%	105	102	102	50-140
Bromofluorobenzene	EPA Surrogate	%	99	94	99	50-140
Trace Metals Dissolved						
Aluminum	Dissolved	mg/L	0.16	3.9	1.1	0.001
Antimony	Dissolved	mg/L	0.00024	<0.0002	<0.0002	0.00002
Arsenic	Dissolved	mg/L	0.0011	0.003	0.005	0.0001
Barium	Dissolved	mg/L	0.30	0.12	0.11	0.0001

Analytical Report

Bill To: Sunshine Coast Regional District	Project ID: SP100543	Lot ID: 1562799
1975 Field Road	Project Name: Sechelt Landfill	Control Number:
Sechelt, BC, Canada	Groundwater	Date Received: Apr 1, 2022
V0N 3A1	Project Location: Sechelt	Date Reported: Apr 13, 2022
Attn: Accounts Payable	LSD:	Report Number: 2734229
Sampled By: Sandi Bandara	P.O.: 3003873	
Company: SCRD	Proj. Acct. code:	

Reference Number	1562799-4	1562799-5	1562799-6
Sample Date	Mar 28, 2022	Mar 28, 2022	Mar 28, 2022
Sample Time	11:26	15:08	15:24
Sample Location		MW2-21	
Sample Description	MW 3 / Groundwater / 16.8 °C	MW 2 / Groundwater / 16.8 °C	MW 13 - 3 / Groundwater / 16.8 °C

		Matrix	Water	Water	Water	
Analyte		Units	Results	Results	Results	Nominal Detection Limit
Trace Metals Dissolved - Continued						
Beryllium	Dissolved	mg/L	<0.00005	<0.0005	<0.0005	0.00005
Bismuth	Dissolved	mg/L	<0.0001	<0.001	<0.001	0.0001
Boron	Dissolved	mg/L	0.49	0.10	0.16	0.002
Cadmium	Dissolved	mg/L	0.00004	0.0001	<0.0001	0.00001
Chromium	Dissolved	mg/L	0.00064	0.013	0.0010	0.00005
Cobalt	Dissolved	mg/L	0.00021	0.0042	0.0016	0.00002
Copper	Dissolved	mg/L	0.0007	0.007	<0.005	0.0005
Iron	Dissolved	mg/L	5.2	18	50	0.002
Lead	Dissolved	mg/L	0.00035	0.0020	0.0011	0.00001
Lithium	Dissolved	mg/L	<0.0005	<0.005	0.006	0.0005
Manganese	Dissolved	mg/L	0.89	1.9	6.8	0.001
Molybdenum	Dissolved	mg/L	0.00008	0.0019	<0.0002	0.00002
Nickel	Dissolved	mg/L	0.0027	0.004	0.002	0.0002
Selenium	Dissolved	mg/L	<0.0002	<0.002	<0.002	0.0002
Silver	Dissolved	mg/L	<0.00001	<0.0001	<0.0001	0.00001
Strontium	Dissolved	mg/L	0.41	1.6	1.2	0.0001
Thallium	Dissolved	mg/L	<0.00001	<0.0001	<0.0001	0.00001
Thorium	Dissolved	mg/L	<0.00005	0.0008	<0.0005	0.00005
Tin	Dissolved	mg/L	0.0002	0.001	0.002	0.0001
Titanium	Dissolved	mg/L	0.0068	0.16	0.042	0.0001
Uranium	Dissolved	mg/L	0.00001	0.0009	0.0002	0.00001
Vanadium	Dissolved	mg/L	0.00066	0.0091	0.0029	0.00005
Zinc	Dissolved	mg/L	0.015	0.016	0.35	0.0005
Zirconium	Dissolved	mg/L	<0.0001	<0.001	<0.001	0.0001

Analytical Report

Bill To: Sunshine Coast Regional District	Project ID: SP100543	Lot ID: 1562799
1975 Field Road	Project Name: Sechelt Landfill	Control Number:
Sechelt, BC, Canada	Groundwater	Date Received: Apr 1, 2022
V0N 3A1	Project Location: Sechelt	Date Reported: Apr 13, 2022
Attn: Accounts Payable	LSD:	Report Number: 2734229
Sampled By: Sandi Bandara	P.O.: 3003873	
Company: SCRD	Proj. Acct. code:	

Reference Number	1562799-7
Sample Date	Mar 28, 2022
Sample Time	15:45
Sample Location	
Sample Description	MW 13 - 1 / Groundwater / 16.8 °C

		Matrix	Water		
Analyte	Units	Results	Results	Results	Nominal Detection Limit
Aggregate Organic Constituents					
Chemical Oxygen Demand	mg/L	17			5
Inorganic Nonmetallic Parameters					
Ammonia - N	mg/L	16.2			0.025
Ammonium/Ammonia Preservation		Yes			
Kjeldahl Nitrogen	Total	mg/L	15.7		0.1
Nitrogen	Total	mg/L	15.9		0.1
Phosphorus	Total - Low Level	mg/L	0.125		0.005
Organic Carbon	Dissolved Nonpurgeable	mg/L	3.1		0.5
Metals Dissolved					
Mercury	Dissolved	mg/L	<0.00001		0.00005
Physical and Aggregate Properties					
Turbidity	NTU	57.6			0.1
Routine Water					
pH - Holding Time		Exceeded			
pH	at 25 °C	7.38			0.01
Electrical Conductivity	µS/cm at 25 °C	499			1
Calcium	Dissolved	mg/L	55		0.01
Magnesium	Dissolved	mg/L	6.7		0.02
Potassium	Dissolved	mg/L	6.0		0.04
Silicon	Dissolved	mg/L	11		0.005
Sodium	Dissolved	mg/L	14		0.1
Sulfur	Dissolved	mg/L	1.3		0.02
Bicarbonate		mg/L	296		5
Carbonate		mg/L	<6		6
Hydroxide		mg/L	<5		5
P-Alkalinity	as CaCO ₃	mg/L	<5		5
T-Alkalinity	as CaCO ₃	mg/L	243		5
Chloride	Dissolved	mg/L	7.5		0.05
Nitrate - N	Dissolved	mg/L	0.5		0.01
Nitrite - N	Dissolved	mg/L	<0.1		0.01
Nitrate and Nitrite - N	Dissolved	mg/L	0.5		0.01
Sulfate (SO ₄)	Dissolved	mg/L	2		0.1
Hardness	as CaCO ₃ (dissolved)	mg/L	160		5
Salinity	Dissolved	g/L	0.036		0.0001
Mono-Aromatic Hydrocarbons - Water					
4-Bromofluorobenzene	Surrogate	%	100		70-130

Analytical Report

Bill To: Sunshine Coast Regional District	Project ID: SP100543	Lot ID: 1562799
1975 Field Road	Project Name: Sechelt Landfill	Control Number:
Sechelt, BC, Canada	Groundwater	Date Received: Apr 1, 2022
V0N 3A1	Project Location: Sechelt	Date Reported: Apr 13, 2022
Attn: Accounts Payable	LSD:	Report Number: 2734229
Sampled By: Sandi Bandara	P.O.: 3003873	
Company: SCRD	Proj. Acct. code:	

Reference Number 1562799-7
Sample Date Mar 28, 2022
Sample Time 15:45
Sample Location
Sample Description MW 13 - 1 /
Groundwater / 16.8
°C

		Matrix	Water		
Analyte		Units	Results	Results	Nominal Detection Limit
Mono-Aromatic Hydrocarbons - Water - Continued					
Toluene-d8	Surrogate	%	109		70-130
Volatile Petroleum Hydrocarbons - Water					
VHw6-10		mg/L	<0.05		0.05
VPHw (VHw6-10 minus BTEX)		mg/L	<0.05		0.05
VOC Screen - Drinking Water					
Benzene		mg/L	0.0007		0.0001
Bromobenzene		mg/L	<0.0001		0.0001
Bromochloromethane		mg/L	<0.0001		0.0001
Bromodichloromethane		mg/L	<0.0001		0.0001
Bromoform		mg/L	<0.0001		0.0001
Bromomethane		mg/L	<0.001		0.001
n-Butylbenzene		mg/L	<0.0001		0.0001
sec-Butylbenzene		mg/L	<0.0001		0.0001
tert-Butylbenzene		mg/L	<0.0001		0.0001
Carbon Tetrachloride		mg/L	<0.0005		0.0005
Chlorobenzene		mg/L	0.0027		0.0001
Chloroethane		mg/L	<0.001		0.001
Chloroform		mg/L	<0.0001		0.0001
Chloromethane		mg/L	<0.001		0.001
2-Chlorotoluene		mg/L	<0.0001		0.0001
4-Chlorotoluene		mg/L	<0.0001		0.0001
1,2-Dibromo-3-Chloropropane		mg/L	<0.0001		0.0001
1,2-Dibromoethane		mg/L	<0.0001		0.0001
Dibromomethane		mg/L	<0.0001		0.0001
1,2-Dichlorobenzene		mg/L	<0.0001		0.0001
1,3-Dichlorobenzene		mg/L	<0.0001		0.0001
1,4-Dichlorobenzene		mg/L	0.0005		0.0001
1,1-Dichloroethane		mg/L	<0.0001		0.0001
Dibromochloromethane		mg/L	<0.0001		0.0001
1,2-Dichloroethane		mg/L	<0.0005		0.0005
1,1-Dichloroethene		mg/L	<0.0005		0.0005
1,2-Dichloroethene(cis)		mg/L	<0.0001		0.0001
1,2-Dichloroethene(trans)		mg/L	<0.0001		0.0001
Dichlorodifluoromethane		mg/L	<0.001		0.001
1,2-Dichloropropane		mg/L	<0.0001		0.0001
1,3-Dichloropropane		mg/L	<0.0001		0.0001

Analytical Report

Bill To: Sunshine Coast Regional District	Project ID: SP100543	Lot ID: 1562799
1975 Field Road	Project Name: Sechelt Landfill	Control Number:
Sechelt, BC, Canada	Groundwater	Date Received: Apr 1, 2022
V0N 3A1	Project Location: Sechelt	Date Reported: Apr 13, 2022
Attn: Accounts Payable	LSD:	Report Number: 2734229
Sampled By: Sandi Bandara	P.O.: 3003873	
Company: SCRD	Proj. Acct. code:	

Reference Number 1562799-7
Sample Date Mar 28, 2022
Sample Time 15:45
Sample Location
Sample Description MW 13 - 1 /
Groundwater / 16.8
°C

		Matrix	Water		
Analyte	Units	Results	Results	Results	Nominal Detection Limit
VOC Screen - Drinking Water - Continued					
1,1-Dichloropropene	mg/L	<0.0001			0.0001
1,3-Dichloropropene(cis)	mg/L	<0.0001			0.0001
1,3-Dichloropropene(trans)	mg/L	<0.0001			0.0001
Ethylbenzene	mg/L	<0.0001			0.0001
Hexachlorobutadiene	mg/L	<0.0001			0.0001
p-Isopropyltoluene	mg/L	<0.001			0.001
Methylene Chloride	mg/L	<0.01			0.01
Methyl t-Butyl Ether	mg/L	0.0012			0.0001
iso-Propylbenzene	mg/L	0.0001			0.0001
n-Propylbenzene	mg/L	<0.0001			0.0001
Styrene	mg/L	<0.0001			0.0001
1,1,1,2-Tetrachloroethane	mg/L	<0.0001			0.0001
1,1,2,2-Tetrachloroethane	mg/L	<0.0001			0.0001
Tetrachloroethene	mg/L	<0.0005			0.0005
Toluene	mg/L	<0.0001			0.0001
1,2,3-Trichlorobenzene	mg/L	<0.0001			0.0001
1,2,4-Trichlorobenzene	mg/L	<0.0001			0.0001
1,1,1-Trichloroethane	mg/L	<0.0001			0.0001
1,1,2-Trichloroethane	mg/L	<0.0001			0.0001
Trichloroethene	mg/L	<0.0005			0.0005
Trichlorofluoromethane	mg/L	<0.0001			0.0001
1,2,3-Trichloropropane	mg/L	<0.0001			0.0001
1,2,4-Trimethylbenzene	mg/L	<0.0001			0.0001
1,3,5-Trimethylbenzene	mg/L	<0.0001			0.0001
Total Xylenes (m,p,o)	mg/L	<0.0001			0.0001
Vinyl Chloride	mg/L	<0.0005			0.0005
Xylene-m&p	mg/L	<0.0001			0.0001
Xylene-o	mg/L	<0.0001			0.0001
VOC - Drinking Water - Surrogate Recovery					
Dibromofluoromethane	EPA Surrogate	%	129		50-140
Toluene-d8	EPA Surrogate	%	102		50-140
Bromofluorobenzene	EPA Surrogate	%	97		50-140
Trace Metals Dissolved					
Aluminum	Dissolved	mg/L	0.18		0.001
Antimony	Dissolved	mg/L	0.00023		0.00002
Arsenic	Dissolved	mg/L	0.0013		0.0001
Barium	Dissolved	mg/L	0.047		0.0001

Analytical Report

Bill To: Sunshine Coast Regional District	Project ID: SP100543	Lot ID: 1562799
1975 Field Road	Project Name: Sechelt Landfill	Control Number:
Sechelt, BC, Canada	Groundwater	Date Received: Apr 1, 2022
V0N 3A1	Project Location: Sechelt	Date Reported: Apr 13, 2022
Attn: Accounts Payable	LSD:	Report Number: 2734229
Sampled By: Sandi Bandara	P.O.: 3003873	
Company: SCRD	Proj. Acct. code:	

Reference Number 1562799-7
Sample Date Mar 28, 2022
Sample Time 15:45
Sample Location
Sample Description MW 13 - 1 /
Groundwater / 16.8
°C

Matrix Water

Analyte	Units	Results	Results	Results	Nominal Detection Limit
Trace Metals Dissolved - Continued					
Beryllium	Dissolved	mg/L	<0.00005		0.00005
Bismuth	Dissolved	mg/L	<0.0001		0.0001
Boron	Dissolved	mg/L	0.047		0.002
Cadmium	Dissolved	mg/L	0.00002		0.00001
Chromium	Dissolved	mg/L	0.00017		0.00005
Cobalt	Dissolved	mg/L	0.0025		0.00002
Copper	Dissolved	mg/L	0.0008		0.0005
Iron	Dissolved	mg/L	9.5		0.002
Lead	Dissolved	mg/L	0.00021		0.00001
Lithium	Dissolved	mg/L	0.0018		0.0005
Manganese	Dissolved	mg/L	4.5		0.001
Molybdenum	Dissolved	mg/L	0.00045		0.00002
Nickel	Dissolved	mg/L	0.0011		0.0002
Selenium	Dissolved	mg/L	<0.0002		0.0002
Silver	Dissolved	mg/L	0.00002		0.00001
Strontium	Dissolved	mg/L	0.62		0.0001
Thallium	Dissolved	mg/L	<0.00001		0.00001
Thorium	Dissolved	mg/L	<0.00005		0.00005
Tin	Dissolved	mg/L	<0.0001		0.0001
Titanium	Dissolved	mg/L	0.0071		0.0001
Uranium	Dissolved	mg/L	0.00013		0.00001
Vanadium	Dissolved	mg/L	0.00034		0.00005
Zinc	Dissolved	mg/L	0.019		0.0005
Zirconium	Dissolved	mg/L	<0.0001		0.0001

Approved by:



Max Hewitt
Operations Manager

Data have been validated by Analytical Quality Control and Element's Integrated Data Validation System (IDVS).

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Methodology and Notes

Bill To: Sunshine Coast Regional District 1975 Field Road Sechelt, BC, Canada V0N 3A1	Project ID: SP100543 Project Name: Sechelt Landfill Groundwater Project Location: Sechelt LSD: P.O.: 3003873 Proj. Acct. code:	Lot ID: 1562799 Control Number: Date Received: Apr 1, 2022 Date Reported: Apr 13, 2022 Report Number: 2734229
Attn: Accounts Payable Sampled By: Sandi Bandara Company: SCRD		

Method of Analysis

Method Name	Reference	Method	Date Analysis Started	Location
Alk, pH, EC, Turb in water (BC)	APHA	* Alkalinity - Titration Method, 2320 B	Apr 1, 2022	Element Vancouver
Alk, pH, EC, Turb in water (BC)	APHA	* Conductivity, 2510 B	Apr 1, 2022	Element Vancouver
Alk, pH, EC, Turb in water (BC)	APHA	* pH - Electrometric Method, 4500-H+ B	Apr 1, 2022	Element Vancouver
Ammonium-N in Water	APHA	* Automated Phenate Method, 4500-NH3 G	Apr 7, 2022	Element Edmonton - Roper Road
Anions by IEC in water (VAN)	APHA	* Ion Chromatography with Chemical Suppression of Eluent Cond., 4110 B	Apr 1, 2022	Element Vancouver
Anions by IEC in water (VAN)	APHA	* Single-Column Ion Chromatography with Electronic Suppression, 4110 C	Apr 1, 2022	Element Vancouver
BTEX-VPH - Water (CLG)	BCELM	* Calculation of Volatile Petroleum Hydrocarbons in Solids, Waters, or Air (Vapour) - VPH (June 26, 2009), VPH	Apr 3, 2022	Element Calgary
Carbon Organic (Dissolved) in water (DOC)	APHA	High-Temperature Combustion Method, 5310 B	Apr 6, 2022	Element Edmonton - Roper Road
Chemical Oxygen Demand in water	APHA	* Closed Reflux, Colorimetric Method, 5220 D	Apr 5, 2022	Element Edmonton - Roper Road
Chemical Oxygen Demand in water	US EPA	* US EPA method, 8000	Apr 5, 2022	Element Edmonton - Roper Road
Mercury Low Level (Dissolved) in water (VAN)	EPA	* Mercury in Water by Cold Vapor Atomic Fluorescence Spectrometry, 245.7	Apr 5, 2022	Element Vancouver
Metals SemiTrace (Dissolved) in water (VAN)	US EPA	* Metals & Trace Elements by ICP-AES, 6010C	Apr 4, 2022	Element Vancouver
Phosphorus - Total in Water	APHA	* Automated Ascorbic Acid Reduction Method, 4500-P F	Apr 4, 2022	Element Edmonton - Roper Road
Total and Kjeldahl Nitrogen (Total) in Water	ISO	* Water Quality - Determination of nitrogen, ISO/TR 11905-2	Apr 4, 2022	Element Edmonton - Roper Road
Trace Metals (dissolved) in Water (VAN)	US EPA	* Determination of Trace Elements in Waters and Wastes by ICP-MS, 200.8	Apr 4, 2022	Element Vancouver
Turbidity - Water (VAN)	APHA	* Turbidity - Nephelometric Method, 2130 B	Apr 1, 2022	Element Vancouver
VOC - Drinking Water	US EPA	* US EPA method, 524	Apr 4, 2022	Element Calgary

* Reference Method Modified

References

APHA	Standard Methods for the Examination of Water and Wastewater
BCELM	B.C. Environmental Laboratory Manual
EPA	Environmental Protection Agency Test Methods - US
ISO	International Organization for Standardization
US EPA	US Environmental Protection Agency Test Methods

Comments:

- Apr 04, 2022 - Reduction of analytical volume was necessary for anion analysis due to matrix effects in lot 1562799. Detection limits are adjusted accordingly.
- Apr 04, 2022 - Sample 1562799-5; 7999172: Reduction of analytical volume was necessary for metals to bring results within the analytical range for sample 1562799-5 & -6. Detection limits are adjusted accordingly.
- Apr 05, 2022 - Reduction of analytical volume was necessary for metals due to matrix effects in sample 1562799. Detection limits are adjusted

Methodology and Notes

Bill To: Sunshine Coast Regional District	Project ID: SP100543	Lot ID: 1562799
1975 Field Road	Project Name: Sechelt Landfill	Control Number:
Sechelt, BC, Canada	Groundwater	Date Received: Apr 1, 2022
V0N 3A1	Project Location: Sechelt	Date Reported: Apr 13, 2022
Attn: Accounts Payable	LSD:	Report Number: 2734229
Sampled By: Sandi Bandara	P.O.: 3003873	
Company: SCRD	Proj. Acct. code:	

accordingly.

- Apr 05, 2022 - Reduction of analytical volume was necessary for metals to bring results within the analytical range for sample 1562799. Detection limits are adjusted accordingly.
- Apr 07, 2022 - TKN was less than ammonium for sample 1562799-7. The results were verified and are within expected measurement uncertainty.

Please direct any inquiries regarding this report to our Client Services group.

Results relate only to samples as submitted.

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Report Transmission Cover Page

Bill To: Sunshine Coast Regional District 1975 Field Road Sechelt, BC, Canada V0N 3A1	Project ID: SP100543 Project Name: Sechelt Landfill Surface Water Project Location: Sechelt LSD: P.O.: 3004082 Proj. Acct. code:	Lot ID: 1585136 Control Number: Date Received: Jul 15, 2022 Date Reported: Jul 22, 2022 Report Number: 2767822
Attn: Accounts Payable Sampled By: Sandi Bandara Company: SCRD		

Contact	Company	Address
Accounts Payable	Sunshine Coast Regional District	1975 Field Road Sechelt, BC V0N 3A1 Phone: (604) 885-6800 Fax: Email: accounts.payable@scrd.ca
<u>Delivery</u>	<u>Format</u>	<u>Deliverables</u>
Email - Single Deliverable	PDF	Invoice
Corrina Suveges	Sunshine Coast Regional District	1975 Field Road Sechelt, BC V0N 3A1 Phone: (604) 885-6800 Fax: Email: Corrina.Suveges@scrd.ca
<u>Delivery</u>	<u>Format</u>	<u>Deliverables</u>
Email - Merge Deliverables	PDF	COC / Test Report
Email - Single Deliverable	PDF	COA
Email - Single Deliverable	Sunshine Coast	Test Report
Sandi Bandara	Sunshine Coast Regional District	1975 Field Road Sechelt, BC V0N 3A1 Phone: (604) 885-6800 Fax: Email: sandi.bandara@scrd.ca
<u>Delivery</u>	<u>Format</u>	<u>Deliverables</u>
Email - Multiple Deliverables By Lot	PDF	COC / Test Report
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Analytical Report

Bill To: Sunshine Coast Regional District	Project ID: SP100543	Lot ID: 1585136
1975 Field Road	Project Name: Sechelt Landfill Surface	Control Number:
Sechelt, BC, Canada	Water	Date Received: Jul 15, 2022
VON 3A1	Project Location: Sechelt	Date Reported: Jul 22, 2022
Attn: Accounts Payable	LSD:	Report Number: 2767822
Sampled By: Sandi Bandara	P.O.: 3004082	
Company: SCRD	Proj. Acct. code:	

		Reference Number	1585136-1	1585136-2	1585136-3	
		Sample Date	Jul 12, 2022	Jul 12, 2022	Jul 12, 2022	
		Sample Time	10:09	11:10	11:46	
		Sample Location				
		Sample Description	SL-A / Surface Water / 8.1 °C	SL-C / Surface Water / 8.1 °C	SL-B / Surface Water / 8.1 °C	
		Matrix	Water	Water	Water	
Analyte		Units	Results	Results	Results	Nominal Detection Limit
Aggregate Organic Constituents						
Chemical Oxygen Demand		mg/L	20	<10	10	10
Inorganic Nonmetallic Parameters						
Ammonia - N		mg/L	<0.025	<0.025	<0.025	0.025
Ammonium/Ammonia			Yes	Yes	Yes	
Preservation						
Kjeldahl Nitrogen	Total	mg/L	<0.10	0.12	0.15	0.1
Nitrogen	Total	mg/L	<0.10	0.30	0.17	0.1
Organic Carbon	Dissolved Nonpurgeable	mg/L	2.5	2.5	2.6	0.5
Metals Total						
Calcium	Total	mg/L	1.8	6.4	1.9	0.01
Magnesium	Total	mg/L	0.13	1.3	0.19	0.02
Potassium	Total	mg/L	0.18	0.71	0.14	0.04
Silicon	Total	mg/L	1.2	7.3	1.3	0.005
Sulfur	Total	mg/L	0.36	0.87	0.34	0.02
Sodium	Total	mg/L	0.5	3.7	0.6	0.1
Titanium	Total	mg/L	<0.002	0.003	0.003	0.002
Mercury	Total	mg/L	<0.00001	<0.00001	<0.00001	0.00001
Routine Water						
Digestion	Dissolved		Lab filtered & preserved	Lab filtered & preserved	Lab filtered & preserved	
			Exceeded	Exceeded	Exceeded	
pH - Holding Time						
pH	at 25 °C		6.63	7.28	6.78	0.01
Electrical Conductivity		µS/cm at 25 °C	14	65	14	1
Chloride	Dissolved	mg/L	0.23	3.69	0.24	0.05
Nitrate - N	Dissolved	mg/L	0.02	0.14	0.02	0.01
Nitrite - N	Dissolved	mg/L	<0.01	<0.01	<0.01	0.01
Nitrate and Nitrite - N	Dissolved	mg/L	0.02	0.14	0.02	0.01
Hardness	as CaCO ₃ (dissolved)	mg/L	<5	19	<5	5
Hardness	Total	mg CaCO ₃ /L	5.0	21	5.4	1
Trace Metals Total						
Aluminum	Total	mg/L	0.14	0.055	0.15	0.001
Antimony	Total	mg/L	0.00003	0.00004	0.00002	0.00002
Arsenic	Total	mg/L	0.0001	0.0001	0.0001	0.0001
Barium	Total	mg/L	0.0023	0.0056	0.0024	0.0001
Beryllium	Total	mg/L	<0.00005	<0.00005	<0.00005	0.00005
Bismuth	Total	mg/L	<0.0001	<0.0001	<0.0001	0.0001
Boron	Total	mg/L	<0.002	0.004	<0.002	0.002
Cadmium	Total	mg/L	0.00002	<0.00001	<0.00001	0.00001

Analytical Report

Bill To: Sunshine Coast Regional District	Project ID: SP100543	Lot ID: 1585136
1975 Field Road	Project Name: Sechelt Landfill Surface	Control Number:
Sechelt, BC, Canada	Water	Date Received: Jul 15, 2022
V0N 3A1	Project Location: Sechelt	Date Reported: Jul 22, 2022
Attn: Accounts Payable	LSD:	Report Number: 2767822
Sampled By: Sandi Bandara	P.O.: 3004082	
Company: SCRD	Proj. Acct. code:	

		Reference Number	1585136-1	1585136-2	1585136-3	
		Sample Date	Jul 12, 2022	Jul 12, 2022	Jul 12, 2022	
		Sample Time	10:09	11:10	11:46	
		Sample Location				
		Sample Description	SL-A / Surface Water / 8.1 °C	SL-C / Surface Water / 8.1 °C	SL-B / Surface Water / 8.1 °C	
		Matrix	Water	Water	Water	
Analyte		Units	Results	Results	Results	Nominal Detection Limit
Trace Metals Total - Continued						
Chromium	Total	mg/L	0.00016	0.00031	0.00029	0.00005
Cobalt	Total	mg/L	0.00005	0.00003	0.00004	0.00002
Copper	Total	mg/L	0.0003	0.0015	0.0010	0.0002
Iron	Total	mg/L	0.069	0.049	0.077	0.002
Lead	Total	mg/L	0.00008	0.00005	0.00008	0.00001
Lithium	Total	mg/L	<0.0005	<0.0005	<0.0005	0.0005
Manganese	Total	mg/L	0.002	0.002	0.002	0.001
Molybdenum	Total	mg/L	0.00009	0.00024	0.00010	0.00002
Nickel	Total	mg/L	<0.0002	<0.0002	<0.0002	0.0002
Selenium	Total	mg/L	<0.0002	<0.0002	<0.0002	0.0002
Silver	Total	mg/L	0.00003	<0.00001	0.00003	0.00001
Strontium	Total	mg/L	0.0059	0.038	0.0071	0.0001
Thallium	Total	mg/L	<0.00001	<0.00001	<0.00001	0.00001
Thorium	Total	mg/L	<0.00005	<0.00005	<0.00005	0.00005
Tin	Total	mg/L	0.0001	0.0002	<0.0001	0.0001
Titanium	Total	mg/L	0.0019	0.0016	0.0021	0.0001
Uranium	Total	mg/L	0.00003	0.00004	0.00003	0.00001
Vanadium	Total	mg/L	0.00009	0.00060	0.00014	0.00005
Zinc	Total	mg/L	0.0032	0.0055	0.010	0.0005
Zirconium	Total	mg/L	<0.0001	<0.0001	<0.0001	0.0001

Analytical Report

Bill To: Sunshine Coast Regional District	Project ID: SP100543	Lot ID: 1585136
1975 Field Road	Project Name: Sechelt Landfill Surface	Control Number:
Sechelt, BC, Canada	Water	Date Received: Jul 15, 2022
V0N 3A1	Project Location: Sechelt	Date Reported: Jul 22, 2022
Attn: Accounts Payable	LSD:	Report Number: 2767822
Sampled By: Sandi Bandara	P.O.: 3004082	
Company: SCRD	Proj. Acct. code:	

Reference Number 1585136-4
Sample Date Jul 12, 2022
Sample Time NA
Sample Location
Sample Description Duplicate / Surface
Water / 8.1 °C

		Matrix	Water		
Analyte		Units	Results	Results	Nominal Detection Limit
Aggregate Organic Constituents					
Chemical Oxygen Demand		mg/L	20		10
Inorganic Nonmetallic Parameters					
Ammonia - N		mg/L	<0.025		0.025
Ammonium/Ammonia			Yes		
Preservation					
Kjeldahl Nitrogen	Total	mg/L	0.11		0.1
Nitrogen	Total	mg/L	0.29		0.1
Organic Carbon	Dissolved Nonpurgeable	mg/L	2.5		0.5
Metals Total					
Calcium	Total	mg/L	6.9		0.01
Magnesium	Total	mg/L	1.4		0.02
Potassium	Total	mg/L	0.68		0.04
Silicon	Total	mg/L	7.9		0.005
Sulfur	Total	mg/L	0.90		0.02
Sodium	Total	mg/L	3.8		0.1
Titanium	Total	mg/L	0.009		0.002
Mercury	Total	mg/L	<0.00001		0.00001
Routine Water					
Digestion	Dissolved		Lab filtered & preserved		
pH - Holding Time			Exceeded		
pH	at 25 °C		7.34		0.01
Electrical Conductivity		µS/cm at 25 °C	66		1
Chloride	Dissolved	mg/L	3.72		0.05
Nitrate - N	Dissolved	mg/L	0.15		0.01
Nitrite - N	Dissolved	mg/L	<0.01		0.01
Nitrate and Nitrite - N	Dissolved	mg/L	0.15		0.01
Hardness	as CaCO3 (dissolved)	mg/L	22		5
Hardness	Total	mg CaCO3/L	23		1
Trace Metals Total					
Aluminum	Total	mg/L	0.22		0.001
Antimony	Total	mg/L	<0.00002		0.00002
Arsenic	Total	mg/L	0.0001		0.0001
Barium	Total	mg/L	0.0066		0.0001
Beryllium	Total	mg/L	<0.00005		0.00005
Bismuth	Total	mg/L	<0.0001		0.0001
Boron	Total	mg/L	0.004		0.002
Cadmium	Total	mg/L	<0.00001		0.00001

Analytical Report

Bill To: Sunshine Coast Regional District	Project ID: SP100543	Lot ID: 1585136
1975 Field Road	Project Name: Sechelt Landfill Surface	Control Number:
Sechelt, BC, Canada	Water	Date Received: Jul 15, 2022
V0N 3A1	Project Location: Sechelt	Date Reported: Jul 22, 2022
Attn: Accounts Payable	LSD:	Report Number: 2767822
Sampled By: Sandi Bandara	P.O.: 3004082	
Company: SCRD	Proj. Acct. code:	

Reference Number 1585136-4
Sample Date Jul 12, 2022
Sample Time NA
Sample Location
Sample Description Duplicate / Surface
Water / 8.1 °C

Matrix Water

Analyte	Units	Results	Results	Results	Nominal Detection Limit
Trace Metals Total - Continued					
Chromium	Total	mg/L	0.00027		0.00005
Cobalt	Total	mg/L	0.00009		0.00002
Copper	Total	mg/L	0.0005		0.0002
Iron	Total	mg/L	0.21		0.002
Lead	Total	mg/L	0.00009		0.00001
Lithium	Total	mg/L	<0.0005		0.0005
Manganese	Total	mg/L	0.012		0.001
Molybdenum	Total	mg/L	0.00022		0.00002
Nickel	Total	mg/L	<0.0002		0.0002
Selenium	Total	mg/L	<0.0002		0.0002
Silver	Total	mg/L	<0.00001		0.00001
Strontium	Total	mg/L	0.038		0.0001
Thallium	Total	mg/L	<0.00001		0.00001
Thorium	Total	mg/L	<0.00005		0.00005
Tin	Total	mg/L	0.0001		0.0001
Titanium	Total	mg/L	0.0078		0.0001
Uranium	Total	mg/L	0.00006		0.00001
Vanadium	Total	mg/L	0.00093		0.00005
Zinc	Total	mg/L	0.0022		0.0005
Zirconium	Total	mg/L	<0.0001		0.0001

Approved by:



Max Hewitt
Operations Manager

Data have been validated by Analytical Quality Control and Element's Integrated Data Validation System (IDVS).

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Methodology and Notes

Bill To: Sunshine Coast Regional District	Project ID: SP100543	Lot ID: 1585136
1975 Field Road	Project Name: Sechelt Landfill Surface	Control Number:
Sechelt, BC, Canada	Water	Date Received: Jul 15, 2022
V0N 3A1	Project Location: Sechelt	Date Reported: Jul 22, 2022
Attn: Accounts Payable	LSD:	Report Number: 2767822
Sampled By: Sandi Bandara	P.O.: 3004082	
Company: SCRD	Proj. Acct. code:	

Method of Analysis

Method Name	Reference	Method	Date Analysis Started	Location
Alk, pH, EC, Turb in water (BC)	APHA	* Conductivity, 2510 B	Jul 15, 2022	Element Vancouver
Alk, pH, EC, Turb in water (BC)	APHA	* pH - Electrometric Method, 4500-H+ B	Jul 15, 2022	Element Vancouver
Ammonium-N in Water	APHA	* Automated Phenate Method, 4500-NH3 G	Jul 21, 2022	Element Edmonton - Roper Road
Anions by IEC in water (VAN)	APHA	* Ion Chromatography with Chemical Suppression of Eluent Cond., 4110 B	Jul 15, 2022	Element Vancouver
Anions by IEC in water (VAN)	APHA	* Single-Column Ion Chromatography with Electronic Suppression, 4110 C	Jul 15, 2022	Element Vancouver
Carbon Organic (Dissolved) in water (DOC)	APHA	High-Temperature Combustion Method, 5310 B	Jul 20, 2022	Element Edmonton - Roper Road
Chemical Oxygen Demand (water-VAN)	APHA	* Closed Reflux, Colorimetric Method, 5220 D	Jul 18, 2022	Element Vancouver
Mercury Low Level (Total) in water (VAN)	EPA	* Mercury in Water by Cold Vapor Atomic Fluorescence Spectrometry, 245.7	Jul 18, 2022	Element Vancouver
Metals SemiTrace (Dissolved) in water (VAN)	US EPA	* Metals & Trace Elements by ICP-AES, 6010C	Jul 18, 2022	Element Vancouver
Metals SemiTrace (Total) in Water (VAN)	US EPA	* Metals & Trace Elements by ICP-AES, 6010C	Jul 18, 2022	Element Vancouver
Total and Kjeldahl Nitrogen (Total) in Water	ISO	* Water Quality - Determination of nitrogen, ISO/TR 11905-2	Jul 19, 2022	Element Edmonton - Roper Road
Trace Metals (Total) in Water (VAN)	US EPA	* Determination of Trace Elements in Waters and Wastes by ICP-MS, 200.8	Jul 18, 2022	Element Vancouver

* Reference Method Modified

References

APHA	Standard Methods for the Examination of Water and Wastewater
EPA	Environmental Protection Agency Test Methods - US
ISO	International Organization for Standardization
US EPA	US Environmental Protection Agency Test Methods

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Report Transmission Cover Page

Bill To: Sunshine Coast Regional District 1975 Field Road Sechelt, BC, Canada V0N 3A1	Project ID: Project Name: Sechelt Landfill Project Location: Sechelt LSD: P.O.: 3004082 Proj. Acct. code:	Lot ID: 1603388 Control Number: Date Received: Oct 3, 2022 Date Reported: Oct 12, 2022 Report Number: 2794101
Attn: Accounts Payable Sampled By: Sandi Bandara Company: SCRD		

Contact	Company	Address
Accounts Payable	Sunshine Coast Regional District	1975 Field Road Sechelt, BC V0N 3A1 Phone: (604) 885-6800 Fax: Email: accounts.payable@scrd.ca

Delivery	Format	Deliverables
Email - Single Deliverable	PDF	Invoice

Corrina Suveges	Sunshine Coast Regional District	1975 Field Road Sechelt, BC V0N 3A1 Phone: (604) 885-6800 Fax: Email: Corrina.Suveges@scrd.ca

Delivery	Format	Deliverables
Email - Merge Deliverables	PDF	COC / Test Report
Email - Single Deliverable	PDF	COA
Email - Single Deliverable	Sunshine Coast	Test Report

Sandi Bandara	Sunshine Coast Regional District	1975 Field Road Sechelt, BC V0N 3A1 Phone: (604) 885-6800 Fax: Email: sandi.bandara@scrd.ca

Delivery	Format	Deliverables
Email - Multiple Deliverables By Lot	PDF	COC / Test Report
Email - Multiple Deliverables By Lot	Sunshine Coast	Test Report
Email - Single Deliverable	PDF	COA

Notes To Clients:

- Oct 04, 2022 - Reduction of analytical volume was necessary for anion analysis due to matrix effects in lot 1603388. Detection limits are adjusted accordingly.
- Oct 05, 2022 - Sample 1603388-8; 8288630: Reduction of analytical volume was necessary for anion analysis due to matrix effects in sample 1603388-8. Detection limits are adjusted accordingly.
- Oct 06, 2022 - Sediment was present in the field filtered bottle for Sample 5 to 7 which may affect dissolved metals results.
- Oct 12, 2022 - TKN was less than ammonium for sample 1603388-8. The results were verified and are within expected measurement uncertainty.

***This lab report has been marked up to reflect a correction to a sample ID that was incorrectly labelled.**

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Analytical Report

Bill To: Sunshine Coast Regional District	Project ID:	Lot ID: 1603388
1975 Field Road	Project Name: Sechelt Landfill	Control Number:
Sechelt, BC, Canada	Groundwater	Date Received: Oct 3, 2022
V0N 3A1	Project Location: Sechelt	Date Reported: Oct 12, 2022
Attn: Accounts Payable	LSD:	Report Number: 2794101
Sampled By: Sandi Bandara	P.O.: 3004082	
Company: SCRD	Proj. Acct. code:	

		Reference Number	1603388-1	1603388-2	1603388-3	
		Sample Date	Sep 27, 2022	Sep 27, 2022	Sep 27, 2022	
		Sample Time	NA	NA	NA	
		Sample Location				
		Sample Description	MW 13-1 / 18.3 °C	MW 13-2 / 18.3 °C	MW 13-3 / 18.3 °C	
		Matrix	Water	Water	Water	
Analyte		Units	Results	Results	Results	Nominal Detection Limit
Aggregate Organic Constituents						
Chemical Oxygen Demand		mg/L	40	60	30	10
Inorganic Nonmetallic Parameters						
Ammonia - N		mg/L	70.7	11.0	2.01	0.025
Ammonium/Ammonia			Yes	Yes	Yes	
Preservation						
Kjeldahl Nitrogen	Total	mg/L	71.5	11.4	2.55	0.1
Nitrogen	Total	mg/L	71.6	11.4	2.68	0.1
Phosphorus	Total - Low Level	mg/L	0.200	0.242	0.092	0.005
Organic Carbon	Dissolved Nonpurgeable	mg/L	6.3	7.5	2.9	0.5
Metals Dissolved						
Silicon	Dissolved	mg/L	14.9	13.4	13.6	0.05
Sulfur	Dissolved	mg/L	1.3	30.5	47.5	0.3
Mercury	Dissolved	mg/L	<0.000005	<0.000005	<0.000005	0.000005
Aluminum	Dissolved	mg/L	0.218	0.177	0.100	0.002
Antimony	Dissolved	mg/L	0.0002	0.0004	0.0003	0.0002
Arsenic	Dissolved	mg/L	0.0088	0.0077	0.0097	0.0002
Barium	Dissolved	mg/L	0.139	0.162	0.098	0.001
Beryllium	Dissolved	mg/L	<0.0001	<0.0001	<0.0001	0.0001
Bismuth	Dissolved	mg/L	<0.0005	<0.0005	<0.0005	0.0005
Boron	Dissolved	mg/L	0.069	0.257	0.151	0.002
Cadmium	Dissolved	mg/L	0.00004	0.00001	0.00010	0.00001
Chromium	Dissolved	mg/L	<0.0005	0.0007	<0.0005	0.0005
Cobalt	Dissolved	mg/L	0.0030	0.0091	0.0275	0.0001
Copper	Dissolved	mg/L	0.001	0.001	0.001	0.001
Lead	Dissolved	mg/L	0.0004	0.0003	0.0002	0.0001
Lithium	Dissolved	mg/L	0.002	0.003	0.009	0.001
Molybdenum	Dissolved	mg/L	<0.001	<0.001	<0.001	0.001
Nickel	Dissolved	mg/L	0.0022	0.0105	0.0276	0.0005
Selenium	Dissolved	mg/L	<0.0002	<0.0002	<0.0002	0.0002
Silver	Dissolved	mg/L	0.00004	<0.00001	<0.00001	0.00001
Strontium	Dissolved	mg/L	1.23	1.28	0.786	0.001
Thallium	Dissolved	mg/L	<0.00005	<0.00005	<0.00005	0.00005
Tin	Dissolved	mg/L	<0.001	<0.001	<0.001	0.001
Titanium	Dissolved	mg/L	0.0084	0.0080	0.0041	0.0005
Uranium	Dissolved	mg/L	<0.0005	0.0007	<0.0005	0.0005
Vanadium	Dissolved	mg/L	0.0009	0.0013	0.0003	0.0001
Zinc	Dissolved	mg/L	0.018	0.020	0.124	0.001
Zirconium	Dissolved	mg/L	<0.001	<0.001	<0.001	0.001
Subsample			Field Filtered	Field Filtered	Field Filtered	

Analytical Report

Bill To: Sunshine Coast Regional District	Project ID:	Lot ID: 1603388
1975 Field Road	Project Name: Sechelt Landfill	Control Number:
Sechelt, BC, Canada	Groundwater	Date Received: Oct 3, 2022
V0N 3A1	Project Location: Sechelt	Date Reported: Oct 12, 2022
Attn: Accounts Payable	LSD:	Report Number: 2794101
Sampled By: Sandi Bandara	P.O.: 3004082	
Company: SCRD	Proj. Acct. code:	

		Reference Number	1603388-1	1603388-2	1603388-3	
		Sample Date	Sep 27, 2022	Sep 27, 2022	Sep 27, 2022	
		Sample Time	NA	NA	NA	
		Sample Location				
		Sample Description	MW 13-1 / 18.3 °C	MW 13-2 / 18.3 °C	MW 13-3 / 18.3 °C	
		Matrix	Water	Water	Water	
Analyte		Units	Results	Results	Results	Nominal Detection Limit
Physical and Aggregate Properties						
Turbidity		NTU	135	63.9	182	0.1
Routine Water						
pH			7.47	6.89	6.54	1
Temperature of observed pH		°C	20.9	20.7	20.4	
Calcium	Dissolved	mg/L	60.6	87.8	41.0	0.2
Magnesium	Dissolved	mg/L	8.9	12.9	5.4	0.2
Sodium	Dissolved	mg/L	35.3	33.8	32.9	0.4
Potassium	Dissolved	mg/L	15.2	13.7	4.8	0.4
Iron	Dissolved	mg/L	14.2	31.6	21.6	0.01
Manganese	Dissolved	mg/L	4.48	8.33	4.81	0.005
Hardness	Dissolved as CaCO ₃	mg/L	188	272	125	
Salinity	Dissolved as NaCl	g/L	0.089	0.085	0.083	0.001
Electrical Conductivity		µS/cm at 25 °C	1080	872	497	1
Bicarbonate		mg/L	587	395	67	5
Carbonate		mg/L	<6	<6	<6	6
Hydroxide		mg/L	<5	<5	<5	5
P-Alkalinity	as CaCO ₃	mg/L	<5	<5	<5	5
T-Alkalinity	as CaCO ₃	mg/L	482	324	55	5
Chloride	Dissolved	mg/L	27.5	34.9	19.8	0.05
Nitrate - N	Dissolved	mg/L	<0.1	<0.1	0.1	0.01
Nitrite - N	Dissolved	mg/L	<0.1	<0.1	<0.1	0.01
Nitrate and Nitrite - N	Dissolved	mg/L	<0.20	<0.20	0.1	0.01
Sulfate (SO ₄)	Dissolved	mg/L	4	75	158	0.1
Mono-Aromatic Hydrocarbons - Water						
4-Bromofluorobenzene	Surrogate	%	90	90	90	70-130
Toluene-d8	Surrogate	%	103	102	103	70-130
Volatile Petroleum Hydrocarbons - Water						
VHw6-10		mg/L	<0.05	<0.05	<0.05	0.05
VPW (VHw6-10 minus BTEX)		mg/L	<0.05	<0.05	<0.05	0.05
VOC Screen - Drinking Water						
Benzene		mg/L	0.0009	0.0005	0.0001	0.0001
Bromobenzene		mg/L	<0.0001	<0.0001	<0.0001	0.0001
Bromochloromethane		mg/L	<0.0001	<0.0001	<0.0001	0.0001
Bromodichloromethane		mg/L	<0.0001	<0.0001	<0.0001	0.0001
Bromoform		mg/L	<0.0001	<0.0001	<0.0001	0.0001
Bromomethane		mg/L	<0.001	<0.001	<0.001	0.001

Analytical Report

Bill To: Sunshine Coast Regional District	Project ID:	Lot ID: 1603388
1975 Field Road	Project Name: Sechelt Landfill	Control Number:
Sechelt, BC, Canada	Groundwater	Date Received: Oct 3, 2022
V0N 3A1	Project Location: Sechelt	Date Reported: Oct 12, 2022
Attn: Accounts Payable	LSD:	Report Number: 2794101
Sampled By: Sandi Bandara	P.O.: 3004082	
Company: SCRD	Proj. Acct. code:	

	Reference Number	1603388-1	1603388-2	1603388-3	
	Sample Date	Sep 27, 2022	Sep 27, 2022	Sep 27, 2022	
	Sample Time	NA	NA	NA	
	Sample Location				
	Sample Description	MW 13-1 / 18.3 °C	MW 13-2 / 18.3 °C	MW 13-3 / 18.3 °C	
	Matrix	Water	Water	Water	
Analyte	Units	Results	Results	Results	Nominal Detection Limit
VOC Screen - Drinking Water - Continued					
n-Butylbenzene	mg/L	<0.0001	<0.0001	<0.0001	0.0001
sec-Butylbenzene	mg/L	<0.0001	<0.0001	<0.0001	0.0001
tert-Butylbenzene	mg/L	<0.0001	<0.0001	<0.0001	0.0001
Carbon Tetrachloride	mg/L	<0.0005	<0.0005	<0.0005	0.0005
Chlorobenzene	mg/L	0.0014	0.0010	0.0004	0.0001
Chloroethane	mg/L	<0.001	<0.001	<0.001	0.001
Chloroform	mg/L	<0.0001	<0.0001	<0.0001	0.0001
Chloromethane	mg/L	<0.001	<0.001	<0.001	0.001
2-Chlorotoluene	mg/L	<0.0001	<0.0001	<0.0001	0.0001
4-Chlorotoluene	mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,2-Dibromo-3-Chloropropane	mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,2-Dibromoethane	mg/L	<0.0001	<0.0001	<0.0001	0.0001
Dibromomethane	mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,2-Dichlorobenzene	mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,3-Dichlorobenzene	mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,4-Dichlorobenzene	mg/L	0.0002	0.0003	0.0005	0.0001
1,1-Dichloroethane	mg/L	0.0001	0.0001	<0.0001	0.0001
Dibromochloromethane	mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,2-Dichloroethane	mg/L	<0.0005	<0.0005	<0.0005	0.0005
1,1-Dichloroethene	mg/L	<0.0005	<0.0005	<0.0005	0.0005
1,2-Dichloroethene(cis)	mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,2-Dichloroethene(trans)	mg/L	<0.0001	<0.0001	<0.0001	0.0001
Dichlorodifluoromethane	mg/L	<0.001	<0.001	<0.001	0.001
1,2-Dichloropropane	mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,3-Dichloropropane	mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,1-Dichloropropene	mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,3-Dichloropropene(cis)	mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,3-Dichloropropene(trans)	mg/L	<0.0001	<0.0001	<0.0001	0.0001
Ethylbenzene	mg/L	<0.0001	<0.0001	<0.0001	0.0001
Hexachlorobutadiene	mg/L	<0.0001	<0.0001	<0.0001	0.0001
p-Isopropyltoluene	mg/L	<0.001	<0.001	<0.001	0.001
Methylene Chloride	mg/L	<0.01	<0.01	<0.01	0.01
Methyl t-Butyl Ether	mg/L	0.0022	0.0005	<0.0001	0.0001
iso-Propylbenzene	mg/L	0.0002	<0.0001	<0.0001	0.0001
n-Propylbenzene	mg/L	<0.0001	<0.0001	<0.0001	0.0001
Styrene	mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,1,1,2-Tetrachloroethane	mg/L	<0.001	<0.001	<0.001	0.001
1,1,2,2-Tetrachloroethane	mg/L	<0.0001	<0.0001	<0.0001	0.0001

Analytical Report

Bill To: Sunshine Coast Regional District	Project ID:	Lot ID: 1603388
1975 Field Road	Project Name: Sechelt Landfill	Control Number:
Sechelt, BC, Canada	Groundwater	Date Received: Oct 3, 2022
V0N 3A1	Project Location: Sechelt	Date Reported: Oct 12, 2022
Attn: Accounts Payable	LSD:	Report Number: 2794101
Sampled By: Sandi Bandara	P.O.: 3004082	
Company: SCRD	Proj. Acct. code:	

		Reference Number	1603388-1	1603388-2	1603388-3
		Sample Date	Sep 27, 2022	Sep 27, 2022	Sep 27, 2022
		Sample Time	NA	NA	NA
		Sample Location			
		Sample Description	MW 13-1 / 18.3 °C	MW 13-2 / 18.3 °C	MW 13-3 / 18.3 °C
		Matrix	Water	Water	Water
Analyte	Units	Results	Results	Results	Nominal Detection Limit
VOC Screen - Drinking Water - Continued					
Tetrachloroethene	mg/L	<0.0005	<0.0005	<0.0005	0.0005
Toluene	mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,2,3-Trichlorobenzene	mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,2,4-Trichlorobenzene	mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,1,1-Trichloroethane	mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,1,2-Trichloroethane	mg/L	<0.0001	<0.0001	<0.0001	0.0001
Trichloroethene	mg/L	<0.0005	<0.0005	<0.0005	0.0005
Trichlorofluoromethane	mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,2,3-Trichloropropane	mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,2,4-Trimethylbenzene	mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,3,5-Trimethylbenzene	mg/L	<0.0001	<0.0001	<0.0001	0.0001
Total Xylenes (m,p,o)	mg/L	<0.0001	<0.0001	<0.0001	0.0001
Vinyl Chloride	mg/L	<0.0005	<0.0005	<0.0005	0.0005
Xylene-m&p	mg/L	<0.0001	<0.0001	<0.0001	0.0001
Xylene-o	mg/L	<0.0001	<0.0001	<0.0001	0.0001
VOC - Drinking Water - Surrogate Recovery					
Dibromofluoromethane	EPA Surrogate	%	98	116	115
Toluene-d8	EPA Surrogate	%	96	95	98
Bromofluorobenzene	EPA Surrogate	%	101	94	100

Analytical Report

Bill To: Sunshine Coast Regional District	Project ID:	Lot ID: 1603388
1975 Field Road	Project Name: Sechelt Landfill	Control Number:
Sechelt, BC, Canada	Groundwater	Date Received: Oct 3, 2022
V0N 3A1	Project Location: Sechelt	Date Reported: Oct 12, 2022
Attn: Accounts Payable	LSD:	Report Number: 2794101
Sampled By: Sandi Bandara	P.O.: 3004082	
Company: SCRD	Proj. Acct. code:	

		Reference Number	1603388-4	1603388-5	1603388-6
		Sample Date	Sep 27, 2022	Sep 27, 2022	Sep 27, 2022
		Sample Time	NA	NA	NA
		Sample Location		MW1	
		Sample Description	MW 3 / 18.3 °C	~~MW 1A~~ / 18.3 °C	MW 13-04 / 18.3 °C
		Matrix	Water	Water	Water
Analyte		Units	Results	Results	Nominal Detection Limit
Aggregate Organic Constituents					
Chemical Oxygen Demand		mg/L	80	50	30
Inorganic Nonmetallic Parameters					
Ammonia - N		mg/L	19.9	0.048	<0.025
Ammonium/Ammonia			Yes	Yes	Yes
Preservation					
Kjeldahl Nitrogen	Total	mg/L	20.9	0.20	<0.07
Nitrogen	Total	mg/L	20.9	0.87	<0.20
Phosphorus	Total - Low Level	mg/L	0.043	0.294	0.327
Organic Carbon	Dissolved Nonpurgeable	mg/L	14.0	0.6	<0.5
Metals Dissolved					
Silicon	Dissolved	mg/L	3.72	8.13	11.4
Sulfur	Dissolved	mg/L	1.0	63.6	0.5
Mercury	Dissolved	mg/L	<0.000005	<0.000005	<0.000005
Aluminum	Dissolved	mg/L	0.024	2.55	2.22
Antimony	Dissolved	mg/L	0.0003	<0.0002	<0.0002
Arsenic	Dissolved	mg/L	0.0015	0.0011	0.0004
Barium	Dissolved	mg/L	0.381	0.085	0.040
Beryllium	Dissolved	mg/L	<0.0001	0.0001	<0.0001
Bismuth	Dissolved	mg/L	<0.0005	<0.0005	<0.0005
Boron	Dissolved	mg/L	0.776	0.239	0.009
Cadmium	Dissolved	mg/L	<0.00001	0.00022	0.00003
Chromium	Dissolved	mg/L	0.0006	0.0026	0.0016
Cobalt	Dissolved	mg/L	0.0002	0.0016	0.0012
Copper	Dissolved	mg/L	<0.001	0.013	0.006
Lead	Dissolved	mg/L	<0.0001	0.0046	0.0022
Lithium	Dissolved	mg/L	<0.001	0.002	0.002
Molybdenum	Dissolved	mg/L	<0.001	<0.001	<0.001
Nickel	Dissolved	mg/L	0.0042	0.0022	0.0010
Selenium	Dissolved	mg/L	<0.0002	<0.0002	<0.0002
Silver	Dissolved	mg/L	<0.00001	0.00002	<0.00001
Strontium	Dissolved	mg/L	0.485	0.653	0.064
Thallium	Dissolved	mg/L	<0.00005	<0.00005	<0.00005
Tin	Dissolved	mg/L	<0.001	<0.001	<0.001
Titanium	Dissolved	mg/L	0.0010	0.122	0.0555
Uranium	Dissolved	mg/L	<0.0005	0.0008	<0.0005
Vanadium	Dissolved	mg/L	0.0008	0.0108	0.0050
Zinc	Dissolved	mg/L	0.004	0.031	0.014
Zirconium	Dissolved	mg/L	<0.001	<0.001	<0.001
Subsample			Field Filtered	Field Filtered	Field Filtered

Analytical Report

Bill To: Sunshine Coast Regional District	Project ID:	Lot ID: 1603388
1975 Field Road	Project Name: Sechelt Landfill	Control Number:
Sechelt, BC, Canada	Groundwater	Date Received: Oct 3, 2022
V0N 3A1	Project Location: Sechelt	Date Reported: Oct 12, 2022
Attn: Accounts Payable	LSD:	Report Number: 2794101
Sampled By: Sandi Bandara	P.O.: 3004082	
Company: SCRD	Proj. Acct. code:	

		Reference Number	1603388-4	1603388-5	1603388-6
		Sample Date	Sep 27, 2022	Sep 27, 2022	Sep 27, 2022
		Sample Time	NA	NA	NA
		Sample Location		MW1	
		Sample Description	MW 3 / 18.3 °C	MW 1A / 18.3 °C	MW 13-04 / 18.3 °C
		Matrix	Water	Water	Water
Analyte		Units	Results	Results	Results
Nominal Detection Limit					
Physical and Aggregate Properties					
Turbidity		NTU	11.9	48.1	167
Routine Water					
pH			7.64	7.01	7.25
Temperature of observed pH		°C	20.4	20.7	20.8
Calcium	Dissolved	mg/L	65.7	82.8	7.3
Magnesium	Dissolved	mg/L	12.8	7.9	1.5
Sodium	Dissolved	mg/L	82.0	10.3	3.4
Potassium	Dissolved	mg/L	31.5	2.4	0.8
Iron	Dissolved	mg/L	4.91	2.76	2.04
Manganese	Dissolved	mg/L	0.854	0.150	0.074
Hardness	Dissolved as CaCO ₃	mg/L	217	239	25
Salinity	Dissolved as NaCl	g/L	0.207	0.026	0.008
Electrical Conductivity		µS/cm at 25 °C	1019	508	53
Bicarbonate		mg/L	435	56	25
Carbonate		mg/L	<6	<6	<6
Hydroxide		mg/L	<5	<5	<5
P-Alkalinity	as CaCO ₃	mg/L	<5	<5	<5
T-Alkalinity	as CaCO ₃	mg/L	357	46	21
Chloride	Dissolved	mg/L	94.1	25.0	2.00
Nitrate - N	Dissolved	mg/L	<0.1	0.6	0.09
Nitrite - N	Dissolved	mg/L	<0.1	<0.1	<0.01
Nitrate and Nitrite - N	Dissolved	mg/L	<0.20	0.6	0.09
Sulfate (SO ₄)	Dissolved	mg/L	1	162	1.6
Mono-Aromatic Hydrocarbons - Water					
4-Bromofluorobenzene	Surrogate	%	90	90	100
Toluene-d ₈	Surrogate	%	101	101	102
Volatile Petroleum Hydrocarbons - Water					
VHw6-10		mg/L	<0.05	<0.05	<0.05
VPW (VHw6-10 minus BTEX)		mg/L	<0.05	<0.05	<0.05
VOC Screen - Drinking Water					
Benzene		mg/L	0.0001	<0.0001	<0.0001
Bromobenzene		mg/L	<0.0001	<0.0001	<0.0001
Bromochloromethane		mg/L	<0.0001	<0.0001	<0.0001
Bromodichloromethane		mg/L	<0.0001	<0.0001	<0.0001
Bromoform		mg/L	<0.0001	<0.0001	<0.0001
Bromomethane		mg/L	<0.001	<0.001	<0.001

Analytical Report

Bill To: Sunshine Coast Regional District	Project ID:	Lot ID: 1603388
1975 Field Road	Project Name: Sechelt Landfill	Control Number:
Sechelt, BC, Canada	Groundwater	Date Received: Oct 3, 2022
V0N 3A1	Project Location: Sechelt	Date Reported: Oct 12, 2022
Attn: Accounts Payable	LSD:	Report Number: 2794101
Sampled By: Sandi Bandara	P.O.: 3004082	
Company: SCRD	Proj. Acct. code:	

	Reference Number	1603388-4	1603388-5	1603388-6	
	Sample Date	Sep 27, 2022	Sep 27, 2022	Sep 27, 2022	
	Sample Time	NA	NA	NA	
	Sample Location		MW1		
	Sample Description	MW 3 / 18.3 °C	MW 1A / 18.3 °C	MW 13-04 / 18.3 °C	
	Matrix	Water	Water	Water	
Analyte	Units	Results	Results	Results	Nominal Detection Limit
VOC Screen - Drinking Water - Continued					
n-Butylbenzene	mg/L	<0.0001	<0.0001	<0.0001	0.0001
sec-Butylbenzene	mg/L	<0.0001	<0.0001	<0.0001	0.0001
tert-Butylbenzene	mg/L	<0.0001	<0.0001	<0.0001	0.0001
Carbon Tetrachloride	mg/L	<0.0005	<0.0005	<0.0005	0.0005
Chlorobenzene	mg/L	<0.0001	<0.0001	<0.0001	0.0001
Chloroethane	mg/L	<0.001	<0.001	<0.001	0.001
Chloroform	mg/L	<0.0001	<0.0001	<0.0001	0.0001
Chloromethane	mg/L	<0.001	<0.001	0.001	0.001
2-Chlorotoluene	mg/L	<0.0001	<0.0001	<0.0001	0.0001
4-Chlorotoluene	mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,2-Dibromo-3-Chloropropane	mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,2-Dibromoethane	mg/L	<0.0001	<0.0001	<0.0001	0.0001
Dibromomethane	mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,2-Dichlorobenzene	mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,3-Dichlorobenzene	mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,4-Dichlorobenzene	mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,1-Dichloroethane	mg/L	<0.0001	<0.0001	<0.0001	0.0001
Dibromochloromethane	mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,2-Dichloroethane	mg/L	<0.0005	<0.0005	<0.0005	0.0005
1,1-Dichloroethene	mg/L	<0.0005	<0.0005	<0.0005	0.0005
1,2-Dichloroethene(cis)	mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,2-Dichloroethene(trans)	mg/L	<0.0001	<0.0001	<0.0001	0.0001
Dichlorodifluoromethane	mg/L	<0.001	<0.001	<0.001	0.001
1,2-Dichloropropane	mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,3-Dichloropropane	mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,1-Dichloropropene	mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,3-Dichloropropene(cis)	mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,3-Dichloropropene(trans)	mg/L	<0.0001	<0.0001	<0.0001	0.0001
Ethylbenzene	mg/L	<0.0001	<0.0001	<0.0001	0.0001
Hexachlorobutadiene	mg/L	<0.0001	<0.0001	<0.0001	0.0001
p-Isopropyltoluene	mg/L	<0.001	<0.001	<0.001	0.001
Methylene Chloride	mg/L	<0.01	<0.01	<0.01	0.01
Methyl t-Butyl Ether	mg/L	<0.0001	<0.0001	<0.0001	0.0001
iso-Propylbenzene	mg/L	0.0001	<0.0001	<0.0001	0.0001
n-Propylbenzene	mg/L	<0.0001	<0.0001	<0.0001	0.0001
Styrene	mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,1,1,2-Tetrachloroethane	mg/L	<0.001	<0.001	<0.001	0.001
1,1,2,2-Tetrachloroethane	mg/L	<0.0001	<0.0001	<0.0001	0.0001

Analytical Report

Bill To: Sunshine Coast Regional District	Project ID:	Lot ID: 1603388
1975 Field Road	Project Name: Sechelt Landfill	Control Number:
Sechelt, BC, Canada	Groundwater	Date Received: Oct 3, 2022
V0N 3A1	Project Location: Sechelt	Date Reported: Oct 12, 2022
Attn: Accounts Payable	LSD:	Report Number: 2794101
Sampled By: Sandi Bandara	P.O.: 3004082	
Company: SCRD	Proj. Acct. code:	

		Reference Number	1603388-4	1603388-5	1603388-6
		Sample Date	Sep 27, 2022	Sep 27, 2022	Sep 27, 2022
		Sample Time	NA	NA	NA
		Sample Location		MW1	
		Sample Description	MW 3 / 18.3 °C	MW-1A / 18.3 °C	MW 13-04 / 18.3 °C
		Matrix	Water	Water	Water
Analyte	Units	Results	Results	Results	Nominal Detection Limit
VOC Screen - Drinking Water - Continued					
Tetrachloroethene	mg/L	<0.0005	<0.0005	<0.0005	0.0005
Toluene	mg/L	0.0002	<0.0001	<0.0001	0.0001
1,2,3-Trichlorobenzene	mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,2,4-Trichlorobenzene	mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,1,1-Trichloroethane	mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,1,2-Trichloroethane	mg/L	<0.0001	<0.0001	<0.0001	0.0001
Trichloroethene	mg/L	<0.0005	<0.0005	<0.0005	0.0005
Trichlorofluoromethane	mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,2,3-Trichloropropane	mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,2,4-Trimethylbenzene	mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,3,5-Trimethylbenzene	mg/L	<0.0001	<0.0001	<0.0001	0.0001
Total Xylenes (m,p,o)	mg/L	<0.0001	<0.0001	<0.0001	0.0001
Vinyl Chloride	mg/L	<0.0005	<0.0005	<0.0005	0.0005
Xylene-m&p	mg/L	<0.0001	<0.0001	<0.0001	0.0001
Xylene-o	mg/L	<0.0001	<0.0001	<0.0001	0.0001
VOC - Drinking Water - Surrogate Recovery					
Dibromofluoromethane	EPA Surrogate	%	123	116	117
Toluene-d8	EPA Surrogate	%	100	95	101
Bromofluorobenzene	EPA Surrogate	%	107	98	90

Analytical Report

Bill To: Sunshine Coast Regional District	Project ID:	Lot ID: 1603388
1975 Field Road	Project Name: Sechelt Landfill	Control Number:
Sechelt, BC, Canada	Groundwater	Date Received: Oct 3, 2022
V0N 3A1	Project Location: Sechelt	Date Reported: Oct 12, 2022
Attn: Accounts Payable	LSD:	Report Number: 2794101
Sampled By: Sandi Bandara	P.O.: 3004082	
Company: SCRD	Proj. Acct. code:	

		Reference Number	1603388-7	1603388-8	1603388-9
		Sample Date	Sep 27, 2022	Sep 27, 2022	Sep 27, 2022
		Sample Time	NA	NA	NA
		Sample Location			MW4
		Sample Description	MW 22-02 / 18.3 °C	MW 22-03 / 18.3 °C	MW 4 - A / 18.3 °C
		Matrix	Water	Water	Water
Analyte		Units	Results	Results	Results
Nominal Detection Limit					
Aggregate Organic Constituents					
Chemical Oxygen Demand		mg/L	20	50	30
Inorganic Nonmetallic Parameters					
Ammonia - N		mg/L	<0.025	96.7	<0.025
Ammonium/Ammonia			Yes	Yes	Yes
Preservation					
Kjeldahl Nitrogen	Total	mg/L	<0.07	94.4	0.07
Nitrogen	Total	mg/L	0.18	94.4	0.17
Phosphorus	Total - Low Level	mg/L	0.044	0.400	0.033
Organic Carbon	Dissolved Nonpurgeable	mg/L	<0.5	6.7	1.7
Metals Dissolved					
Silicon	Dissolved	mg/L	10.3	14.9	12.7
Sulfur	Dissolved	mg/L	0.6	<0.3	3.0
Mercury	Dissolved	mg/L	<0.000005	<0.000005	<0.000005
Aluminum	Dissolved	mg/L	0.544	0.225	0.188
Antimony	Dissolved	mg/L	0.0003	0.0002	<0.0002
Arsenic	Dissolved	mg/L	<0.0002	0.0053	<0.0002
Barium	Dissolved	mg/L	0.011	0.186	0.047
Beryllium	Dissolved	mg/L	<0.0001	<0.0001	<0.0001
Bismuth	Dissolved	mg/L	<0.0005	<0.0005	<0.0005
Boron	Dissolved	mg/L	0.005	0.082	0.022
Cadmium	Dissolved	mg/L	0.00001	<0.00001	0.00006
Chromium	Dissolved	mg/L	0.0009	0.0006	0.0009
Cobalt	Dissolved	mg/L	0.0014	0.0009	0.0003
Copper	Dissolved	mg/L	0.001	0.001	0.001
Lead	Dissolved	mg/L	0.0004	0.0002	0.0002
Lithium	Dissolved	mg/L	<0.001	0.001	0.004
Molybdenum	Dissolved	mg/L	<0.001	<0.001	<0.001
Nickel	Dissolved	mg/L	0.0006	0.0022	0.0006
Selenium	Dissolved	mg/L	<0.0002	<0.0002	<0.0002
Silver	Dissolved	mg/L	<0.00001	<0.00001	0.00001
Strontium	Dissolved	mg/L	0.053	1.20	0.654
Thallium	Dissolved	mg/L	<0.00005	<0.00005	<0.00005
Tin	Dissolved	mg/L	<0.001	<0.001	<0.001
Titanium	Dissolved	mg/L	0.0226	0.0100	0.0133
Uranium	Dissolved	mg/L	<0.0005	<0.0005	<0.0005
Vanadium	Dissolved	mg/L	0.0017	0.0019	0.0005
Zinc	Dissolved	mg/L	0.006	0.007	0.006
Zirconium	Dissolved	mg/L	<0.001	<0.001	<0.001
Subsample			Field Filtered	Field Filtered	Field Filtered

Analytical Report

Bill To: Sunshine Coast Regional District	Project ID:	Lot ID: 1603388
1975 Field Road	Project Name: Sechelt Landfill	Control Number:
Sechelt, BC, Canada	Groundwater	Date Received: Oct 3, 2022
V0N 3A1	Project Location: Sechelt	Date Reported: Oct 12, 2022
Attn: Accounts Payable	LSD:	Report Number: 2794101
Sampled By: Sandi Bandara	P.O.: 3004082	
Company: SCRD	Proj. Acct. code:	

		Reference Number	1603388-7	1603388-8	1603388-9
		Sample Date	Sep 27, 2022	Sep 27, 2022	Sep 27, 2022
		Sample Time	NA	NA	NA
		Sample Location			MW4
		Sample Description	MW 22-02 / 18.3 °C	MW 22-03 / 18.3 °C	MW 4-A / 18.3 °C
		Matrix	Water	Water	Water
Analyte		Units	Results	Results	Results
Nominal Detection Limit					
Physical and Aggregate Properties					
Turbidity		NTU	46.6	172	1.94
Routine Water					
pH			7.74	7.33	7.05
Temperature of observed pH		°C	20.4	20.7	20.2
Calcium	Dissolved	mg/L	14.3	56.1	64.9
Magnesium	Dissolved	mg/L	1.7	7.6	10.7
Sodium	Dissolved	mg/L	4.2	38.3	14.2
Potassium	Dissolved	mg/L	0.8	17.3	5.1
Iron	Dissolved	mg/L	0.54	17.9	0.33
Manganese	Dissolved	mg/L	0.038	5.65	0.040
Hardness	Dissolved as CaCO ₃	mg/L	42.4	172	206
Salinity	Dissolved as NaCl	g/L	0.011	0.096	0.036
Electrical Conductivity		µS/cm at 25 °C	102	1281	450
Bicarbonate		mg/L	57	714	266
Carbonate		mg/L	<6	<6	<6
Hydroxide		mg/L	<5	<5	<5
P-Alkalinity	as CaCO ₃	mg/L	<5	<5	<5
T-Alkalinity	as CaCO ₃	mg/L	47	586	218
Chloride	Dissolved	mg/L	1.19	24.2	6.21
Nitrate - N	Dissolved	mg/L	0.16	<0.1	<0.01
Nitrite - N	Dissolved	mg/L	<0.01	<0.1	<0.01
Nitrate and Nitrite - N	Dissolved	mg/L	0.16	<0.20	<0.020
Sulfate (SO ₄)	Dissolved	mg/L	2.1	<1	10.0
Mono-Aromatic Hydrocarbons - Water					
4-Bromofluorobenzene	Surrogate	%	100	100	90
Toluene-d8	Surrogate	%	102	102	100
Volatile Petroleum Hydrocarbons - Water					
VHw6-10		mg/L	<0.05	<0.05	<0.05
VPW (VHw6-10 minus BTEX)		mg/L	<0.05	<0.05	<0.05
VOC Screen - Drinking Water					
Benzene		mg/L	<0.0001	0.0016	<0.0001
Bromobenzene		mg/L	<0.0001	<0.0001	<0.0001
Bromochloromethane		mg/L	<0.0001	<0.0001	<0.0001
Bromodichloromethane		mg/L	<0.0001	<0.0001	<0.0001
Bromoform		mg/L	<0.0001	<0.0001	<0.0001
Bromomethane		mg/L	<0.001	<0.001	<0.001

Analytical Report

Bill To: Sunshine Coast Regional District	Project ID:	Lot ID: 1603388
1975 Field Road	Project Name: Sechelt Landfill	Control Number:
Sechelt, BC, Canada	Groundwater	Date Received: Oct 3, 2022
V0N 3A1	Project Location: Sechelt	Date Reported: Oct 12, 2022
Attn: Accounts Payable	LSD:	Report Number: 2794101
Sampled By: Sandi Bandara	P.O.: 3004082	
Company: SCRD	Proj. Acct. code:	

Reference Number	1603388-7	1603388-8	1603388-9
Sample Date	Sep 27, 2022	Sep 27, 2022	Sep 27, 2022
Sample Time	NA	NA	NA
Sample Location			MW4
Sample Description	MW 22-02 / 18.3 °C	MW 22-03 / 18.3 °C	MW 4 - A / 18.3 °C

	Matrix	Water	Water	Water	
Analyte	Units	Results	Results	Results	Nominal Detection Limit
VOC Screen - Drinking Water - Continued					
n-Butylbenzene	mg/L	<0.0001	<0.0001	<0.0001	0.0001
sec-Butylbenzene	mg/L	<0.0001	<0.0001	<0.0001	0.0001
tert-Butylbenzene	mg/L	<0.0001	<0.0001	<0.0001	0.0001
Carbon Tetrachloride	mg/L	<0.0005	<0.0005	<0.0005	0.0005
Chlorobenzene	mg/L	<0.0001	0.0016	<0.0001	0.0001
Chloroethane	mg/L	<0.001	<0.001	<0.001	0.001
Chloroform	mg/L	<0.0001	<0.0001	<0.0001	0.0001
Chloromethane	mg/L	<0.001	<0.001	<0.001	0.001
2-Chlorotoluene	mg/L	<0.0001	<0.0001	<0.0001	0.0001
4-Chlorotoluene	mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,2-Dibromo-3-Chloropropane	mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,2-Dibromoethane	mg/L	<0.0001	<0.0001	<0.0001	0.0001
Dibromomethane	mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,2-Dichlorobenzene	mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,3-Dichlorobenzene	mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,4-Dichlorobenzene	mg/L	<0.0001	0.0002	<0.0001	0.0001
1,1-Dichloroethane	mg/L	<0.0001	0.0002	<0.0001	0.0001
Dibromochloromethane	mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,2-Dichloroethane	mg/L	<0.0005	<0.0005	<0.0005	0.0005
1,1-Dichloroethene	mg/L	<0.0005	<0.0005	<0.0005	0.0005
1,2-Dichloroethene(cis)	mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,2-Dichloroethene(trans)	mg/L	<0.0001	<0.0001	<0.0001	0.0001
Dichlorodifluoromethane	mg/L	<0.001	<0.001	<0.001	0.001
1,2-Dichloropropane	mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,3-Dichloropropane	mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,1-Dichloropropene	mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,3-Dichloropropene(cis)	mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,3-Dichloropropene(trans)	mg/L	<0.0001	<0.0001	<0.0001	0.0001
Ethylbenzene	mg/L	<0.0001	<0.0001	<0.0001	0.0001
Hexachlorobutadiene	mg/L	<0.0001	<0.0001	<0.0001	0.0001
p-Isopropyltoluene	mg/L	<0.001	<0.001	<0.001	0.001
Methylene Chloride	mg/L	<0.01	<0.01	<0.01	0.01
Methyl t-Butyl Ether	mg/L	<0.0001	0.0037	0.0011	0.0001
iso-Propylbenzene	mg/L	<0.0001	0.0003	<0.0001	0.0001
n-Propylbenzene	mg/L	<0.0001	<0.0001	<0.0001	0.0001
Styrene	mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,1,1,2-Tetrachloroethane	mg/L	<0.001	<0.001	<0.001	0.001
1,1,2,2-Tetrachloroethane	mg/L	<0.0001	<0.0001	<0.0001	0.0001

Analytical Report

Bill To: Sunshine Coast Regional District	Project ID:	Lot ID: 1603388
1975 Field Road	Project Name: Sechelt Landfill	Control Number:
Sechelt, BC, Canada	Groundwater	Date Received: Oct 3, 2022
V0N 3A1	Project Location: Sechelt	Date Reported: Oct 12, 2022
Attn: Accounts Payable	LSD:	Report Number: 2794101
Sampled By: Sandi Bandara	P.O.: 3004082	
Company: SCRD	Proj. Acct. code:	

		Reference Number	1603388-7	1603388-8	1603388-9
		Sample Date	Sep 27, 2022	Sep 27, 2022	Sep 27, 2022
		Sample Time	NA	NA	NA
		Sample Location			MW4
		Sample Description	MW 22-02 / 18.3 °C	MW 22-03 / 18.3 °C	MW 4-A / 18.3 °C
		Matrix	Water	Water	Water
Analyte	Units	Results	Results	Results	Nominal Detection Limit
VOC Screen - Drinking Water - Continued					
Tetrachloroethene	mg/L	<0.0005	<0.0005	<0.0005	0.0005
Toluene	mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,2,3-Trichlorobenzene	mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,2,4-Trichlorobenzene	mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,1,1-Trichloroethane	mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,1,2-Trichloroethane	mg/L	<0.0001	<0.0001	<0.0001	0.0001
Trichloroethene	mg/L	<0.0005	<0.0005	<0.0005	0.0005
Trichlorofluoromethane	mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,2,3-Trichloropropane	mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,2,4-Trimethylbenzene	mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,3,5-Trimethylbenzene	mg/L	<0.0001	<0.0001	<0.0001	0.0001
Total Xylenes (m,p,o)	mg/L	<0.0001	<0.0001	<0.0001	0.0001
Vinyl Chloride	mg/L	<0.0005	<0.0005	<0.0005	0.0005
Xylene-m&p	mg/L	<0.0001	<0.0001	<0.0001	0.0001
Xylene-o	mg/L	<0.0001	<0.0001	<0.0001	0.0001
VOC - Drinking Water - Surrogate Recovery					
Dibromofluoromethane	EPA Surrogate	%	115	118	110
Toluene-d8	EPA Surrogate	%	100	100	96
Bromofluorobenzene	EPA Surrogate	%	95	88	112

Analytical Report

Bill To: Sunshine Coast Regional District	Project ID:	Lot ID: 1603388
1975 Field Road	Project Name: Sechelt Landfill	Control Number:
Sechelt, BC, Canada	Groundwater	Date Received: Oct 3, 2022
V0N 3A1	Project Location: Sechelt	Date Reported: Oct 12, 2022
Attn: Accounts Payable	LSD:	Report Number: 2794101
Sampled By: Sandi Bandara	P.O.: 3004082	
Company: SCRD	Proj. Acct. code:	

Reference Number 1603388-10
Sample Date Sep 27, 2022
Sample Time NA
Sample Location
Sample Description Duplicate / 18.3 °C

		Matrix	Water		
Analyte		Units	Results	Results	Nominal Detection Limit
Aggregate Organic Constituents					
Chemical Oxygen Demand		mg/L	20		10
Inorganic Nonmetallic Parameters					
Ammonia - N		mg/L	<0.025		0.025
Ammonium/Ammonia			Yes		
Preservation					
Kjeldahl Nitrogen	Total	mg/L	<0.07		0.1
Nitrogen	Total	mg/L	0.18		0.1
Phosphorus	Total - Low Level	mg/L	0.024		0.005
Organic Carbon	Dissolved Nonpurgeable	mg/L	<0.5		0.5
Metals Dissolved					
Silicon	Dissolved	mg/L	10.3		0.05
Sulfur	Dissolved	mg/L	0.6		0.3
Mercury	Dissolved	mg/L	<0.000005		0.000005
Aluminum	Dissolved	mg/L	0.315		0.002
Antimony	Dissolved	mg/L	0.0003		0.0002
Arsenic	Dissolved	mg/L	<0.0002		0.0002
Barium	Dissolved	mg/L	0.007		0.001
Beryllium	Dissolved	mg/L	<0.0001		0.0001
Bismuth	Dissolved	mg/L	<0.0005		0.0005
Boron	Dissolved	mg/L	0.003		0.002
Cadmium	Dissolved	mg/L	0.00001		0.00001
Chromium	Dissolved	mg/L	0.0005		0.0005
Cobalt	Dissolved	mg/L	0.0011		0.0001
Copper	Dissolved	mg/L	0.001		0.001
Lead	Dissolved	mg/L	0.0002		0.0001
Lithium	Dissolved	mg/L	<0.001		0.001
Molybdenum	Dissolved	mg/L	<0.001		0.001
Nickel	Dissolved	mg/L	0.0006		0.0005
Selenium	Dissolved	mg/L	<0.0002		0.0002
Silver	Dissolved	mg/L	<0.00001		0.00001
Strontium	Dissolved	mg/L	0.052		0.001
Thallium	Dissolved	mg/L	<0.00005		0.00005
Tin	Dissolved	mg/L	<0.001		0.001
Titanium	Dissolved	mg/L	0.0136		0.0005
Uranium	Dissolved	mg/L	<0.0005		0.0005
Vanadium	Dissolved	mg/L	0.0013		0.0001
Zinc	Dissolved	mg/L	0.006		0.001
Zirconium	Dissolved	mg/L	<0.001		0.001
Subsample			Field Filtered		

Analytical Report

Bill To: Sunshine Coast Regional District	Project ID:	Lot ID: 1603388
1975 Field Road	Project Name: Sechelt Landfill	Control Number:
Sechelt, BC, Canada	Groundwater	Date Received: Oct 3, 2022
V0N 3A1	Project Location: Sechelt	Date Reported: Oct 12, 2022
Attn: Accounts Payable	LSD:	Report Number: 2794101
Sampled By: Sandi Bandara	P.O.: 3004082	
Company: SCRD	Proj. Acct. code:	

Reference Number	1603388-10
Sample Date	Sep 27, 2022
Sample Time	NA
Sample Location	
Sample Description	Duplicate / 18.3 °C

		Matrix	Water		
Analyte		Units	Results	Results	Nominal Detection Limit
Physical and Aggregate Properties					
Turbidity		NTU	11.3		0.1
Routine Water					
pH			7.55		1
Temperature of observed pH		°C	20.2		
Calcium	Dissolved	mg/L	14.1		0.2
Magnesium	Dissolved	mg/L	1.6		0.2
Sodium	Dissolved	mg/L	4.3		0.4
Potassium	Dissolved	mg/L	0.8		0.4
Iron	Dissolved	mg/L	0.32		0.01
Manganese	Dissolved	mg/L	0.031		0.005
Hardness	Dissolved as CaCO ₃	mg/L	42.0		
Salinity	Dissolved as NaCl	g/L	0.011		0.001
Electrical Conductivity		µS/cm at 25 °C	101		1
Bicarbonate		mg/L	55		5
Carbonate		mg/L	<6		6
Hydroxide		mg/L	<5		5
P-Alkalinity	as CaCO ₃	mg/L	<5		5
T-Alkalinity	as CaCO ₃	mg/L	45		5
Chloride	Dissolved	mg/L	1.23		0.05
Nitrate - N	Dissolved	mg/L	0.18		0.01
Nitrite - N	Dissolved	mg/L	<0.01		0.01
Nitrate and Nitrite - N	Dissolved	mg/L	0.18		0.01
Sulfate (SO ₄)	Dissolved	mg/L	2.1		0.1
Mono-Aromatic Hydrocarbons - Water					
4-Bromofluorobenzene	Surrogate	%	100		70-130
Toluene-d ₈	Surrogate	%	101		70-130
Volatile Petroleum Hydrocarbons - Water					
VHw6-10		mg/L	<0.05		0.05
VPW (VHw6-10 minus BTEX)		mg/L	<0.05		0.05
VOC Screen - Drinking Water					
Benzene		mg/L	<0.0001		0.0001
Bromobenzene		mg/L	<0.0001		0.0001
Bromochloromethane		mg/L	<0.0001		0.0001
Bromodichloromethane		mg/L	<0.0001		0.0001
Bromoform		mg/L	<0.0001		0.0001
Bromomethane		mg/L	<0.001		0.001

Analytical Report

Bill To: Sunshine Coast Regional District	Project ID:	Lot ID: 1603388
1975 Field Road	Project Name: Sechelt Landfill	Control Number:
Sechelt, BC, Canada	Groundwater	Date Received: Oct 3, 2022
V0N 3A1	Project Location: Sechelt	Date Reported: Oct 12, 2022
Attn: Accounts Payable	LSD:	Report Number: 2794101
Sampled By: Sandi Bandara	P.O.: 3004082	
Company: SCRD	Proj. Acct. code:	

Reference Number 1603388-10
Sample Date Sep 27, 2022
Sample Time NA
Sample Location
Sample Description Duplicate / 18.3 °C

Analyte	Matrix		Water		
	Units	Results	Results	Results	Nominal Detection Limit
VOC Screen - Drinking Water - Continued					
n-Butylbenzene	mg/L	<0.0001			0.0001
sec-Butylbenzene	mg/L	<0.0001			0.0001
tert-Butylbenzene	mg/L	<0.0001			0.0001
Carbon Tetrachloride	mg/L	<0.0005			0.0005
Chlorobenzene	mg/L	<0.0001			0.0001
Chloroethane	mg/L	<0.001			0.001
Chloroform	mg/L	<0.0001			0.0001
Chloromethane	mg/L	<0.001			0.001
2-Chlorotoluene	mg/L	<0.0001			0.0001
4-Chlorotoluene	mg/L	<0.0001			0.0001
1,2-Dibromo-3-Chloropropane	mg/L	<0.0001			0.0001
1,2-Dibromoethane	mg/L	<0.0001			0.0001
Dibromomethane	mg/L	<0.0001			0.0001
1,2-Dichlorobenzene	mg/L	<0.0001			0.0001
1,3-Dichlorobenzene	mg/L	<0.0001			0.0001
1,4-Dichlorobenzene	mg/L	<0.0001			0.0001
1,1-Dichloroethane	mg/L	<0.0001			0.0001
Dibromochloromethane	mg/L	<0.0001			0.0001
1,2-Dichloroethane	mg/L	<0.0005			0.0005
1,1-Dichloroethene	mg/L	<0.0005			0.0005
1,2-Dichloroethene(cis)	mg/L	<0.0001			0.0001
1,2-Dichloroethene(trans)	mg/L	<0.0001			0.0001
Dichlorodifluoromethane	mg/L	<0.001			0.001
1,2-Dichloropropane	mg/L	<0.0001			0.0001
1,3-Dichloropropane	mg/L	<0.0001			0.0001
1,1-Dichloropropene	mg/L	<0.0001			0.0001
1,3-Dichloropropene(cis)	mg/L	<0.0001			0.0001
1,3-Dichloropropene(trans)	mg/L	<0.0001			0.0001
Ethylbenzene	mg/L	<0.0001			0.0001
Hexachlorobutadiene	mg/L	<0.0001			0.0001
p-Isopropyltoluene	mg/L	<0.001			0.001
Methylene Chloride	mg/L	<0.01			0.01
Methyl t-Butyl Ether	mg/L	<0.0001			0.0001
iso-Propylbenzene	mg/L	<0.0001			0.0001
n-Propylbenzene	mg/L	<0.0001			0.0001
Styrene	mg/L	<0.0001			0.0001
1,1,1,2-Tetrachloroethane	mg/L	<0.001			0.001
1,1,2,2-Tetrachloroethane	mg/L	<0.0001			0.0001

Analytical Report

Bill To: Sunshine Coast Regional District	Project ID:	Lot ID: 1603388
1975 Field Road	Project Name: Sechelt Landfill	Control Number:
Sechelt, BC, Canada	Groundwater	Date Received: Oct 3, 2022
V0N 3A1	Project Location: Sechelt	Date Reported: Oct 12, 2022
Attn: Accounts Payable	LSD:	Report Number: 2794101
Sampled By: Sandi Bandara	P.O.: 3004082	
Company: SCRD	Proj. Acct. code:	

Reference Number 1603388-10
Sample Date Sep 27, 2022
Sample Time NA
Sample Location
Sample Description Duplicate / 18.3 °C

		Matrix	Water			
Analyte		Units	Results	Results	Results	Nominal Detection Limit
VOC Screen - Drinking Water - Continued						
Tetrachloroethene		mg/L	<0.0005			0.0005
Toluene		mg/L	<0.0001			0.0001
1,2,3-Trichlorobenzene		mg/L	<0.0001			0.0001
1,2,4-Trichlorobenzene		mg/L	<0.0001			0.0001
1,1,1-Trichloroethane		mg/L	<0.0001			0.0001
1,1,2-Trichloroethane		mg/L	<0.0001			0.0001
Trichloroethene		mg/L	<0.0005			0.0005
Trichlorofluoromethane		mg/L	<0.0001			0.0001
1,2,3-Trichloropropane		mg/L	<0.0001			0.0001
1,2,4-Trimethylbenzene		mg/L	<0.0001			0.0001
1,3,5-Trimethylbenzene		mg/L	<0.0001			0.0001
Total Xylenes (m,p,o)		mg/L	<0.0001			0.0001
Vinyl Chloride		mg/L	<0.0005			0.0005
Xylene-m&p		mg/L	<0.0001			0.0001
Xylene-o		mg/L	<0.0001			0.0001
VOC - Drinking Water - Surrogate Recovery						
Dibromofluoromethane	EPA Surrogate	%	113			50-140
Toluene-d8	EPA Surrogate	%	97			50-140
Bromofluorobenzene	EPA Surrogate	%	88			50-140

Approved by:



Abhishek Suryawanshi
Operations Manager

Data have been validated by Analytical Quality Control and Element's Integrated Data Validation System (IDVS).

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Methodology and Notes

Bill To: Sunshine Coast Regional District	Project ID:	Lot ID: 1603388
1975 Field Road	Project Name: Sechelt Landfill	Control Number:
Sechelt, BC, Canada	Groundwater	Date Received: Oct 3, 2022
V0N 3A1	Project Location: Sechelt	Date Reported: Oct 12, 2022
Attn: Accounts Payable	LSD:	Report Number: 2794101
Sampled By: Sandi Bandara	P.O.: 3004082	
Company: SCRD	Proj. Acct. code:	

Method of Analysis

Method Name	Reference	Method	Date Analysis Started	Location
Alk, pH, EC, Turb in water (BC)	APHA	* Alkalinity - Titration Method, 2320 B	Oct 5, 2022	Element Vancouver
Alk, pH, EC, Turb in water (BC)	APHA	* Conductivity, 2510 B	Oct 5, 2022	Element Vancouver
Alkalinity, pH, and EC in water	APHA	* pH - Electrometric Method, 4500-H+ B	Oct 5, 2022	Element Edmonton - Roper Road
Ammonium-N in Water	APHA	* Automated Phenate Method, 4500-NH3 G	Oct 7, 2022	Element Edmonton - Roper Road
Ammonium-N in Water	APHA	* Automated Phenate Method, 4500-NH3 G	Oct 12, 2022	Element Edmonton - Roper Road
Anions by IEC in water (VAN)	APHA	* Ion Chromatography with Chemical Suppression of Eluent Cond., 4110 B	Oct 3, 2022	Element Vancouver
Anions by IEC in water (VAN)	APHA	* Ion Chromatography with Chemical Suppression of Eluent Cond., 4110 B	Oct 4, 2022	Element Vancouver
Anions by IEC in water (VAN)	APHA	* Single-Column Ion Chromatography with Electronic Suppression, 4110 C	Oct 3, 2022	Element Vancouver
Anions by IEC in water (VAN)	APHA	* Single-Column Ion Chromatography with Electronic Suppression, 4110 C	Oct 4, 2022	Element Vancouver
BTEX-VPH - Water (CLG)	BCELM	* Calculation of Volatile Petroleum Hydrocarbons in Solids, Waters, or Air (Vapour) - VPH (June 26, 2009), VPH	Oct 10, 2022	Element Calgary
Carbon Organic (Dissolved) in water (DOC)	APHA	High-Temperature Combustion Method, 5310 B	Oct 5, 2022	Element Edmonton - Roper Road
Carbon Organic (Dissolved) in water (DOC)	APHA	High-Temperature Combustion Method, 5310 B	Oct 11, 2022	Element Edmonton - Roper Road
Chemical Oxygen Demand (water-VAN)	APHA	* Closed Reflux, Colorimetric Method, 5220 D	Oct 12, 2022	Element Vancouver
Mercury (Dissolved) in water	APHA	* Cold Vapour Atomic Absorption Spectrometric Method, 3112 B	Oct 5, 2022	Element Edmonton - Roper Road
Mercury (Dissolved) in water	APHA	* Cold Vapour Atomic Absorption Spectrometric Method, 3112 B	Oct 11, 2022	Element Edmonton - Roper Road
Mercury (Dissolved) in water	EPA	* Mercury in Water by Cold Vapor Atomic Fluorescence Spectrometry, 245.7	Oct 5, 2022	Element Edmonton - Roper Road
Mercury (Dissolved) in water	EPA	* Mercury in Water by Cold Vapor Atomic Fluorescence Spectrometry, 245.7	Oct 11, 2022	Element Edmonton - Roper Road
Metals ICP-MS (Dissolved) in water	APHA/USEPA	* Metals By Inductively Coupled Plasma/Mass Spectrometry, APHA 3125 B / USEPA 200.2, 200.8	Oct 6, 2022	Element Edmonton - Roper Road
Metals ICP-MS (Dissolved) in water	APHA/USEPA	* Metals By Inductively Coupled Plasma/Mass Spectrometry, APHA 3125 B / USEPA 200.2, 200.8	Oct 11, 2022	Element Edmonton - Roper Road
Metals ICP-MS (Dissolved) in water	US EPA	* Determination of Trace Elements in Waters and Wastes by ICP-MS, 200.8	Oct 6, 2022	Element Edmonton - Roper Road
Metals ICP-MS (Dissolved) in water	US EPA	* Determination of Trace Elements in Waters and Wastes by ICP-MS, 200.8	Oct 11, 2022	Element Edmonton - Roper Road
Metals Trace (Dissolved) in water	APHA	Hardness by Calculation, 2340 B	Oct 6, 2022	Element Edmonton - Roper Road
Metals Trace (Dissolved) in water	APHA	Hardness by Calculation, 2340 B	Oct 11, 2022	Element Edmonton - Roper Road

Methodology and Notes

Bill To: Sunshine Coast Regional District	Project ID:	Lot ID: 1603388
1975 Field Road	Project Name: Sechelt Landfill	Control Number:
Sechelt, BC, Canada	Groundwater	Date Received: Oct 3, 2022
V0N 3A1	Project Location: Sechelt	Date Reported: Oct 12, 2022
Attn: Accounts Payable	LSD:	Report Number: 2794101
Sampled By: Sandi Bandara	P.O.: 3004082	
Company: SCRD	Proj. Acct. code:	

Method Name	Reference	Method	Date Analysis Started	Location
Metals Trace (Dissolved) in water	APHA			Road
Metals Trace (Dissolved) in water	APHA	* Inductively Coupled Plasma (ICP) Method, 3120 B	Oct 6, 2022	Element Edmonton - Roper Road
Metals Trace (Dissolved) in water	APHA	* Inductively Coupled Plasma (ICP) Method, 3120 B	Oct 11, 2022	Element Edmonton - Roper Road
Phosphorus - Total in Water	APHA	* Automated Ascorbic Acid Reduction Method, 4500-P F	Oct 6, 2022	Element Edmonton - Roper Road
Phosphorus - Total in Water	APHA	* Automated Ascorbic Acid Reduction Method, 4500-P F	Oct 11, 2022	Element Edmonton - Roper Road
Total and Kjeldahl Nitrogen (Total) in Water	ISO	* Water Quality - Determination of nitrogen, ISO/TR 11905-2	Oct 5, 2022	Element Edmonton - Roper Road
Turbidity - Water (VAN)	APHA	* Turbidity - Nephelometric Method, 2130 B	Oct 3, 2022	Element Vancouver
Turbidity - Water (VAN)	APHA	* Turbidity - Nephelometric Method, 2130 B	Oct 5, 2022	Element Vancouver
VOC - Drinking Water	US EPA	* US EPA method, 524	Oct 5, 2022	Element Calgary
VOC - Drinking Water	US EPA	* US EPA method, 524	Oct 7, 2022	Element Calgary
VOC - Drinking Water	US EPA	* Volatile Organic Compounds by GCMS / Purge and Trap for Aqueous Samples, 8260/5030	Oct 5, 2022	Element Calgary
VOC - Drinking Water	US EPA	* Volatile Organic Compounds by GCMS / Purge and Trap for Aqueous Samples, 8260/5030	Oct 7, 2022	Element Calgary

* Reference Method Modified

References

APHA	Standard Methods for the Examination of Water and Wastewater
APHA/USEPA	Standard Methods For Water/ Environmental Protection Agency
BCELM	B.C. Environmental Laboratory Manual
EPA	Environmental Protection Agency Test Methods - US
ISO	International Organization for Standardization
US EPA	US Environmental Protection Agency Test Methods

Comments:

- Oct 04, 2022 - Reduction of analytical volume was necessary for anion analysis due to matrix effects in lot 1603388. Detection limits are adjusted accordingly.
- Oct 05, 2022 - Sample 1603388-8; 8288630: Reduction of analytical volume was necessary for anion analysis due to matrix effects in sample 1603388-8. Detection limits are adjusted accordingly.
- Oct 06, 2022 - Sediment was present in the field filtered bottle for Sample 5 to 7 which may affect dissolved metals results.
- Oct 12, 2022 - TKN was less than ammonium for sample 1603388-8. The results were verified and are within expected measurement uncertainty.

Methodology and Notes

Bill To: Sunshine Coast Regional District	Project ID:	Lot ID: 1603388
1975 Field Road	Project Name: Sechelt Landfill	Control Number:
Sechelt, BC, Canada	Groundwater	Date Received: Oct 3, 2022
V0N 3A1	Project Location: Sechelt	Date Reported: Oct 12, 2022
Attn: Accounts Payable	LSD:	Report Number: 2794101
Sampled By: Sandi Bandara	P.O.: 3004082	
Company: SCRD	Proj. Acct. code:	

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Report Transmission Cover Page

Bill To: Sunshine Coast Regional District 1975 Field Road Sechelt, BC, Canada V0N 3A1	Project ID: Project Name: Sechelt Landfill Surface Project Location: Sechelt LSD: P.O.: 3004082 Proj. Acct. code:	Lot ID: 1603414 Control Number: Date Received: Oct 3, 2022 Date Reported: Oct 7, 2022 Report Number: 2794122
Attn: Accounts Payable Sampled By: Sandi Bandara Company: SCRD		

Contact	Company	Address
Accounts Payable	Sunshine Coast Regional District	1975 Field Road Sechelt, BC V0N 3A1 Phone: (604) 885-6800 Fax: Email: accounts.payable@scrd.ca
<u>Delivery</u>	<u>Format</u>	<u>Deliverables</u>
Email - Single Deliverable	PDF	Invoice
Corrina Suveges	Sunshine Coast Regional District	1975 Field Road Sechelt, BC V0N 3A1 Phone: (604) 885-6800 Fax: Email: Corrina.Suveges@scrd.ca
<u>Delivery</u>	<u>Format</u>	<u>Deliverables</u>
Email - Merge Deliverables	PDF	COC / Test Report
Email - Single Deliverable	PDF	COA
Email - Single Deliverable	Sunshine Coast	Test Report
Sandi Bandara	Sunshine Coast Regional District	1975 Field Road Sechelt, BC V0N 3A1 Phone: (604) 885-6800 Fax: Email: sandi.bandara@scrd.ca
<u>Delivery</u>	<u>Format</u>	<u>Deliverables</u>
Email - Multiple Deliverables By Lot	PDF	COC / Test Report
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Email - Single Deliverable	PDF	COA

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Analytical Report

Bill To: Sunshine Coast Regional District	Project ID:	Lot ID: 1603414
1975 Field Road	Project Name: Sechelt Landfill Surface	Control Number:
Sechelt, BC, Canada	Project Location: Sechelt	Date Received: Oct 3, 2022
V0N 3A1	LSD:	Date Reported: Oct 7, 2022
Attn: Accounts Payable	P.O.: 3004082	Report Number: 2794122
Sampled By: Sandi Bandara	Proj. Acct. code:	
Company: SCRD		

		Reference Number	1603414-1	1603414-2	1603414-3	
		Sample Date	Sep 29, 2022	Sep 29, 2022	Sep 29, 2022	
		Sample Time	NA	NA	NA	
		Sample Location				
		Sample Description	SL B / 18.3 °C	SL A / 18.3 °C	Duplicate / 18.3 °C	
		Matrix	Water	Water	Water	
Analyte		Units	Results	Results	Results	Nominal Detection Limit
Aggregate Organic Constituents						
Chemical Oxygen Demand		mg/L	20	20	<10	10
Inorganic Nonmetallic Parameters						
Ammonia - N		mg/L	<0.025	<0.025	<0.025	0.025
Ammonium/Ammonia			Yes	Yes	Yes	
Preservation						
Kjeldahl Nitrogen	Total	mg/L	<0.07	<0.07	<0.07	0.1
Nitrogen	Total	mg/L	<0.10	<0.10	<0.10	0.1
Organic Carbon	Dissolved Nonpurgeable	mg/L	1.4	1.3	1.5	0.5
Metals Total						
Mercury	Total	mg/L	<0.000005	0.000007	<0.000005	0.000005
Aluminum	Total	mg/L	0.033	0.115	0.103	0.005
Antimony	Total	mg/L	<0.0001	<0.0001	<0.0001	0.0001
Arsenic	Total	mg/L	0.00012	0.00012	0.00019	0.00005
Barium	Total	mg/L	0.0034	0.0039	0.0039	0.0005
Beryllium	Total	mg/L	<0.00005	<0.00005	<0.00005	0.00005
Bismuth	Total	mg/L	<0.0001	<0.0001	<0.0001	0.0001
Boron	Total	mg/L	0.007	0.004	0.003	0.002
Cadmium	Total	mg/L	<0.00001	0.00001	0.00002	0.00001
Calcium	Total	mg/L	4.35	3.84	3.98	0.05
Chromium	Total	mg/L	<0.0005	<0.0005	0.0008	0.0005
Cobalt	Total	mg/L	<0.0001	<0.0001	0.0001	0.0001
Copper	Total	mg/L	0.0002	0.0004	0.0023	0.0001
Iron	Total	mg/L	0.052	0.149	0.867	0.002
Lead	Total	mg/L	<0.0001	<0.0001	<0.0001	0.0001
Lithium	Total	mg/L	<0.0005	<0.0005	<0.0005	0.0005
Magnesium	Total	mg/L	0.51	0.43	0.42	0.04
Manganese	Total	mg/L	0.0017	0.0087	0.0107	0.001
Molybdenum	Total	mg/L	0.00037	0.00031	0.00039	0.00005
Nickel	Total	mg/L	<0.0002	<0.0002	0.0010	0.0002
Potassium	Total	mg/L	0.3	0.3	0.2	0.1
Selenium	Total	mg/L	<0.0001	<0.0001	<0.0001	0.0001
Silicon	Total	mg/L	2.75	2.35	2.38	0.02
Silver	Total	mg/L	<0.00005	<0.00005	<0.00005	0.00005
Sodium	Total	mg/L	1.4	1.1	1.1	0.1
Strontium	Total	mg/L	0.0153	0.0127	0.0124	0.0001
Sulfur	Total	mg/L	0.56	0.55	0.54	0.02
Thallium	Total	mg/L	<0.00001	<0.00001	<0.00001	0.00001
Thorium	Total	mg/L	<0.00001	<0.00001	<0.00001	0.00001
Tin	Total	mg/L	<0.0001	<0.0001	0.0001	0.0001

Analytical Report

Bill To: Sunshine Coast Regional District	Project ID:	Lot ID: 1603414
1975 Field Road	Project Name: Sechelt Landfill Surface	Control Number:
Sechelt, BC, Canada	Water	Date Received: Oct 3, 2022
V0N 3A1	Project Location: Sechelt	Date Reported: Oct 7, 2022
Attn: Accounts Payable	LSD:	Report Number: 2794122
Sampled By: Sandi Bandara	P.O.: 3004082	
Company: SCRD	Proj. Acct. code:	

		Reference Number	1603414-1	1603414-2	1603414-3	
		Sample Date	Sep 29, 2022	Sep 29, 2022	Sep 29, 2022	
		Sample Time	NA	NA	NA	
		Sample Location				
		Sample Description	SL B / 18.3 °C	SL A / 18.3 °C	Duplicate / 18.3 °C	
		Matrix	Water	Water	Water	
Analyte		Units	Results	Results	Results	Nominal Detection Limit
Metals Total - Continued						
Titanium	Total	mg/L	<0.0005	0.0031	0.0027	0.0005
Uranium	Total	mg/L	0.00004	0.00003	0.00004	0.00001
Vanadium	Total	mg/L	0.0003	0.0005	0.0004	0.0001
Zinc	Total	mg/L	<0.0010	0.0023	0.0022	0.001
Zirconium	Total	mg/L	<0.0005	<0.0005	<0.0005	0.0005
Hardness	as CaCO ₃	mg/L	13	11	12	1
Routine Water						
pH			7.33	7.26	7.27	1
Temperature of observed		°C	20.4	20.6	20.7	
pH						
Digestion	Dissolved		Lab filtered & preserved	Lab filtered & preserved	Lab filtered & preserved	
Electrical Conductivity		µS/cm at 25 °C	33	27	27	1
Chloride	Dissolved	mg/L	0.54	0.38	0.38	0.05
Nitrate - N	Dissolved	mg/L	0.03	0.04	0.04	0.01
Nitrite - N	Dissolved	mg/L	<0.01	<0.01	<0.01	0.01
Nitrate and Nitrite - N	Dissolved	mg/L	0.03	0.04	0.04	0.01
Hardness	as CaCO ₃ (dissolved)	mg/L	12	10	10	5

Approved by:



Benjamin Morris, B.Sc
Operations Manager

Data have been validated by Analytical Quality Control and Element's Integrated Data Validation System (IDVS).

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Methodology and Notes

Bill To: Sunshine Coast Regional District	Project ID:	Lot ID: 1603414
1975 Field Road	Project Name: Sechelt Landfill Surface	Control Number:
Sechelt, BC, Canada	Project Location: Sechelt	Date Received: Oct 3, 2022
V0N 3A1	LSD:	Date Reported: Oct 7, 2022
Attn: Accounts Payable	P.O.: 3004082	Report Number: 2794122
Sampled By: Sandi Bandara	Proj. Acct. code:	
Company: SCRD		

Method of Analysis

Method Name	Reference	Method	Date Analysis Started	Location
Alk, pH, EC, Turb in water (BC)	APHA	* Conductivity, 2510 B	Oct 4, 2022	Element Vancouver
Alkalinity, pH, and EC in water	APHA	* pH - Electrometric Method, 4500-H+ B	Oct 5, 2022	Element Edmonton - Roper Road
Ammonium-N in Water	APHA	* Automated Phenate Method, 4500-NH3 G	Oct 7, 2022	Element Edmonton - Roper Road
Anions by IEC in water (VAN)	APHA	* Ion Chromatography with Chemical Suppression of Eluent Cond., 4110 B	Oct 3, 2022	Element Vancouver
Anions by IEC in water (VAN)	APHA	* Single-Column Ion Chromatography with Electronic Suppression, 4110 C	Oct 3, 2022	Element Vancouver
BC ICP-MS Total Metals in Water	US EPA	* Determination of Trace Elements in Waters and Wastes by ICP-MS, 200.8	Oct 5, 2022	Element Edmonton - Roper Road
BC Trace Total Metals in Water	APHA	* Inductively Coupled Plasma (ICP) Method, 3120 B	Oct 5, 2022	Element Edmonton - Roper Road
BC Trace Total Metals in Water	US EPA	* Metals & Trace Elements by ICP-MS, 6020	Oct 5, 2022	Element Edmonton - Roper Road
Carbon Organic (Dissolved) in water (DOC)	APHA	High-Temperature Combustion Method, 5310 B	Oct 5, 2022	Element Edmonton - Roper Road
Chemical Oxygen Demand (water-VAN)	APHA	* Closed Reflux, Colorimetric Method, 5220 D	Oct 6, 2022	Element Vancouver
Mercury (Total) in water	EPA	* Mercury in Water by Cold Vapor Atomic Fluorescence Spectrometry, 245.7	Oct 5, 2022	Element Edmonton - Roper Road
Metals SemiTrace (Dissolved) in water (VAN)	US EPA	* Metals & Trace Elements by ICP-AES, 6010C	Oct 6, 2022	Element Vancouver
Total and Kjeldahl Nitrogen (Total) in Water	ISO	* Water Quality - Determination of nitrogen, ISO/TR 11905-2	Oct 5, 2022	Element Edmonton - Roper Road

* Reference Method Modified

References

APHA	Standard Methods for the Examination of Water and Wastewater
EPA	Environmental Protection Agency Test Methods - US
ISO	International Organization for Standardization
US EPA	US Environmental Protection Agency Test Methods

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Report Transmission Cover Page

Bill To: Sunshine Coast Regional District 1975 Field Road Sechelt, BC, Canada V0N 3A1	Project ID: Project Name: Sechelt Landfill Groundwater Project Location: Sechelt LSD: P.O.: 3004082 Proj. Acct. code:	Lot ID: 1622107 Control Number: Date Received: Dec 16, 2022 Date Reported: Dec 28, 2022 Report Number: 2828898
Attn: Accounts Payable Sampled By: Sandi Bandara Company: SCRD		

Contact	Company	Address
Accounts Payable	Sunshine Coast Regional District	1975 Field Road Sechelt, BC V0N 3A1 Phone: (604) 885-6800 Fax: Email: accounts.payable@scrd.ca
<u>Delivery</u>	<u>Format</u>	<u>Deliverables</u>
Email - Single Deliverable	PDF	Invoice
Corrina Suveges	Sunshine Coast Regional District	1975 Field Road Sechelt, BC V0N 3A1 Phone: (604) 885-6800 Fax: Email: Corrina.Suveges@scrd.ca
<u>Delivery</u>	<u>Format</u>	<u>Deliverables</u>
Email - Merge Deliverables	PDF	COC / Test Report
Email - Single Deliverable	PDF	COA
Email - Single Deliverable	Sunshine Coast	Test Report
Sandi Bandara	Sunshine Coast Regional District	1975 Field Road Sechelt, BC V0N 3A1 Phone: (604) 885-6800 Fax: Email: sandi.bandara@scrd.ca
<u>Delivery</u>	<u>Format</u>	<u>Deliverables</u>
Email - Multiple Deliverables By Lot	PDF	COC / Test Report
Email - Multiple Deliverables By Lot	Sunshine Coast	Test Report
Email - Single Deliverable	PDF	COA

Notes To Clients:

- Dec 19, 2022 - Reduction of analytical volume was necessary for anion analysis due to matrix effects in samples 1622107-1, 2, 3, 5, and 10. Detection limits are adjusted accordingly.

Analytical Report

Bill To: Sunshine Coast Regional District	Project ID:	Lot ID: 1622107
1975 Field Road	Project Name: Sechelt Landfill	Control Number:
Sechelt, BC, Canada	Groundwater	Date Received: Dec 16, 2022
V0N 3A1	Project Location: Sechelt	Date Reported: Dec 28, 2022
Attn: Accounts Payable	LSD:	Report Number: 2828898
Sampled By: Sandi Bandara	P.O.: 3004082	
Company: SCRD	Proj. Acct. code:	

		Reference Number	1622107-1	1622107-2	1622107-3	
		Sample Date	Dec 13, 2022	Dec 13, 2022	Dec 13, 2022	
		Sample Time	NA	NA	NA	
		Sample Location				
		Sample Description	MW 22-03 / 11.5 °C	MW 13-01 / 11.5 °C	MW 13-02 / 11.5 °C	
		Matrix	Water	Water	Water	
Analyte		Units	Results	Results	Results	Nominal Detection Limit
Aggregate Organic Constituents						
Chemical Oxygen Demand		mg/L	30	30	110	10
Inorganic Nonmetallic Parameters						
Ammonia - N		mg/L	92.9	59.3	11.4	0.025
Ammonium/Ammonia			Yes	Yes	Yes	
Preservation						
Kjeldahl Nitrogen	Total	mg/L	90.2	59.2	11.2	0.1
Nitrogen	Total	mg/L	90.2	59.3	11.2	0.1
Phosphorus	Total - Low Level	mg/L	0.34	0.188	0.103	0.005
Organic Carbon	Dissolved Nonpurgeable	mg/L	5.7	5.0	6.5	0.5
Metals Total						
Digestion	Preparation		Field Pres, digest as	Field Pres, digest as	Field Pres, digest as	
			total Hg	total Hg	total Hg	
Mercury	Total	mg/L	<0.00001	<0.00001	<0.00001	0.00001
Physical and Aggregate Properties						
Turbidity		NTU	138	99.4	103	0.1
Routine Water						
pH	at 25 °C	pH	6.5	6.4	5.9	
pH - Holding Time	at 25 °C		Exceeded	Exceeded	Exceeded	
pH - Holding Time			Exceeded	Exceeded	Exceeded	
pH	at 25 °C		7.26	7.29	6.84	0.01
Electrical Conductivity		µS/cm at 25 °C	1244	978	731	1
Calcium	Dissolved	mg/L	57	110	82	0.01
Magnesium	Dissolved	mg/L	7.6	19	12	0.02
Potassium	Dissolved	mg/L	17	5.9	14	0.04
Sodium	Dissolved	mg/L	37	50	23	0.1
Sulfur	Dissolved	mg/L	0.87	16	15	0.02
Bicarbonate		mg/L	701	537	331	5
Carbonate		mg/L	<6	<6	<6	6
Hydroxide		mg/L	<5	<5	<5	5
P-Alkalinity	as CaCO ₃	mg/L	<5	<5	<5	5
T-Alkalinity	as CaCO ₃	mg/L	575	441	271	5
Chloride	Dissolved	mg/L	20.1	23.9	36.8	0.05
Nitrate - N	Dissolved	mg/L	<0.1	0.2	<0.1	0.01
Nitrite - N	Dissolved	mg/L	<0.1	<0.1	<0.1	0.01
Nitrate and Nitrite - N	Dissolved	mg/L	<0.20	0.2	<0.20	0.01
Sulfate (SO ₄)	Dissolved	mg/L	<1	4	46	0.1
Hardness	as CaCO ₃ (dissolved)	mg/L	170	340	250	5
Salinity	Dissolved	g/L	0.093	0.13	0.058	0.0001

Analytical Report

Bill To: Sunshine Coast Regional District	Project ID:	Lot ID: 1622107
1975 Field Road	Project Name: Sechelt Landfill	Control Number:
Sechelt, BC, Canada	Groundwater	Date Received: Dec 16, 2022
VON 3A1	Project Location: Sechelt	Date Reported: Dec 28, 2022
Attn: Accounts Payable	LSD:	Report Number: 2828898
Sampled By: Sandi Bandara	P.O.: 3004082	
Company: SCRD	Proj. Acct. code:	

		Reference Number	1622107-1	1622107-2	1622107-3	
		Sample Date	Dec 13, 2022	Dec 13, 2022	Dec 13, 2022	
		Sample Time	NA	NA	NA	
		Sample Location				
		Sample Description	MW 22-03 / 11.5 °C	MW 13-01 / 11.5 °C	MW 13-02 / 11.5 °C	
		Matrix	Water	Water	Water	
Analyte	Units	Results	Results	Results	Nominal Detection Limit	
Routine Water - Continued						
Silicon	Dissolved	µg/L	14000	8400	13000	5
Mono-Aromatic Hydrocarbons - Water						
4-Bromofluorobenzene	Surrogate	%	90	110	120	70-130
Toluene-d8	Surrogate	%	120	95	97	70-130
Volatile Petroleum Hydrocarbons - Water						
VHw6-10		mg/L	<0.05	<0.05	<0.05	0.05
VPW (VHw6-10 minus BTEX)		mg/L	<0.05	<0.05	<0.05	0.05
VOC Screen - Drinking Water						
Benzene		mg/L	0.0014	0.0008	0.0010	0.0001
Bromobenzene		mg/L	<0.0001	<0.0001	<0.0001	0.0001
Bromochloromethane		mg/L	<0.0001	<0.0001	<0.0001	0.0001
Bromodichloromethane		mg/L	<0.0001	<0.0001	<0.0001	0.0001
Bromoform		mg/L	<0.0001	<0.0001	<0.0001	0.0001
Bromomethane		mg/L	<0.001	<0.001	<0.001	0.001
n-Butylbenzene		mg/L	<0.0001	<0.0001	<0.0001	0.0001
sec-Butylbenzene		mg/L	<0.0001	<0.0001	<0.0001	0.0001
tert-Butylbenzene		mg/L	<0.0001	<0.0001	<0.0001	0.0001
Carbon Tetrachloride		mg/L	<0.0005	<0.0005	<0.0005	0.0005
Chlorobenzene		mg/L	0.0018	0.0023	0.0017	0.0001
Chloroethane		mg/L	<0.001	<0.001	0.001	0.001
Chloroform		mg/L	<0.0001	<0.0001	<0.0001	0.0001
Chloromethane		mg/L	<0.001	<0.001	<0.001	0.001
2-Chlorotoluene		mg/L	<0.0001	<0.0001	<0.0001	0.0001
4-Chlorotoluene		mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,2-Dibromo-3-Chloropropane		mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,2-Dibromoethane		mg/L	<0.0001	<0.0001	<0.0001	0.0001
Dibromomethane		mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,2-Dichlorobenzene		mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,3-Dichlorobenzene		mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,4-Dichlorobenzene		mg/L	<0.0001	0.0003	0.0003	0.0001
1,1-Dichloroethane		mg/L	0.0002	<0.0001	0.0001	0.0001
Dibromochloromethane		mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,2-Dichloroethane		mg/L	<0.0005	<0.0005	<0.0005	0.0005
1,1-Dichloroethene		mg/L	<0.0005	<0.0005	<0.0005	0.0005
1,2-Dichloroethene(cis)		mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,2-Dichloroethene(trans)		mg/L	<0.0001	<0.0001	<0.0001	0.0001
Dichlorodifluoromethane		mg/L	<0.001	<0.001	<0.001	0.001

Analytical Report

Bill To: Sunshine Coast Regional District	Project ID:	Lot ID: 1622107
1975 Field Road	Project Name: Sechelt Landfill	Control Number:
Sechelt, BC, Canada	Groundwater	Date Received: Dec 16, 2022
VON 3A1	Project Location: Sechelt	Date Reported: Dec 28, 2022
Attn: Accounts Payable	LSD:	Report Number: 2828898
Sampled By: Sandi Bandara	P.O.: 3004082	
Company: SCRD	Proj. Acct. code:	

		Reference Number	1622107-1	1622107-2	1622107-3
		Sample Date	Dec 13, 2022	Dec 13, 2022	Dec 13, 2022
		Sample Time	NA	NA	NA
		Sample Location			
		Sample Description	MW 22-03 / 11.5 °C	MW 13-01 / 11.5 °C	MW 13-02 / 11.5 °C
		Matrix	Water	Water	Water
Analyte	Units	Results	Results	Results	Nominal Detection Limit
VOC Screen - Drinking Water - Continued					
1,2-Dichloropropane	mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,3-Dichloropropane	mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,1-Dichloropropene	mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,3-Dichloropropene(cis)	mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,3-Dichloropropene(trans)	mg/L	<0.0001	<0.0001	<0.0001	0.0001
Ethylbenzene	mg/L	<0.0001	<0.0001	<0.0001	0.0001
Hexachlorobutadiene	mg/L	<0.0001	<0.0001	<0.0001	0.0001
p-Isopropyltoluene	mg/L	<0.001	<0.001	<0.001	0.001
Methylene Chloride	mg/L	<0.01	<0.01	<0.01	0.01
Methyl t-Butyl Ether	mg/L	0.0028	0.0017	0.0003	0.0001
iso-Propylbenzene	mg/L	0.0003	0.0002	<0.0001	0.0001
n-Propylbenzene	mg/L	<0.0001	<0.0001	<0.0001	0.0001
Styrene	mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,1,1,2-Tetrachloroethane	mg/L	<0.001	<0.001	<0.001	0.001
1,1,1,2,2-Tetrachloroethane	mg/L	<0.0001	<0.0001	<0.0001	0.0001
Tetrachloroethene	mg/L	<0.0005	<0.0005	<0.0005	0.0005
Toluene	mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,2,3-Trichlorobenzene	mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,2,4-Trichlorobenzene	mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,1,1-Trichloroethane	mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,1,2-Trichloroethane	mg/L	<0.0001	<0.0001	<0.0001	0.0001
Trichloroethene	mg/L	<0.0005	<0.0005	<0.0005	0.0005
Trichlorofluoromethane	mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,2,3-Trichloropropane	mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,2,4-Trimethylbenzene	mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,3,5-Trimethylbenzene	mg/L	<0.0001	<0.0001	<0.0001	0.0001
Total Xylenes (m,p,o)	mg/L	<0.0001	<0.0001	<0.0001	0.0001
Vinyl Chloride	mg/L	<0.0005	<0.0005	<0.0005	0.0005
Xylene-m&p	mg/L	<0.0001	<0.0001	<0.0001	0.0001
Xylene-o	mg/L	<0.0001	<0.0001	<0.0001	0.0001
VOC - Drinking Water - Surrogate Recovery					
Dibromofluoromethane	EPA Surrogate	%	117	109	114
Toluene-d8	EPA Surrogate	%	92	95	95
Bromofluorobenzene	EPA Surrogate	%	108	106	110
Trace Metals Dissolved					
Digestion	Dissolved		Lab filtered & preserved	Lab filtered & preserved	Lab filtered & preserved
Aluminum	Dissolved	µg/L	<1	3	<1
Antimony	Dissolved	µg/L	0.07	0.04	0.21

Analytical Report

Bill To: Sunshine Coast Regional District	Project ID:	Lot ID: 1622107
1975 Field Road	Project Name: Sechelt Landfill	Control Number:
Sechelt, BC, Canada	Groundwater	Date Received: Dec 16, 2022
V0N 3A1	Project Location: Sechelt	Date Reported: Dec 28, 2022
Attn: Accounts Payable	LSD:	Report Number: 2828898
Sampled By: Sandi Bandara	P.O.: 3004082	
Company: SCRD	Proj. Acct. code:	

		Reference Number	1622107-1	1622107-2	1622107-3	
		Sample Date	Dec 13, 2022	Dec 13, 2022	Dec 13, 2022	
		Sample Time	NA	NA	NA	
		Sample Location				
		Sample Description	MW 22-03 / 11.5 °C	MW 13-01 / 11.5 °C	MW 13-02 / 11.5 °C	
		Matrix	Water	Water	Water	
Analyte		Units	Results	Results	Results	Nominal Detection Limit
Trace Metals Dissolved - Continued						
Arsenic	Dissolved	µg/L	1.1	0.5	3.0	0.1
Barium	Dissolved	µg/L	100	20	100	0.1
Beryllium	Dissolved	µg/L	<0.05	<0.05	<0.05	0.05
Bismuth	Dissolved	µg/L	<0.1	<0.1	<0.1	0.1
Boron	Dissolved	µg/L	76	1600	170	2
Cadmium	Dissolved	µg/L	<0.01	0.05	<0.01	0.01
Chromium	Dissolved	µg/L	0.09	0.37	0.15	0.05
Cobalt	Dissolved	µg/L	0.84	5.4	5.4	0.02
Copper	Dissolved	µg/L	<0.5	1.8	<0.5	0.5
Iron	Dissolved	µg/L	15	22	9	2
Lead	Dissolved	µg/L	0.01	0.03	<0.01	0.01
Lithium	Dissolved	µg/L	0.8	<0.5	1.9	0.5
Manganese	Dissolved	µg/L	5800	2400	7900	1
Molybdenum	Dissolved	µg/L	0.11	0.23	0.26	0.02
Nickel	Dissolved	µg/L	1.8	1.7	5.5	0.2
Selenium	Dissolved	µg/L	<0.2	<0.2	<0.2	0.2
Silver	Dissolved	µg/L	<0.01	<0.01	<0.01	0.01
Strontium	Dissolved	µg/L	1100	480	1100	0.1
Thallium	Dissolved	µg/L	<0.01	<0.01	<0.01	0.01
Thorium	Dissolved	µg/L	<0.05	<0.05	<0.05	0.05
Tin	Dissolved	µg/L	<0.1	<0.1	<0.1	0.1
Tungsten	Dissolved	µg/L	<0.2	<0.2	<0.2	0.2
Uranium	Dissolved	µg/L	0.08	0.08	0.47	0.01
Vanadium	Dissolved	µg/L	0.05	0.26	0.10	0.05
Zinc	Dissolved	µg/L	3.8	2.6	3.3	0.5
Zirconium	Dissolved	µg/L	<0.1	0.1	<0.1	0.1
Titanium	Dissolved	µg/L	<0.1	0.3	<0.1	0.1

Analytical Report

Bill To: Sunshine Coast Regional District	Project ID:	Lot ID: 1622107
1975 Field Road	Project Name: Sechelt Landfill	Control Number:
Sechelt, BC, Canada	Groundwater	Date Received: Dec 16, 2022
V0N 3A1	Project Location: Sechelt	Date Reported: Dec 28, 2022
Attn: Accounts Payable	LSD:	Report Number: 2828898
Sampled By: Sandi Bandara	P.O.: 3004082	
Company: SCRD	Proj. Acct. code:	

		Reference Number	1622107-4	1622107-5	1622107-6	
		Sample Date	Dec 13, 2022	Dec 13, 2022	Dec 13, 2022	
		Sample Time	NA	NA	NA	
		Sample Location				
		Sample Description	MW 13- 3 / 11.5 °C	MW 3 / 11.5 °C	MW 1 / 11.5 °C	
		Matrix	Water	Water	Water	
Analyte		Units	Results	Results	Results	Nominal Detection Limit
Aggregate Organic Constituents						
Chemical Oxygen Demand		mg/L	20	60	20	10
Inorganic Nonmetallic Parameters						
Ammonia - N		mg/L	1.20	24.8	<0.025	0.025
Ammonium/Ammonia			Yes	Yes	Yes	
Preservation						
Kjeldahl Nitrogen	Total	mg/L	1.15	29.2	<0.07	0.1
Nitrogen	Total	mg/L	1.27	29.2	0.54	0.1
Phosphorus	Total - Low Level	mg/L	0.077	0.042	0.067	0.005
Organic Carbon	Dissolved Nonpurgeable	mg/L	6.0	15.8	1.2	0.5
Metals Total						
Digestion	Preparation		Field Pres, digest as	Field Pres, digest as	Field Pres, digest as	
			total Hg	total Hg	total Hg	
Mercury	Total	mg/L	<0.00001	<0.00001	<0.00001	0.00001
Physical and Aggregate Properties						
Turbidity		NTU	166	53.9	28.8	0.1
Routine Water						
pH	at 25 °C	pH	5.8	6.6	5.7	
pH - Holding Time	at 25 °C		Exceeded	Exceeded	Exceeded	
pH - Holding Time			Exceeded	Exceeded	Exceeded	
pH	at 25 °C		6.71	7.38	6.70	0.01
Electrical Conductivity		µS/cm at 25 °C	319	1258	306	1
Calcium	Dissolved	mg/L	32	88	46	0.01
Magnesium	Dissolved	mg/L	4.3	18	4.1	0.02
Potassium	Dissolved	mg/L	4.7	38	1.5	0.04
Sodium	Dissolved	mg/L	22	96	6.7	0.1
Sulfur	Dissolved	mg/L	3.4	1.7	29	0.02
Bicarbonate		mg/L	154	583	62	5
Carbonate		mg/L	<6	<6	<6	6
Hydroxide		mg/L	<5	<5	<5	5
P-Alkalinity	as CaCO3	mg/L	<5	<5	<5	5
T-Alkalinity	as CaCO3	mg/L	126	478	51	5
Chloride	Dissolved	mg/L	15.7	105	6.50	0.05
Nitrate - N	Dissolved	mg/L	0.16	<0.1	0.51	0.01
Nitrite - N	Dissolved	mg/L	0.02	<0.1	<0.01	0.01
Nitrate and Nitrite - N	Dissolved	mg/L	0.18	<0.20	0.51	0.01
Sulfate (SO4)	Dissolved	mg/L	9.0	<1	83.6	0.1
Hardness	as CaCO3 (dissolved)	mg/L	98	290	130	5
Salinity	Dissolved	g/L	0.056	0.24	0.017	0.0001

Analytical Report

Bill To: Sunshine Coast Regional District	Project ID:	Lot ID: 1622107
1975 Field Road	Project Name: Sechelt Landfill	Control Number:
Sechelt, BC, Canada	Groundwater	Date Received: Dec 16, 2022
VON 3A1	Project Location: Sechelt	Date Reported: Dec 28, 2022
Attn: Accounts Payable	LSD:	Report Number: 2828898
Sampled By: Sandi Bandara	P.O.: 3004082	
Company: SCRD	Proj. Acct. code:	

		Reference Number	1622107-4	1622107-5	1622107-6	
		Sample Date	Dec 13, 2022	Dec 13, 2022	Dec 13, 2022	
		Sample Time	NA	NA	NA	
		Sample Location				
		Sample Description	MW 13- 3 / 11.5 °C	MW 3 / 11.5 °C	MW 1 / 11.5 °C	
		Matrix	Water	Water	Water	
Analyte	Units	Results	Results	Results	Nominal Detection Limit	
Routine Water - Continued						
Silicon	Dissolved	µg/L	9600	4200	8900	5
Mono-Aromatic Hydrocarbons - Water						
4-Bromofluorobenzene	Surrogate	%	70	100	80	70-130
Toluene-d8	Surrogate	%	126	129	97	70-130
Volatile Petroleum Hydrocarbons - Water						
VHw6-10		mg/L	<0.05	<0.05	<0.05	0.05
VPW (VHw6-10 minus BTEX)		mg/L	<0.05	<0.05	<0.05	0.05
VOC Screen - Drinking Water						
Benzene		mg/L	0.0003	0.0004	<0.0001	0.0001
Bromobenzene		mg/L	<0.0001	<0.0001	<0.0001	0.0001
Bromochloromethane		mg/L	<0.0001	<0.0001	<0.0001	0.0001
Bromodichloromethane		mg/L	<0.0001	<0.0001	<0.0001	0.0001
Bromoform		mg/L	<0.0001	<0.0001	<0.0001	0.0001
Bromomethane		mg/L	<0.001	<0.001	<0.001	0.001
n-Butylbenzene		mg/L	<0.0001	<0.0001	<0.0001	0.0001
sec-Butylbenzene		mg/L	<0.0001	<0.0001	<0.0001	0.0001
tert-Butylbenzene		mg/L	<0.0001	<0.0001	<0.0001	0.0001
Carbon Tetrachloride		mg/L	<0.0005	<0.0005	<0.0005	0.0005
Chlorobenzene		mg/L	0.0007	<0.0001	<0.0001	0.0001
Chloroethane		mg/L	<0.001	<0.001	<0.001	0.001
Chloroform		mg/L	<0.0001	<0.0001	<0.0001	0.0001
Chloromethane		mg/L	<0.001	<0.001	<0.001	0.001
2-Chlorotoluene		mg/L	<0.0001	<0.0001	<0.0001	0.0001
4-Chlorotoluene		mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,2-Dibromo-3-Chloropropane		mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,2-Dibromoethane		mg/L	<0.0001	<0.0001	<0.0001	0.0001
Dibromomethane		mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,2-Dichlorobenzene		mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,3-Dichlorobenzene		mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,4-Dichlorobenzene		mg/L	0.0005	<0.0001	<0.0001	0.0001
1,1-Dichloroethane		mg/L	0.0002	<0.0001	<0.0001	0.0001
Dibromochloromethane		mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,2-Dichloroethane		mg/L	<0.0005	<0.0005	<0.0005	0.0005
1,1-Dichloroethene		mg/L	<0.0005	<0.0005	<0.0005	0.0005
1,2-Dichloroethene(cis)		mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,2-Dichloroethene(trans)		mg/L	<0.0001	<0.0001	<0.0001	0.0001
Dichlorodifluoromethane		mg/L	<0.001	<0.001	<0.001	0.001

Analytical Report

Bill To: Sunshine Coast Regional District	Project ID:	Lot ID: 1622107
1975 Field Road	Project Name: Sechelt Landfill	Control Number:
Sechelt, BC, Canada	Groundwater	Date Received: Dec 16, 2022
VON 3A1	Project Location: Sechelt	Date Reported: Dec 28, 2022
Attn: Accounts Payable	LSD:	Report Number: 2828898
Sampled By: Sandi Bandara	P.O.: 3004082	
Company: SCRD	Proj. Acct. code:	

		Reference Number	1622107-4	1622107-5	1622107-6
		Sample Date	Dec 13, 2022	Dec 13, 2022	Dec 13, 2022
		Sample Time	NA	NA	NA
		Sample Location			
		Sample Description	MW 13- 3 / 11.5 °C	MW 3 / 11.5 °C	MW 1 / 11.5 °C
		Matrix	Water	Water	Water
Analyte	Units	Results	Results	Results	Nominal Detection Limit
VOC Screen - Drinking Water - Continued					
1,2-Dichloropropane	mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,3-Dichloropropane	mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,1-Dichloropropene	mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,3-Dichloropropene(cis)	mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,3-Dichloropropene(trans)	mg/L	<0.0001	<0.0001	<0.0001	0.0001
Ethylbenzene	mg/L	<0.0001	<0.0001	<0.0001	0.0001
Hexachlorobutadiene	mg/L	<0.0001	<0.0001	<0.0001	0.0001
p-Isopropyltoluene	mg/L	<0.001	<0.001	<0.001	0.001
Methylene Chloride	mg/L	<0.01	<0.01	<0.01	0.01
Methyl t-Butyl Ether	mg/L	0.0003	<0.0001	<0.0001	0.0001
iso-Propylbenzene	mg/L	<0.0001	0.0003	<0.0001	0.0001
n-Propylbenzene	mg/L	<0.0001	<0.0001	<0.0001	0.0001
Styrene	mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,1,1,2-Tetrachloroethane	mg/L	<0.001	<0.001	<0.001	0.001
1,1,1,2,2-Tetrachloroethane	mg/L	<0.0001	<0.0001	<0.0001	0.0001
Tetrachloroethene	mg/L	<0.0005	<0.0005	<0.0005	0.0005
Toluene	mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,2,3-Trichlorobenzene	mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,2,4-Trichlorobenzene	mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,1,1-Trichloroethane	mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,1,2-Trichloroethane	mg/L	<0.0001	<0.0001	<0.0001	0.0001
Trichloroethene	mg/L	<0.0005	<0.0005	<0.0005	0.0005
Trichlorofluoromethane	mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,2,3-Trichloropropane	mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,2,4-Trimethylbenzene	mg/L	0.0006	0.0009	<0.0001	0.0001
1,3,5-Trimethylbenzene	mg/L	<0.0001	<0.0001	<0.0001	0.0001
Total Xylenes (m,p,o)	mg/L	<0.0001	0.0022	<0.0001	0.0001
Vinyl Chloride	mg/L	<0.0005	<0.0005	<0.0005	0.0005
Xylene-m&p	mg/L	<0.0001	0.0022	<0.0001	0.0001
Xylene-o	mg/L	<0.0001	<0.0001	<0.0001	0.0001
VOC - Drinking Water - Surrogate Recovery					
Dibromofluoromethane	EPA Surrogate	%	122	106	111
Toluene-d8	EPA Surrogate	%	93	94	98
Bromofluorobenzene	EPA Surrogate	%	109	99	107
Trace Metals Dissolved					
Digestion	Dissolved		Lab filtered & preserved	Lab filtered & preserved	Lab filtered & preserved
Aluminum	Dissolved	µg/L	<1	<1	5
Antimony	Dissolved	µg/L	0.20	0.24	0.18

Analytical Report

Bill To: Sunshine Coast Regional District	Project ID:	Lot ID: 1622107
1975 Field Road	Project Name: Sechelt Landfill	Control Number:
Sechelt, BC, Canada	Groundwater	Date Received: Dec 16, 2022
V0N 3A1	Project Location: Sechelt	Date Reported: Dec 28, 2022
Attn: Accounts Payable	LSD:	Report Number: 2828898
Sampled By: Sandi Bandara	P.O.: 3004082	
Company: SCRD	Proj. Acct. code:	

		Reference Number	1622107-4	1622107-5	1622107-6	
		Sample Date	Dec 13, 2022	Dec 13, 2022	Dec 13, 2022	
		Sample Time	NA	NA	NA	
		Sample Location				
		Sample Description	MW 13- 3 / 11.5 °C	MW 3 / 11.5 °C	MW 1 / 11.5 °C	
		Matrix	Water	Water	Water	
Analyte		Units	Results	Results	Results	Nominal Detection Limit
Trace Metals Dissolved - Continued						
Arsenic	Dissolved	µg/L	1.4	1.3	0.1	0.1
Barium	Dissolved	µg/L	52	500	17	0.1
Beryllium	Dissolved	µg/L	<0.05	<0.05	<0.05	0.05
Bismuth	Dissolved	µg/L	<0.1	<0.1	<0.1	0.1
Boron	Dissolved	µg/L	160	830	130	2
Cadmium	Dissolved	µg/L	0.02	<0.01	0.04	0.01
Chromium	Dissolved	µg/L	0.10	0.56	0.07	0.05
Cobalt	Dissolved	µg/L	8.2	0.15	0.05	0.02
Copper	Dissolved	µg/L	<0.5	<0.5	0.6	0.5
Iron	Dissolved	µg/L	6	29	2	2
Lead	Dissolved	µg/L	<0.01	0.04	0.07	0.01
Lithium	Dissolved	µg/L	4.6	<0.5	<0.5	0.5
Manganese	Dissolved	µg/L	3600	1200	12	1
Molybdenum	Dissolved	µg/L	0.09	0.20	0.06	0.02
Nickel	Dissolved	µg/L	14	4.4	0.4	0.2
Selenium	Dissolved	µg/L	<0.2	<0.2	<0.2	0.2
Silver	Dissolved	µg/L	<0.01	<0.01	<0.01	0.01
Strontium	Dissolved	µg/L	510	580	330	0.1
Thallium	Dissolved	µg/L	0.05	<0.01	<0.01	0.01
Thorium	Dissolved	µg/L	<0.05	<0.05	<0.05	0.05
Tin	Dissolved	µg/L	<0.1	0.1	<0.1	0.1
Tungsten	Dissolved	µg/L	<0.2	<0.2	<0.2	0.2
Uranium	Dissolved	µg/L	0.06	0.02	0.05	0.01
Vanadium	Dissolved	µg/L	0.07	0.43	0.15	0.05
Zinc	Dissolved	µg/L	20	4.0	5.8	0.5
Zirconium	Dissolved	µg/L	<0.1	<0.1	<0.1	0.1
Titanium	Dissolved	µg/L	<0.1	0.2	0.1	0.1

Analytical Report

Bill To: Sunshine Coast Regional District	Project ID:	Lot ID: 1622107
1975 Field Road	Project Name: Sechelt Landfill	Control Number:
Sechelt, BC, Canada	Groundwater	Date Received: Dec 16, 2022
V0N 3A1	Project Location: Sechelt	Date Reported: Dec 28, 2022
Attn: Accounts Payable	LSD:	Report Number: 2828898
Sampled By: Sandi Bandara	P.O.: 3004082	
Company: SCRD	Proj. Acct. code:	

		Reference Number	1622107-7	1622107-8	1622107-9	
		Sample Date	Dec 13, 2022	Dec 13, 2022	Dec 13, 2022	
		Sample Time	NA	NA	NA	
		Sample Location				
		Sample Description	MW 13-4 / 11.5 °C	MW 22 -01 / 11.5 °C	MW 4 / 11.5 °C	
		Matrix	Water	Water	Water	
Analyte		Units	Results	Results	Results	Nominal Detection Limit
Aggregate Organic Constituents						
Chemical Oxygen Demand		mg/L	30	30	10	10
Inorganic Nonmetallic Parameters						
Ammonia - N		mg/L	<0.025	<0.025	<0.025	0.025
Ammonium/Ammonia			Yes	Yes	Yes	
Preservation						
Kjeldahl Nitrogen	Total	mg/L	<0.07	<0.07	<0.07	0.1
Nitrogen	Total	mg/L	<0.10	0.17	0.10	0.1
Phosphorus	Total - Low Level	mg/L	0.50	<0.005	0.040	0.005
Organic Carbon	Dissolved Nonpurgeable	mg/L	<0.5	<0.5	1.4	0.5
Metals Total						
Digestion	Preparation		Field Pres, digest as total Hg	Field Pres, digest as total Hg	Field Pres, digest as total Hg	
Mercury	Total	mg/L	<0.00001	<0.00001	<0.00001	0.00001
Physical and Aggregate Properties						
Turbidity		NTU	208	33.3	0.86	0.1
Routine Water						
pH	at 25 °C	pH	6.2	6.7	5.9	
pH - Holding Time	at 25 °C		Exceeded	Exceeded	Exceeded	
pH - Holding Time			Exceeded	Exceeded	Exceeded	
pH	at 25 °C		6.90	7.34	6.86	0.01
Electrical Conductivity		µS/cm at 25 °C	60	103	443	1
Calcium	Dissolved	mg/L	7.4	16	63	0.01
Magnesium	Dissolved	mg/L	0.96	1.6	11	0.02
Potassium	Dissolved	mg/L	0.56	0.82	5.6	0.04
Sodium	Dissolved	mg/L	3.7	4.1	15	0.1
Sulfur	Dissolved	mg/L	0.66	0.79	4.2	0.02
Bicarbonate		mg/L	31	57	262	5
Carbonate		mg/L	<6	<6	<6	6
Hydroxide		mg/L	<5	<5	<5	5
P-Alkalinity	as CaCO ₃	mg/L	<5	<5	<5	5
T-Alkalinity	as CaCO ₃	mg/L	25	47	215	5
Chloride	Dissolved	mg/L	1.78	1.18	5.37	0.05
Nitrate - N	Dissolved	mg/L	0.08	0.16	<1.0	0.01
Nitrite - N	Dissolved	mg/L	<0.01	<0.01	<0.01	0.01
Nitrate and Nitrite - N	Dissolved	mg/L	0.08	0.16	<1.0	0.01
Sulfate (SO ₄)	Dissolved	mg/L	1.8	2.0	10.9	0.1
Hardness	as CaCO ₃ (dissolved)	mg/L	23	45	200	5
Salinity	Dissolved	g/L	0.0092	0.010	0.037	0.0001

Analytical Report

Bill To: Sunshine Coast Regional District	Project ID:	Lot ID: 1622107
1975 Field Road	Project Name: Sechelt Landfill	Control Number:
Sechelt, BC, Canada	Groundwater	Date Received: Dec 16, 2022
VON 3A1	Project Location: Sechelt	Date Reported: Dec 28, 2022
Attn: Accounts Payable	LSD:	Report Number: 2828898
Sampled By: Sandi Bandara	P.O.: 3004082	
Company: SCRD	Proj. Acct. code:	

		Reference Number	1622107-7	1622107-8	1622107-9	
		Sample Date	Dec 13, 2022	Dec 13, 2022	Dec 13, 2022	
		Sample Time	NA	NA	NA	
		Sample Location				
		Sample Description	MW 13-4 / 11.5 °C	MW 22 -01 / 11.5 °C	MW 4 / 11.5 °C	
		Matrix	Water	Water	Water	
Analyte	Units	Results	Results	Results	Nominal Detection Limit	
Routine Water - Continued						
Silicon	Dissolved	µg/L	9300	10000	13000	5
Mono-Aromatic Hydrocarbons - Water						
4-Bromofluorobenzene	Surrogate	%	90	100	80	70-130
Toluene-d8	Surrogate	%	98	112	97	70-130
Volatile Petroleum Hydrocarbons - Water						
VHw6-10		mg/L	<0.05	<0.05	<0.05	0.05
VPHw (VHw6-10 minus BTEX)		mg/L	<0.05	<0.05	<0.05	0.05
VOC Screen - Drinking Water						
Benzene		mg/L	<0.0001	<0.0001	<0.0001	0.0001
Bromobenzene		mg/L	<0.0001	<0.0001	<0.0001	0.0001
Bromochloromethane		mg/L	<0.0001	<0.0001	<0.0001	0.0001
Bromodichloromethane		mg/L	<0.0001	<0.0001	<0.0001	0.0001
Bromoform		mg/L	<0.0001	<0.0001	<0.0001	0.0001
Bromomethane		mg/L	<0.001	<0.001	<0.001	0.001
n-Butylbenzene		mg/L	<0.0001	<0.0001	<0.0001	0.0001
sec-Butylbenzene		mg/L	<0.0001	<0.0001	<0.0001	0.0001
tert-Butylbenzene		mg/L	<0.0001	<0.0001	<0.0001	0.0001
Carbon Tetrachloride		mg/L	<0.0005	<0.0005	<0.0005	0.0005
Chlorobenzene		mg/L	<0.0001	<0.0001	<0.0001	0.0001
Chloroethane		mg/L	<0.001	<0.001	<0.001	0.001
Chloroform		mg/L	<0.0001	<0.0001	<0.0001	0.0001
Chloromethane		mg/L	<0.001	<0.001	<0.001	0.001
2-Chlorotoluene		mg/L	<0.0001	<0.0001	<0.0001	0.0001
4-Chlorotoluene		mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,2-Dibromo-3-Chloropropane		mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,2-Dibromoethane		mg/L	<0.0001	<0.0001	<0.0001	0.0001
Dibromomethane		mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,2-Dichlorobenzene		mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,3-Dichlorobenzene		mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,4-Dichlorobenzene		mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,1-Dichloroethane		mg/L	<0.0001	<0.0001	<0.0001	0.0001
Dibromochloromethane		mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,2-Dichloroethane		mg/L	<0.0005	<0.0005	<0.0005	0.0005
1,1-Dichloroethene		mg/L	<0.0005	<0.0005	<0.0005	0.0005
1,2-Dichloroethene(cis)		mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,2-Dichloroethene(trans)		mg/L	<0.0001	<0.0001	<0.0001	0.0001
Dichlorodifluoromethane		mg/L	<0.001	<0.001	<0.001	0.001

Analytical Report

Bill To: Sunshine Coast Regional District	Project ID:	Lot ID: 1622107
1975 Field Road	Project Name: Sechelt Landfill	Control Number:
Sechelt, BC, Canada	Groundwater	Date Received: Dec 16, 2022
VON 3A1	Project Location: Sechelt	Date Reported: Dec 28, 2022
Attn: Accounts Payable	LSD:	Report Number: 2828898
Sampled By: Sandi Bandara	P.O.: 3004082	
Company: SCRD	Proj. Acct. code:	

		Reference Number	1622107-7	1622107-8	1622107-9
		Sample Date	Dec 13, 2022	Dec 13, 2022	Dec 13, 2022
		Sample Time	NA	NA	NA
		Sample Location			
		Sample Description	MW 13-4 / 11.5 °C	MW 22 -01 / 11.5 °C	MW 4 / 11.5 °C
		Matrix	Water	Water	Water
Analyte	Units	Results	Results	Results	Nominal Detection Limit
VOC Screen - Drinking Water - Continued					
1,2-Dichloropropane	mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,3-Dichloropropane	mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,1-Dichloropropene	mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,3-Dichloropropene(cis)	mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,3-Dichloropropene(trans)	mg/L	<0.0001	<0.0001	<0.0001	0.0001
Ethylbenzene	mg/L	<0.0001	<0.0001	<0.0001	0.0001
Hexachlorobutadiene	mg/L	<0.0001	<0.0001	<0.0001	0.0001
p-Isopropyltoluene	mg/L	<0.001	<0.001	<0.001	0.001
Methylene Chloride	mg/L	<0.01	<0.01	<0.01	0.01
Methyl t-Butyl Ether	mg/L	<0.0001	<0.0001	0.0014	0.0001
iso-Propylbenzene	mg/L	<0.0001	<0.0001	<0.0001	0.0001
n-Propylbenzene	mg/L	<0.0001	<0.0001	<0.0001	0.0001
Styrene	mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,1,1,2-Tetrachloroethane	mg/L	<0.001	<0.001	<0.001	0.001
1,1,1,2,2-Tetrachloroethane	mg/L	<0.0001	<0.0001	<0.0001	0.0001
Tetrachloroethene	mg/L	<0.0005	<0.0005	<0.0005	0.0005
Toluene	mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,2,3-Trichlorobenzene	mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,2,4-Trichlorobenzene	mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,1,1-Trichloroethane	mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,1,2-Trichloroethane	mg/L	<0.0001	<0.0001	<0.0001	0.0001
Trichloroethene	mg/L	<0.0005	<0.0005	<0.0005	0.0005
Trichlorofluoromethane	mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,2,3-Trichloropropane	mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,2,4-Trimethylbenzene	mg/L	<0.0001	<0.0001	<0.0001	0.0001
1,3,5-Trimethylbenzene	mg/L	<0.0001	<0.0001	<0.0001	0.0001
Total Xylenes (m,p,o)	mg/L	<0.0001	<0.0001	<0.0001	0.0001
Vinyl Chloride	mg/L	<0.0005	<0.0005	<0.0005	0.0005
Xylene-m&p	mg/L	<0.0001	<0.0001	<0.0001	0.0001
Xylene-o	mg/L	<0.0001	<0.0001	<0.0001	0.0001
VOC - Drinking Water - Surrogate Recovery					
Dibromofluoromethane	EPA Surrogate	%	111	114	109
Toluene-d8	EPA Surrogate	%	93	96	93
Bromofluorobenzene	EPA Surrogate	%	105	108	105
Trace Metals Dissolved					
Digestion	Dissolved		Lab filtered & preserved	Lab filtered & preserved	Lab filtered & preserved
Aluminum	Dissolved	µg/L	3	8	1
Antimony	Dissolved	µg/L	0.11	0.27	0.05

Analytical Report

Bill To: Sunshine Coast Regional District	Project ID:	Lot ID: 1622107
1975 Field Road	Project Name: Sechelt Landfill	Control Number:
Sechelt, BC, Canada	Groundwater	Date Received: Dec 16, 2022
V0N 3A1	Project Location: Sechelt	Date Reported: Dec 28, 2022
Attn: Accounts Payable	LSD:	Report Number: 2828898
Sampled By: Sandi Bandara	P.O.: 3004082	
Company: SCRD	Proj. Acct. code:	

		Reference Number	1622107-7	1622107-8	1622107-9	
		Sample Date	Dec 13, 2022	Dec 13, 2022	Dec 13, 2022	
		Sample Time	NA	NA	NA	
		Sample Location				
		Sample Description	MW 13-4 / 11.5 °C	MW 22 -01 / 11.5 °C	MW 4 / 11.5 °C	
		Matrix	Water	Water	Water	
Analyte		Units	Results	Results	Results	Nominal Detection Limit
Trace Metals Dissolved - Continued						
Arsenic	Dissolved	µg/L	<0.1	0.1	0.2	0.1
Barium	Dissolved	µg/L	1.1	3.7	43	0.1
Beryllium	Dissolved	µg/L	<0.05	<0.05	<0.05	0.05
Bismuth	Dissolved	µg/L	<0.1	<0.1	<0.1	0.1
Boron	Dissolved	µg/L	4	4	23	2
Cadmium	Dissolved	µg/L	0.01	<0.01	0.03	0.01
Chromium	Dissolved	µg/L	0.21	0.06	0.95	0.05
Cobalt	Dissolved	µg/L	0.02	0.58	0.03	0.02
Copper	Dissolved	µg/L	<0.5	<0.5	0.9	0.5
Iron	Dissolved	µg/L	10	3	<2	2
Lead	Dissolved	µg/L	0.01	<0.01	<0.01	0.01
Lithium	Dissolved	µg/L	<0.5	<0.5	3.9	0.5
Manganese	Dissolved	µg/L	1	17	2	1
Molybdenum	Dissolved	µg/L	0.16	0.46	0.04	0.02
Nickel	Dissolved	µg/L	<0.2	0.3	0.3	0.2
Selenium	Dissolved	µg/L	<0.2	<0.2	<0.2	0.2
Silver	Dissolved	µg/L	<0.01	<0.01	<0.01	0.01
Strontium	Dissolved	µg/L	47	44	560	0.1
Thallium	Dissolved	µg/L	<0.01	<0.01	<0.01	0.01
Thorium	Dissolved	µg/L	<0.05	<0.05	<0.05	0.05
Tin	Dissolved	µg/L	<0.1	<0.1	<0.1	0.1
Tungsten	Dissolved	µg/L	0.3	0.6	<0.2	0.2
Uranium	Dissolved	µg/L	0.02	0.03	0.26	0.01
Vanadium	Dissolved	µg/L	0.50	0.66	<0.05	0.05
Zinc	Dissolved	µg/L	1.2	1.8	3.3	0.5
Zirconium	Dissolved	µg/L	<0.1	<0.1	<0.1	0.1
Titanium	Dissolved	µg/L	<0.1	0.3	<0.1	0.1

Analytical Report

Bill To: Sunshine Coast Regional District	Project ID:	Lot ID: 1622107
1975 Field Road	Project Name: Sechelt Landfill	Control Number:
Sechelt, BC, Canada	Groundwater	Date Received: Dec 16, 2022
V0N 3A1	Project Location: Sechelt	Date Reported: Dec 28, 2022
Attn: Accounts Payable	LSD:	Report Number: 2828898
Sampled By: Sandi Bandara	P.O.: 3004082	
Company: SCRD	Proj. Acct. code:	

		Reference Number	1622107-10	1622107-11	
		Sample Date	Dec 13, 2022	Dec 13, 2022	
		Sample Time	NA	NA	
		Sample Location			
		Sample Description	Duplicate / 11.5 °C	Blank / 11.5 °C	
		Matrix	Water	Water	
Analyte		Units	Results	Results	Nominal Detection Limit
Aggregate Organic Constituents					
Chemical Oxygen Demand		mg/L	60	<10	10
Inorganic Nonmetallic Parameters					
Ammonia - N		mg/L	24.7	<0.025	0.025
Ammonium/Ammonia			Yes	Yes	
Preservation					
Kjeldahl Nitrogen	Total	mg/L	29.8	<0.10	0.1
Nitrogen	Total	mg/L	29.8	<0.10	0.1
Phosphorus	Total - Low Level	mg/L	0.053	<0.005	0.005
Organic Carbon	Dissolved Nonpurgeable	mg/L	15.8	<0.5	0.5
Metals Total					
Digestion	Preparation		Field Pres, digest as total Hg	Field Pres, digest as total Hg	
Mercury	Total	mg/L	<0.00001	<0.00001	0.00001
Physical and Aggregate Properties					
Turbidity		NTU	45.6	<0.10	0.1
Routine Water					
pH	at 25 °C	pH	6.6	5.6	
pH - Holding Time	at 25 °C		Exceeded	Exceeded	
pH - Holding Time			Exceeded	Exceeded	
pH	at 25 °C		7.39	5.88	0.01
Electrical Conductivity		µS/cm at 25 °C	1268	1	1
Calcium	Dissolved	mg/L	89	<0.01	0.01
Magnesium	Dissolved	mg/L	19	<0.02	0.02
Potassium	Dissolved	mg/L	40	<0.04	0.04
Sodium	Dissolved	mg/L	98	<0.1	0.1
Sulfur	Dissolved	mg/L	1.7	<0.02	0.02
Bicarbonate		mg/L	588	<5	5
Carbonate		mg/L	<6	<6	6
Hydroxide		mg/L	<5	<5	5
P-Alkalinity	as CaCO3	mg/L	<5	<5	5
T-Alkalinity	as CaCO3	mg/L	482	<5	5
Chloride	Dissolved	mg/L	106	<0.05	0.05
Nitrate - N	Dissolved	mg/L	<0.1	0.01	0.01
Nitrite - N	Dissolved	mg/L	<0.1	<0.01	0.01
Nitrate and Nitrite - N	Dissolved	mg/L	<0.20	0.01	0.01
Sulfate (SO4)	Dissolved	mg/L	<1	<0.1	0.1
Hardness	as CaCO3 (dissolved)	mg/L	300	<5	5
Salinity	Dissolved	g/L	0.25	<0.0003	0.0001

Analytical Report

Bill To: Sunshine Coast Regional District	Project ID:	Lot ID: 1622107
1975 Field Road	Project Name: Sechelt Landfill	Control Number:
Sechelt, BC, Canada	Groundwater	Date Received: Dec 16, 2022
VON 3A1	Project Location: Sechelt	Date Reported: Dec 28, 2022
Attn: Accounts Payable	LSD:	Report Number: 2828898
Sampled By: Sandi Bandara	P.O.: 3004082	
Company: SCRD	Proj. Acct. code:	

		Reference Number	1622107-10	1622107-11	
		Sample Date	Dec 13, 2022	Dec 13, 2022	
		Sample Time	NA	NA	
		Sample Location			
		Sample Description	Duplicate / 11.5 °C	Blank / 11.5 °C	
		Matrix	Water	Water	
Analyte	Units	Results	Results	Results	Nominal Detection Limit
Routine Water - Continued					
Silicon	Dissolved	µg/L	4300	89	5
Mono-Aromatic Hydrocarbons - Water					
4-Bromofluorobenzene	Surrogate	%	90	100	70-130
Toluene-d8	Surrogate	%	97	97	70-130
Volatile Petroleum Hydrocarbons - Water					
VHw6-10		mg/L	<0.05	<0.05	0.05
VPW (VHw6-10 minus BTEX)		mg/L	<0.05	<0.05	0.05
VOC Screen - Drinking Water					
Benzene		mg/L	0.0005	<0.0001	0.0001
Bromobenzene		mg/L	<0.0001	<0.0001	0.0001
Bromochloromethane		mg/L	<0.0001	<0.0001	0.0001
Bromodichloromethane		mg/L	<0.0001	0.0003	0.0001
Bromoform		mg/L	<0.0001	<0.0001	0.0001
Bromomethane		mg/L	<0.001	<0.001	0.001
n-Butylbenzene		mg/L	<0.0001	<0.0001	0.0001
sec-Butylbenzene		mg/L	<0.0001	<0.0001	0.0001
tert-Butylbenzene		mg/L	<0.0001	<0.0001	0.0001
Carbon Tetrachloride		mg/L	<0.0005	<0.0005	0.0005
Chlorobenzene		mg/L	<0.0001	<0.0001	0.0001
Chloroethane		mg/L	<0.001	<0.001	0.001
Chloroform		mg/L	<0.0001	0.0017	0.0001
Chloromethane		mg/L	<0.001	<0.001	0.001
2-Chlorotoluene		mg/L	<0.0001	<0.0001	0.0001
4-Chlorotoluene		mg/L	<0.0001	<0.0001	0.0001
1,2-Dibromo-3-Chloropropane		mg/L	<0.0001	<0.0001	0.0001
1,2-Dibromoethane		mg/L	<0.0001	<0.0001	0.0001
Dibromomethane		mg/L	<0.0001	<0.0001	0.0001
1,2-Dichlorobenzene		mg/L	<0.0001	<0.0001	0.0001
1,3-Dichlorobenzene		mg/L	<0.0001	<0.0001	0.0001
1,4-Dichlorobenzene		mg/L	<0.0001	<0.0001	0.0001
1,1-Dichloroethane		mg/L	<0.0001	<0.0001	0.0001
Dibromochloromethane		mg/L	<0.0001	<0.0001	0.0001
1,2-Dichloroethane		mg/L	<0.0005	<0.0005	0.0005
1,1-Dichloroethene		mg/L	<0.0005	<0.0005	0.0005
1,2-Dichloroethene(cis)		mg/L	<0.0001	<0.0001	0.0001
1,2-Dichloroethene(trans)		mg/L	<0.0001	<0.0001	0.0001
Dichlorodifluoromethane		mg/L	<0.001	<0.001	0.001

Analytical Report

Bill To: Sunshine Coast Regional District	Project ID:	Lot ID: 1622107
1975 Field Road	Project Name: Sechelt Landfill	Control Number:
Sechelt, BC, Canada	Groundwater	Date Received: Dec 16, 2022
VON 3A1	Project Location: Sechelt	Date Reported: Dec 28, 2022
Attn: Accounts Payable	LSD:	Report Number: 2828898
Sampled By: Sandi Bandara	P.O.: 3004082	
Company: SCRD	Proj. Acct. code:	

		Reference Number	1622107-10	1622107-11	
		Sample Date	Dec 13, 2022	Dec 13, 2022	
		Sample Time	NA	NA	
		Sample Location			
		Sample Description	Duplicate / 11.5 °C	Blank / 11.5 °C	
		Matrix	Water	Water	
Analyte	Units	Results	Results	Results	Nominal Detection Limit
VOC Screen - Drinking Water - Continued					
1,2-Dichloropropane	mg/L	<0.0001	<0.0001		0.0001
1,3-Dichloropropane	mg/L	<0.0001	<0.0001		0.0001
1,1,1-Dichloropropene	mg/L	<0.0001	<0.0001		0.0001
1,3-Dichloropropene(cis)	mg/L	<0.0001	<0.0001		0.0001
1,3-Dichloropropene(trans)	mg/L	<0.0001	<0.0001		0.0001
Ethylbenzene	mg/L	<0.0001	<0.0001		0.0001
Hexachlorobutadiene	mg/L	<0.0001	<0.0001		0.0001
p-Isopropyltoluene	mg/L	<0.001	<0.001		0.001
Methylene Chloride	mg/L	<0.01	<0.01		0.01
Methyl t-Butyl Ether	mg/L	<0.0001	<0.0001		0.0001
iso-Propylbenzene	mg/L	0.0004	<0.0001		0.0001
n-Propylbenzene	mg/L	<0.0001	<0.0001		0.0001
Styrene	mg/L	<0.0001	<0.0001		0.0001
1,1,1,2-Tetrachloroethane	mg/L	<0.001	<0.001		0.001
1,1,1,2,2-Tetrachloroethane	mg/L	<0.0001	<0.0001		0.0001
Tetrachloroethene	mg/L	<0.0005	<0.0005		0.0005
Toluene	mg/L	<0.0001	<0.0001		0.0001
1,2,3-Trichlorobenzene	mg/L	<0.0001	<0.0001		0.0001
1,2,4-Trichlorobenzene	mg/L	<0.0001	<0.0001		0.0001
1,1,1-Trichloroethane	mg/L	<0.0001	<0.0001		0.0001
1,1,2-Trichloroethane	mg/L	<0.0001	<0.0001		0.0001
Trichloroethene	mg/L	<0.0005	<0.0005		0.0005
Trichlorofluoromethane	mg/L	<0.0001	<0.0001		0.0001
1,2,3-Trichloropropane	mg/L	<0.0001	<0.0001		0.0001
1,2,4-Trimethylbenzene	mg/L	0.0010	<0.0001		0.0001
1,3,5-Trimethylbenzene	mg/L	<0.0001	<0.0001		0.0001
Total Xylenes (m,p,o)	mg/L	0.0024	<0.0001		0.0001
Vinyl Chloride	mg/L	<0.0005	<0.0005		0.0005
Xylene-m&p	mg/L	0.0024	<0.0001		0.0001
Xylene-o	mg/L	<0.0001	<0.0001		0.0001
VOC - Drinking Water - Surrogate Recovery					
Dibromofluoromethane	EPA Surrogate	%	120	123	50-140
Toluene-d8	EPA Surrogate	%	90	97	50-140
Bromofluorobenzene	EPA Surrogate	%	104	111	50-140
Trace Metals Dissolved					
Digestion	Dissolved		Lab filtered & preserved	Lab filtered & preserved	
Aluminum	Dissolved	µg/L	2	<1	1
Antimony	Dissolved	µg/L	0.21	0.05	0.02

Analytical Report

Bill To: Sunshine Coast Regional District	Project ID:	Lot ID: 1622107
1975 Field Road	Project Name: Sechelt Landfill	Control Number:
Sechelt, BC, Canada	Groundwater	Date Received: Dec 16, 2022
V0N 3A1	Project Location: Sechelt	Date Reported: Dec 28, 2022
Attn: Accounts Payable	LSD:	Report Number: 2828898
Sampled By: Sandi Bandara	P.O.: 3004082	
Company: SCRD	Proj. Acct. code:	

		Reference Number	1622107-10	1622107-11		
		Sample Date	Dec 13, 2022	Dec 13, 2022		
		Sample Time	NA	NA		
		Sample Location				
		Sample Description	Duplicate / 11.5 °C	Blank / 11.5 °C		
		Matrix	Water	Water		
Analyte		Units	Results	Results	Results	Nominal Detection Limit
Trace Metals Dissolved - Continued						
Arsenic	Dissolved	µg/L	1.3	<0.1		0.1
Barium	Dissolved	µg/L	520	<0.1		0.1
Beryllium	Dissolved	µg/L	<0.05	<0.05		0.05
Bismuth	Dissolved	µg/L	<0.1	<0.1		0.1
Boron	Dissolved	µg/L	850	<2		2
Cadmium	Dissolved	µg/L	<0.01	<0.01		0.01
Chromium	Dissolved	µg/L	0.53	<0.05		0.05
Cobalt	Dissolved	µg/L	0.15	<0.02		0.02
Copper	Dissolved	µg/L	<0.5	<0.5		0.5
Iron	Dissolved	µg/L	31	<2		2
Lead	Dissolved	µg/L	<0.01	<0.01		0.01
Lithium	Dissolved	µg/L	<0.5	<0.5		0.5
Manganese	Dissolved	µg/L	1100	<1		1
Molybdenum	Dissolved	µg/L	0.21	<0.02		0.02
Nickel	Dissolved	µg/L	4.5	<0.2		0.2
Selenium	Dissolved	µg/L	<0.2	<0.2		0.2
Silver	Dissolved	µg/L	<0.01	<0.01		0.01
Strontium	Dissolved	µg/L	610	<0.1		0.1
Thallium	Dissolved	µg/L	<0.01	<0.01		0.01
Thorium	Dissolved	µg/L	<0.05	<0.05		0.05
Tin	Dissolved	µg/L	0.1	<0.1		0.1
Tungsten	Dissolved	µg/L	<0.2	<0.2		0.2
Uranium	Dissolved	µg/L	0.02	<0.01		0.01
Vanadium	Dissolved	µg/L	0.47	<0.05		0.05
Zinc	Dissolved	µg/L	3.3	<0.5		0.5
Zirconium	Dissolved	µg/L	0.3	<0.1		0.1
Titanium	Dissolved	µg/L	<0.1	<0.1		0.1

Approved by:



Max Hewitt
Operations Manager

Data have been validated by Analytical Quality Control and Element's Integrated Data Validation System (IDVS).

Generation and distribution of the report, and approval by the digitized signature above, are performed through a secure and controlled automatic process.

Methodology and Notes

Bill To: Sunshine Coast Regional District	Project ID:	Lot ID: 1622107
1975 Field Road	Project Name: Sechelt Landfill	Control Number:
Sechelt, BC, Canada	Groundwater	Date Received: Dec 16, 2022
V0N 3A1	Project Location: Sechelt	Date Reported: Dec 28, 2022
Attn: Accounts Payable	LSD:	Report Number: 2828898
Sampled By: Sandi Bandara	P.O.: 3004082	
Company: SCRD	Proj. Acct. code:	

Method of Analysis

Method Name	Reference	Method	Date Analysis Started	Location
Alk, pH, EC, Turb in water (BC)	APHA	* Alkalinity - Titration Method, 2320 B	Dec 16, 2022	Element Vancouver
Alk, pH, EC, Turb in water (BC)	APHA	* Conductivity, 2510 B	Dec 16, 2022	Element Vancouver
Alk, pH, EC, Turb in water (BC)	APHA	* pH - Electrometric Method, 4500-H+ B	Dec 16, 2022	Element Vancouver
Ammonium-N in Water	APHA	* Automated Phenate Method, 4500-NH3 G	Dec 20, 2022	Element Edmonton - Roper Road
Anions by IEC in water (VAN)	APHA	* Ion Chromatography with Chemical Suppression of Eluent Cond., 4110 B	Dec 17, 2022	Element Vancouver
Anions by IEC in water (VAN)	APHA	* Single-Column Ion Chromatography with Electronic Suppression, 4110 C	Dec 17, 2022	Element Vancouver
BTEX-VPH - Water (CLG)	BCELM	* Calculation of Volatile Petroleum Hydrocarbons in Solids, Waters, or Air (Vapour) - VPH (June 26, 2009), VPH	Dec 18, 2022	Element Calgary
Carbon Organic (Dissolved) in water (DOC)	APHA	High-Temperature Combustion Method, 5310 B	Dec 21, 2022	Element Edmonton - Roper Road
Chemical Oxygen Demand (water-VAN)	APHA	* Closed Reflux, Colorimetric Method, 5220 D	Dec 22, 2022	Element Vancouver
Chemical Oxygen Demand (water-VAN)	APHA	* Closed Reflux, Colorimetric Method, 5220 D	Dec 22, 2022	Element Vancouver
Mercury Low Level (Total) in water (VAN)	EPA	* Mercury in Water by Cold Vapor Atomic Fluorescence Spectrometry, 245.7	Dec 20, 2022	Element Vancouver
Metals SemiTrace (Dissolved) in water (VAN)	US EPA	* Metals & Trace Elements by ICP-AES, 6010C	Dec 19, 2022	Element Vancouver
pH in water (VAN)	APHA	* pH - Electrometric Method, 4500-H+ B	Dec 19, 2022	Element Vancouver
Phosphorus - Total in Water	APHA	* Automated Ascorbic Acid Reduction Method, 4500-P F	Dec 21, 2022	Element Edmonton - Roper Road
Total and Kjeldahl Nitrogen (Total) in Water	ISO	* Water Quality - Determination of nitrogen, ISO/TR 11905-2	Dec 21, 2022	Element Edmonton - Roper Road
Trace Metals (dissolved) in Water (VAN)	US EPA	* Determination of Trace Elements in Waters and Wastes by ICP-MS, 200.8	Dec 19, 2022	Element Vancouver
Turbidity - Water (VAN)	APHA	* Turbidity - Nephelometric Method, 2130 B		Element Vancouver
Turbidity - Water (VAN)	APHA	* Turbidity - Nephelometric Method, 2130 B	Dec 16, 2022	Element Vancouver
VOC - Drinking Water	US EPA	* US EPA method, 524	Dec 21, 2022	Element Calgary
VOC - Drinking Water	US EPA	* Volatile Organic Compounds by GCMS / Purge and Trap for Aqueous Samples, 8260/5030	Dec 21, 2022	Element Calgary

* Reference Method Modified

References

APHA	Standard Methods for the Examination of Water and Wastewater
BCELM	B.C. Environmental Laboratory Manual
EPA	Environmental Protection Agency Test Methods - US
ISO	International Organization for Standardization
US EPA	US Environmental Protection Agency Test Methods

Methodology and Notes

Bill To: Sunshine Coast Regional District	Project ID:	Lot ID: 1622107
1975 Field Road	Project Name: Sechelt Landfill	Control Number:
Sechelt, BC, Canada	Groundwater	Date Received: Dec 16, 2022
V0N 3A1	Project Location: Sechelt	Date Reported: Dec 28, 2022
Attn: Accounts Payable	LSD:	Report Number: 2828898
Sampled By: Sandi Bandara	P.O.: 3004082	
Company: SCRD	Proj. Acct. code:	

Comments:

- Dec 19, 2022 - Reduction of analytical volume was necessary for anion analysis due to matrix effects in samples 1622107-1, 2, 3, 5, and 10. Detection limits are adjusted accordingly.

Please direct any inquiries regarding this report to our Client Services group.

Results relate only to samples as submitted.

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Report Transmission Cover Page

Bill To: Sunshine Coast Regional District 1975 Field Road Sechelt, BC, Canada V0N 3A1	Project ID: Project Name: Sechelt Landfill Surface Water Project Location: Sechelt LSD: P.O.: 3004082 Proj. Acct. code:	Lot ID: 1622116 Control Number: Date Received: Dec 16, 2022 Date Reported: Dec 22, 2022 Report Number: 2828916
Attn: Accounts Payable Sampled By: Sandi Bandara Company: SCRD		

Contact	Company	Address
Accounts Payable	Sunshine Coast Regional District	1975 Field Road Sechelt, BC V0N 3A1 Phone: (604) 885-6800 Fax: Email: accounts.payable@scrd.ca
<u>Delivery</u>	<u>Format</u>	<u>Deliverables</u>
Email - Single Deliverable	PDF	Invoice
Corrina Suveges	Sunshine Coast Regional District	1975 Field Road Sechelt, BC V0N 3A1 Phone: (604) 885-6800 Fax: Email: Corrina.Suveges@scrd.ca
<u>Delivery</u>	<u>Format</u>	<u>Deliverables</u>
Email - Merge Deliverables	PDF	COC / Test Report
Email - Single Deliverable	PDF	COA
Email - Single Deliverable	Sunshine Coast	Test Report
Sandi Bandara	Sunshine Coast Regional District	1975 Field Road Sechelt, BC V0N 3A1 Phone: (604) 885-6800 Fax: Email: sandi.bandara@scrd.ca
<u>Delivery</u>	<u>Format</u>	<u>Deliverables</u>
Email - Multiple Deliverables By Lot	PDF	COC / Test Report
Email - Multiple Deliverables By Lot	Sunshine Coast	Test Report
Email - Single Deliverable	PDF	COA

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Analytical Report

Bill To: Sunshine Coast Regional District	Project ID:	Lot ID: 1622116
1975 Field Road	Project Name: Sechelt Landfill Surface	Control Number:
Sechelt, BC, Canada	Water	Date Received: Dec 16, 2022
V0N 3A1	Project Location: Sechelt	Date Reported: Dec 22, 2022
Attn: Accounts Payable	LSD:	Report Number: 2828916
Sampled By: Sandi Bandara	P.O.: 3004082	
Company: SCRD	Proj. Acct. code:	

		Reference Number	1622116-1	1622116-2	1622116-3	
		Sample Date	Dec 14, 2022	Dec 14, 2022	Dec 14, 2022	
		Sample Time	NA	NA	NA	
		Sample Location				
		Sample Description	SL A / 11.5 °C	SL C / 11.5 °C	SL B / 11.5 °C	
		Matrix	Water	Water	Water	
Analyte		Units	Results	Results	Results	Nominal Detection Limit
Aggregate Organic Constituents						
Chemical Oxygen Demand		mg/L	20	10	20	10
Inorganic Nonmetallic Parameters						
Ammonia - N		mg/L	<0.025	<0.025	<0.025	0.025
Ammonium/Ammonia			Yes	Yes	Yes	
Preservation						
Kjeldahl Nitrogen	Total	mg/L	0.12	<0.07	<0.07	0.1
Nitrogen	Total	mg/L	0.19	0.21	0.13	0.1
Organic Carbon	Dissolved Nonpurgeable	mg/L	2.3	1.9	2.7	0.5
Metals Total						
Calcium	Total	mg/L	3.3	7.6	3.8	0.01
Magnesium	Total	mg/L	0.47	1.6	0.59	0.02
Potassium	Total	mg/L	0.12	0.81	0.21	0.04
Silicon	Total	mg/L	3.3	8.1	3.7	0.005
Sulfur	Total	mg/L	0.55	1.1	0.56	0.02
Sodium	Total	mg/L	1.4	3.9	1.7	0.1
Mercury	Total	mg/L	<0.00001	<0.00001	<0.00001	0.00001
Routine Water						
pH - Holding Time			Exceeded	Exceeded	Exceeded	
pH	at 25 °C		6.79	7.16	6.83	0.01
Electrical Conductivity		µS/cm at 25 °C	27	72	30	1
Chloride	Dissolved	mg/L	0.77	4.16	0.90	0.05
Nitrate - N	Dissolved	mg/L	0.08	0.20	0.17	0.01
Nitrite - N	Dissolved	mg/L	<0.01	<0.01	<0.01	0.01
Nitrate and Nitrite - N	Dissolved	mg/L	0.08	0.20	0.17	0.01
Hardness	Total	mg CaCO3/L	10.2	26	11.9	1
Trace Metals Total						
Tungsten	Total	µg/L	<0.2	<0.2	<0.2	0.2
Aluminum	Total	mg/L	0.081	0.099	0.082	0.001
Antimony	Total	mg/L	0.00005	0.00004	0.00003	0.00002
Arsenic	Total	mg/L	<0.0001	<0.0001	<0.0001	0.0001
Barium	Total	mg/L	0.0034	0.0061	0.0037	0.0001
Beryllium	Total	mg/L	<0.00005	<0.00005	<0.00005	0.00005
Bismuth	Total	mg/L	<0.0001	<0.0001	<0.0001	0.0001
Boron	Total	mg/L	<0.002	0.003	<0.002	0.002
Cadmium	Total	mg/L	0.00001	0.00001	<0.00001	0.00001
Chromium	Total	mg/L	0.00017	0.00016	0.00015	0.00005
Cobalt	Total	mg/L	0.00002	0.00004	0.00002	0.00002
Copper	Total	mg/L	0.0005	0.0005	0.0003	0.0002

Analytical Report

Bill To: Sunshine Coast Regional District	Project ID:	Lot ID: 1622116
1975 Field Road	Project Name: Sechelt Landfill Surface	Control Number:
Sechelt, BC, Canada	Water	Date Received: Dec 16, 2022
V0N 3A1	Project Location: Sechelt	Date Reported: Dec 22, 2022
Attn: Accounts Payable	LSD:	Report Number: 2828916
Sampled By: Sandi Bandara	P.O.: 3004082	
Company: SCRD	Proj. Acct. code:	

		Reference Number	1622116-1	1622116-2	1622116-3	
		Sample Date	Dec 14, 2022	Dec 14, 2022	Dec 14, 2022	
		Sample Time	NA	NA	NA	
		Sample Location				
		Sample Description	SL A / 11.5 °C	SL C / 11.5 °C	SL B / 11.5 °C	
		Matrix	Water	Water	Water	
Analyte		Units	Results	Results	Results	Nominal Detection Limit
Trace Metals Total - Continued						
Iron	Total	mg/L	0.058	0.078	0.058	0.002
Lead	Total	mg/L	0.00003	0.00009	0.00004	0.00001
Lithium	Total	mg/L	<0.0005	<0.0005	<0.0005	0.0005
Manganese	Total	mg/L	0.001	0.002	0.003	0.001
Molybdenum	Total	mg/L	0.00024	0.00021	0.00024	0.00002
Nickel	Total	mg/L	<0.0002	<0.0002	<0.0002	0.0002
Selenium	Total	mg/L	<0.0002	<0.0002	<0.0002	0.0002
Silver	Total	mg/L	<0.00001	0.00003	<0.00001	0.00001
Strontium	Total	mg/L	0.013	0.039	0.015	0.0001
Thallium	Total	mg/L	<0.00001	<0.00001	<0.00001	0.00001
Thorium	Total	mg/L	<0.00005	<0.00005	<0.00005	0.00005
Tin	Total	mg/L	0.0002	0.0016	<0.0001	0.0001
Titanium	Total	mg/L	0.0008	0.0039	0.0011	0.0001
Uranium	Total	mg/L	0.00006	0.00003	0.00006	0.00001
Vanadium	Total	mg/L	0.00033	0.00066	0.00037	0.00005
Zinc	Total	mg/L	0.0030	0.0035	0.0016	0.0005
Zirconium	Total	mg/L	0.0001	<0.0001	<0.0001	0.0001

Analytical Report

Bill To: Sunshine Coast Regional District	Project ID:	Lot ID: 1622116
1975 Field Road	Project Name: Sechelt Landfill Surface	Control Number:
Sechelt, BC, Canada	Water	Date Received: Dec 16, 2022
VON 3A1	Project Location: Sechelt	Date Reported: Dec 22, 2022
Attn: Accounts Payable	LSD:	Report Number: 2828916
Sampled By: Sandi Bandara	P.O.: 3004082	
Company: SCRD	Proj. Acct. code:	

Reference Number 1622116-4
Sample Date Dec 14, 2022
Sample Time NA
Sample Location
Sample Description Duplicate / 11.5 °C

		Matrix	Water		
Analyte		Units	Results	Results	Nominal Detection Limit
Aggregate Organic Constituents					
Chemical Oxygen Demand		mg/L	10		10
Inorganic Nonmetallic Parameters					
Ammonia - N		mg/L	<0.025		0.025
Ammonium/Ammonia Preservation			Yes		
Kjeldahl Nitrogen	Total	mg/L	<0.07		0.1
Nitrogen	Total	mg/L	0.15		0.1
Organic Carbon	Dissolved Nonpurgeable	mg/L	2.5		0.5
Metals Total					
Calcium	Total	mg/L	3.8		0.01
Magnesium	Total	mg/L	0.55		0.02
Potassium	Total	mg/L	0.21		0.04
Silicon	Total	mg/L	3.6		0.005
Sulfur	Total	mg/L	0.59		0.02
Sodium	Total	mg/L	1.7		0.1
Mercury	Total	mg/L	<0.00001		0.00001
Routine Water					
pH - Holding Time			Exceeded		
pH	at 25 °C		6.82		0.01
Electrical Conductivity		µS/cm at 25 °C	30		1
Chloride	Dissolved	mg/L	0.91		0.05
Nitrate - N	Dissolved	mg/L	0.10		0.01
Nitrite - N	Dissolved	mg/L	<0.01		0.01
Nitrate and Nitrite - N	Dissolved	mg/L	0.10		0.01
Hardness	Total	mg CaCO ₃ /L	11.7		1
Trace Metals Total					
Tungsten	Total	µg/L	<0.2		0.2
Aluminum	Total	mg/L	0.091		0.001
Antimony	Total	mg/L	0.00002		0.00002
Arsenic	Total	mg/L	<0.0001		0.0001
Barium	Total	mg/L	0.0038		0.0001
Beryllium	Total	mg/L	<0.00005		0.00005
Bismuth	Total	mg/L	<0.0001		0.0001
Boron	Total	mg/L	<0.002		0.002
Cadmium	Total	mg/L	<0.00001		0.00001
Chromium	Total	mg/L	0.00016		0.00005
Cobalt	Total	mg/L	0.00003		0.00002
Copper	Total	mg/L	0.0006		0.0002

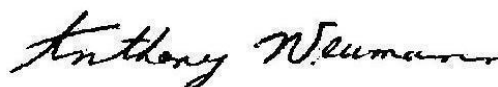
Analytical Report

Bill To: Sunshine Coast Regional District	Project ID:	Lot ID: 1622116
1975 Field Road	Project Name: Sechelt Landfill Surface	Control Number:
Sechelt, BC, Canada	Water	Date Received: Dec 16, 2022
V0N 3A1	Project Location: Sechelt	Date Reported: Dec 22, 2022
Attn: Accounts Payable	LSD:	Report Number: 2828916
Sampled By: Sandi Bandara	P.O.: 3004082	
Company: SCRD	Proj. Acct. code:	

Reference Number 1622116-4
Sample Date Dec 14, 2022
Sample Time NA
Sample Location
Sample Description Duplicate / 11.5 °C

		Matrix	Water		
Analyte		Units	Results	Results	Nominal Detection Limit
Trace Metals Total - Continued					
Iron	Total	mg/L	0.066		0.002
Lead	Total	mg/L	0.00005		0.00001
Lithium	Total	mg/L	<0.0005		0.0005
Manganese	Total	mg/L	0.003		0.001
Molybdenum	Total	mg/L	0.00025		0.00002
Nickel	Total	mg/L	0.0003		0.0002
Selenium	Total	mg/L	<0.0002		0.0002
Silver	Total	mg/L	<0.00001		0.00001
Strontium	Total	mg/L	0.015		0.0001
Thallium	Total	mg/L	<0.00001		0.00001
Thorium	Total	mg/L	<0.00005		0.00005
Tin	Total	mg/L	<0.0001		0.0001
Titanium	Total	mg/L	0.0012		0.0001
Uranium	Total	mg/L	0.00007		0.00001
Vanadium	Total	mg/L	0.00039		0.00005
Zinc	Total	mg/L	0.0028		0.0005
Zirconium	Total	mg/L	<0.0001		0.0001

Approved by:



Anthony Neumann, MSc
General Manager

Data have been validated by Analytical Quality Control and Element's Integrated Data Validation System (IDVS).

Generation and distribution of the report, and approval by the digitized signature above, are performed through a secure and controlled automatic process.

Methodology and Notes

Bill To: Sunshine Coast Regional District	Project ID:	Lot ID: 1622116
1975 Field Road	Project Name: Sechelt Landfill Surface	Control Number:
Sechelt, BC, Canada	Water	Date Received: Dec 16, 2022
V0N 3A1	Project Location: Sechelt	Date Reported: Dec 22, 2022
Attn: Accounts Payable	LSD:	Report Number: 2828916
Sampled By: Sandi Bandara	P.O.: 3004082	
Company: SCRD	Proj. Acct. code:	

Method of Analysis

Method Name	Reference	Method	Date Analysis Started	Location
Alk, pH, EC, Turb in water (BC)	APHA	* Conductivity, 2510 B	Dec 16, 2022	Element Vancouver
Alk, pH, EC, Turb in water (BC)	APHA	* pH - Electrometric Method, 4500-H+ B	Dec 16, 2022	Element Vancouver
Ammonium-N in Water	APHA	* Automated Phenate Method, 4500-NH3 G	Dec 22, 2022	Element Edmonton - Roper Road
Anions by IEC in water (VAN)	APHA	* Ion Chromatography with Chemical Suppression of Eluent Cond., 4110 B	Dec 16, 2022	Element Vancouver
Anions by IEC in water (VAN)	APHA	* Single-Column Ion Chromatography with Electronic Suppression, 4110 C	Dec 16, 2022	Element Vancouver
Carbon Organic (Dissolved) in water (DOC)	APHA	High-Temperature Combustion Method, 5310 B	Dec 21, 2022	Element Edmonton - Roper Road
Chemical Oxygen Demand (water-VAN)	APHA	* Closed Reflux, Colorimetric Method, 5220 D	Dec 21, 2022	Element Vancouver
Chemical Oxygen Demand (water-VAN)	APHA	* Closed Reflux, Colorimetric Method, 5220 D	Dec 21, 2022	Element Vancouver
Mercury Low Level (Total) in water (VAN)	EPA	* Mercury in Water by Cold Vapor Atomic Fluorescence Spectrometry, 245.7	Dec 20, 2022	Element Vancouver
Metals SemiTrace (Total) in Water (VAN)	US EPA	* Metals & Trace Elements by ICP-AES, 6010C	Dec 19, 2022	Element Vancouver
Total and Kjeldahl Nitrogen (Total) in Water	ISO	* Water Quality - Determination of nitrogen, ISO/TR 11905-2	Dec 21, 2022	Element Edmonton - Roper Road
Trace Metals (Total) in Water (VAN)	US EPA	* Determination of Trace Elements in Waters and Wastes by ICP-MS, 200.8	Dec 19, 2022	Element Vancouver

* Reference Method Modified

References

APHA	Standard Methods for the Examination of Water and Wastewater
EPA	Environmental Protection Agency Test Methods - US
ISO	International Organization for Standardization
US EPA	US Environmental Protection Agency Test Methods

Please direct any inquiries regarding this report to our Client Services group.

Results relate only to samples as submitted.

The test report shall not be reproduced except in full, without the written approval of the laboratory.



APPENDIX G
HISTORIC LANDFILL GAS MONITORING RESULTS



Table G1 Historic Groundwater Elevations

Monitoring Location	Top of Casing Elevation	Ground Elevation (mASL)	Groundwater Elevation (mASL)																		
			15-Jun-17	20-Oct-17	22-Dec-17	14-Feb-18	15-Feb-18	14-Mar-18	25-Jun-18	27-Sep-18	18-Dec-18	12-Apr-19	13-Nov-19	17-Dec-19	25-Mar-20	06-Aug-20	12-Nov-20	25-Mar-21	30-Jun-21	22-Apr-22	22-Dec-22
GP13-01S	-	215.82	213.02	213.02	<212.82	Drv	Drv	Drv	Drv	Drv	Drv	Drv	Drv	Drv	Drv	Drv	Drv				
GP13-01D	-	215.82	<210.92	<210.92	<210.92	Drv	Drv	Drv	Drv	Drv	Drv	Drv	Drv	Drv	Drv	Drv	Drv				
GP13-02S	-	216.39	213.94	<213.69	<213.69	Drv	Drv	Drv	Drv	Drv	Drv	Drv	Drv	Drv	Drv	Drv	Drv				
GP13-02D	-	216.39	212.07	212.07	<211.79	Drv	Drv	Drv	Drv	Drv	Drv	Drv	Drv	Drv	Drv	Drv	Drv				
GP17-01S	219.32	218.51	-	<215.81	<215.81	Drv	Drv	Drv	Drv	Drv	Drv	Drv	Drv	Drv	Drv	Drv	Drv	Drv	Drv	Drv	
GP17-01D	219.32	218.51	-	<213.91	<213.91	Drv	Drv	Drv	Drv	Drv	Drv	Drv	Drv	Drv	Drv	Drv	Drv	Drv	Drv	Drv	
Notes:																					
(1) Soil Gas Probe locations obtained from survey completed by Strait Land Surveying Inc. in 2013 (GP13-01, GP13-02) and 2017 (GP17-01).																					
(2) All groundwater elevations reported in metres above mean sea level.																					
(3) < indicates that the probe was dry and the water level was below the bottom elevation of the probe.																					



Table G2 Historic Results - GP13-01S

Sample Date:	Units	15-Jun-17	20-Oct-17	22-Dec-17	14-Feb-18	15-Feb-18	14-Mar-18	25-Jun-18	27-Sep-18	18-Dec-18	12-Apr-19	13-Nov-19	17-Dec-19	25-Mar-20	06-Aug-20	12-Nov-20	25-Mar-21	30-Jun-21	27-Apr-22	15-Dec-22
Parameters:																				
Field																				
Pressure	inches of water	0.0	-1.56	0.0	-0.13	-0.30	-0.15	0.06	0.14	-0.28	0.00	0.02	0.04	0.01	0.01	0.01	-0.13	0.02	-	-
Methane (CH ₄)	%	0.0	0.0	0.1	3.0	2.2	1.1	0.0	0.0	3.1	0.5	1.5	4.1	0.0	0.0	0.0	0.0	7.5	-	-
Carbon Dioxide (CO ₂)	%	6.9	8.5	5.6	7.2	7.3	6.5	9.2	6.9	6.3	8.8	9.9	15.6	10.0	7.9	7.3	7.3	9.5	-	-
Oxygen (O ₂)	%	6.9	6.7	1.6	1.4	1.4	2.1	10	9.2	0.4	8.4	0.4	1.0	9.2	12.0	1.2	10.6	0.0	-	-
Notes:																				
-	Not analyzed																			
No Cap	Indicates that the well did not have a gas cap, or the cap was not sealed																			
ND	Non-detect (detection limit)																			
	Well blinded																			



Table G3 Historic Results - GP13-01D

Sample Date:	Units	15-Jun-17	20-Oct-17	22-Dec-17	14-Feb-18	15-Feb-18	14-Mar-18	25-Jun-18	27-Sep-18	18-Dec-18	12-Apr-19	13-Nov-19	17-Dec-19	25-Mar-20	06-Aug-20	12-Nov-20	25-Mar-21	30-Jun-21	27-Apr-22	15-Dec-22
Parameters:																				
Field																				
Pressure	inches of water	0.0	-1.63	0.0	-0.22	-0.31	-0.20	0.04	0.15	-0.15	0.07	0.03	0.05	0.04	-0.03	-0.05	0.02	-0.07	-	-
Methane (CH ₄)	%	0.0	0.0	0.1	0.5	0.2	0.0	0.0	0.0	12.3	0.5	3.0	5.9	0.0	0.0	0.3	0.0	0.1	-	-
Carbon Dioxide (CO ₂)	%	7.4	11.3	9.2	7.8	7.5	6.5	8.8	11.2	13.8	9.3	15.4	10.7	7.8	11.7	11.2	9.4	19.5	-	-
Oxygen (O ₂)	%	5.9	1.6	2.4	2.4	3.3	5.6	6.1	3.1	0.2	4.6	0.5	1.8	11.4	5.5	1.2	6.7	0.0	-	-
Notes:																				
-	Not analyzed																			
No Cap	Indicates that the well did not have a gas cap, or the cap was not sealed																			
ND	Non-detect (detection limit)																			
	Well blinded																			



Table G4 Historic Results - GP13-02S

Sample Date:	Units	15-Jun-17	20-Oct-17	22-Dec-17	14-Feb-18	15-Feb-18	14-Mar-18	25-Jun-18	27-Sep-18	18-Dec-18	12-Apr-19	13-Nov-19	17-Dec-19	25-Mar-20	06-Aug-20	12-Nov-20	25-Mar-21	30-Jun-21	27-Apr-22	15-Dec-22
Parameters:																				
Field																				
Pressure	inches of water	0.0	-0.09	-1.09	0.00	-0.21	-0.19	-0.14	0.13	-0.20	0.10	0.01	0.05	0.02	-0.20	0.02	0.15	0.05	-	-
Methane (CH ₄)	%	1.4	0.0	4.7	26.8	26.9	25.3	19.3	3.5	27.3	19.0	11.3	11.8	40.3	21.7	12.7	18.3	22.8	-	-
Carbon Dioxide (CO ₂)	%	13.5	14.7	11.4	11.0	11.1	9.9	14.3	13.4	15.9	15.4	15.7	20.0	23.1	25.0	19.3	16.9	29.7	-	-
Oxygen (O ₂)	%	0.9	2.0	0.4	1.0	1.1	1.9	0.6	1.2	0.2	0.2	0.2	1.4	2.1	1.6	0.5	1.7	0.5	-	-
Notes:																				
-	Not analyzed																			
No Cap	Indicates that the well did not have a gas cap, or the cap was not sealed																			
ND	Non-detect (detection limit)																			
	Well blinded																			



Table G5 Historic Results - GP13-02D

Sample Date: Parameters:	Units	15-Jun-17	20-Oct-17	22-Dec-17	14-Feb-18	15-Feb-18	14-Mar-18	25-Jun-18	27-Sep-18	18-Dec-18	12-Apr-19	13-Nov-19	17-Dec-19	25-Mar-20	06-Aug-20	12-Nov-20	25-Mar-21	30-Jun-21	27-Apr-22	15-Dec-22
Field																				
Pressure	inches of water	0.0	-1.67	-0.62	0.00	-0.27	-0.21	-0.01	0.19	-0.26	0.15	-0.17	-0.08	0.04	0.02	0.02	0.14	0.26	-	-
Methane (CH ₄)	%	0.0	-	0.0	2.0	0.4	6.3	9.5	2.0	12.8	15.7	8.9	9.7	12.0	9.9	12.1	26.8	13.1	-	-
Carbon Dioxide (CO ₂)	%	10.3	-	9.7	11.8	12.3	11.2	13.4	13.0	13.4	14.5	15.1	15.6	17.0	15.0	17.1	23.3	15.2	-	-
Oxygen (O ₂)	%	1.4	-	3.3	1.1	2.0	2.0	1.9	1.1	0.1	0.2	0.2	1.4	0.2	1.7	0.5	2.1	0.5	-	-
Notes:																				
-	Not analyzed																			
No Cap	Indicates that the well did not have a gas cap, or the cap was not sealed																			
ND	Non-detect (detection limit)																			
	Well blinded																			



Table G6 Historic Results - GP17-01S

Sample Date:	Units	15-Jun-17	20-Oct-17	22-Dec-17	14-Feb-18	15-Feb-18	14-Mar-18	25-Jun-18	27-Sep-18	18-Dec-18	12-Apr-19	13-Nov-19	17-Dec-19	25-Mar-20	06-Aug-20	12-Nov-20	25-Mar-21	30-Jun-21	27-Apr-22	15-Dec-22
Parameters:																				
Field																				
Pressure	inches of water	-	-0.11	0.0	-0.16	-0.31	-0.21	0.09	0.24	-0.32	0.19	0.13	0.16	0.11	0.01	-0.20	0.02	0.02	-0.05	-0.26
Methane (CH ₄)	%	-	0.0	43.8	64.9	47.6	58.3	60.5	51.9	15.5	67.3	65.1	61.8	60.9	33.5	49.1	2.2	56.0	60.3	9.8
Carbon Dioxide (CO ₂)	%	-	0.0	24.7	26.1	22.1	23.7	35.7	37.4	13.6	32.2	34.9	31.7	32.0	30.1	34.4	5.9	38.9	30.2	6
Oxygen (O ₂)	%	-	21.2	1.4	1.1	3.6	2.5	0.3	1.2	11.1	0.5	0.1	1.9	2.0	4.2	3.1	13.5	4.0	0.8	0
Notes:																				
-	Not analyzed																			
No Cap	Indicates that the well did not have a gas cap, or the cap was not sealed																			
ND	Non-detect (detection limit)																			
	Well blinded																			



Table G7 Historic Results - GP17-01D

Sample Date:	Units	15-Jun-17	20-Oct-17	22-Dec-17	14-Feb-18	15-Feb-18	14-Mar-18	25-Jun-18	27-Sep-18	18-Dec-18	12-Apr-19	13-Nov-19	17-Dec-19	25-Mar-20	06-Aug-20	12-Nov-20	25-Mar-21	30-Jun-21	27-Apr-22	15-Dec-22
Parameters:																				
Field																				
Pressure	inches of water	-	-0.1	0.0	-0.12	-0.28	-0.21	0.09	0.28	-0.37	0.18	0.01	0.15	0.11	-	-0.16	-0.07	0.07	0.18	-0.16
Methane (CH ₄)	%	-	3.0	31.9	48.9	52.2	49.5	59.9	48.1	52.1	65.5	20.1	51.2	51.3	-	59.4	46.2	50.4	54.3	11.6
Carbon Dioxide (CO ₂)	%	-	2.8	25.1	28.1	27.8	27.3	35.9	39.1	34.0	33.9	35.5	32.4	31.6	-	34.5	24.3	32.9	27.6	7.6
Oxygen (O ₂)	%	-	20.0	3.5	2.2	2.6	3.5	0.3	1.9	2.6	0.5	1.8	3.5	3.8	-	0.6	4.6	0.0	2.8	0
Notes:																				
-	Not analyzed																			
No Cap	Indicates that the well did not have a gas cap, or the cap was not sealed																			
ND	Non-detect (detection limit)																			
	Well blinded																			

Table G8 Historic Landfill Gas Building Monitoring

Sample Date:	Share Shed		Special Waste Storage (Storage Bunker)		Office Building		Scale House		Power Shed		Maintenance Shop	
Parameters:												
Methane (CH4) %												
14-Feb-18	0.0025	0.0035	-		0.0025	0.0035	0.0025	0.0035	0.0025	0.0035	0.0025	0.0035
15-Feb-18	0.0000	0.0005	-		-		0.0025	0.0035	0.0000	0.0005	0.0000	0.0005
25-Jun-18	0.0000	0.0000	0.0015	0.0015	0.0015	0.0010	0.0000	0.0000	0.0030	0.0025	0.0005	0.0270
28-Sep-18	0.0065	0.0015	0.0005	0.0025	0.0000	0.0010	0.0015	0.0030	0.0010	0.0030	0.0040	0.0035
19-Dec-18	0.0005	0.0005	0.0025	0.0025	0.0025	0.0045	0.0005	0.0005	0.0005	0.0025	0.0000	0.0000
16-Apr-19	0.0000	0.0000	0.0000	0.0005	0.0000	0.0010	0.0000	0.0000	0.0000	0.0005	0.0000	0.0000
19-Dec-19	0.0005	0.0010	0.0005	0.0015	0.0010	0.0020	0.0010	0.0010	0.0010	0.0015	0.0005	0.0005
25-Mar-20	0.0010	0.0000	0.0000	0.0005	0.0000	0.0005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
06-Aug-20	-	-	0.0010	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
12-Nov-20	-	-	0.0010	0.0010	-	0.0020	0.0010	0.0005	0.0010	0.0010	0.0000	0.0010
25-Mar-21	-	-	-	-	0.0000	0.0000	0.0000	0.0005	0.0000	-	0.0000	-
30-Jun-21	-	-	-	-	0.0000	0.0005	0.0000	0.0000	0.0005	-	0.0005	-
27-Apr-22	0.0000	0.0000	-	-	0.0000	0.0000	0.0000	0.0000	-	-	0.0000	0.0000
15-Dec-22	-	-	-	-	0.0000	0.0000	0.0005	0.0000	-	-	0.0000	0.0005
Notes:												
1. All buildings were monitored using an RKI Eagle. Buildings were monitored at ground surface and at breathing level.												
- No data available												

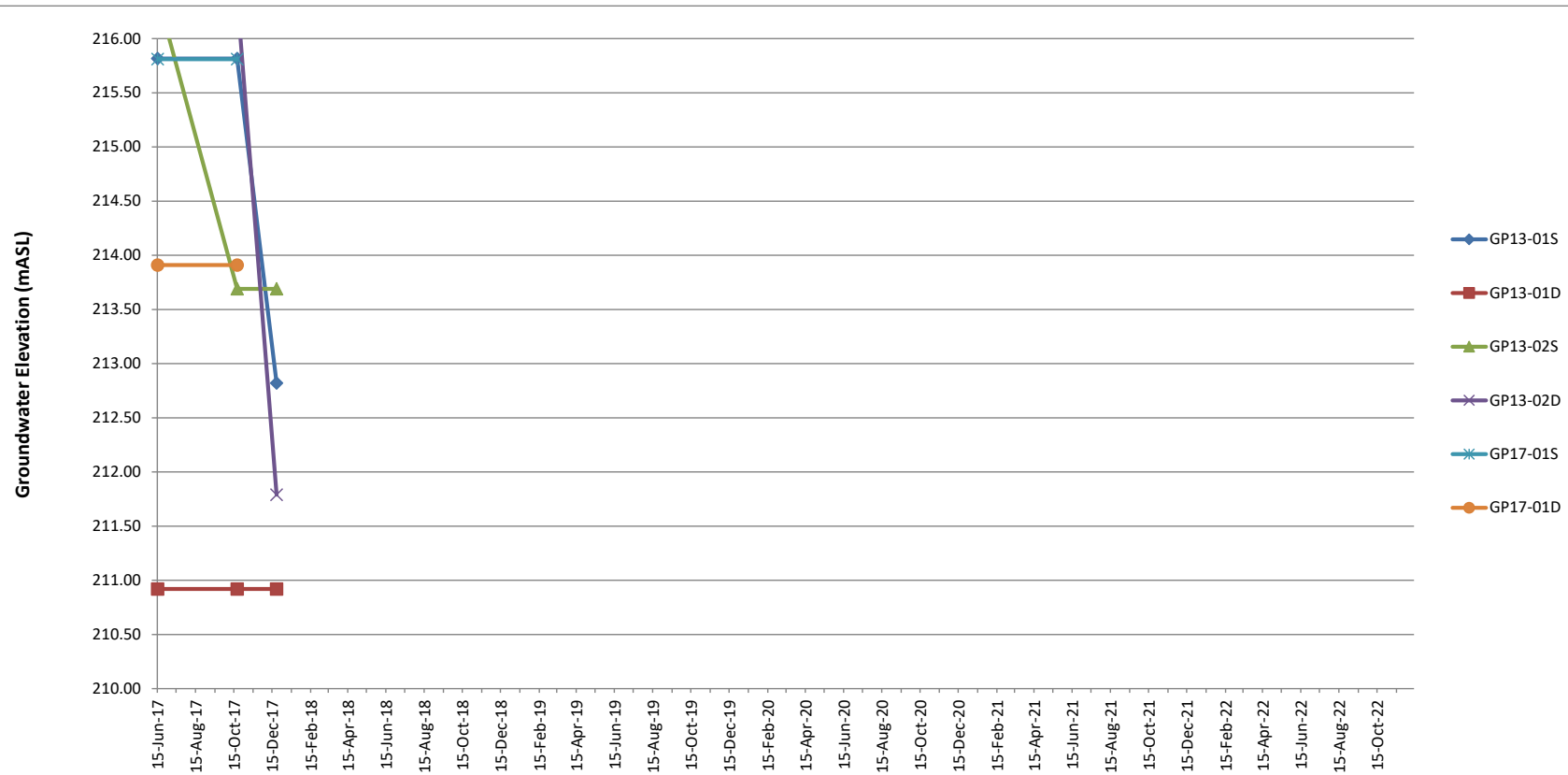


Figure G1
Soil Gas Probe Groundwater Hydrograph
Sechelt Landfill



APPENDIX H
FINANCIAL SUMMARY

Pender Harbour Landfill/Transfer Station
Summary Statement of Revenue, Expenses and Transfers (Unaudited)
For the Year Ended December 31, 2022

	Actual	Budget
Revenues		
Tax Requisitions	\$ 430,807	\$ 430,807
User Fees & Service Charges	323,417	357,056
Investment Income	14	-
Other Revenue	34,163	35,000
	788,401	822,863
Expenses		
Administration	95,538	95,538
Wages and Benefits	254,411	295,253
Operating	489,240	572,370
Amortization of Tangible Capital Assets	7,532	12,299
	846,721	975,460
Operating Surplus/(Deficit)	\$ (58,320)	\$ (152,597)
Other		
Capital Expenditures	(9,865)	(111,000)
Transfer (to)/from Reserves	33,385	111,880
Prior Year Surplus/(Deficit)	-	-
Unfunded Amortization	7,532	12,299
Transfer (to)/from Unfunded Liability	27,268	-
Financial Plan Surplus/(Deficit)	\$ (0)	\$ (139,418)

Sechelt Landfill
Summary Statement of Revenue, Expenses and Transfers (Unaudited)
For the Year Ended December 31, 2022

	Actual	Budget
Revenues		
Tax Requisitions	\$ 1,094,399	\$ 1,094,399
User Fees & Service Charges	2,587,716	2,438,863
Investment Income	106,151	-
Other Revenue	136,052	141,000
	3,924,318	3,674,262
Expenses		
Administration	225,305	225,305
Wages and Benefits	526,052	488,701
Operating	2,576,815	1,915,346
Debt Charges - Interest	-	745
Amortization of Tangible Capital Assets	78,881	41,962
(Gain)/Loss on Disposal of Tangible Capital Assets	1,750	-
	3,408,803	2,672,059
Operating Surplus/(Deficit)	\$ 515,515	\$ 1,002,203
Other		
Capital Expenditures	(75,973)	(2,836,916)
Proceeds from Sale of TCA	775	-
Proceeds from Long Term Debt	1,563,198	1,853,316
Debt Principal Repayment	(156,320)	(309,974)
Transfer (to)/from Reserves	(248,241)	170,649
Transfer (to)/from Appropriated Surplus	(140,515)	-
Transfer (to)/from Other Funds	(1,529,380)	(1,577,368)
Transfer (to)/from Accumulated Surplus	1,750	-
Prior Year Surplus/(Deficit)	195,546	195,546
Unfunded Amortization	78,881	41,692
Transfer (to)/from Unfunded Liability	(205,237)	1,600,000
Financial Plan Surplus/(Deficit)	\$ -	\$ 139,148