REPORT

2024 Annual Report

Tiskwat (Wildwood) Landfill, Powell River, BC

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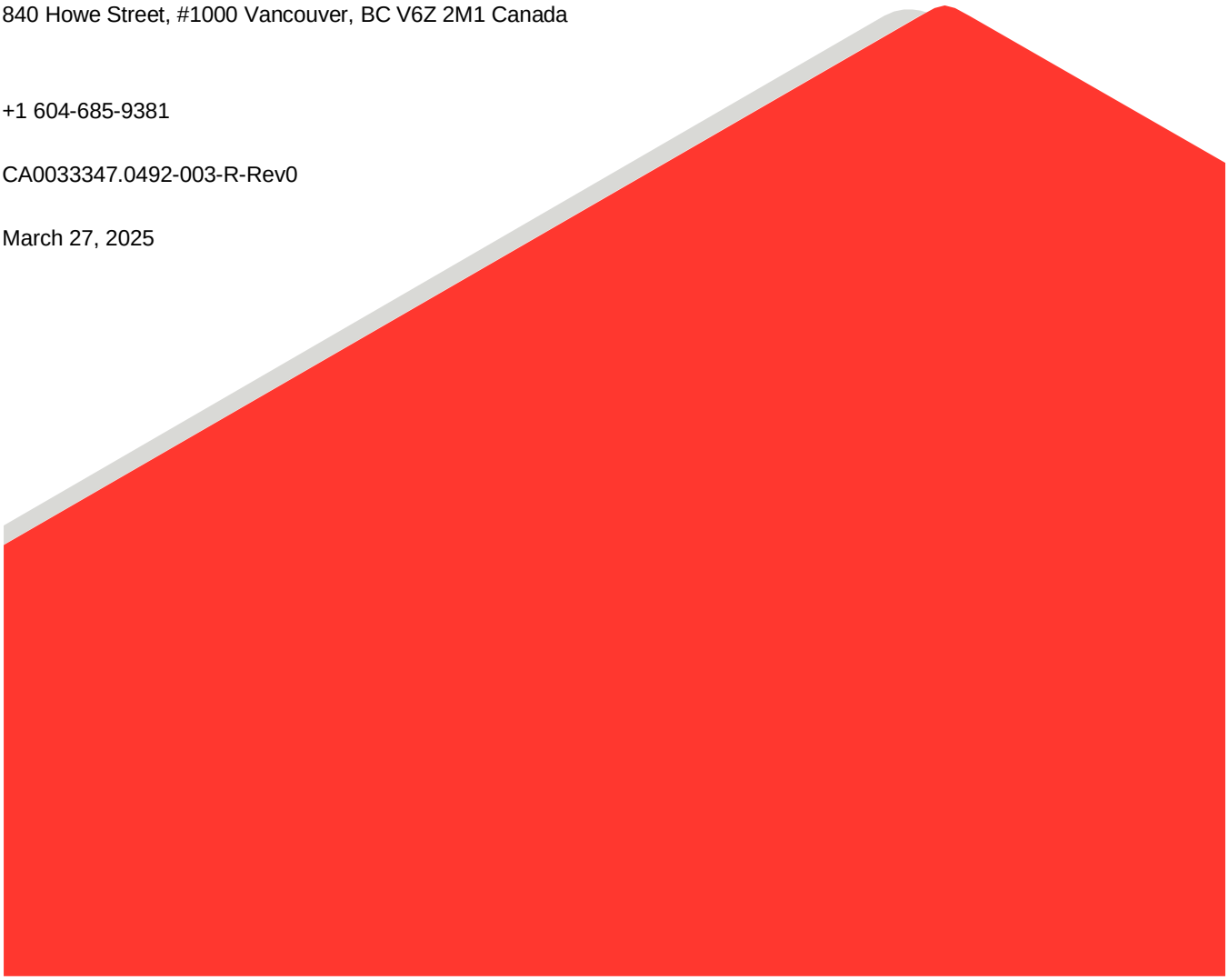

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1.0 INTRODUCTION

This report presents the results of groundwater and air quality monitoring conducted at the Domtar Tiskwat (Wildwood) Landfill (Landfill) over the 2024 monitoring year. The Tiskwat (Wildwood) Landfill receives waste from the Domtar mill site located in Powell River, BC.

The 2024 monitoring program was carried out in accordance with the requirements outlined in the Landfill permit (PR-4565), which was amended by BC Ministry of Environment & Climate Change Strategy (ENV) on 19 March 2015. A copy of the amended permit is provided in Appendix A. A summary of the contents of this report relative to the reporting requirements specified by the Landfill permit is presented below in Table 1.

Table 1: Summary of Reporting Compliance with Landfill Permit

Section of Permit	Permit Requirement	Report Reference
Section 3.7	Remaining design capacity of the Landfill (uncompacted cubic metres) and an estimation of closure date at the current rate of disposal	Section 4.2
Section 2.8	Efforts in waste reduction and alternative disposal	Section 4.3
Section 2.11	Measures taken to minimize leachate generation, their effectiveness, and any proposed measures	Section 4.3.2
Section 2.12	Slope stability and settlement monitoring	Section 4.4
Section 2.14	An evaluation of air quality (PM_{10} and $PM_{2.5}$) in the adjacent community of Wildwood	Section 6.8, Appendix G
Section 2.15	Any changes to the design and operating plan	Section 4.1
Section 2.19	Estimated costs of closure and post-closure activities	Section 4.2
Section 3.1.1	Monitoring data	Sections 6.3, 6.4, 6.5, and 6.6
Section 3.1.2	Types and volumes (uncompacted cubic metres) or refuse discharged	Section 4.3.3.1, Appendix B
Section 3.7	Details of the proposed dustfall monitoring program for the coming year	Appendix G

A summary of the scope of work completed in 2024 in excess of the permit requirements is summarized in Table 2.

Table 2: Scope of Work and Reporting in Excess of Permit Requirements

Scope of Work	Report Reference
Sampling and analysis for chloride at all available monitoring locations for assessment purposes	Section 6.5.2
Snap-shot sampling at additional monitoring wells 94-2, 94-3, 94-10 and AH4 (note: Figure 3 does not show these as sampling locations)	Section 6.5.2

2.0 BACKGROUND

A variety of waste-material from the Powell River mill site, including flyash from a power boiler, was placed in a sand and gravel quarry beginning in the 1960s to create the Tiskwat (Wildwood) Landfill. The location of the Landfill is shown on Figure 1 and site plans are presented on Figure 2 and 3. MacMillan Bloedel Ltd. (MB Paper Ltd.) owned and operated the Landfill from the 1960s until its closure in 1995. The closed portion of the Landfill is referred to as the Phase 1 Landfill. In January 1996, a new, smaller Landfill (referred to as the “Mini-Landfill”) was established within the footprint (on the northeast corner) of the older Landfill (Figure 3). In June 1998, MB Paper Ltd. sold the pulp and paper mill located in Powell River, BC to Pacifica Papers Inc. Pacifica Papers Inc. merged with Norske Skog Canada on 27 August 2001, forming a new company, NorskeCanada. In October of 2005, NorskeCanada changed its name to Catalyst Paper Corporation (Catalyst). Paper Excellence Group, parent company of Catalyst Paper Corporation, acquired Domtar Inc. (Domtar) in 2021 and recently rebranded Catalyst as Domtar. The Tiskwat (Wildwood) Landfill has been included in all of these corporate transactions.

Closure of the Phase 1 Landfill consisted of covering the Landfill with a low-permeability asphalt cap to minimize recharge from precipitation, and installation of a leachate collection system. The asphalt cap covers an area of approximately 4 hectares immediately south of the Mini-Landfill. The leachate collection system initially consisted of three pumping wells located within the uppermost perched groundwater flow system (PW95-1, PW95-8 and PW95-9) along the south edge of the Landfill. Three additional pumping wells (PW99-2, PW99-4 and PW99-5) were installed to greater depths along the east edge of the Landfill in 1999 (and became operational in March 2000) to intercept leachate that may have been by-passing the original collection system. The groundwater recovered by these wells is conveyed by pipeline to the Catalyst Paper mill site wastewater treatment plant, where it is treated along with the mill’s wastewater prior to discharge. Since closure of the Phase 1 Landfill and commencement of operation of the groundwater extraction system in 1995, groundwater quality at the site has improved considerably.

Waste from the mill site was placed in the Mini-Landfill commencing on 27 August 1996. The Mini-Landfill is lined with a HDPE geomembrane and soil bentonite liner and has provisions for leachate detection and collection.

Construction of a Phase 2 Landfill (Landfill expansion) above the Mini-Landfill and the Phase I Landfill was carried out in 2013. The Landfill expansion consists of a 1.5 mm (60 mil) HDPE geomembrane liner above the asphalt cap of the Phase I Landfill, an engineered leachate collection system, a below-liner drainage system, and a lined pond (Active Pond) for receipt of leachate runoff. Waste types permitted under the Environmental Management Act (Permit PR-4565) include flyash and a minor proportion of spent bed sand, miscellaneous mill waste and waste asbestos. Discharge of waste to the Phase 2 (expanded) Landfill commenced on 15 October 2013. Discharging of waste materials to the Landfill has significantly reduced since February 2022 due to curtailment of mill operations, with the mill shutting down in November 2021 and the power boiler shutting down in December 2021. According to Domtar, ash waste has not been placed in the Landfill since February 2022. Only sand and miscellaneous waste in 2023, and only minor amount of miscellaneous waste in 2024 was discharged to the Mini-Landfill and Phase 2 Landfill.

The December 2021 wet season monitoring program identified elevated concentrations of metals and major ions at some downgradient monitoring locations. These results were due to leachate discharge from a broken pipe that was identified by Domtar on 20 January 2022 at a location directly downslope from well 95-3 and the groundwater pumping shed (Figure 3). Details of the leachate line breach and resulting actions, including additional groundwater monitoring, are described in the 2022 Annual Report (WSP 2023). The results of the monitoring following the pipe break showed leachate indicators including chloride, sulphate, sodium, potassium, calcium, chromium, and molybdenum at elevated concentrations downgradient of the break (AH-3, 94-2, 94-10, 94-16B and Spring S1). Concentrations returned to, or were approaching, historically normal levels by the end of 2022, and this trend continued in 2023 and 2024.

3.0 GEOLOGY AND HYDROGEOLOGY

3.1 Geological Setting

The Tiskwat (Wildwood) Landfill is located at the southeastern edge of a coastal terrace near the top of a minor watershed, approximately 700 m by 700 m, which drains toward Powell River. This minor watershed consists of a bedrock valley filled with deposits of gravel, sand, and silt. The ground surface slopes downward (at about 4 degrees) in a southeast direction from the southeast edge of the Landfill to Powell River. The portion of the hillside immediately above Powell River is a steep bank with a slope on the order of 30 degrees. The northwest edge of the Landfill appears to represent a saddle point in the surface topography, with the ground surface sloping downwards towards the west and southwest at some distance northwest of the Landfill (Figure 2).

Prior to operation, the Landfill site was a sand and gravel quarry. Inspection of the 6-metre-high western quarry wall in 1977 revealed large-scale cross-stratification and at least one fine-grained marine sediment layer (McCammon, 1977). The following interpretations are inferred from borehole logs recorded during the drilling investigations at the site. Sediment thickness, from the present surface to the top of the underlying bedrock, ranges from approximately 20 m to 60 m. Several stratigraphic sequences are bedded approximately parallel to the present topography. These sequences appear to extend over large portions of the site, but some units may pinch-out locally.

The sediments are likely to have been deposited in the last c. 125,000 years during one or more series of glacial activity, glacial melt, and sea inundation associated with icecap isostasy. While specific stratigraphic units have not been identified at the site, deposits of the Fraser Glaciation (c. 10,000 to 28,000 ya), possibly including the Coquitlam Sequence and Vashon Sequence, are likely to compose the sediment fill atop the bedrock (Ryder et al., 1991). The steep slope southeast of the Landfill and adjacent to Powell Lake may have formed as the river cut through much of the glacial sediments during isostatic rebound following melting of the icecap. Some recent colluvium and soils overlie the glacial sediments.

The area occupied by the Landfill is bounded to the west and east by ridges of granitic bedrock, with exposed bedrock along the southwest edge of the Landfill. Beneath the site, the bedrock surface slopes in a southeast direction from an elevation of approximately 100 m above sea level at the south edge of the Landfill to an elevation of about 60 m above sea level just before the break in slope above the shoreline.

3.2 Hydrogeology

A conceptual hydrogeological model is provided in Figure 4 as a schematic cross-section through the site. A medium sand to sand and gravel layer is present above the bedrock surface. Regional groundwater flows in a southeast direction at the Landfill site within the sand unit and the upper, fractured zone of the bedrock. The thickness of the saturated zone above the bedrock is inferred to range between 5 m and 10 m in the central portion of the Landfill to between 2 m and 20 m downgradient of the Landfill. Hydraulic conductivity of the regional flow zone has been estimated to be approximately 4 $x10^{-4}$ m/s from a single-well response test (Golder Associates Ltd., 2007). Groundwater within the regional zone is estimated to flow under an average gradient of 0.05 m/m, resulting in a velocity on the order of 5 m/day.

Groundwater is inferred to discharge from the upper portion of the regional aquifer to springs located on the slope above Powell River and likely also directly to the river by seepage beneath the water level in the river (i.e., underflow). Groundwater within bedrock is inferred to discharge as underflow to Powell River.

The regional aquifer is overlain by a sequence of sands and gravels that contain layers of clay, silt, and fine sand ranging from 0.1 m to 1.5 m in thickness. The presence of these stratigraphic units has created perched groundwater conditions. Perched aquifers have previously been identified beneath the southern crest of the Landfill above fine-grained sediment layers at depths of approximately 11 m, 19 m, 29 m and 38 m below ground surface. Groundwater is inferred to move laterally in the aquifers and vertically at any boundaries of the perched aquifers, as illustrated in the schematic in Figure 4. Hydraulic conductivity in the perched flow zones is estimated to range from approximately 3×10^{-7} m/s to 2×10^{-4} m/s, with a mean of 2×10^{-5} m/s, based on single well response tests and pumping tests at eight wells (Golder Associates Ltd., 2007).

Based on this mean value and the hydraulic gradient at the site, groundwater flow through the perched aquifers in the region of the Landfill is estimated to be between approximately 5 m^3/day and 20 m^3/day. Some groundwater from the shallower perched zones may discharge to the steep slope above the spring zone.

A summary of the sample locations and their respective groundwater flow zones is presented in Table 3 and displayed on Figure 3.

Table 3: Sample Locations and Associated Groundwater Flow Zones

Flow Zone	Sample Location	Pumping Wells
11 m Perched Zone	AH-3, 89-5, 94-2, 94-3, 94-10, 94-16U,	
19 m Perched Zone		PW95-2
29 m Perched Zone	AH4, AH6L	PW99-5
38 m Zone	94-1/3, 94-16M, 94-18U, 94-18M, 94-19U, 94-19M, Spring S1, Spring S2	
Regional Aquifer	93-2B (upgradient), 94-16L, 94-17L, 94-18L, 94-19L	
Bedrock Aquifer	94-16B, 94-17B, 94-19B	

Note: 94-3, 94-10, AH4 were dry and could not be sampled in 2024.

4.0 DESIGN AND OPERATING PLAN

4.1 Changes to the Operating Plan in 2024

The current Design and Operating (D&O) Plan for the Tiskwat (Wildwood) Landfill is dated 23 February 2021 and the amended Landfill Permit 4565 is dated 19 March 2015. There have been no changes to the 2021 Operating Plan since it was issued.

Site visits by a geotechnical engineer to the Landfill were not completed in 2024 as only 4 m^3 of waste in total was discharged to the Landfill over the year. Since 2024, annual site visits by a geotechnical engineer have been postponed until more than 5,000 m^3 of waste has been placed in the Landfill in any calendar year, or more than 10,000 m^3 of waste has been placed cumulatively since 2024. As per the D&O Plan (Appendix G), Domtar should continue to carry out quarterly operational inspections of the landfill to identify any deficiencies (outlined in Section 2.3.9 of the D&O Plan) and communicate those deficiencies to WSP.

During the 2021 site visit, holes in the exposed 2.5 mm thick high-density polyethylene (HDPE) geomembrane liner for the active pond were noted and recommendations to repair the HDPE geomembrane were made. Holes in the HDPE geomembrane were first identified during the 2019 site visit and appear to be from a large mammal (likely a bear), and recommendations to repair or enhance the existing perimeter fence to prevent large animals from entering were also provided. During the 2022 site visit on 18 October 2022, repairs of the previously identified holes in the HDPE geomembrane liner were observed to have been made; however, additional holes were observed to the east of the lined spillway and on the east lined slope, including near or below the normal water line. During the 2023 site visit on 17 October 2023, it was observed that the holes in the geomembrane liner identified during the 2022 site visit had not been repaired. According to Domtar, the holes remained unrepaired in 2024 due to difficulty to source the required repair tape. To limit leakage through these holes, Domtar maintains the water level in the pond below the lowest level holes.

Based on observations during the most recent site visit on October 17th, 2023, it is WSP's opinion that landfilling was observed to be generally consistent with good landfill operational practice and the 2021 Design and Operating Plan. Measures to prevent further damage to the exposed liner of the active pond should be implemented as soon as possible, as recommended previously. No visual evidence of Landfill instability was observed during the 2023 site visit, and the volume of waste discharged to the Landfill in 2024 was insignificant. Domtar should undertake regular inspections of the active pond liner to monitor for holes in the liner and to repair them, until such time as measures to limit the intrusion of animals that can damage the liner are implemented.

4.2 Landfill Capacity and Closure Plan

The capacity of the Landfill authorized by the 19 March 2015 amended permit is 620,000 m^3, with a maximum rate of discharge of 25,000 m^3/year.

Based on the site visit described in the 2023 Annual Report (WSP, 2024a), no final cover appeared to have been placed in 2023. According to Domtar, the conditions remained unchanged in 2024. The remaining waste design capacity of the Landfill is estimated based on the 15 February 2024 Polaris survey to be approximately 262,300 m^3.

The estimated cost of future closure, post-closure, and other regulatory requirements was reviewed by Domtar and the balance of accrued obligation on Domtar's books on 31 December 2024 was $2,725,781.

4.3 Monitoring of Mill Refuse in 2024

4.3.1 Alternate Disposal

In the 2018 monitoring year, laboratory analysis was conducted on the spent bed sand that is disposed of at the Landfill to determine, based on its chemistry, whether the sand could be diverted from the Landfill. Further testing of the spent bed sand and a technical memorandum summarizing the results was completed in 2021 (Golder Associates Ltd., 2021b). The results of the preliminary chemical analyses on the sand suggest that a potential beneficial use may be as an aggregate in concrete or mortar, whereby the leachability of the sand would be reduced by binding with the cement.

Efforts undertaken to assess options for alternative flyash disposal prior to 2009 were presented in the July 2007 Environmental Assessment report and the 2008 Annual report. Options that were the subject of past investigations for flyash utilization are listed below:

- Research on the ability of flyash to oxidize hydrogen sulfide from sour gas wells is being undertaken by the Northern Alberta Institute of Technology.
- Flyash (and spent sand) was sent to FPInnovations, a research project funded by the Federal Government to look at alternative uses for flyash waste.
- Discussions with Natural Resources Canada regarding the potential for application of flyash on forested soils.
- Learning about alternative use of ash at Catalyst's sister mill in Rumford, Maine.
- Use at Site C by BC Hydro
- Participation in the BC bio economy network on the commercialization of forest-based materials.
- Use as a soil amendment or fuel additive for markets available to Sliammon.
- Commercial uses as an additive in concrete, building bricks, or a patented composite binder.
- Uses as a supplement in fertilizer, catalyst in biofuel production, soil conditioner, liming agent in agriculture, manufacturing of lock blocks, backfill material for oil well closure, solidification of mine tailings, or other construction purposes.

4.3.2 Efforts to Minimize Leachate Formation

The Landfill permit requires that a minimum of one metre freeboard in the active pond be maintained. However, due to the holes in the active pond liner, the liquid in the pond should be maintained below the elevation of the lowest hole until the holes are repaired. It is reported by Domtar that no additional efforts were made to minimize leachate formation in 2024 due to curtailment of mill operations.

4.3.3 Discharge Monitoring: Mini-Landfill

4.3.3.1 Discharge Types and Quantities

Domtar recorded each truck load of mill refuse that was discharged to the Mini-Landfill and Phase 2 Landfill in 2024 and recorded the types and quantities of material. Authorized types of landfill refuse include flyash, spent bed sand, waste asbestos, and a maximum of 3,000 m^3 per year of miscellaneous waste. Under the amended (19 March 2015) Landfill permit, the maximum rate of discharge to the Landfill authorized is 25,000 m^3 per year and the total volume permitted is 620,000 m^3.

Historically, Domtar provides the types and volumes (based on truck counts) of uncompacted refuse discharged to the Mini-Landfill and Phase 2 Landfill, and these are summarized in Table B-1, through to the end of 2024. According to Domtar, a total uncompacted volume of approximately 4 m^3 of waste material was placed in the Landfill during the 2024 monitoring year. All waste material disposed was miscellaneous waste, which was generated as part of the activities to de-risk the millsite following shut down of the paper manufacturing operation. This volume was within the allowable amount stated in the Landfill permit Section 1.1.2 (Appendix A).

Based on surveys carried out by Polaris Land Surveying Inc., the total Landfill airspace consumed between 20 February 2022 and 15 February 2024 was 4,400 m^3 and the total volume of waste and associated cover material that has been deposited in the Mini-Landfill and Phase 2 Landfill since the start of landfilling on 27 August 1996, is 353,300 m^3 (Appendix B). The total Landfill airspace consumed is the airspace after compaction in the Landfill.

4.4 Landfill Settlement

In 2013, three slope inclinometers were installed across the base of the Landfill expansion, three surface monuments were installed on the asphalt cover along the toe of the Landfill expansion, and five settlement gauges were installed on the slope south of the Landfill expansion to monitor settlement related to operations of the Phase 2 Landfill. These monitors were first surveyed on 27 January 2014 to provide baseline measurements and have been re-surveyed annually since then to allow an assessment of Landfill settlement and slope stability.

Table 4 summarizes the elevations of these settlement monitors measured by Emery and Rae Land Surveying Ltd. in 2014 and 2015; and by Polaris Land Surveying Inc. since 2016. The 2016 to 2020 settlement monitoring data are not shown. A copy of the most recent survey plan (by Polaris Land Surveying Inc.) is provided in Appendix B.

Table 4: Settlement Monitoring Results (excluding 2016-2020 data)

Location	Station ID	Description	Settlement Monitoring Results					
			27 Jan 2014	6 Jan 2015	13 Jan 2021	20 Feb 2022	15 Feb 2024	Settlement 2014-2024 (m)
W Toe	10106	Surface monument	135.157	135.158	135.153	135.151	135.150	0.007
W Toe	10105	Surface monument	134.423	134.425	134.415	134.415	134.413	0.010
East	10007	Surface monument	133.254	133.260	133.245	133.246	133.239	0.015
LF	10107	Slope inclinometer	140.757	140.752	No data	No data	No data	0.007*
LF	10108	Slope inclinometer	138.687	138.679	No data	No data	No data	0.011*
LF	10109	Slope inclinometer	137.424	137.420	No data	No data	No data	0.011*
SE Slope	10008	Settlement gauge	131.108	131.107	131.092	131.088	131.081	0.027
SE Slope	10009	Settlement gauge	127.761	127.761	127.743	127.743	127.737	0.024
SE Slope	10010	Settlement gauge	125.648	125.646	125.628	125.625	125.627	0.021
SE Slope	10011	Settlement gauge	123.692	123.690	123.676	123.661	123.674	0.018
SE Slope	10012	Settlement gauge	121.209	121.206	121.198	121.196	121.186	0.023

Note: * Settlements at slope inclinometer locations 10107, 10108, and 10109 were between January 2014 and January 2016. No survey data at these locations have been available since 2017.

The settlement monitoring over the past ten years can be summarized as follows:

- The Landfill experienced 7 to 11 mm of settlement at the inclinometer locations from January 2014 to January 2016. Survey data at these inclinometer locations have not been available since 2017.
- Settlements of 15 mm or less have occurred at the monitoring stations along the Landfill perimeter at the 10106,10105, and 10007 locations.
- Settlements of 27 mm or less have typically occurred at the settlement monitoring points on the southeast slope of the old Landfill. Between 2022 and 2024, the maximum settlement recorded was 10 mm at 10012.

Based on the settlement monitoring results and waste discharge quantity record to date, it is WSP's opinion that the Landfill is geotechnically stable with respect to potential failure surfaces through the foundation of the Landfill.

5.0 ENVIRONMENTAL MONITORING PROGRAM - SCOPE AND FIELD METHODS

Environmental monitoring was undertaken in 2024 to meet the requirements of the Landfill Permit and the secondary objectives proposed in the 2022 Annual report related to additional leachate characterization (WSP, 2023a) (see Section 5.1.3).

There were no deviations (work not performed) of the Landfill Permit apart from the absence of air quality monitoring (discussed in Section 5.3). The work associated with the proposed secondary objectives was not performed in 2024, as discussed in Section 5.1.3 below.

Results of the monitoring program are presented and discussed in Section 6.0.

5.1 Leachate Monitoring

5.1.1 Leachate from the Mini-Landfill and Phase 2 Landfill

Samples of leachate were collected in 2024 on two occasions (June and December) from the Mini-Landfill and the Phase 2 Landfill. Both June and December samples were analyzed for pH, specific conductance, and biological oxygen demand (BOD_5). June samples were also submitted for annual Dioxins and Furans analysis.

5.1.2 Monitoring of Leakage Detection System

Historically, the leakage detection pump located beneath the liner of the Mini-Landfill was activated weekly by Domtar to determine whether leachate has leaked through the Mini-Landfill liner. The weekly activation of the leakage detection pump stopped in early summer 2021 as a result of personnel changes at the Mill, which has carried into the 2022 and 2023 monitoring years. According to Domtar, the weekly activation of the pumps was reinstated in 2024. Liquid was detected beneath the Mini-Landfill in December 2024 and a sample of the leakage was analyzed for pH, specific conductance, biological oxygen demand (BOD_5), and dioxins and furans. The results are presented in Section 6.3.2.

5.1.3 Additional Leachate Characterization

In addition to the leachate sampling and analysis undertaken as part of the Landfill permitting requirements, further chemical characterization of the leachate has previously been conducted as a means of “fingerprinting” the leachate derived from the three parts of the Landfill (i.e., the closed Phase 1 Landfill, the Mini-Landfill, and the Phase 2 Landfill). Additional characterization of leachate samples from the Mini-landfill and Phase 2 Landfill was inadvertently missed in 2024.

5.2 Groundwater and Spring Monitoring

5.2.1 Groundwater

Groundwater monitoring was carried out in accordance with the Landfill permit requirements. Snap-shot samples at 94-16U and 94-16M could not be collected because insufficient groundwater was available at those locations for sampling.

During each monitoring event, groundwater levels were measured at all accessible monitoring and pumping wells (the entire 85-well network), using an electronic water-level meter. Totalizer flow meters monitor the volume of water pumped from the extraction wells. Domtar recorded the totalized volumes and the electrical conductivity and pH of the discharge.

Prior to sampling, monitoring wells were purged of three standing well volumes with dedicated lengths of 0.5-inch (inner diameter) tubing using a Waterra Hydrolift Pump. Water quality parameters (pH, specific conductivity, temperature, dissolved oxygen, and redox potential) were measured in the field during purging at regular intervals through to the time of sampling and documented on dedicated sampling forms (Appendix D).

5.2.2 Surface Water

Sampling of spring discharge was carried out in accordance with the Landfill permitting requirements. Grab samples were collected from discharging seepage faces at their inflows to Powell River (Springs S1 and S2). Water quality parameters (pH, specific conductivity, temperature, dissolved oxygen, and redox potential) were measured in the field at the time of sampling and documented on dedicated sampling forms (Appendix D).

5.2.3 Quality Assurance and Quality Control (QA/QC)

WSP's quality assurance/quality control (QA/QC) program was followed to produce interpretable, meaningful, and reproducible sampling and analytical data. Standard industry field procedures were used during the monitoring program to help achieve reproducibility. This involved using QA/QC measures in both the collection (field program) and analysis (laboratory) of samples. A description of the QA/QC program employed during the monitoring program is presented in Appendix F.

5.3 Particulate Monitoring

Historically, particulate monitoring has been carried out by Domtar as part of the routine annual monitoring program. However, no data was collected in monitoring year 2024. According to Domtar, PM_{10} and $PM_{2.5}$ sampling at the Wildwood School using a Teledyne API T640 has stopped since the instrument failure in August 2023, and PM_{10} sampling at the Mini-Landfill using a high volume (Hi-Vol) sampler has ended in February 2023 with the instrument being out of service for repair.

Permission to discontinue dustfall (particulate) monitoring, as per the Landfill Permit (4565), was provided by ENV in their email to Catalyst Paper on 5 August 2022. However, ambient air monitoring requirements are still listed in the Landfill permit. A landfill permit amendment is needed to remove this requirement. An amendment application will be prepared for submission to ENV to formally discontinue the air quality monitoring requirements in the landfill permit. This application will be submitted as soon as possible.

6.0 RESULTS OF ENVIRONMENTAL MONITORING AND DISCUSSION

The results and accompanying discussion of the 2024 monitoring year are presented in the subsections below.

6.1 Applicable Regulatory Criteria

The tabulated groundwater results were compared to the groundwater regulatory criteria for the protection of drinking water (DW) and aquatic life (AW), as specified in the B.C. Contaminated Sites Regulation (CSR) (B.C. Reg. 375/96), last amended on 1 March 2023 by B.C. Reg. 133/2022.

The British Columbia Approved and Working Water Quality Guidelines (BCWQG) for Aquatic Life and Drinking Water represent criteria for surface water. As the BCWQG were derived for discharge directly to surface water, they are not applicable to groundwater at distances greater than or equal to the 10 m setback from the high-water mark of an aquatic receiving environment. For this site, the only sampling locations within 10 m of a surface water body (Powell River) are surface water sample locations Springs S1 and S2. The results from these locations were compared with the drinking water criteria (DW) contained within the Summary of Water Quality Guideline for Drinking Water Sources (BC ENV 2020a), and with the freshwater aquatic life criteria (FAW) contained within the Summary of Water Quality Guidelines for Aquatic Life, Wildlife & Agriculture (February 2025; BC ENV 2025).

6.2 Precipitation

Total precipitation at the Tiskwat (Wildwood) Landfill in 2024 was estimated to be 1,273 mm, based on measurements at the Powell River weather station, located 8 km to the southeast of the Landfill (Environment Canada, 2024). Precipitation in 2024 was 22% above the mean annual value (1,040 mm), as calculated from measurements at the station from 1924 through 2024 (Figure C-1). Precipitation in February through April, June, September, and October was generally consistent with the historical mean values for those months; January, May, November and December saw precipitation significantly higher than historical means, and February July and August exhibited precipitation lower than historical means (Figure C-2).

6.3 Leachate Monitoring

6.3.1 Leachate from the Mini-Landfill and Phase 2 Landfill

Results from the leachate sampling conducted by Domtar in 2024 from the collection systems of the Mini-Landfill and Phase 2 Landfill are summarized in Table 5 and Table 6 below. The historical and 2024 results for both the Mini-Landfill and Phase 2 Landfill leachate are presented graphically on Figure 5.

Table 5 : Analysis of Leachate from the Mini-Landfill in 2024

Date of Sample Collection	pH	Specific Conductance (µS/cm)	BOD_5 (mg/L)	Dioxin/Furan	
				NATO TEQ (DL=0) (pg/L)	WHO TEQ (DL=0) (pg/L)
5 June 2024	9.6	15,840	87	0	0
10 December 2024	9.6	16,310	112		

Table 6: Analysis of Leachate from the Phase 2 Landfill in 2024

Date of Sample Collection	pH	Specific Conductance (µS/cm)	BOD_5 (mg/L)	Dioxin/Furan	
				NATO TEQ (DL=0) (pg/L)	WHO TEQ (DL=0) (pg/L)
5 June 2024	11.6	11,730	< 2	0	0
10 December 2024	11.6	10,810	< 2		

A review of Figure 5 shows that the pH and specific conductance of leachate from the Mini- and Phase 2 landfill in 2024 were generally consistent with historical data. The pH of the leachate from the Phase 2 Landfill has been variable since the Landfill expansion, but generally higher than that of the Mini-Landfill leachate.

The specific conductance of leachate from the Mini-Landfill was higher than the Phase 2 Landfill in 2024, and the specific conductance of both leachates measured in 2024 were within previous historical ranges.

BOD_5 of the Mini-Landfill leachate (87 mg/L and 112 mg/L) indicates that the leachate contains dissolved organic matter that could be decomposed by microbes. Historical data show that it increased in the early 2000s, reaching a peak of 704.8 mg/L in 2004, and subsequently declined; this is possibly due to a decrease in disposal of biodegradable material in the Mini-Landfill and because there was relatively very little deposition of flyash compared to miscellaneous waste in the early 2000s (Table B-1). An increasing trend in BOD_5 in the Mini-Landfill leachate has been observed from 2018 to 2023 with a peak in 2023 when there was approximately 5,300 m^3 of hogfuel deposited. A significant decrease in BOD_5 was observed in 2024 in which both June and December 2024 results returned to values similar those observed in 2021. This sharp decline may be related to the significant decrease in waste discharged in 2024 (only 4 m^3 of miscellaneous waste; Table B-1). BOD_5 results for the Phase 2 Landfill, since testing began in 2014, are one to two orders of magnitude lower than the results for the Mini-Landfill. These results suggest that, to date, there is very little biodegradable material in the Phase 2 Landfill in comparison to the Mini-Landfill.

No dioxins and furans have been detected in leachate from the Mini-Landfill and Phase 2 Landfill in recent monitoring years including 2024.

6.3.2 Monitoring of Leakage Detection System

As discussed in Section 5.1.2, leachate was detected by Domtar in December 2024 beneath the Mini-Landfill liner. Sample of leachate was collected on 10 December 2024 and submitted for laboratory analysis for pH, specific conductance, BOD, and dioxins and furans in accordance with the Landfill permit requirements. The analysis results are presented in Table 7 below. The results show that the December 2024 leachate appears to be characterized by a lower pH and specific conductance than typical leachate from the Mini-Landfill currently, and is somewhat similar to Mini-Landfill leachate from 10 years ago or more. The Dioxin and Furan concentrations detected are not considered distinguishable from the laboratory method blanks presented in Table 14.

Table 7: Analysis of Leachate from Mini-Landfill Leak Detection System in 2024

Date of Sample Collection	pH	Specific Conductance (µS/cm)	BOD_5 (mg/L)	Dioxin/Furan	
				NATO TEQ (DL=0) (pg/L)	WHO TEQ (DL=0) (pg/L)
10 December 2024	7.67	6,379	7	0.02	0.01

6.3.3 Additional Leachate Characterization

As discussed in Section 5.1.3, additional characterization of leachate from the Mini-landfill and Phase 2 Landfill was inadvertently missed in monitoring year 2024. Results from 2023 are provided with available historical data in Table C-1 (Appendix C). Indicator parameters of the leachate from the Phase I Landfill have been identified over the course of groundwater monitoring since 1990 and are also summarized in Table C-1. The indicator parameters for Phase 1 leachate are presented with their maximum concentration observed historically in groundwater from the recovery wells and from monitoring well 89-5 (located in the 11 m flow zone immediately downgradient of the closed Landfill), as concentrations representative of pure leachate for Phase 1 are not available.

An evaluation of the historical data suggests that the Phase 2 Landfill leachate, in comparison to the Mini-Landfill leachate, is characterized by elevated concentrations of aluminum, arsenic, chromium, copper, molybdenum, vanadium, and higher pH. In contrast, the Mini-Landfill leachate is characterized by elevated concentrations of total organic carbon (TOC), magnesium and manganese when comparing to the Phase 2 Landfill leachate results.

Based on this review, elevated concentrations of the constituents listed above may provide insight into potential leachate impacts from the Phase 2 Landfill. However, their occurrence should be interpreted with caution as these metals may be subject to geochemical changes along the groundwater flow path.

6.4 Monitoring of Groundwater from Pumping Wells

Historically, the majority (99% in 2022) of groundwater removed from the site has been from PW99-5 (29 m flow zone) and the remainder has been removed from PW99-2 (19 m flow zone). In 2023 and 2024, all of the groundwater recovered from the site was from PW99-5 due to a mechanical issue with the pump in PW99-2.

In 2024, Domtar recorded the pumping volume for PW99-5 from the totalizer flow meter, and recorded field measurements of pH and specific conductivity of the groundwater discharge from this well generally on a weekly to bi-weekly basis throughout the year. The results of these measurements for the 2024 monitoring year are plotted in Figures 6, 7, and 8.

Pumping wells PW95-1 (11 m flow zone), PW95-8 (11 m flow zone), PW95-9 (11 m flow zone), and PW99-4 (19 m flow zone) were found to be dry (or nearly dry) during the 2024 monitoring events, which is consistent with previous years.

6.4.1 Extraction Volumes and Rates from Pumping Wells

Extraction rates and volumes in this section assume a pumping period from 9 January through 31 December 2024 (358 days). A total volume of approximately 2,154.5 m^3 of groundwater was removed by the extraction wells in 2024. The total volume of water extracted in 2024 was approximately 11% lower than the total volume of water extracted in 2023 (2,420.5 m^3). As discussed above, all extracted groundwater in 2024 was from PW99-5. Figure 6 presents the total daily pumping rates (combined rate for all active recovery wells) since installation of the extraction system in 1995.

Over the life of the extraction system (1995 through 2024), a total volume of approximately 69,935 m^3 has been extracted. Approximately 9,646 m^3 was extracted from the 11 m flow zone by PW95-1, PW95-7, PW95-8, PW95-9, PW95-10, and PW95-12 to effectively dewater the zone by 1997. The discharge volume from the extraction well system increased following the well rehabilitation program conducted in March 2014 (Figure 6).

6.4.2 Quality of Pumped Groundwater

Measurements of specific conductance and pH are provided in Figures 7 and 8, where available. Laboratory analyses of the composite sample (PW-COMP) collected from the pumping well system is presented in Tables 10, 12, and 14. As PW99-5 accounted for all extracted groundwater in the 2024 monitoring year, the PW-COMP samples are considered representative of conditions in groundwater at location PW99-5.

Historical results of PW-COMP samples are shown graphically for select parameters on Figure 11A to 11P. All constituents measured in 2024 in the PW-COMP samples remained consistent with historical values. No exceedances of the BC CSR occurred in the samples collected from the groundwater extraction system and water quality is considerably favourable in comparison to AH-6L, a nearby monitoring well within the same flow zone (29 m flow zone) as PW99-5.

The pH measurements obtained by Domtar in monitoring year 2023 and 2024 (Figure 8) are generally higher than measured over the decade prior. The pH results by Domtar are generally consistent with those obtained by WSP for the 2023-2024 monitoring years (Table 10 and Figure 11B).

6.5 Results of Groundwater Monitoring

Groundwater monitoring was completed by WSP in September and November 2024. In both monitoring events, groundwater levels were measured manually at all monitoring locations, and groundwater samples were collected from select monitoring wells in accordance with the Landfill permit. The results of these tasks are presented below, with groundwater chemistry results provided in Tables 10 through 14 and groundwater elevations provided in Table 15.

6.5.1 Water-level Monitoring and Groundwater Flow

The results from monitoring groundwater levels in 2024 are provided in Table 15. Groundwater contours and flow direction inferred from measurements made in November 2024 in the 11 m and regional flow zones are presented in Figures 9 and 10, respectively.

Groundwater in the 11 m flow zone is inferred to flow toward the south to southeast. Regional groundwater flow appears to be influenced by the topographic protrusion immediately west of the Landfill. To the south of the Landfill, groundwater in the regional aquifer, located 2 to 20 m above bedrock, flows east to southeast toward Powell River.

6.5.2 Groundwater Chemistry Results

The results of the 2024 groundwater sampling are tabulated in Tables 10 through 14. Figures 11 A-P present time-series plots of selected geochemical constituents and general parameters. Laboratory Certificates of Analysis (COAs) are provided in Appendix E.

In general, for each geochemical constituent representative of the Phase I Landfill, concentrations along the flow path are highest at the Landfill and decrease downgradient of the extraction system. Historically, no Phase 2 leachate indicators have been identified downgradient of the Landfill, with the exception of the 2022 monitoring year, when a rise in leachate indicators (chloride, sulphate, sodium, potassium, calcium, chromium and molybdenum) was observed in select downgradient wells as a result of the December 2021 leachate pipe breach (WSP 2023). Generally, these constituents have since returned to, or were approaching, historical concentrations, and this trend continued in 2024.

Results of the 2024 groundwater sampling program and temporal trends in groundwater chemistry based on historical results are discussed below for individual constituents relative to baseline conditions.

Specific Conductance

Specific conductance (Figure 11A) measured in the 2024 monitoring year at all sampled locations is considered to be consistent with values over the last decade.

pH

pH (Figure 11B) measured in the 2024 monitoring year at all sampled locations is considered to be consistent with values over the last decade.

The pH at AH-6L has remained largely above 8.5; observations from 2014 through 2021 showed a slight decrease in pH since the Phase 2 Landfilling started. This downward trend was not observed from 2022 to 2024. The elevated pH at AH-6L may be related to the leachate from the Phase 1 Landfill directly (associated with either flyash or lime dregs), or due to biodegradation of carbon, similar to reactions from a typical carbon-rich Landfill.

Sulphate

Sulphate (Figure 11C) concentrations measured in the 2024 monitoring year at all sampled locations are considered to be consistent with values over the last decade. Sulphate concentrations at the south edge of the Landfill and downgradient of the Landfill are generally higher than levels at locations upgradient of the Landfill.

Sulphate concentrations at AH6L, which demonstrated an upward trend from 2005 to 2013, have remained relatively stable to slightly declining thereafter. Sulphate concentrations indicate that sulphate minerals in the Phase 1 Landfill continue to dissolve. Sulphate is then captured by the extraction wells and attenuates downgradient of the Landfill, possibly due more to mineral precipitation than sulphate reduction.

Alkalinity and Calcium

Alkalinity and calcium (Figure 11D and 11E) concentrations measured in the 2024 monitoring year are considered to be generally consistent with values over the last decade.

Alkalinity (reported as $CaCO_3$) in the 11 m flow zone at the south edge of the Landfill has decreased since operation of the extraction system began in 1995[1]. Decreasing trends in alkalinity have also been observed downgradient of the Landfill in the 11 m and 38 m flow zones, at AH-3 and 94-1/3, respectively, until approximately 2004; alkalinity at these locations has been relatively stable since then. Alkalinity at AH6L in the 29 m flow zone downgradient of the landfill has historically varied several orders of magnitude but has generally stabilized since 2011. Alkalinity in the 40 mg/L to 115 mg/L range upgradient of the Landfill is likely due to the mineralogy of the glacial sediments. Alkalinity elevated above these levels, where they occur downgradient of the Landfill, is likely due to dissolution of calcite and other carbonate compounds in the Phase 1 Landfill material.

Calcium concentrations have been generally consistent since monitoring began, with the exception of 89-5, where a declining trend is evident since 2008, and AH6L, where concentrations were rising until 2016 but have subsequently declined. Calcium concentrations increased significantly at Spring S1 and AH-3 in December 2021, following the leachate release due to the pipe break, and have since declined to within historical values.

Alkaline Metals

Generally, sodium (Figure 11F) concentrations measured in the 2024 monitoring year are considered to be consistent with values over the last decade. Sodium concentrations are typically measured between 5 and 40 mg/L under background groundwater conditions upgradient of the Landfill. Typically, sodium concentrations are elevated above background at the edge of the Landfill and immediately downgradient of the Landfill but are similar to background levels near the shoreline, which suggests sodium is captured by the extraction wells and attenuated between the Landfill and Powell River. Sodium concentrations increased significantly at Spring S1 and AH-3 in December 2021, following the leachate release due to the pipe break, and have since declined to within historical values.

Potassium (Figure 11G) concentrations measured in the 2024 monitoring year are generally considered to be consistent with historical values, with some minor exceptions. AH-3 and S1 exhibited an increase in potassium concentrations following the 2021 leachate line breach, although concentrations have declined considerably since then. Potassium concentrations at AH-3 remain slightly above those measured before the breach, indicating continued residual effects of the breach at this location.

Redox-Sensitive Metals

Manganese concentrations (Figure 11H) measured in the 2024 monitoring year are considered to be consistent with historical values. At location 89-5, manganese concentrations have fluctuated widely since the beginning of monitoring, but have generally trended downwards (below the CSR standard) since 2019.

Manganese concentrations at all other locations have remained stable for several years, with the exception of 94-16B, where concentrations have been variable, with a downward trend from 2009 to 2021, and a historically high concentration in December 2022. Elevated and fluctuating manganese levels at 94-16B may be related to changes in vertical flow direction between the bedrock and overlying sediments in that area. Elevated manganese concentrations are typical of groundwater flow through a carbon-rich Landfill, due to dissolution of manganese from sediments under reducing conditions.

[1] Of note, an overall increase in alkalinity occurred at 89-5 from 2010 through 2018, after which alkalinity declined.

Trace Metals

Aluminum concentrations (Figure 11I) measured in the 2024 monitoring year are considered to be consistent with values over the last decade. Concentrations of aluminum upgradient of the landfill (93-2B) are historically below or near the laboratory detection limit. In groundwater downgradient of the landfill (AH-6L), aluminum has been detected and fluctuations in concentrations have been observed following the start of Phase 2 landfilling; however, they remain well below the CSR DW standard.

Arsenic concentrations (Figure 11J) measured in the 2024 monitoring year are considered to be consistent with values over the last decade. Arsenic concentrations at AH-6L have consistently exceeded the CSR DW standard since the start of monitoring and may be a result of the elevated concentrations identified in both Mini- and Phase 2 Landfill leachate.

Chromium concentrations (Figure 11K) measured in the 2024 monitoring year are considered to be consistent with values over the last decade. Chromium concentrations have remained stable over the past 10 years at all sample locations until December 2021 when the leachate release related to the pipe break occurred. The leachate release affected some downgradient locations, particularly AH-3 and S1. Concentrations at these locations have since returned to normal historical levels.

Molybdenum concentrations (Figure 11L) measured in the 2024 monitoring year are generally considered to be consistent with values over the last decade. Historically, molybdenum concentrations across the Site are consistent with historical background groundwater concentrations, with the exception of AH-3 in 2021, when concentrations rose in response to the leachate release, and declined thereafter, approaching historical levels. Residual effects of the leachate discharge remain at AH-3 as concentrations continue to decline towards normal historical concentrations in 2024; however, concentrations have decreased below the CSR DW standard.

Vanadium concentrations (Figure 11M) measured in the 2024 monitoring year are generally considered to be consistent with values over the last decade, with concentrations at location 89-5 and AH-6L remaining above the CSR DW standard.

Total Organic Carbon

Total organic carbon (TOC) concentrations (Figure 11N) measured in the 2024 monitoring year are considered to be consistent with values over the last decade. TOC has historically been between 0 and 7 mg/L upgradient of the Landfill and decreased significantly at the south edge of the Landfill from concentrations greater than 1,000 mg/L to values of less than 50 mg/L between 2006 and 2018, but have since increased slightly, to concentrations ranging between 10 mg/L and 160 mg/L.

Chlorinated and Non-chlorinated Phenols

Concentrations of all chlorinated and non-chlorinated phenols (Table 13) analyzed at AH-3 and AH-6L in 2024 reported below the laboratory detection limits, with the exception of 3,4-Dichlorophenol at AH-6L (0.000255 mg/L), at an order of magnitude below the CSR standard for freshwater aquatic life (CSR AW).

Dioxins and Furans

The World Health Organization (WHO) and the North Atlantic Treaty Organization (NATO) have developed a method of quantifying the toxic equivalency (TEQ) of 17 dioxin and furan congeners by multiplying the concentration of each congener by a corresponding toxic equivalency factor (TEF). No guidelines for dioxins and furans in water have been established in Canada. A Maximum Contaminant Level (MCL) of 30 pg/L for 2,3,7,8-TCDD has been established by the United States Environmental Protection Agency (US EPA) for drinking water and is noted here for reference purposes only (US EPA 1992).

Figure 11O presents the historical trends in total TEQ for dioxins and furans. In the figure, the total TEQ is presented using the NATO TEF's and an assumption that non-detection represents a concentration of 0 pg/L. This approach tends to highlight instances in which the TEQ for dioxins and furans is above detection limits.

Table 14 presents the results of dioxin and furan analyses conducted on samples collected in 2024. Congeners were detected at all monitoring locations. Dioxins and furans are ubiquitous in nature, as evidenced by their presence in the laboratory method blanks. Therefore, only concentrations above those found in the laboratory method blanks are considered meaningful. Of the monitoring locations where congeners were found, the concentrations measured at AH-6L and 89-5 in 2024 are the only locations with concentrations considered to be distinguishable from the laboratory method blanks. Table 8 shows the concentrations of 2,3,7,8-TCDD and total TEQ (using NATO TEF's and an assumption that non-detects are 0) in samples distinguishable from laboratory blanks compared to the US EPA MCL for drinking water, for reference purposes only.

Table 8: Concentrations of 2,3,7,8-TCDD and total TEQ in Samples Distinguishable from Laboratory Blanks Compared to US EPA MCL for Drinking Water

AH-6L (pg/L)	89-5 (pg/L)	US EPA MCL – Reference purposes only (pg/L)
<0.36	<0.38	30
TEQ = 11.2	TEQ = 5.46	

Halogens

Monitoring of chloride, bromide, and fluoride at sample locations began in 2008. Analysis of the Phase 2 and Mini-Landfill leachates indicates that these materials are characterized by high chloride concentrations relative to the Phase 1 Landfill material (Table C-1 in Appendix C). Figure 11P presents chloride results since 2008, where available. Bromide and fluoride were not monitored in 2024.

Chloride concentrations measured in the 2024 monitoring year are generally considered to be consistent with historical values. In 2021, a significant rise in chloride was observed at several downgradient locations (e.g., AH-3 and S1) as a result of leachate discharge from the pipe break. Chloride concentrations in groundwater have returned to typical historical values at these locations, with the exception of 94-2, where residual effects of the 2021 leachate discharge are still evident (maximum of 1,750 mg/L in 2022 following the pipe, down to 393 mg/L in 2024; for comparison, chloride levels were 4.8 mg/L and 2.8 mg/L in 2020 and 2021 respectively).

6.5.3 Groundwater Exceedances of the BC CSR

Groundwater concentrations in 2024 found in exceedance of the BC CSR standards are summarized in Table 9.

Table 9: 2024 Groundwater Exceedances of the BC CSR

BC CSR Standard (mg/L)	89-5 (mg/L)	94-2 (mg/L)	AH-6L (mg/L)
Sample Date	**27-Nov-2024**	**08-Sept-2024**	**26-Nov-2024**
Chloride (DW) - **250**	*N/A*	**393**	*<CSR*
Sulfide, as H_2S (FAW) – **0.02**	**0.0295**	*<CSR*	*<CSR*
Arsenic (DW) – **0.01**	*<CSR*	*N/A*	**0.0221**

BC CSR Standard (mg/L)	89-5 (mg/L)	94-2 (mg/L)	AH-6L (mg/L)
Sample Date	**27-Nov-2024**	**08-Sept-2024**	**26-Nov-2024**
Cobalt (DW) – **0.001**	*<CSR*	*N/A*	**0.00156**
Sodium (DW) - **200**	**319**	*N/A*	**539**
Vanadium (DW) – **0.02**	**0.0236**	*N/A*	**0.146**

In 2024, exceedances of the CSR standards were in groundwater at the south edge of the Landfill (89-5), immediately downgradient of the Landfill (AH-6L), and at the east edge of the active pond (94-2). No exceedances of the CSR standards were identified in groundwater near the southern (downgradient) site boundary.

All exceedances in groundwater, with the exception of cobalt, and possibly also sulfide, are constituents with elevated concentrations found in the Mini- and Phase 2 Landfill leachate characterization samples (Table C-1; note that sulfide concentrations in the leachate is currently unknown). Exceedances of cobalt at AH-6L and sulfide at 89-5 also occurred from 2021 through 2023. A comparison of groundwater exceedances in recent monitoring years relative to 2024 results suggests that groundwater at the Site is improving in quality and returning to conditions observed prior to the 2021 leachate line breach.

6.6 Results of Surface Water Monitoring

Surface water monitoring was completed by WSP in September and November 2024. Surface water chemistry results are compared to the BCWQG (where applicable) and are provided in Tables 10, 11, and 14. Historical results of Spring S1 and Spring S2 samples, where available, are shown graphically for select parameters in Figure 11A to 11P.

All constituents measured in 2024 in the surface water samples are considered to be consistent with values over the last decade. Total aluminum concentrations at Spring S2 exhibited a slight increase in 2023 but have returned to normal historical levels in 2024. Several constituent concentrations at Spring S1 exhibited a sharp rise in concentrations following the December 2021 leachate line breach (e.g., calcium, sodium, potassium, chromium, and chloride), although concentrations have since declined to within historical levels.

6.6.1 Surface Water Exceedances of the BCWQG

In 2023, BCWQG's for some total metal concentrations were updated to be dependent on other parameters including dissolved organic carbon (DOC), which is a toxicity modifying factor required to determine the appropriate guideline value. Due to the absence of DOC analysis in the 2023 sampling program, metal concentrations at that time were screened against the most conservative guidelines values. Exceedances of total aluminum and total copper concentration were estimated at both Spring S1 and Spring S2 based on this approach.

Following the recommendations made in the 2023 Annual Report (WSP, 2024a), the 2024 surface water samples were also submitted for analysis of these other parameters, including DOC. The updated guidelines were used to evaluate the concentrations in the surface water samples. No exceedances of BCWQG's were observed in 2024 for any of the surface samples (Table 11).

6.7 Quality Assurance/Quality Control Results

A summary of the relative percent difference (RPD) and difference factor (DF) for the duplicate samples collected in 2024 is provided in Appendix F, Tables F1 to F3. The RPD and DF values for the paired groundwater analyses, where calculated, met WSP's data quality objectives (DQOs) as described in Appendix F.

WSP completed a review of the laboratory quality of the data provided by ALS Canada Ltd. (ALS). This included review of laboratory QC performance (standards, spike recoveries, etc.) to confirm results were within acceptance criteria, as well as evaluation of field duplicates results to confirm they were within alert limits. The samples met ALS's data quality objectives for laboratory control samples, method blanks, and duplicate pairs, except for a number of detection limit raises and a method blank value outlier for phenol analysis indicated on the analytical results for COA 23822. The laboratory qualifiers on these results do not affect the interpretation of the data.

Samples were received by ALS in good condition and within required hold times and temperature range, with the exception of one sample (23603-03), collected as part of the September 2024 sampling event. This sample exceeded the hold time for total organic carbon analysis by 1 day.

The review of the laboratory QC performance suggests the laboratory data is generally accurate and reproducible. The laboratory data can be relied upon for the purposes of this investigation. Copies of the laboratory COAs are provided in Appendix E.

6.8 Results of Air Quality Monitoring

No particulate monitoring data was collected by Domtar in monitoring year 2024, as discussed in Section 5.3.

7.0 CONCLUSIONS AND RECOMMENDATIONS

The results of the 2024 groundwater monitoring program were consistent with previous years and confirm that the closure and groundwater recovery controls related to the Phase 1 Landfill have resulted in the reduction of contaminants downgradient of the Landfill. In recent years, the groundwater monitoring results indicate that groundwater discharging to Powell River and groundwater recovered by the extraction system (PW-Composite) continued to have water of sufficient quality to meet the standards of the BC CSR. The quality of groundwater discharging to the receiving environment at Spring S1 and S2 met all applicable criteria of the BCWQG. Generally, concentrations have returned to, or are approaching, historically normal levels following the 2021 leachate release related to the leachate line break. Where minor residual effects remain, concentrations continue to trend downwards towards normal historical ranges in 2024.

Recovery well PW99-5 was fully operational throughout 2024. PW99-2 went offline some time between 29 August and 6 September 2022 and remains inoperable. Sampling of the pumping well collection system in 2024 is considered representative of groundwater collected by PW99-5.

Recommendations for the 2025 monitoring year are as follows:

- The leaks in the active pond liner identified in WSP's October 2023 Site visit should be repaired. The fencing around the Landfill (including active pond) should be enhanced or a separate electric fence should be installed around the active pond to prevent bears or other animals from damaging the pond liner. Domtar should undertake regular inspections, of the active pond to monitor for holes in the liner and to repair them, until such time as measures to limit the intrusion of animals that can damage the liner are implemented.
- As per the D&O Plan , Domtar should continue to carry out quarterly operational inspections of the landfill to identify any deficiencies outlined in Section 2.3.9 of the DOCP, and communicate those deficiencies to WSP.
- Dry and wet season monitoring at select monitoring locations should be continued in 2025 in accordance with the permit requirements.
  - The scope of the snapshot sampling program (including sampling of 94-2, 94-3, 94-10 and AH4) should be continued.
  - The scope of surface water sampling (Spring S1 and Spring S2) should be continued.
- Analysis of both the Mini-Landfill and Phase 2 Landfill leachate is recommended in 2025 for further leachate characterization to assist in comparison to groundwater data. Recommended analyses consist of dissolved chloride, dissolved metals, alkalinity, sulfide, sulphate, nitrate, total dissolved solids (TSS) and total organic carbon (TOC).
- Repairs should be made to the pump at PW99-2 so this well can be used to recover groundwater in addition to recovery well PW99-5.
- The recovery well rehabilitation program conducted in March 2014 has resulted in increased efficiency of the pumping wells, particularly PW99-5. However, the increased efficiency at PW99-5 has only resulted in a limited response to pumping at nearby monitoring well AH6L. Additional efforts to recover impacted groundwater from this location may require the installation of an additional recovery well.
- No air quality monitoring was completed in 2024 due to equipment failure described in detail in Section 5.3. Given the long history of air quality monitoring at the Site that consistently indicated no meaningful effects from the landfill on ambient air quality, it is recommended that Domtar apply to formally remove the air quality monitoring requirements from the landfill permit. Domtar plans to submit this amendment application as soon as possible.

8.0 CLOSURE

We trust that this annual report meets your current requirements. Should you have any questions or comments, please do not hesitate to contact the undersigned. The report was prepared by Jarod Devries (P.Geo.) and reviewed by Connie Romano (P.Geo.). Jarod Devries was the professional responsible for the groundwater aspects of this report. Eric Mohlmann (P.Eng.) was the professional responsible for the landfill operational planning, geotechnical stability and landfill settlement aspects of the report.

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https://wsponlinecan.sharepoint.com/sites/ca-ca00333470492/shared documents/06. deliverables/3.0 issued/ca0033347.0492-003-r-rev0/ca0033347.0492-003-r-rev0-2024 annual rpt tiskwat (wildwood) landfill-27mar_25.docx

9.0 REFERENCES

Christensen, T.H., Kjeldsen, Bjerg, Jensen, Christensen, Baun, Albrechtsen, and Heron, 2001. Biogeochemistry of Landfill leachate plumes, Applied Geochemistry, v. 16, pp. 659-718.

Environment Canada Weather Office (2023). http://climate.weather.gc.ca/

Environment Canada, 1992. Reference Method EPS 1/RM/19.

Golder Associates Ltd., 2021a. Design and Operating Plan 2021, Wildwood Landfill, Powell River, BC, *report prepared for* Catalyst Paper Corporation (project no. 19128752-006-R-Rev0), dated February 23, 2021.

Golder Associates Ltd., 2021b. Results of the Boiler Sand Analysis, *technical memo prepared for* Catalyst Paper Corporation, (project no. 19128752-007-TM-Rev0), dated July 16, 2021.

McCammon, J.W., 1977. Surficial geology and sand and gravel deposits of Sunshine Coast, Powell River, and Campbell River areas, Province of British Columbia Ministry of Mines and Petroleum Resources Bulletin 65, p. 17-25.

Province of British Columbia. 1996. Contaminated Sites Regulation (CSR), BC Reg. 375/96, O.C. 1480/96, including amendments up to BC Reg. 133/2022, 1 March 2023.

Province of British Columbia. 2003. Environmental Management Act (EMA), SBC 2003, Chapter 53 assented to 23 October 2003, current to 1 March 2023.

Province of British Columbia Ministry of Environment and Climate Change Strategy. 2016. (BC ENV 2016). Landfill Criteria for Municipal Solid Waste, Second Edition.

Province of British Columbia Ministry of Environment and Climate Change Strategy. 2020. (BC ENV 2020a). B.C. Source Drinking Water Quality Guidelines: Guideline Summary. Water Quality Guideline Series, WQG-01.

Province of British Columbia Ministry of Environment and Climate Change Strategy. 2020. (BC ENV 2020b). Technical Guidance: Dust-fall Monitoring and Pollution Control Objectives. June 2020.

Province of British Columbia Ministry of Environment and Climate Change Strategy. 2023. (BC ENV 2023). British Columbia Environmental Laboratory Manual. Analysis, Reporting & Knowledge Services, Knowledge Management Branch, Ministry of Environment and Climate Change Strategy.

Province of British Columbia Ministry of Environment and Climate Change Strategy. 2025. (BC ENV 2025). B.C. Approved Water Quality Guidelines: Aquatic Life, Wildlife, and Agriculture – Guideline Summary. Water Quality Guideline Series, WQG-20. February 2025.

Ryder, J.M., Fulton, R.J., and Clague, J.J., 1991. The cordilleran ice sheet and the glacial geomorphology of southern and central British Columbia, *Géographie physique et Quaternaire*, vol. 45, n° 3, p. 365-377.

U.S. Environmental Protection Agency (US EPA), 1992. 2,3,7,8-Tetrachlorodibenzo-p-Dioxin (2,3,7,8,-TCDD) Hazard Summary Fact Sheet. Dated April 1992, updated January 2000. Accessed 03 April 2023.

WSP Canada Inc (WSP), 2023. 2022 Annual Report, Wildwood Landfill, Powell River, BC, *report prepared for* Catalyst Paper Corporation for submittal to the British Columbia Ministry of Environment, (Reference no. 22520572-004-R-Rev0), dated April 27, 2023.

WSP Canada Inc (WSP), 2024. 2023 Annual Report, Wildwood Landfill, Powell River, BC, report prepared for Catalyst Paper Corporation for submittal to the British Columbia Ministry of Environment, (Reference no.23607027-005-R-Rev0), dated April 25, 2024.

TABLE 10
Results of General Parameters Analyses

Monitoring Well	Units	BC CSR Standards[1]		BC Water Quality Guidelines[2]		AH-3	AH-3	AH-6L	AH-6L	89-5	89-5	93-2B	93-2B	94-1/3	94-1/3	94-1/3
Flow Zone						11	11	29	29	11	11	Regional	Regional	38	38	38
Sample Date		AW	DW	FAW	DW	08-Sep-2024	26-Nov-2024	10-Sep-2024	26-Nov-2024	08-Sep-2024	27-Nov-2024	08-Sep-2024	27-Nov-2024	10-Sep-2024	27-Nov-2024	27-Nov-2024
Sample No.		(F)	(D)	(f)	(d)	23755-03	23822-02	23757-02	23822-04	23755-04	23822-05	23755-05	23822-06	23757-01	23822-08	23822-09
QAQC Sample No.															23822-09	23822-08
Duplicate															FDA	FD
Field Parameters																
Temperature	°C	-	-	-	15 (AO)	14	10.4	11.2	10.3	15.9	9.7	10.3	9.4	10.7	10.4	
pH	s.u.	-	-	6.5-9.0	-	6.56	6.56	8.31	8.47	7.22	7.31	6.83	6.84	6.81	7.03	
Specific Conductance	µS/cm	-	-	-	-	603	420.6	1594	2366	1512	1353	172	179.5	208.8	214.7	
Oxidation Reduction Potential	mV	-	-	-	-	101.1	47	73.1	64.3	85.9	-15.8	102.9	-3.7	34.9	17.9	
Dissolved Oxygen	mg/L	-	-	8	-	5.05	6.5	1.7	1.45	0.71	4.67	7.96	5.67	4.13	4.61	
Eh[a] (calculated)	mV	-	-	-	-	311.1	260.6	285.9	278.0	294.0	198.5	316.6	210.9	248.2	231.5	
Physical + TOC					-											
Alkalinity-Total ($CaCO_3$)	mg/L	-	-	20[b]	-	142	160	507	875	569	592	76.6	81.7	79.7	79	79.1
Hardness ($CaCO_3$)	mg/L	-	-	-	-	-	54.5	-	142	-	90.4	-	76.1	-	83	81.6
Total Suspended Solids (TSS)	mg/L	-	-	-	-	368	309	1080	1590	1170	907	117	138	168	150	150
Total Dissolved Solids (TDS)	mg/L	-	-	-	-	5.4	<3	44.7	44.4	48	24.4	7	<3	9.1	10	10.4
Total Organic Carbon (TOC)	mg/L	-	-	-	-	3.22	2.66	16.3	44	158	30	1.75	1.31	< 0.5	< 0.5	0.52
Anions and Nutrients																
Chloride	mg/L	1500	250	150	250 (AO)	50.6	-	153	-	68.1	-	3.64	-	12.1	-	-
Sulfate	mg/L	1280 - 3090[d]	500	128[d]	500 (AO)	72.6	50.6	180	163	176	82.1	3.48	3.75	11.1	9.6	9.74
Sulfide as S	mg/L			-	-	-	-	-	-	-	0.0277	-	-	-	-	-
Sulfide as H_2S	mg/L	0.02	0.05	0.002	-	-	-	-	-	-	**0.0295**[F]	-	-	-	-	-

Notes:
All concentrations are reported in mg/L unless otherwise noted.

[1]Standards shown are from the Contaminated Sites Regulation (CSR) B.C. Reg 375/96 (O.C. 1480/96) including amendments up to B.C. Reg. 133/2022, March 1, 2023.

[2] Guidelines shown are from the British Columbia Water Quality Guidelines (BCWQG) - Aquatic Life, Wildlife & Agriculture (February 2025); Drinking Water (2020)

All BCWQG Standards for Fresh Water Aquatic Life are 30-day mean concentration unless otherwise noted.

FAW = Freshwater Aquatic Life, DW = Drinking Water

FD - Field Duplicate; FDA - field duplicate available

F, D	**F** indicates an exceedance of CSR FAW standard, **D** indicates an exceedance of CSR DW standard
f, d	**f** indicates an exceedance of BCWQG FAW, **d** indicates an exceedance of BCWQG DW

Surface water sampling locations Spring S1 and Spring S2 are screened against applicable BCWQGs. All groundwater and surface water sampling locations are screened against applicable CSR Standards.

Italic font indicates a detection limit higher than the lowest applicable guideline.

[a] Redox value is corrected from the Ag/AgCl reference to Eh (the equivalent potential for a standard hydrogen electrode). Eh (mV) = (Field Redox [mV]) + (224 - Temperature [C])

[b] Guideline is a minimum value, unless the background concentration or value is lower.

[c] Standard or Guideline is pH dependent.

[d] Standard or Guideline is hardness dependent.

[e] Standard or Guideline is Chloride dependent.

[f] Standard or Guideline is temperature dependent.

(AO) Aesthetic Criteria

TABLE 10
Results of General Parameters Analyses

Monitoring Well	Units	BC CSR Standards[1]		BC Water Quality Guidelines[2]		94-2	94-3	94-16L	94-16B	94-16B	94-17L	94-17B	94-18U	94-18M	94-18L	94-19M	94-19U
Flow Zone						11		Regional	Bedrock	Bedrock	Regional	Bedrock	38	38	Regional	38	38
Sample Date		AW	DW	FAW	DW	08-Sep-2024	26-Nov-2024	09-Sep-2024	09-Sep-2024	27-Nov-2024	09-Sep-2024	09-Sep-2024	08-Sep-2024	08-Sep-2024	08-Sep-2024	09-Sep-2024	09-Sep-2024
Sample No.		(F)	(D)	(f)	(d)	23755-02	23822-03	23756-03	23756-04	23822-10	23756-01	23756-02	23755-06	23755-08	23755-07	23755-12	23755-10
QAQC Sample No.																	
Duplicate																	
Field Parameters																	
Temperature	°C	-	-	-	15 (AO)	12	9.4	10.6	11.4	9.9	11.4	10.9	11.2	11.1	11	10.9	10.9
pH	s.u.	-	-	6.5-9.0	-	6.34	5.69	6.83	7.35	7.54	7.35	7.43	6.63	6.67	6.86	6.88	6.86
Specific Conductance	µS/cm	-	-	-	-	1980	43.4	164.9	283.6	299.9	329.5	229.3	240	253.8	159	297.3	301.7
Oxidation Reduction Potential	mV	-	-	-	-	88.7	10.4	3	-139.4	30.6	97.7	89.3	105.8	102.9	102.2	37.5	109.3
Dissolved Oxygen	mg/L	-	-	8	-	2.51	6.63	6.7	3.93	2.77	7.72	6.68	7.88	6.87	8.33	4.29	2.86
Eh[a] (calculated)	mV	-	-	-	-	300.7	225.0	216.4	73.2	244.7	310.3	302.4	318.6	315.8	315.2	250.6	322.4
Physical + TOC					-												
Alkalinity-Total ($CaCO_3$)	mg/L	-	-	20[b]	-	157	14	56.3	138	131	72.4	109	65.8	71.5	47.9	94.4	98.6
Hardness ($CaCO_3$)	mg/L	-	-	-	-	-	-	-	-	71.6	-	-	-	-	-	-	-
Total Suspended Solids (TSS)	mg/L	-	-	-	-	-	47	-	165	180	-	-	-	-	-	-	-
Total Dissolved Solids (TDS)	mg/L	-	-	-	-	-	6.4	-	88.2	6	-	-	-	-	-	-	-
Total Organic Carbon (TOC)	mg/L	-	-	-	-	-	1.3	-	5.86	0.89	-	-	-	-	-	-	-
Anions and Nutrients																	
Chloride	mg/L	1500	250	150	250 (AO)	**393**[D]	1.85	14.1	11.3	-	64.6	8.06	27.6	26.4	13.8	31.2	28.6
Sulfate	mg/L	1280 - 3090[d]	500	128[d]	500 (AO)	287	2.23	7.24	16.1	16.6	6.7	14.2	10.2	13	5.68	22.9	27
Sulfide as S	mg/L			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulfide as H_2S	mg/L	0.02	0.05	0.002	-	-	-	-	-	-	-	-	-	-	-	-	-

Notes:
All concentrations are reported in mg/L unless otherwise noted.

[1]Standards shown are from the Contaminated Sites Regulation (CSR) B.C. Reg 375/96 (O.C. 1480/96) including amendments up to B.C. Reg. 133/2022, March 1, 2023.

[2] Guidelines shown are from the British Columbia Water Quality Guidelines (BCWQG) - Aquatic Life, Wildlife & Agriculture (February 2025); Drinking Water (2020)

All BCWQG Standards for Fresh Water Aquatic Life are 30-day mean concentration unless otherwise noted.

FAW = Freshwater Aquatic Life, DW = Drinking Water

FD - Field Duplicate; FDA - field duplicate available

F, D	**F** indicates an exceedance of CSR FAW standard, **D** indicates an exceedance of CSR DW standard
f, d	**f** indicates an exceedance of BCWQG FAW, **d** indicates an exceedance of BCWQG DW

Surface water sampling locations Spring S1 and Spring S2 are screened against applicable BCWQGs. All groundwater and surface water sampling locations are screened against applicable CSR Standards.

Italic font indicates a detection limit higher than the lowest applicable guideline.

[a] Redox value is corrected from the Ag/AgCl reference to Eh (the equivalent potential for a standard hydrogen electrode). Eh (mV) = (Field Redox [mV]) + (224 - Temperature [C])

[b] Guideline is a minimum value, unless the background concentration or value is lower.

[c] Standard or Guideline is pH dependent.

[d] Standard or Guideline is hardness dependent.

[e] Standard or Guideline is Chloride dependent.

[f] Standard or Guideline is temperature dependent.

(AO) Aesthetic Criteria

TABLE 10
Results of General Parameters Analyses

Monitoring Well Flow Zone Sample Date Sample No. QAQC Sample No. Duplicate	Units	BC CSR Standards[1]		BC Water Quality Guidelines[2]		94-19L Regional 09-Sep-2024 23755-11	94-19L Regional 27-Nov-2024 23822-07	94-19B Bedrock 09-Sep-2024 23755-09	PW COMPOSITE 29 08-Sep-2024 23755-01	PW COMPOSITE 29 26-Nov-2024 23822-01	Spring S1 38 06-Sep-2024 23603-01 23603-03 FDA	Spring S1 38 06-Sep-2024 23603-03 23603-01 FD	Spring S1 38 25-Nov-2024 23605-01	Spring S2 38 06-Sep-2024 23603-02	Spring S2 38 25-Nov-2024 23605-02
		AW (F)	DW (D)	FAW (f)	DW (d)										
Field Parameters															
Temperature	°C	-	-	-	15 [(AO)]	11	10.1	11.2	13.3	11.5	11.4		9.3	12.1	8.9
pH	s.u.	-	-	6.5-9.0	-	6.81	6.81	7.68	6.86	6.84	7.42		7.2	7.59	7.66
Specific Conductance	µS/cm	-	-	-	-	214.9	267.4	226.4	288.7	283.4	303.9		263.4	237.8	207.8
Oxidation Reduction Potential	mV	-	-	-	-	103.5	-12.4	100.3	45.3	34.9	-94.2		-143.2	33.3	18
Dissolved Oxygen	mg/L	-	-	8	-	5.55	4.6	5.54	8.5	9.25	11.87		10.12	11.29	10.42
Eh[a] (calculated)	mV	-	-	-	-	316.5	201.5	313.1	256.0	247.4	118.4		71.5	245.2	233.1
Physical + TOC					-										
Alkalinity-Total ($CaCO_3$)	mg/L	-	-	20[b]	-	69.3	76.5	88.3	64.5	66.3	85	82.1	81.2	62.7	62.6
Hardness ($CaCO_3$)	mg/L	-	-	-	-	-	87.6	-	-	110	-	-	80.6	-	75.6
Total Suspended Solids (TSS)	mg/L	-	-	-	-	151	202	-	230	222	< 3	4.4	< 3	< 3	9.1
Total Dissolved Solids (TDS)	mg/L	-	-	-	-	6.6	267	-	<3	<3	176	194	178	160	146
Total Organic Carbon (TOC)	mg/L	-	-	-	-	1.03	1.39	-	0.57	0.55	0.97	1.15	1.42	1.3	2.91
Anions and Nutrients															
Chloride	mg/L	1500	250	150	250 [(AO)]	21.3	-	16.9	40.2	-	31.1	-	-	27.9	-
Sulfate	mg/L	1280 - 3090[d]	500	128[d]	500 [(AO)]	12.2	15	10.6	13.7	11.7	20.9	21.1	18.8	10.4	9.62
Sulfide as S	mg/L			-	-	-	-	-	-	<0.0015	-	-	-	-	-
Sulfide as H_2S	mg/L	0.02	0.05	0.002	-	-	-	-	-	<0.0016	-	-	-	-	-

Notes:
All concentrations are reported in mg/L unless otherwise noted.

[1]Standards shown are from the Contaminated Sites Regulation (CSR) B.C. Reg 375/96 (O.C. 1480/96) including amendments up to B.C. Reg. 133/2022, March 1, 2023.

[2] Guidelines shown are from the British Columbia Water Quality Guidelines (BCWQG) - Aquatic Life, Wildlife & Agriculture (February 2025); Drinking Water (2020)

All BCWQG Standards for Fresh Water Aquatic Life are 30-day mean concentration unless otherwise noted.

FAW = Freshwater Aquatic Life, DW = Drinking Water

FD - Field Duplicate; FDA - field duplicate available

F, D	**F** indicates an exceedance of CSR FAW standard, **D** indicates an exceedance of CSR DW standard
f, d	**f** indicates an exceedance of BCWQG FAW, **d** indicates an exceedance of BCWQG DW

Surface water sampling locations Spring S1 and Spring S2 are screened against applicable BCWQGs. All groundwater and surface water sampling locations are screened against applicable CSR Standards.

Italic font indicates a detection limit higher than the lowest applicable guideline.

[a] Redox value is corrected from the Ag/AgCl reference to Eh (the equivalent potential for a standard hydrogen electrode). Eh (mV) = (Field Redox [mV]) + (224 - Temperature [C])

[b] Guideline is a minimum value, unless the background concentration or value is lower.

[c] Standard or Guideline is pH dependent.

[d] Standard or Guideline is hardness dependent.

[e] Standard or Guideline is Chloride dependent.

[f] Standard or Guideline is temperature dependent.

[(AO)] Aesthetic Criteria

TABLE 11
Results of Total Metals Analyses - Surface Water

Monitoring Well Flow Zone Sample Date Sample No. Ref SCN Duplicate	Units	BC Water Quality Guidelines[1]		Spring S1 38 25-Nov-2024 23605-01	Spring S2 38 25-Nov-2024 23605-02
		FAW (f)	DW (d)		
Field Parameters					
Temperature	°C	-	15	9.3	8.9
pH	s.u.	6.5-9.0	-	7.2	7.66
Specific Conductance	µS/cm	-	-	263.4	207.8
Oxidation Reduction Potential	mV	-	-	-143.2	18
Dissolved Oxygen*	mg/L	8	-	10.12	10.42
Eh[a] (calculated)	mV	-	-	71.5	233.1
Total Metals					
Aluminum*	mg/L	0.0785-0.13[b,c,d,k]	9.5	0.0134	0.0659
Antimony	mg/L	0.074	0.006	<0.0001	<0.0001
Arsenic	mg/L	0.005	0.01	0.00047	0.00021
Barium	mg/L	1	-	0.00561	0.00462
Beryllium	mg/L	0.00013	-	<0.0001	<0.0001
Bismuth	mg/L	-	-	<0.00005	<0.00005
Boron	mg/L	1.2	5	0.019	0.014
Cadmium	mg/L	0.000172-0.00018[b,g]	0.005	0.0000075	0.0000121
Calcium	mg/L	-	-	21.3	20.1
Cesium	mg/L	-	-	<0.00001	<0.00001
Chromium	mg/L	0.0025[i]	0.05	<0.0005	<0.0005
Cobalt	mg/L	0.004	0.001	<0.0001	<0.0001
Copper*	mg/L	0.00023-0.00054[b,c,d,g]	2	<0.0005	<0.0005
Iron	mg/L	1[f]	0.3[e]	0.02	0.121
Lead	mg/L	0.0021-0.0024[b,d,g]	0.005	<0.00005	0.000203
Lithium	mg/L	-	-	0.0015	0.0016
Magnesium	mg/L	-	-	6.67	6.17
Manganese	mg/L	0.938-0.96[b]	0.12	0.00154	0.00372
Mercury	mg/L	0.00001[h]	0.001	<0.000005	<0.000005
Molybdenum	mg/L	7.6	0.088	0.00134	0.000295
Nickel	mg/L	0.0014[b,c,d,g,j]	0.08	<0.0005	<0.0005
Phosphorus, ICP-MS	mg/L	0.015	0.01	<0.00005	<0.00005
Potassium	mg/L	-	-	2.46	2.28
Rubidum	mg/L	-	-	0.00026	0.00025
Selenium	mg/L	0.002	0.01	0.000056	0.000092
Silicon	mg/L	-	-	14	14.2
Silver	mg/L	0.00005[b]	-	<0.00001	<0.00001
Sodium	mg/L	-	-	28.9	16.1
Strontium	mg/L	1.25[g]	7	0.142	0.13
Sulphur	mg/L	-	-	6.27	3.49
Telurium	mg/L	-	-	<0.0002	<0.0002
Thallium	mg/L	0.00003	-	<0.00001	<0.00001
Thorium	mg/L	-	-	<0.0001	<0.0001
Tin	mg/L	-	-	<0.0001	<0.0001
Titanium	mg/L	-	-	0.00041	0.00135
Tungsten	mg/L	-	-	<0.0001	<0.0001
Uranium	mg/L	0.0075	0.02	0.000604	0.000739
Vanadium	mg/L	0.06	-	0.00556	0.00431
Zinc	mg/L	0.0069-0.0096[b,c,d,g]	3	<0.003	<0.003
Zirconium	mg/L	-	-	<0.0002	<0.0002

Notes:

All concentrations are reported in mg/L unless otherwise noted.

[1] Guidelines shown are from the British Columbia Water Quality Guidelines (BCWQG) - Aquatic Life, Wildlife & Agriculture (February 2025); Drinking Water (2020)

All BCWQGs for Freshwater Aquatic Life are long-term chronic standards unless otherwise noted.

FAW = Freshwater Aquatic Life, DW = Drinking Water

f, d **f** indicates an exceedance of BCWQG FAW, **d** indicates an exceedance of BCWQG DW

*Exceedances shown in table are to be intepreted with the discussion provided in the accompanying report.

[a] Redox value is corrected from the Ag/AgCl reference to Eh (the equivalent potential for a standard hydrogen electrode).

[b] Indicates a hardness dependent guideline

[c] Indicates a pH dependent guideline

[d] Indicates a dissolved organic carbon (DOC) dependent guideline

[e] Indicates an aesthetic standard related to taste, odour, or colour, rather than health.

[f] Indicates a short-term acute BCWQG instead of a long-term chronic standard

[g] Guidelines shown is for dissolved, in absence of total metal guideline

[h] Standard based on concentration of methyl mercury ≤ 0.5 % of total mercury

[i] Guideline is for chromium VI.

[j] Guideline is temperature dependent

[k] Guidelines is dependent on hardness, pH, and dissolved organic carbon (DOC), where WQG = [e^{[0.645*ln(DOC)]+[2.255*ln(hardness)]+[1.995*pH]+[−0.284 *(ln(hardness)*pH)]−9.898}]/3. Where DOC is unkown, a value of 0.08 mg/L is conservatively assumed.

TABLE 12
Results of Dissolved Metals Analyses

Monitoring Well Flow Zone Sample Date Sample No. QC Target Sample No. Duplicate		BC CSR Standards[1] FAW (F)	BC CSR Standards[1] DW (D)	AH-3 11 26-Nov-2024 23822-02	AH-6L 29 26-Nov-2024 23822-04	89-5 11 27-Nov-2024 23822-05	93-2B Regional 27-Nov-2024 23822-06	94-1/3 38 27-Nov-2024 23822-08 23822-09 FDA	94-1/3 38 27-Nov-2024 23822-09 23822-08 FD	94-16B Bedrock 27-Nov-2024 23822-10	94-19L Regional 27-Nov-2024 23822-07	PW COMPOSITE 29 26-Nov-2024 23822-01
Field Parameters	**Units**											
Temperature	°C	-	-	10.4	10.3	9.7	9.4	10.4		9.9	10.1	11.5
pH	s.u.	-	-	6.56	8.47	7.31	6.84	7.03		7.54	6.81	6.84
Specific Conductance	µS/cm	-	-	420.6	2366	1353	179.5	214.7		299.9	267.4	283.4
Oxidation Reduction Potential	mV	-	-	47	64.3	-15.8	-3.7	17.9		30.6	-12.4	34.9
Dissolved Oxygen	mg/L	-	-	6.5	1.45	4.67	5.67	4.61		2.77	4.6	9.25
Eh[a] (calculated)	mV			260.6	278.0	198.5	210.9	231.5		244.7	201.5	247.4
Dissolved Metals												
Aluminum	mg/L	-	9.5	0.0122	0.0888	0.0463	<0.0010	0.0011	<0.0010	0.002	0.639	<0.0010
Antimony	mg/L	0.09	0.006	0.00063	0.00154	0.00068	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Arsenic	mg/L	0.05	**0.01**	0.00026	**0.0221**[D]	0.00028	0.00026	0.00028	0.00029	0.00524	0.00063	0.00024
Barium	mg/L	10	1	0.0158	0.019	0.0156	0.00365	0.00533	0.00525	0.0361	0.00681	0.0081
Beryllium	mg/L	0.0015	0.008	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Bismuth	mg/L	-	-	<0.000050	<0.00010	<0.00010	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Boron	mg/L	12	5	0.059	0.194	0.458	<0.010	0.01	<0.010	0.048	0.016	0.018
Cadmium	mg/L	0.0015-0.0025[a]	0.005	<0.000035	0.0000949	0.0000119	0.0000052	<0.0000050	<0.0000050	<0.000015	0.0000062	0.0000076
Calcium	mg/L	-	-	14.9	40.5	22.8	18.6	21	21	19.9	23.7	29.6
Cesium	mg/L	-	-	<0.000010	<0.000020	<0.000020	<0.000010	<0.000010	<0.000010	<0.000010	0.000019	<0.000010
Chromium	mg/L	0.01[b]	0.05	<0.00050	0.00507	0.00105	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Cobalt	mg/L	0.04	**0.001**	<0.00010	**0.00156**[D]	0.00022	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Copper	mg/L	0.03-0.06[a]	1.5	0.0006	0.0136	0.00544	<0.00020	<0.00020	<0.00020	<0.00020	0.0005	0.00494
Iron	mg/L	-	6.5	<0.010	0.286	0.296	<0.010	<0.010	<0.010	0.538	0.179	<0.010
Lead	mg/L	0.05-0.06[a]	0.01	<0.000050	0.0011	0.000155	<0.000050	<0.000050	<0.000050	<0.000050	0.000509	0.000124
Lithium	mg/L	-	0.008	<0.0010	<0.0020	<0.0020	0.0022	0.0022	0.0022	0.0077	0.002	0.0035
Magnesium	mg/L	-	-	4.2	9.99	8.12	7.2	7.42	7.08	5.33	6.89	8.8
Manganese	mg/L	-	1.5	0.00096	0.186	0.217	<0.00010	0.00012	<0.00010	0.191	0.00516	0.00138
Mercury	mg/L	0.00025	0.001	<0.0000050	0.0000106	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum	mg/L	10	0.25	0.0239	0.000824	0.00349	0.00124	0.000894	0.000867	0.0318	0.000405	0.00008
Nickel	mg/L	0.25-1.1[a]	0.08	<0.00050	0.00316	<0.0010	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Phosphorus	mg/L	-	-	<0.050	1.17	0.122	<0.050	<0.050	<0.050	0.071	0.058	<0.050
Potassium	mg/L	-	-	31.6	2.39	2.74	2.53	2.32	2.32	1.74	2.42	3.35
Rubidium	mg/L	-	-	0.0438	<0.00040	<0.00040	<0.00020	0.00025	0.00029	0.00056	0.00036	<0.00020
Selenium	mg/L	0.02	0.01	0.000073	0.000132	<0.00010	0.000117	0.000104	0.000095	0.000058	0.000054	0.000055
Silicon	mg/L			8.72	8.69	8.48	14.2	15.7	15.9	7.02	16.4	16.2
Silver	mg/L	0.0005-0.015[a]	0.02	<0.000010	0.000043	<0.000020	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Sodium	mg/L	-	**200**	73.2	**539**[D]	**319**[D]	11.4	15.9	15.8	42.2	23.6	17.2
Strontium	mg/L	-	2.5	0.145	0.36	0.484	0.0973	0.131	0.128	0.0765	0.14	0.158
Sulphur	mg/L			16.8	75.1	30	1.14	3.34	3.3	6.83	5.08	3.89
Tellurium	mg/L	-	-	<0.00020	<0.00040	<0.00040	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Thallium	mg/L	0.003	-	0.00001	<0.000020	<0.000020	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Thorium	mg/L			<0.00010	0.00037	0.0006	<0.00010	<0.00010	<0.00010	<0.00010	0.00052	<0.00010
Tin	mg/L	-	2.5	<0.00010	0.00125	<0.00020	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.0001
Titanium	mg/L	1	-	0.00038	0.124	0.0273	<0.00030	<0.00030	<0.00030	<0.00030	0.00511	0.00048
Tungsten	mg/L	-	0.003	0.00108	0.00282	0.00061	<0.00010	<0.00010	<0.00010	0.00039	<0.00010	<0.00010
Uranium	mg/L	0.085	0.02	0.000047	0.00636	0.00215	0.000589	0.000108	0.00011	0.00183	0.000758	0.000749
Vanadium	mg/L	-	**0.02**	0.00555	**0.146**[D]	**0.0236**[D]	0.00365	0.0062	0.00621	<0.00050	0.00576	0.00504
Zinc	mg/L	0.075-0.9[a]	3	0.0016	<0.0020	<0.0020	<0.0010	<0.0010	<0.0010	<0.0010	0.0015	0.0055
Zirconium	mg/L			<0.00020	0.00324	0.00084	<0.00020	<0.00020	<0.00020	<0.00020	0.00048	<0.00020

Notes:

All concentrations are reported in mg/L unless otherwise noted.

[1]Standards shown are from the Contaminated Sites Regulation (CSR) B.C. Reg 375/96 (O.C. 1480/96) including amendments up to B.C. Reg. 133/2022, March 1, 2023.

FAW = Freshwater Aquatic Life, DW = Drinking Water

FD - Field Duplicate; FDA - Field duplicate available

F, D **F** indicates an exceedance of CSR FAW standard, **D** indicates an exceedance of CSR DW standard

Italic font indicates a detection limit that exceeds the lowest applicable guideline.

[a] Indicates a hardness dependent calculated standard

[b] Indicates a valency-dependent standard

TABLE 13
Results of Chlorinated and Non-Chlorinated Phenol Analyses

Monitoring Well Flow System Sample Date Sample Number QC Target Sample No. Duplicate		BC CSR Standards[1]		AH-3 11 26-Nov-2024 23822-02	AH-6L 29 26-Nov-2024 23822-04
		FAW (F)	DW (D)		
Field Parameters					
Temperature	°C			10.4	10.3
pH	s.u.			6.56	8.47
Specific Conductance	µS/cm			420.6	2366
Oxidation Reduction Potential	mV			47	64.3
Dissolved Oxygen	mg/L			6.5	1.45
Eh[a] (calculated)	mV			260.6	278.0
Chlorinated Phenolics					
2-Chlorophenol	mg/L	0.0195[a]	0.045	<0.000050	<0.000050
3-Chlorophenol	mg/L	0.017[a]	-	<0.000050	<0.000050
4-Chlorophenol	mg/L	0.0085[a]	-	<0.000050	<0.000050
4-Chloro-3-methylphenol	mg/L	-	0.4	<0.00010	<0.00010
2,3-Dichlorophenol	mg/L	0.0055[a]	-	<0.000050	<0.000050
2,4 and 2,5-Dichlorophenol	mg/L	0.0025-0.034[a]	0.9	<0.000050	<0.000050
2,6-Dichlorophenol	mg/L	0.01[a]	-	<0.000050	<0.000050
3,4-Dichlorophenol	mg/L	0.003[a]	-	<0.000050	0.000255
3,5-Dichlorophenol	mg/L	0.0025[a]	-	<0.000050	<0.000050
2,3,4-Trichlorophenol	mg/L	0.0025[a]	-	<0.00010	<0.00010
2,3,5-Trichlorophenol	mg/L	0.0025[a]	-	<0.00010	<0.00010
2,3,6-Trichlorophenol	mg/L	0.008[a]	-	<0.00010	<0.00021
2,4,5-Trichlorophenol	mg/L	0.0025[a]	0.4	<0.00010	<0.00010
2,4,6-Trichlorophenol	mg/L	0.006[a]	0.005	<0.00010	<0.00010
3,4,5-Trichlorophenol	mg/L	0.001[a]	-	<0.00010	<0.00010
2,3,4,5-Tetrachlorophenol	mg/L	0.002[a]	-	<0.00010	<0.00010
2,3,4,6-Tetrachlorophenol	mg/L	0.0055[a]	0.1	<0.00010	<0.00010
2,3,5,6-Tetrachlorophenol	mg/L	0.0025[a]	-	<0.00010	<0.00010
Pentachlorophenol	mg/L	0.001[a]	0.06	<0.00010	<0.00010
Non-chlorinated Phenolics					
o-Cresol	mg/L	2.5	0.2	<0.00050	<0.00050
m-Cresol	mg/L	0.8	0.2	<0.00020	<0.00020
p-Cresol	mg/L	0.7	0.4	<0.00020	<0.00020
2,4-dimethylphenol	mg/L	-	0.08	<0.00020	<0.00020
Phenol	mg/L	2	1	<0.00075	<0.00075

Notes:

All concentrations are reported in mg/L unless otherwise noted.

[1]Standards shown are from the Contaminated Sites Regulation (CSR) B.C. Reg 375/96 (O.C. 1480/96) including amendments up to B.C. Reg. 133/2022, March 1, 2023.

FAW = Freshwater Aquatic Life, DW = Drinking Water

FD - Field Duplicate; FDA - Field duplicate available

F, D **F** indicates an exceedance of CSR FAW standard,
D indicates an exceedance of CSR DW standard

Italic font indicates a detection limit that exceeds the lowest applicable guideline.

[a] pH and temperature dependent standard or guideline; generally the guideline is higher for water with high pH.

TABLE 14
Results of Dioxin and Furan Analyses

Location:			Laboratory Method Blank	Laboratory Method Blank	Laboratory Method Blank	Laboratory Method Blank	AH-3	AH-6L	89-5	93-2B	94-1/3	94-16B	94-19L	PW COMPOSITE	Spring S1	Spring S1	Spring S1	Spring S2	Spring S2	Field Blank
Flow Zone:							11	29	11	Regional	38	Bedrock	Regional	29	38	38	38	38	38	
Date Sampled:							26-Nov-2024	26-Nov-2024	27-Nov-2024	27-Nov-2024	27-Nov-2024	27-Nov-2024	27-Nov-2024	26-Nov-2024	06-Sep-24	06-Sep-2024	25-Nov-2024	06-Sep-2024	25-Nov-2024	06-Sep-2024
Sample Control Number:							23822-02	23822-04	23822-05	23822-06	23822-08	23822-10	23822-07	23822-01	23603-01	23603-03	23605-01	23603-02	23605-02	23603-04
Ref. Sample No.:											23822-09				23603-03	23603-01				
Duplicate Sample Type:											FDA				FDA	FD				
			L2757330	L2758265	L2758281	L2758281	L2758281	L2758281	L2758281	L2758281	L2758281	L2758281	L2758281	L2758281	L2757330	L2757330	L2758265	L2757330	L2758265	L2757330
Dioxins (All results in pg/L)	***Toxicity Equivalence Factor (TEF) ****																			
	WHO (2005)	***NATO***																		
2,3,7,8-TCDD	1	1	<0.37	<0.25	<0.19	<0.25	<0.17	<0.36	<0.38	<0.15	<0.17	<0.19	<0.24	<0.23	<0.41	<0.38	<0.24	<0.67	<0.21	<0.37
Total-TCDD			<0.37	<0.25	<0.19	<0.25	0.42	16.5	13.2	<0.15	<0.17	<0.19	0.31	<0.23	<0.41	<0.38	<0.24	<0.67	0.53	<0.37
1,2,3,7,8-PeCDD	1	0.5	<0.43	<0.24	<0.21	<0.19	<0.29	3.1	1.33	<0.20	<0.18	<0.16	0.46	<0.19	<0.53	<0.44	<0.17	<0.86	<0.30	<0.34
Total-PeCDD			<0.43	<0.24	<0.21	<0.19	3.52	58.8	28.90	<0.20	<0.18	<0.16	<0.28	<0.19	<0.53	<0.44	<0.17	<0.86	<0.30	<0.34
1,2,3,4,7,8-HxCDD	0.1	0.1	<0.41	<0.32	<0.19	<0.15	<0.19	<0.53	0.35	<0.13	<0.28	<0.13	<0.16	<0.22	<0.38	<0.36	<0.19	<0.46	<0.32	<0.51
1,2,3,6,7,8-HxCDD	0.1	0.1	<0.43	<0.32	<0.19	<0.15	<0.19	38.2	14.7	<0.13	<0.27	<0.13	0.66	<0.23	<0.39	<0.37	<0.20	<0.44	<0.33	<0.53
1,2,3,7,8,9-HxCDD	0.1	0.1	<0.41	<0.31	<0.19	<0.15	<0.19	13.1	5.49	<0.13	<0.27	<0.13	<0.16	<0.23	<0.37	<0.35	<0.19	<0.44	<0.32	<0.50
Total-HxCDD			<0.43	<0.32	<0.19	<0.15	0.3	317	132	<0.13	<0.28	<0.13	4.12	<0.23	<0.39	0.64	0.25	<0.46	<0.33	<0.53
1,2,3,4,6,7,8-HpCDD	0.01	0.01	<0.57	<0.33	<0.21	<0.23	1.17	61.4	30.9	<0.23	<0.25	0.66	1.00	0.62	0.9	1.1	0.49	<0.90	0.48	<0.50
Total-HpCDD			<0.57	<0.33	<0.21	<0.23	1.17	151.00	68.70	<0.23	0.39	<0.15	<0.24	<0.15	<0.50	<0.72	<0.35	<0.90	<0.42	<0.50
OCDD	0.0003	0.001	2.9	<0.97	1.10	1.2	3.73	310	112.0	1.59	1.94	2.1	6.00	1.83	4.2	3.1	2.03	6.4	1.8	3.4
Furans (All results in pg/L)	***Toxicity Equivalence Factor (TEF) ****																			
	WHO (2005)	***NATO***																		
2,3,7,8-TCDF	0.1	0.1	<0.52	<0.22	<0.18	<0.15	<0.23	0.59	<0.41	<0.17	<0.16	<0.17	<0.31	<0.17	<0.54	<0.56	<0.17	<0.32	<0.23	<0.45
Total-TCDF			<0.52	<0.22	<0.18	0.21	0.31	6.69	1.45	<0.17	0.3	<0.17	<0.31	<0.17	<0.54	<0.56	<0.17	<0.32	<0.23	<0.45
1,2,3,7,8-PeCDF	0.03	0.05	<0.83	<0.24	0.27	0.43	0.4	1.2	0.54	0.37	<0.17	<0.12	<0.24	0.28	1.27	0.45	0.41	<0.54	0.38	<0.39
2,3,4,7,8-PeCDF	0.3	0.5	<0.70	<0.20	<0.16	<0.16	<0.25	5.3	2.20	<0.13	<0.17	<0.11	<0.20	<0.15	<0.59	<0.36	<0.12	<0.42	<0.13	<0.36
Total-PeCDF			1.11	<0.24	<0.17	0.43	<0.28	30	7.1	0.37	<0.17	<0.12	0.86	<0.16	1.27	<0.44	<0.13	<0.54	<0.14	<0.39
1,2,3,4,7,8-HxCDF	0.1	0.1	<0.26	<0.20	<0.12	<0.12	<0.10	1	0.64	<0.079	<0.10	<0.13	<0.24	<0.21	<0.23	<0.24	<0.12	<0.41	<0.12	<0.22
1,2,3,6,7,8-HxCDF	0.1	0.1	<0.24	<0.20	<0.11	<0.11	<0.096	3.9	2.10	<0.077	<0.096	<0.13	<0.22	<0.19	<0.22	0.24	0.18	<0.43	<0.11	<0.22
1,2,3,7,8,9-HxCDF	0.1	0.1	<0.34	<0.24	<0.16	<0.15	<0.13	0.85	<0.36	<0.099	<0.13	<0.16	<0.31	<0.25	<0.29	<0.31	0.21	<0.53	<0.15	<0.30
2,3,4,6,7,8-HxCDF	0.1	0.1	<0.24	<0.19	<0.12	<0.12	0.29	21	10.40	0.128	<0.10	<0.14	<0.24	<0.19	0.36	<0.23	0.23	<0.43	<0.12	<0.22
Total-HxCDF			<0.34	<0.24	<0.16	<0.15	0.72	115	58.3	0.291	<0.13	<0.16	1.04	<0.25	<0.29	<0.31	0.44	<0.53	<0.15	<0.30
1,2,3,4,6,7,8-HpCDF	0.01	0.01	0.61	<0.20	0.16	<0.12	0.27	25.2	17.7	<0.14	<0.14	<0.14	0.42	<0.13	1.16	0.38	<0.17	<0.62	<0.16	0.47
1,2,3,4,7,8,9-HpCDF	0.01	0.01	<0.43	<0.26	<0.18	<0.15	<0.14	1.45	0.87	<0.17	<0.17	<0.17	<0.20	<0.16	<0.45	<0.37	<0.22	<0.96	0.24	<0.54
Total-HpCDF			<0.43	<0.26	<0.18	<0.15	<0.14	69.3	43.2	<0.17	<0.17	<0.17	<0.20	<0.16	1.2	<0.37	<0.22	<0.96	<0.21	<0.54
OCDF	0.0003	0.001	0.98	0.66	<0.21	<0.24	0.49	13.40	6.8	0.29	<0.26	<0.22	<0.36	<0.27	1.0	<1.0	<0.48	<0.63	<0.45	<0.92
Total PCDD/PCDF TEQ **(using NATO I-TEF's)**																				
TEQs (ND=1/2DL) [pg/L]			0.646	0.346	0.269	0.293	0.345	13.5	6	0.234	0.252	0.232	0.575	0.308	0.734	0.578	0.327	0.861	0.327	0.531
TEQs (ND=DL) [pg/L]			1.28	0.692	0.521	0.563	0.622	13.7	6.23	0.435	0.502	0.455	0.835	0.594	1.34	1.09	0.565	1.71	0.625	1.05
TEQs (ND=0) [pg/L]			0	0	0	0.0215	0.0154	11.2	5.46	0.0326	0.00194	0	0.006	0.00183	0.0793	0	0.0456	0	0	0.00471
Total PCDD/PCDF TEQ (using WHO 2005 TEF's) **																				
TEQs (ND=1/2DL) [pg/L]			0.672	0.383	0.299	0.315	0.381	13.8	6.13	0.262	0.277	0.258	0.779	0.334	0.778	0.64	0.348	1.02	0.38	0.573
TEQs (ND=DL) [pg/L]			1.34	0.766	0.588	0.616	0.706	14	6.36	0.5	0.553	0.509	1.02	0.652	1.46	1.23	0.616	2.05	0.74	1.14
TEQs (ND=0) [pg/L]			0	0	0	0.0129	0.0128	9.94	5.6	0.0242	0.000582	0	0.0018	0.000549	0.051	0	0.0442	0	0	0.00471

Notes:
- All concentrations in pg/L.

ND = Not detected, DL = Detection limit
- There are no standards for dioxins or furans under the BC Water Quality Guidelines or the BC Contaminated Sites Regulation. For reference only, the maximum contaminant level for dioxin in drinking water, under the US EPA Safe Drinking Water Act, is 30 pg/L.

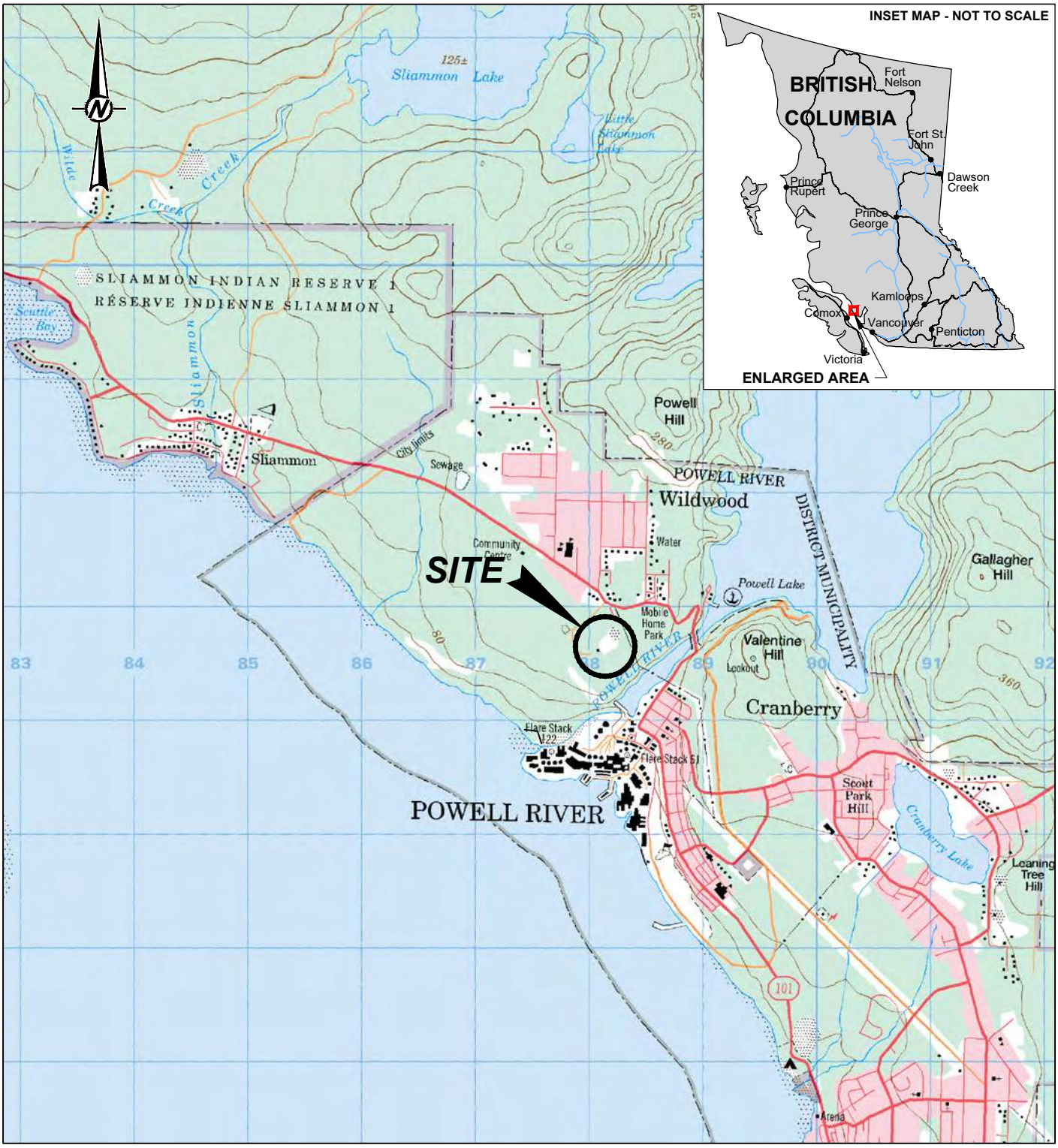
* TEF's present the toxicity of each congener relative to the congeners with the highest toxicity, those with a TEF of 1.

TABLE 15
Groundwater Elevation Data

Monitoring Well	Flow Zone	Geodetic Elevation of Top of Well (m) (up to 2013)	Geodetic Elevation of Top of Well (m)	Geodetic Elevation of Base of Well Screen (m)	Jul 2024	Nov 2024
89-1	19	132.70	132.70	97.04	102.83	102.80
89-2	11	131.36	131.36	115.05	dry	dry
89-3	11	130.73	130.73	113.35	dry	dry
89-4	11	132.49	132.49	111.73	dry	dry
89-5	11	133.38	133.38	106.78	110.20	110.07
AH1	r	136.50	136.50	127.12	dry	dry
AH3	11	111.54	114.40	98.67	100.00	100.94
AH4	29/r	119.66	119.66	90.14	90.33	90.27
AH5A (Upper)	11	106.97	106.97	94.30	n/m	n/m
AH5B (Lower)	11	106.97	106.97	76.23	n/m	n/m
AH6L (Lower)	29	120.58	120.58	101.48	102.15	102.13
93-1B (Upper)	r	128.14	129.52	97.72	104.05	103.93
93-1A (Lower)	r	128.08	129.49	82.47	101.27	101.18
93-2C (Upper)	11	135.65	135.65	117.24	dry	dry
93-2B (Middle)	r	134.65	134.65	97.18	105.01	104.88
93-2A (Lower)	br	134.61	134.61	86.19	105.29	105.18
94-1/5 (Upmost)		118.24	118.24	84.61	dry	dry
94-1/4 (Upper)	38	118.24	118.24	80.36	81.64	81.67
94-1/3 (Middle)	38	118.26	118.26	74.24	81.97	81.95
94-1/2 (Lower)	r	118.24	118.24	68.14	75.36	75.39
94-1/1 (Lowest)	r	118.26	118.26	61.20	75.40	75.42
94-1B (Bedrock)	br	118.26	118.26	54.94	dry	dry
94-2	11	117.26	115.89	105.27	106.99	107.43
94-3	11	119.98	119.98	110.49	110.53	112.13
94-4U (Upper)	r	124.20	124.20	103.55	104.81	104.77
94-4B (Bedrock)	br	124.20	124.20	98.70	100.72	100.24
94-5U (Upper)	r	120.62	120.59	73.78	75.76	75.77
94-5M (Middle)	r	120.61	120.59	69.23	75.76	75.76
94-5L (Lower)	r	120.61	120.59	62.70	75.74	75.75
94-5B (Bedrock)	br	120.63	120.61	58.87	75.73	75.73
94-6	19	125.85	125.88	100.15	103.11	103.02
94-7	19	123.85	123.85	101.04	102.45	102.38
94-8U (Upper)	19	114.49	114.49	105.16	dry	dry
94-8L (Lower)	19	114.52	114.52	93.18	dry	dry
94-9	11	112.61	112.61	97.42	n/m	n/m
94-10	11	109.34	109.34	97.24	97.32	97.31
94-11U (Upper)	11	102.97	102.97	94.83	94.80	dry
94-11L (Lower)	19	102.91	102.91	81.37	81.38	81.38
94-12	11	106.35	106.35	94.21	94.33	94.31
94-13	19	120.95	120.95	99.71	100.75	100.71
94-14U (Upper)	11	119.31	119.31	111.19	dry	dry
94-14L (Lower)	19	119.31	119.31	107.07	dry	dry
94-15	-	110.07	110.07	97.11	dry	dry

TABLE 15
Groundwater Elevation Data

Monitoring Well	Flow Zone	Geodetic Elevation of Top of Well (m) (up to 2013)	Geodetic Elevation of Top of Well (m)	Geodetic Elevation of Base of Well Screen (m)	Jul 2024	Nov 2024
94-16U (Upper)	11	105.56	105.56	92.83	92.96	92.96
94-16M (Middle)	38	105.61	105.61	68.91	dry	dry
94-16L (Lower)	r	105.58	105.58	59.81	67.17	67.31
94-16B (Bedrock)	br	105.66	105.66	55.48	67.50	67.66
94-17L (Lower)	r	103.24	103.24	67.76	68.98	69.19
94-17B (Bedrock)	br	103.24	103.24	63.14	69.64	69.82
94-18U (Upper)	38	110.23	110.23	66.42	71.41	71.46
94-18M (Middle)	38	110.22	110.22	62.73	71.30	71.35
94-18L (Lower)	r	110.22	110.32	56.66	67.33	67.45
94-18B (Bedrock)	br	110.22	110.22	52.05	68.48	68.59
94-19U (Upper)	38	107.91	107.91	67.01	71.86	71.92
94-19M (Middle)	38	107.93	107.93	63.08	71.73	71.80
94-19L (Lower)	r	107.93	107.93	57.60	67.63	67.75
94-19B (Bedrock)	br	107.93	107.93	52.97	67.74	67.87
PW-95-1	11	131.49	131.49	108.19	108.35	108.08
95-2	11	133.19	133.19	109.16	110.20	110.08
95-3	11	132.36	132.36	109.97	dry	dry
95-4	11	131.19	131.19	114.59	dry	dry
95-5	11	132.13	132.13	109.93	110.02	110.02
95-6	19	132.78	132.77	106.62	dry	106.63
95-7	11	131.72	131.72	110.97	dry	dry
PW-95-8	11	132.14	132.14	110.84	dry	dry
PW-95-9	11	131.24	131.24	110.69	dry	dry
95-10	11	131.29	131.29	112.49	dry	dry
95-12	19	133.14	133.14	105.44	dry	dry
95-13	19	133.38	133.38	103.78	dry	dry
98-2	11	132.25	132.25	116.56	116.98	116.94
98-3A	19	124.93	124.93	105.91	106.18	dry
98-3B	11	124.81	124.81	108.89	dry	dry
98-4A	19	122.76	122.72	106.05	dry	dry
98-4B	11	122.80	122.78	110.60	dry	dry
98-5	r	58.03	58.03	54.91	57.49	57.54
98-6A	19	121.55	121.51	106.17	dry	dry
98-6B	11	121.56	121.56	109.59	dry	dry
99-1	19	135.48	135.48	115.48	115.46	115.46
PW99-2	19	124.11	124.11	105.87	106.41	106.41
PW99-4	19	133.73	133.73	105.89	dry	dry
PW99-5	29	120.42	120.42	99.23	dry	dry
00-1 (Upper)	38	112.00	112.00	80.26	dry	dry
00-1 (Lower)	r	112.00	112.00	62.43	72.44	72.49
06-1 (Lower)	r	137.22	137.22	91.36	105.35	105.22
06-2 (Upper)	19	134.60	134.60	114.49	116.64	116.69
06-2 (Lower)	r	134.67	134.67	94.69	105.68	105.56



REFERENCE

BASE MAP FROM ETOPO, 1:50,000 NTS MAP 092F15, EDITION 3, UTM ZONE 10.

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DOMTAR INC.

PROJECT
WILDWOOD LANDFILL
POWELL RIVER, B.C.

CONSULTANT

YYYY-MM-DD	2024-12-09
DESIGNED	XQ
PREPARED	DF
REVIEWED	JD
APPROVED	CR

TITLE
KEY PLAN

PROJECT NO.	PHASE/DOC.	REV.	FIGURE
CA0033347.0492	4100/02	0	1

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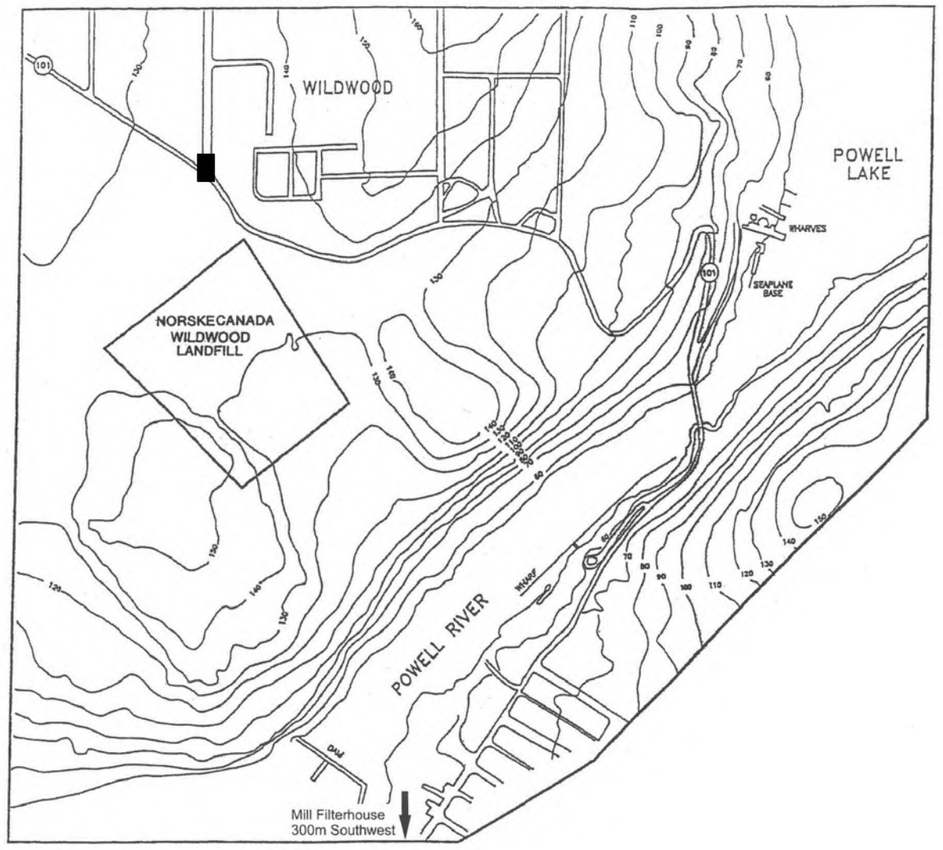

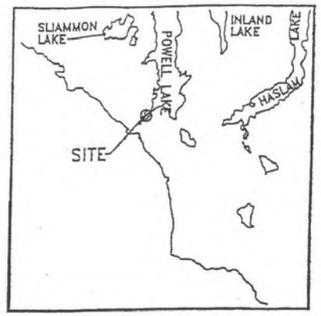

SITE PLAN
SCALE N.T.S.

LEGEND

CONTOUR INTERVAL = 10m

Wildwood Air Quality Monitory Station

REFERENCE(S)

1. AGRA, EARTH & ENVIRONMENTAL LTD.
   DWG NO: VE-50600, DATED: 31-10-1994.

NOTE

1. AREA NORTHEAST TO THE DAM IS NOW CONSIDERED AS PART OF POWELL LAKE

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CONSULTANT
wsp

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DESIGNED	XQ
PREPARED	DF
REVIEWED	JD
APPROVED	CR

PROJECT
WILDWOOD LANDFILL
POWELL RIVER, B.C.

TITLE
SITE PLAN

PROJECT NO.	PHASE/DOC.	REV.	FIGURE
CA0033347.0492	4100/02	0	2

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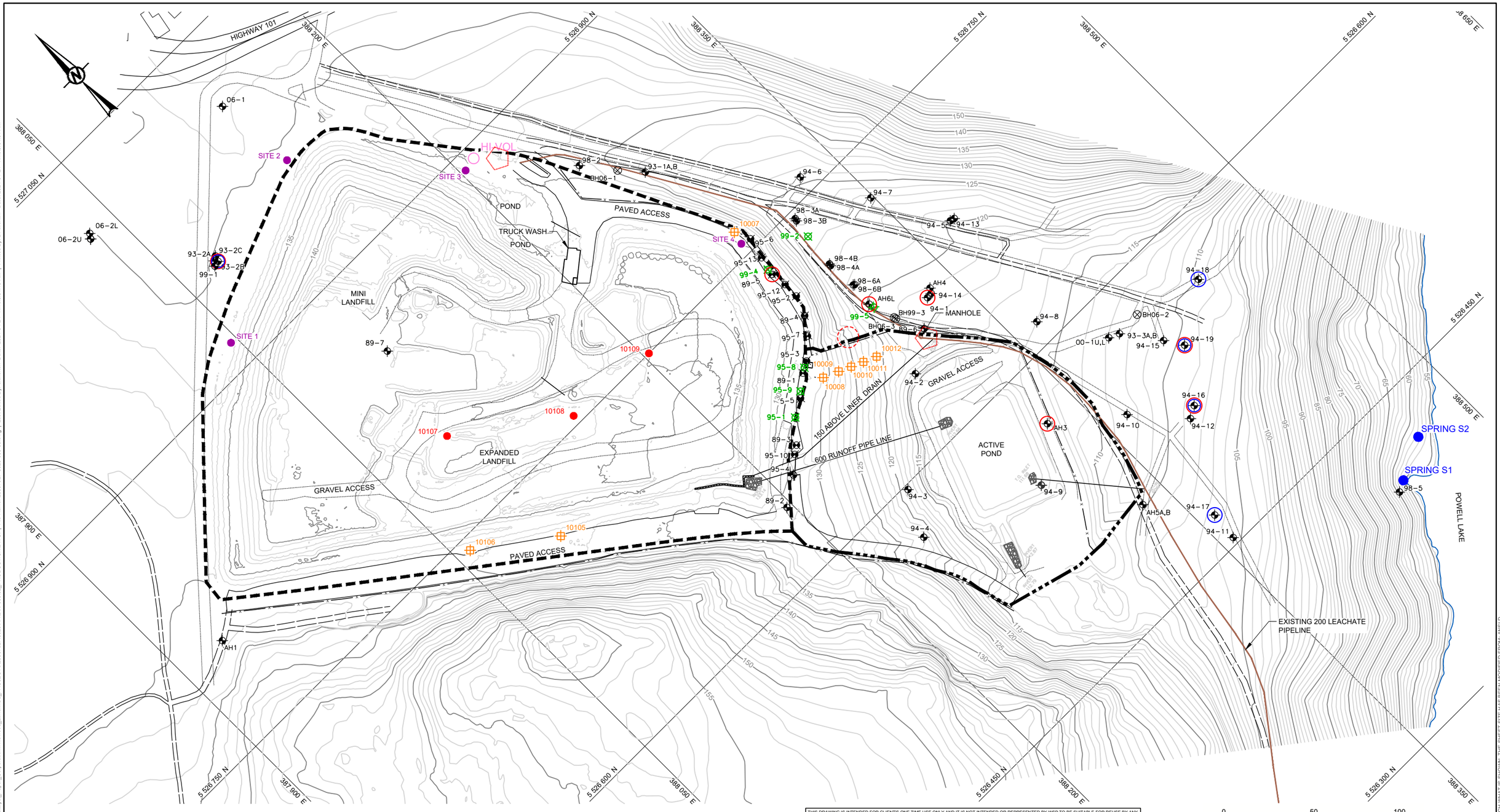

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LEGEND

- GROUNDWATER MONITORING WELL
- GROUNDWATER SAMPLING LOCATION
- "SNAP SHOT" GROUNDWATER SAMPLING LOCATION
- RECOVERY WELL
- SURFACE WATER SAMPLING LOCATION
- INCLINOMETER MONITORING STATION
- DUSTFALL MONITORING LOCATIONS
- HI-VOL PM_{10} SAMPLING LOCATION
- APPROXIMATE LOCATION OF LEACHATE PIPE BREAK (2021)
- APPROXIMATE LOCATION OF MINI-LANDFILL AND PHASE 2 LANDFILL LEACHATE SAMPLE POINTS
- SETTLEMENT MONUMENT STATIONS
- EXISTING TOPOGRAPHY (5 m MAJOR AND 1 m MINOR CONTOURS)
- FENCE
- RIVER
- EXISTING 200 LEACHATE PIPE
- APPROXIMATE 2020 TOPOGRAPHY FOOTPRINT
- APPROXIMATE 2013 TOPOGRAPHY FOOTPRINT

NOTES

1. COORDINATES ARE IN UTM NAD83, ZONE 10.
2. ROAD LOCATIONS ARE APPROXIMATE.
3. BASE SITE TOPOGRAPHY FROM JULY 31, 2012 SURVEY (SEE REFERENCE 1).
4. ACTIVE POND TOPOGRAPHY FROM OCTOBER 2013 SURVEY (SEE REFERENCE 2).
5. MAIN LANDFILL TOPOGRAPHY FROM JANUARY 2016 SURVEY (SEE REFERENCE 3).
6. LEACHATE PIPE BREAK DISCOVERED DECEMBER 2021, REPAIRED JANUARY 2022

REFERENCES

1. EMERY & RAE LAND SURVEYING LTD., FILE NAME: 7-160 JULY 31-2012 SITE TOPO.dwg, DATED: JULY 31, 2012.
2. EMERY & RAE, FILE: 7-183 AS BUILT SITE PLAN OCTOBER-2013 FOR CLIENT.dwg, DATED NOVEMBER 4, 2013.
3. EMERY & RAE LAND SURVEYING LTD., FILE NAME: 7-197-5 January-2016 FOR CLIENT.dwg, RECEIVED: FEBRUARY 22, 2016.

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APPROVED	CR

PROJECT
WILDWOOD LANDFILL
POWELL RIVER, B.C.

TITLE
GROUNDWATER, GAS AND DUSTFALL MONITORING LOCATIONS

PROJECT NO.	PHASE/DOC.	REV.	FIGURE
CA0033347.0492	4100/02	0	3

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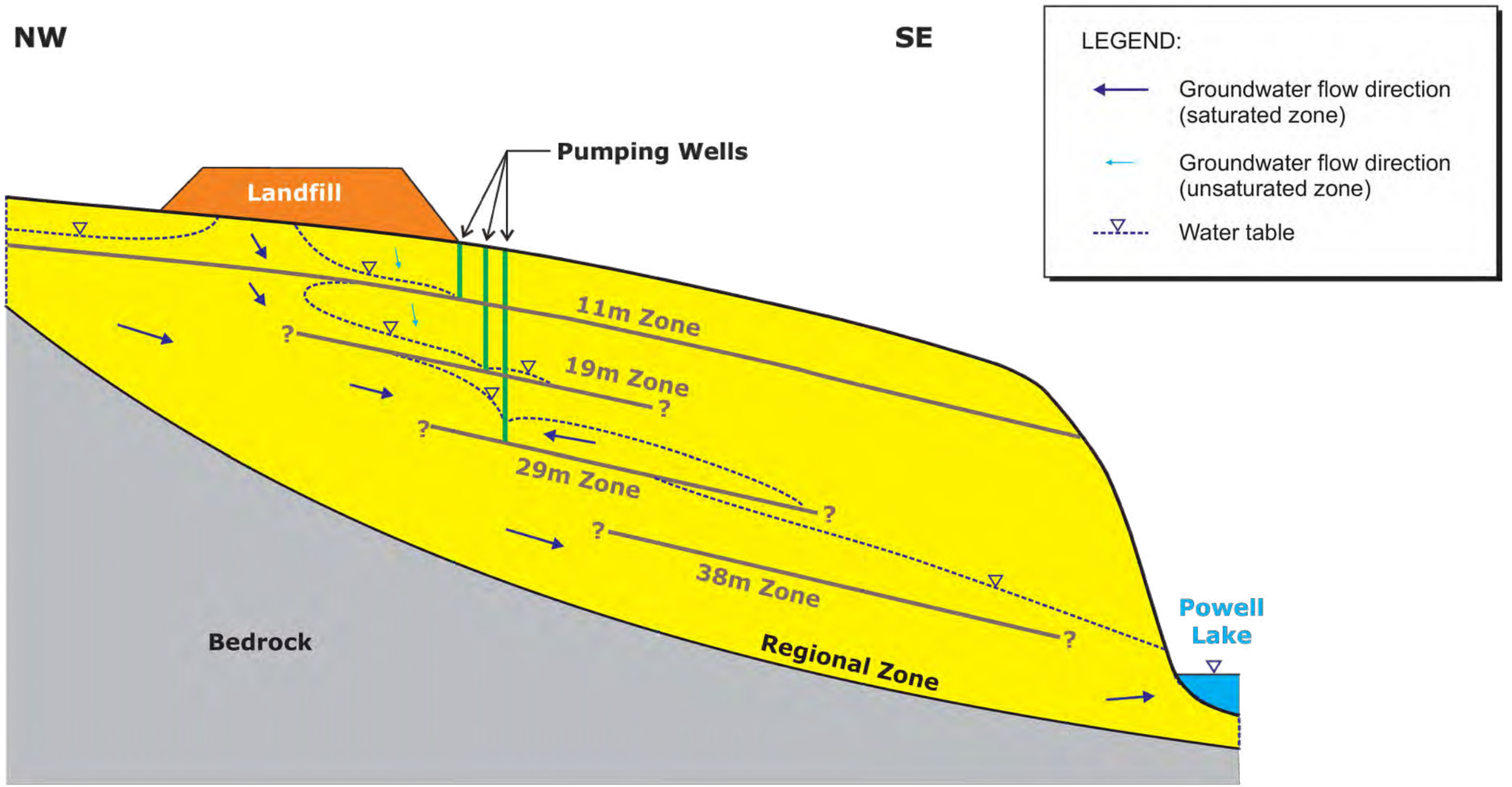

NOTE(S)

1. THIS FIGURE IS A SCHEMATIC ONLY.
2. THIS FIGURE IS NOT TO SCALE.

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DESIGNED	XQ
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PROJECT
WILDWOOD LANDFILL
POWELL RIVER, B.C.

TITLE
CONCEPTUAL HYDROGEOLOGICAL MODEL

PROJECT NO.	PHASE/DOC.	REV.	FIGURE
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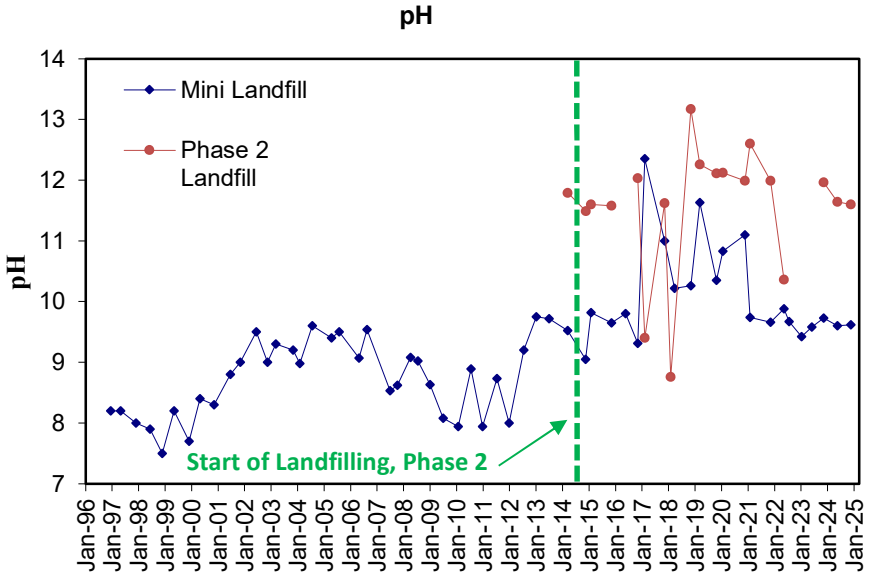
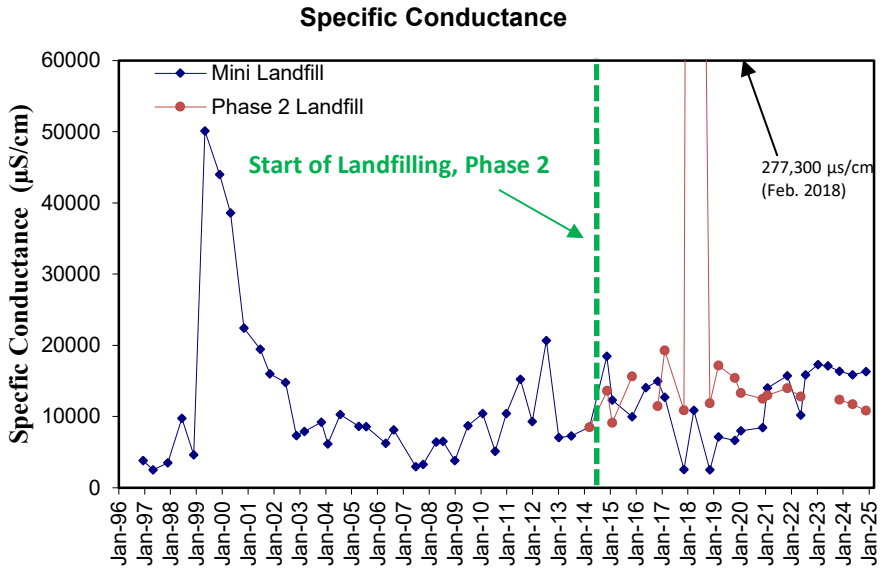
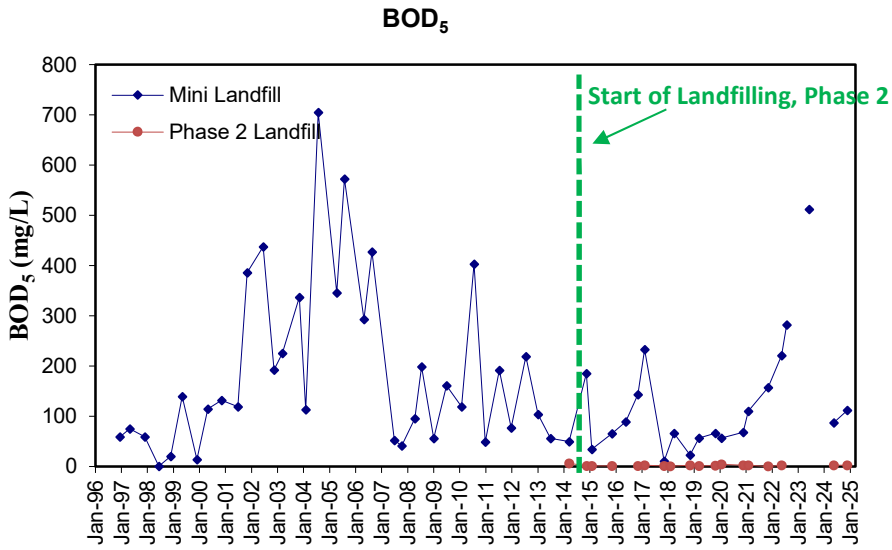
Figure 5: Leachate Analysis from Mini-Landfill and Phase 2 Landfill







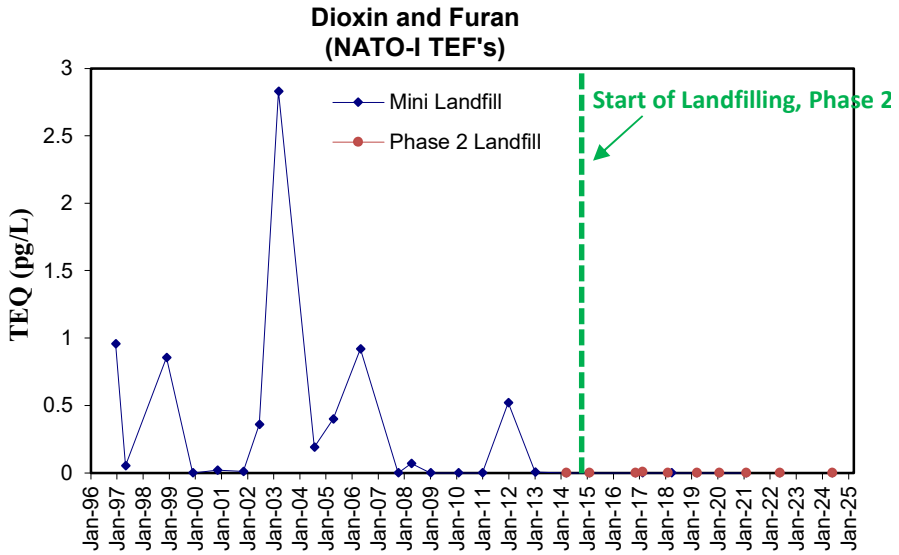


Figure 6
Recovery Wells Pumping Rate
TOTAL OF ALL WELLS
January 1995 to January 2023

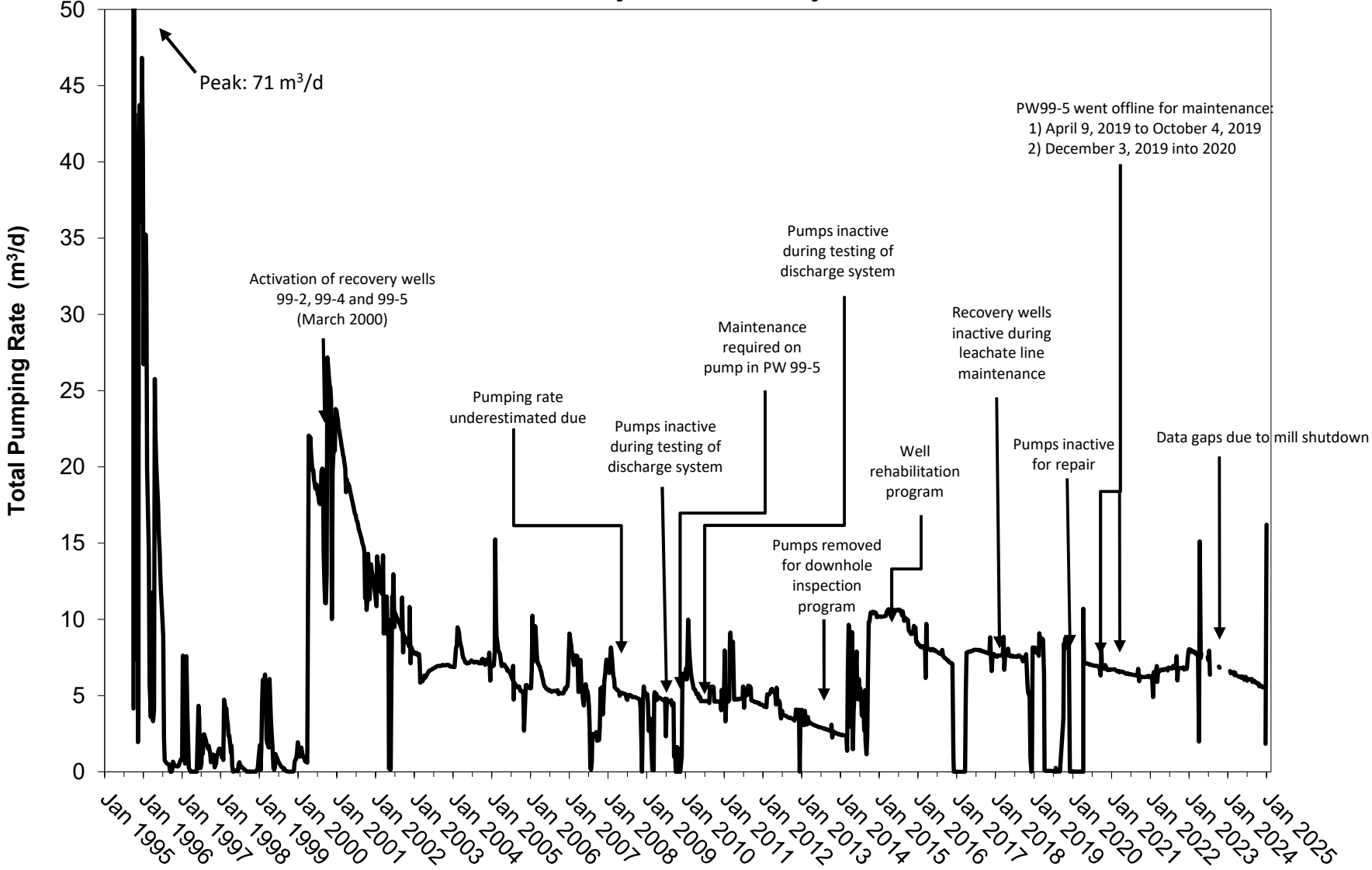


Figure 7
Specific Conductivity in Groundwater from Recovery Wells

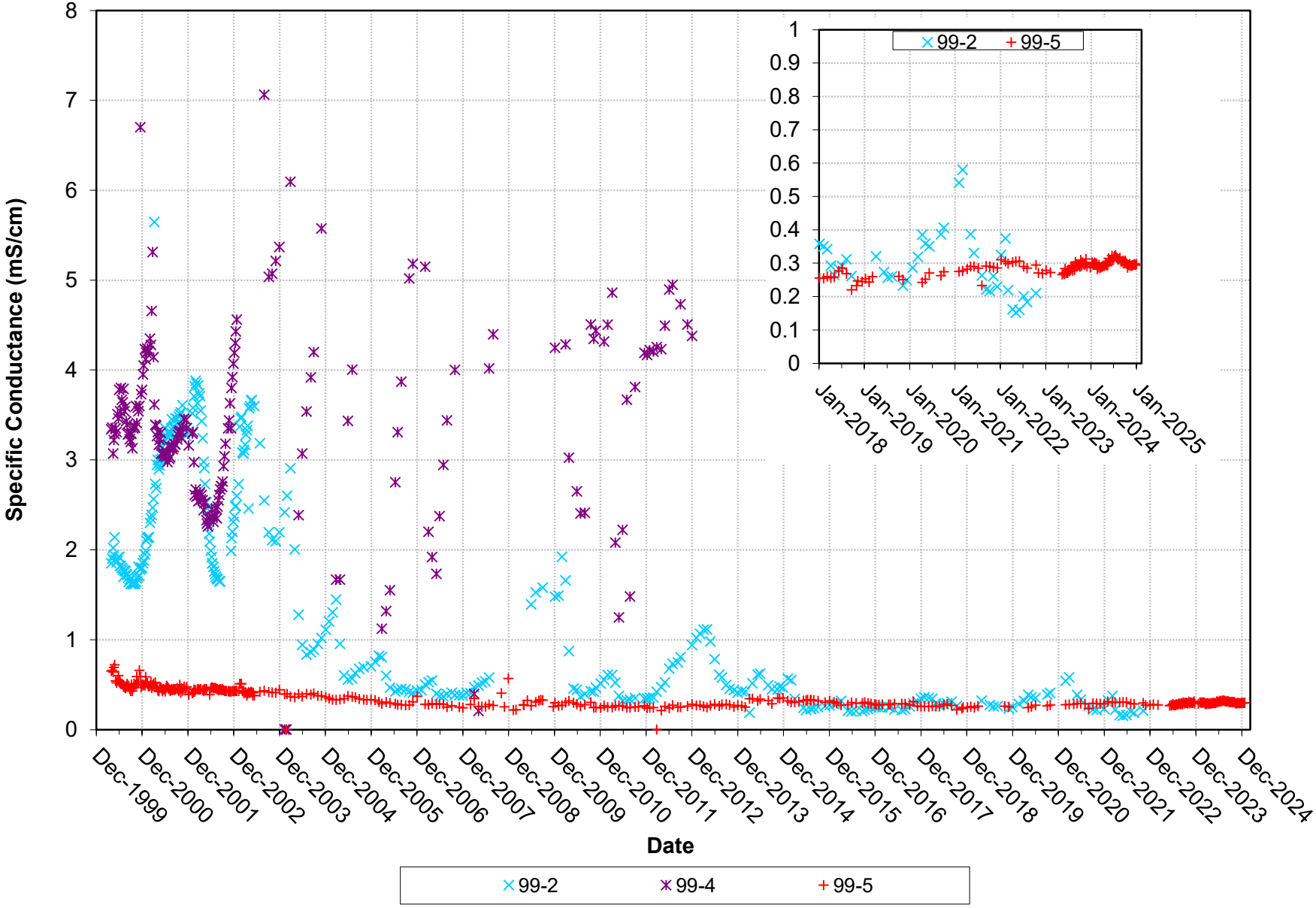
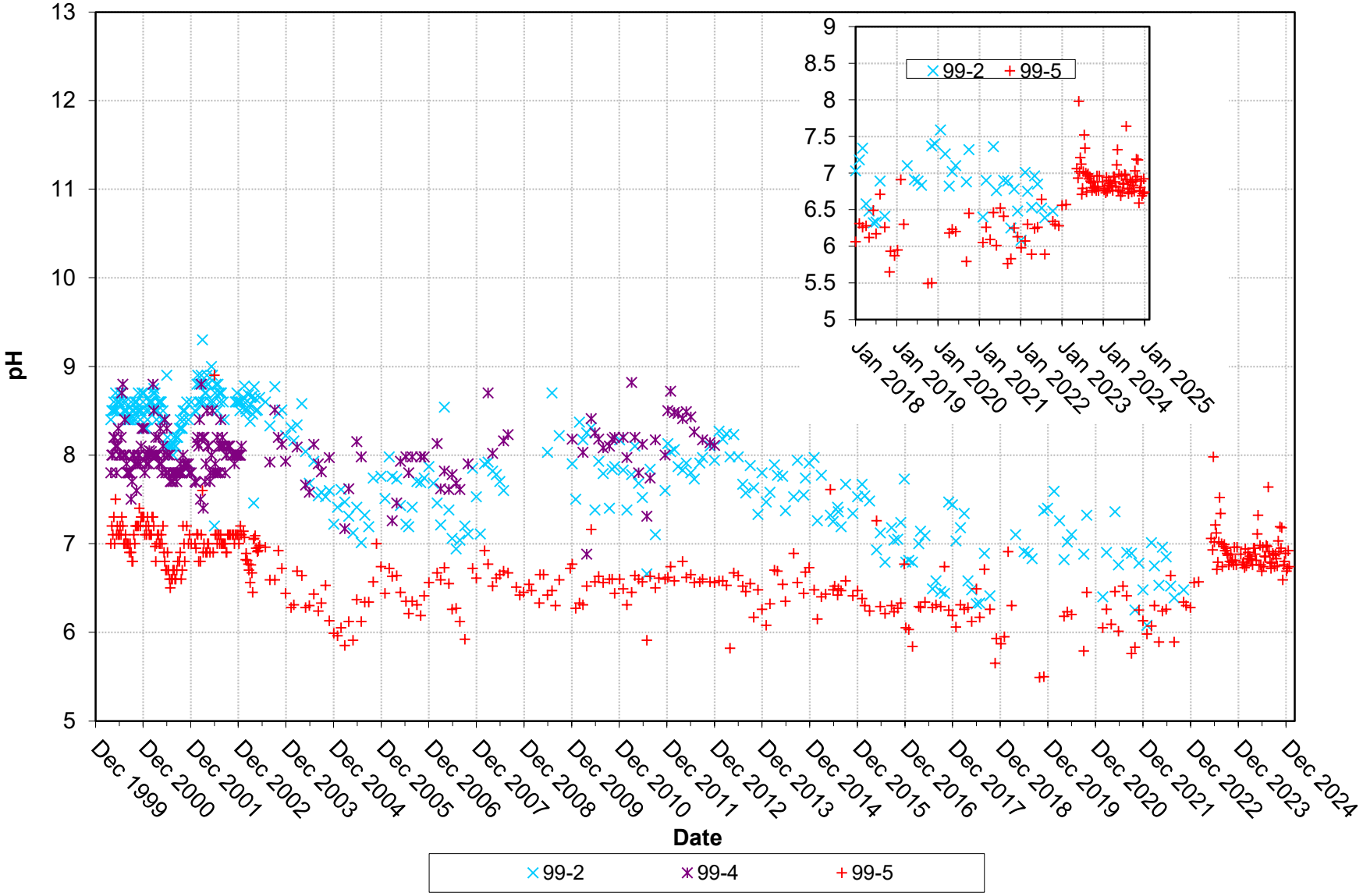
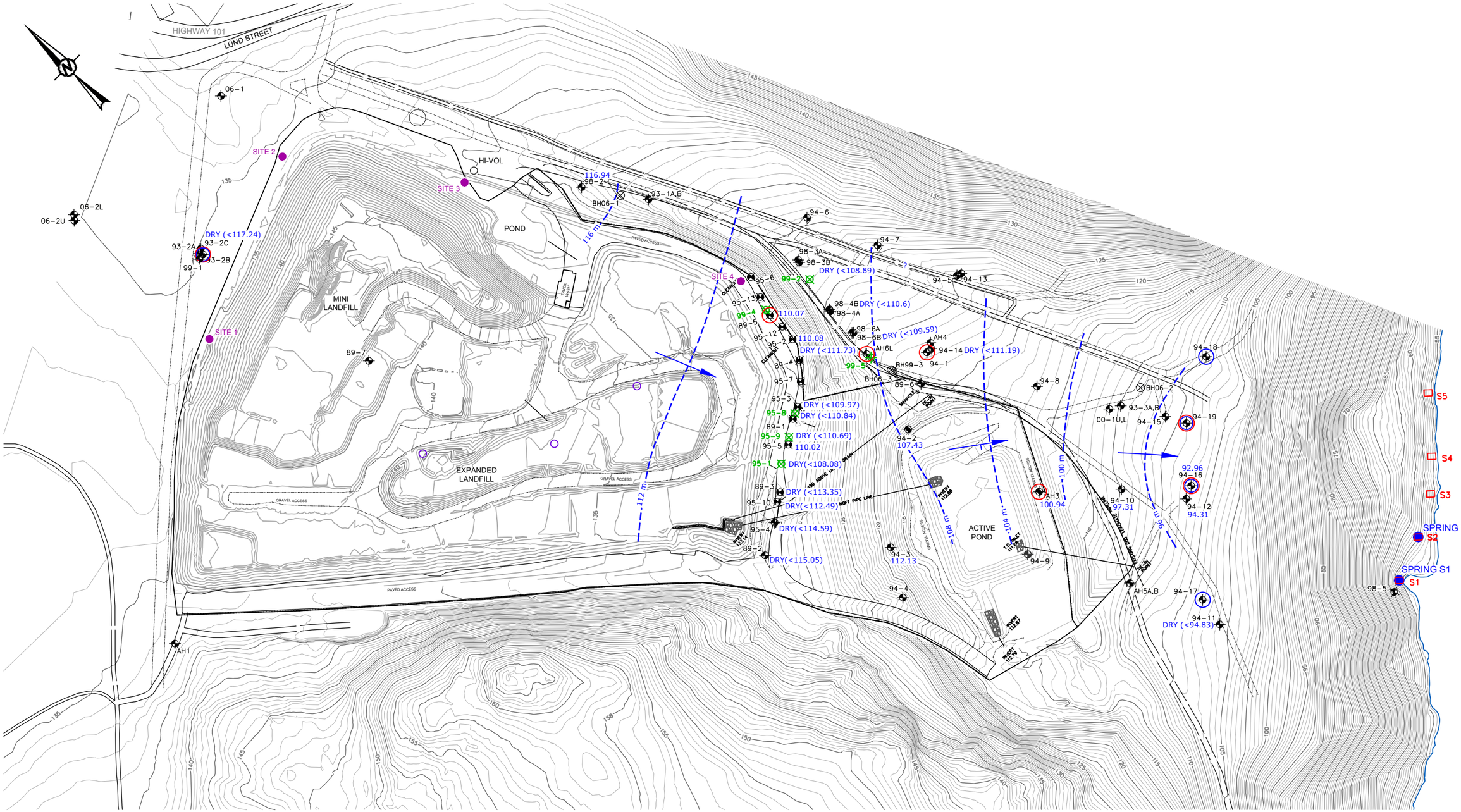


Figure 8
pH in Groundwater from Recovery Wells





LEGEND

- GROUNDWATER MONITORING WELL
- GROUNDWATER SAMPLING LOCATION
- "SNAP SHOT" GROUNDWATER SAMPLING LOCATION
- DESTROYED GROUNDWATER MONITORING WELL
- PUMPING WELL
- SURFACE WATER SAMPLING LOCATION
- SPRING OR SEEP
- INCLINOMETER MONITORING STATION
- DUSTFALL MONITORING LOCATIONS
- HI-VOL PM_{10} SAMPLING LOCATION
- GROUNDWATER ELEVATION
- INFERRED GROUNDWATER CONTOUR (MASL)
- INFERRED GROUNDWATER FLOW DIRECTION
- MAJOR TOPOGRAPHIC CONTOUR (INTERVAL = 5 m)
- MINOR TOPOGRAPHIC CONTOUR (INTERVAL = 0.5 m)
- FENCE

NOTES

1. ROAD LOCATIONS ARE APPROXIMATE.
2. BASE SITE TOPOGRAPHY FROM JULY 31, 2012 SURVEY (SEE REFERENCE 1).
3. ACTIVE POND TOPOGRAPHY FROM OCTOBER 2013 SURVEY (SEE REFERENCE 2).
4. MAIN LANDFILL TOPOGRAPHY FROM JANUARY 2016 SURVEY (SEE REFERENCE 3).

REFERENCES

1. EMERY & RAE LAND SURVEYING LTD.,
   FILE NAME: 7-160 JULY 31-2012 SITE TOPO.dwg, DATED: JULY 31, 2012.
2. EMERY & RAE, FILE: 7-183 AS BUILT SITE PLAN OCTOBER-2013 FOR CLIENT.dwg,
   DATED NOVEMBER 4, 2013. ORIGINAL SCALE 1:1000.
3. EMERY & RAE LAND SURVEYING LTD.,
   FILE NAME: 7-197-5 January-2016 FOR CLIENT.dwg, RECEIVED: FEBRUARY 22, 2016.

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0 50 100
1:2,000 METRES

CLIENT
DOMTAR INC.

CONSULTANT
wsp

YYYY-MM-DD	2025-03-26
PREPARED	ZX
DESIGN	RTJ
REVIEW	JD
APPROVED	CR

PROJECT
WILDWOOD LANDFILL
POWELL RIVER, B.C.

TITLE
GROUNDWATER ELEVATION: 11 m FLOWZONE NOVEMBER 2024

PROJECT No.	CONTROL	Rev.	FIGURE
CA0033347.0492	1000	0	9

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

0 25 mm

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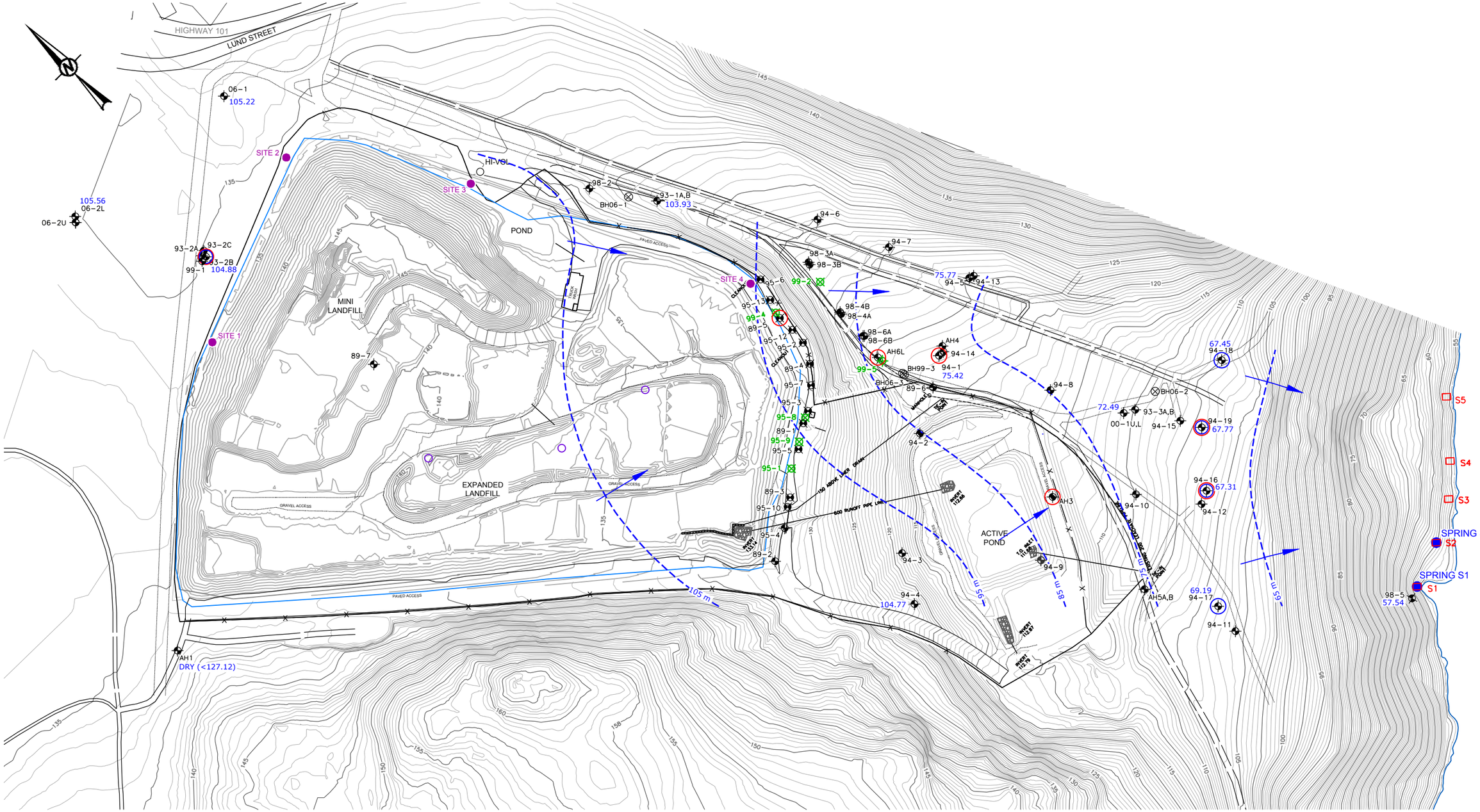

LEGEND

- GROUNDWATER MONITORING WELL
- GROUNDWATER SAMPLING LOCATION
- "SNAP SHOT" GROUNDWATER SAMPLING LOCATION
- DESTROYED GROUNDWATER MONITORING WELL
- PUMPING WELL
- SURFACE WATER SAMPLING LOCATION
- SPRING OR SEEP
- INCLINOMETER MONITORING STATION
- DUSTFALL MONITORING LOCATIONS
- HI-VOL PM_{10} SAMPLING LOCATION
- 115.05 GROUNDWATER ELEVATION
- INFERRED GROUNDWATER CONTOUR (MASL)
- INFERRED GROUNDWATER FLOW DIRECTION
- MAJOR TOPOGRAPHIC CONTOUR (INTERVAL = 5 m)
- MINOR TOPOGRAPHIC CONTOUR (INTERVAL = 0.5 m)
- FENCE

NOTES

1. ROAD LOCATIONS ARE APPROXIMATE.
2. BASE SITE TOPOGRAPHY FROM JULY 31, 2012 SURVEY (SEE REFERENCE 1).
3. ACTIVE POND TOPOGRAPHY FROM OCTOBER 2013 SURVEY (SEE REFERENCE 2).
4. MAIN LANDFILL TOPOGRAPHY FROM JANUARY 2016 SURVEY (SEE REFERENCE 3).

REFERENCES

1. EMERY & RAE LAND SURVEYING LTD., FILE NAME: 7-160 JULY 31-2012 SITE TOPO.dwg, DATED: JULY 31, 2012.
2. EMERY & RAE, FILE: 7-183 AS BUILT SITE PLAN OCTOBER-2013 FOR CLIENT.dwg, DATED NOVEMBER 4, 2013. ORIGINAL SCALE 1:1000.
3. EMERY & RAE LAND SURVEYING LTD., FILE NAME: 7-197-5 January-2016 FOR CLIENT.dwg, RECEIVED: FEBRUARY 22, 2016.

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0 50 100
1:2,000 METRES

CLIENT
DOMTAR INC.

CONSULTANT
wsp

YYYY-MM-DD	2025-03-26
PREPARED	ZX
DESIGN	RTJ
REVIEW	JD
APPROVED	CR

PROJECT
WILDWOOD LANDFILL
POWELL RIVER, B.C.

TITLE
GROUNDWATER ELEVATION: REGIONAL FLOW ZONE

PROJECT No.	CONTROL	Rev.	FIGURE
CA0033347.0492	1000	0	10

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

0 25 mm

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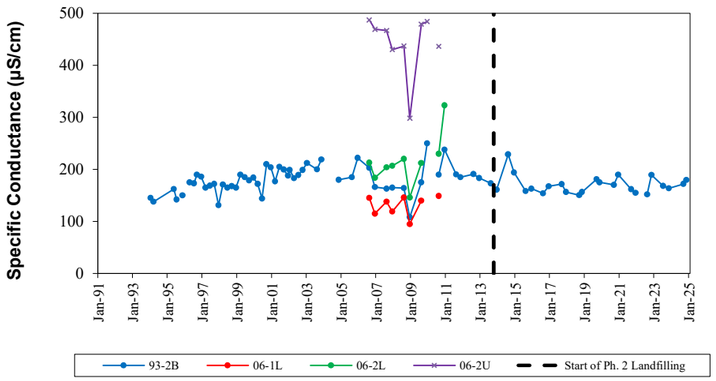
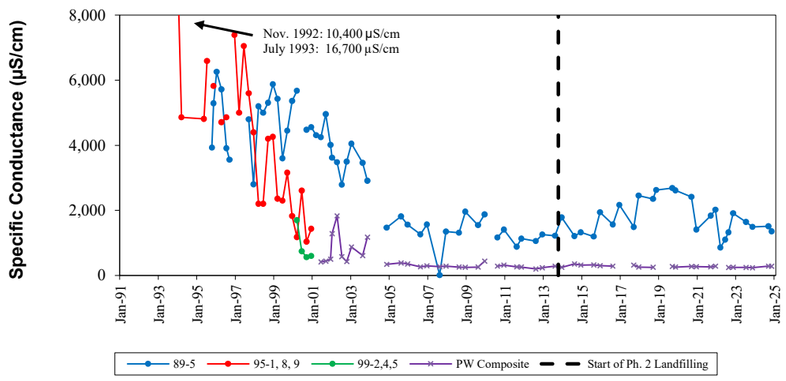
Figure 11A: Specific Conductance in Groundwater and Seepage from Springs S1 and S2

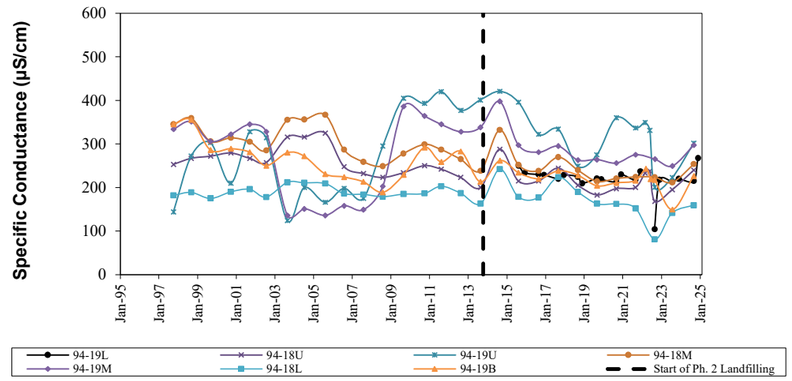
Upgradient of Landfill



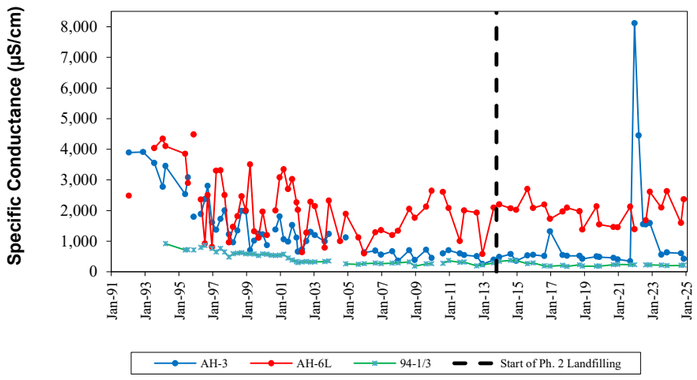
South Edge of Landfill



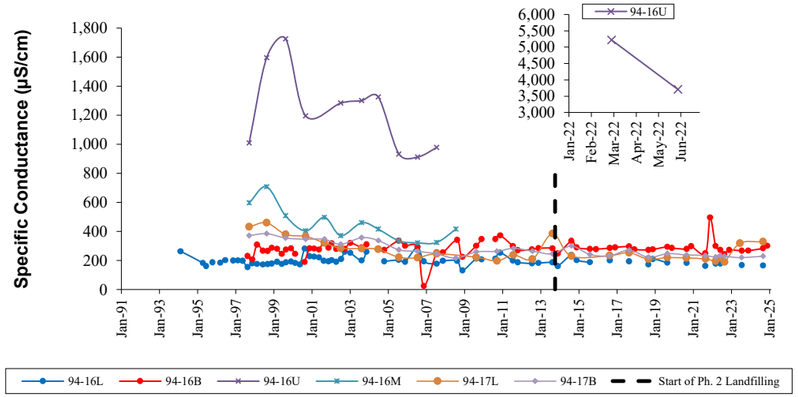
Wells Near Shoreline (2/2)



Downgradient of Landfill



Wells Near Shoreline (1/2)



Surface Water Near Shoreline & Mill Filterhouse

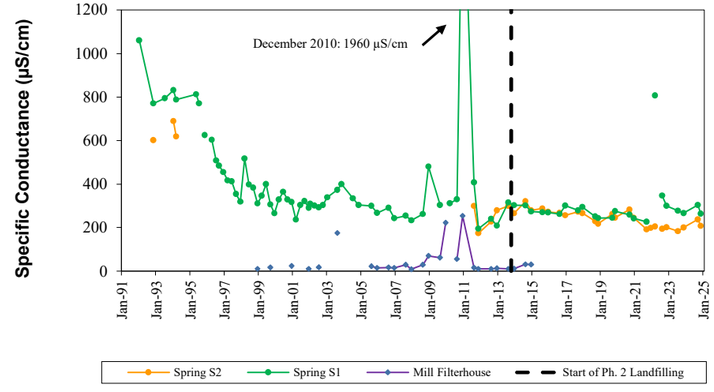
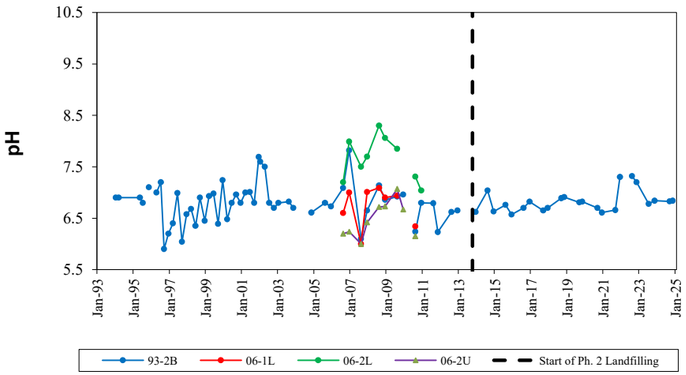
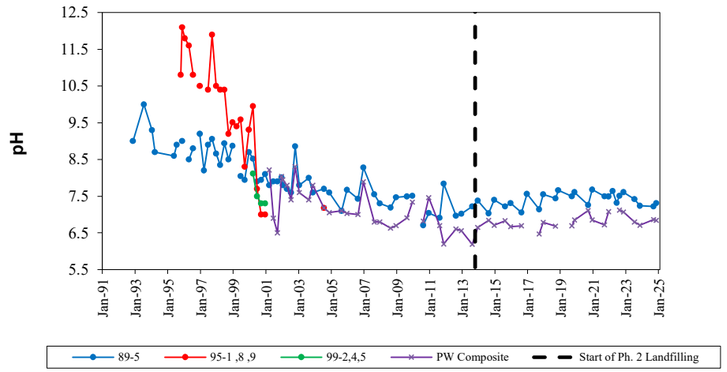


Figure 11B: pH in Groundwater and Seepage from Springs S1 and S2

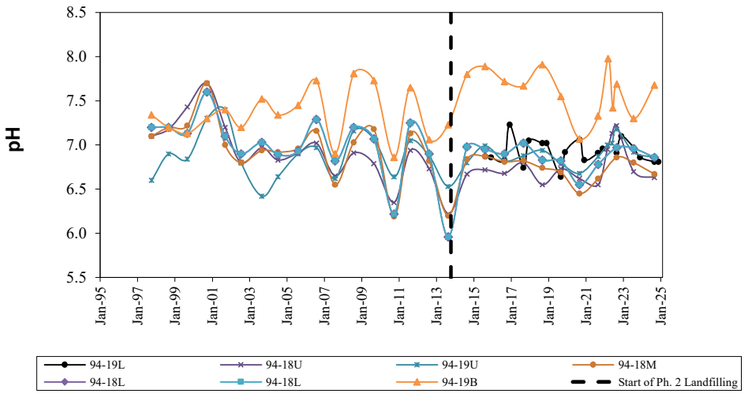
Upgradient of Landfill



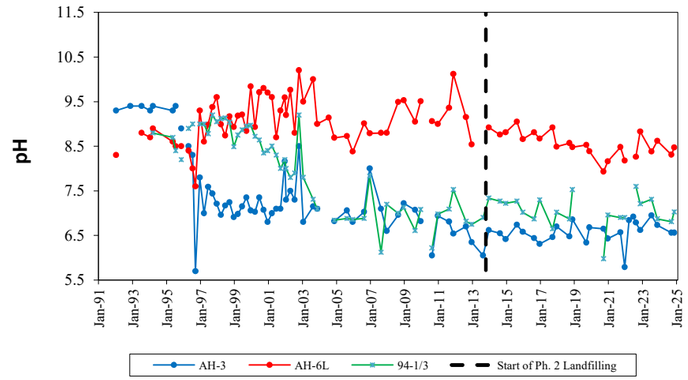
South Edge of Landfill



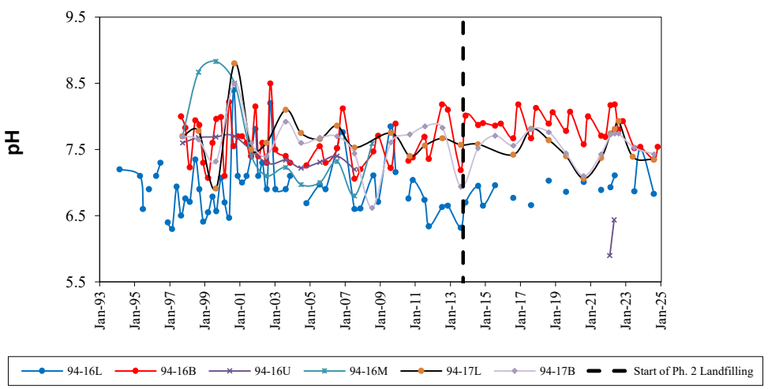
Wells Near Shoreline (2/2)



Downgradient of Landfill



Wells Near Shoreline (1/2)



Surface Water Near Shoreline & Mill Filterhouse

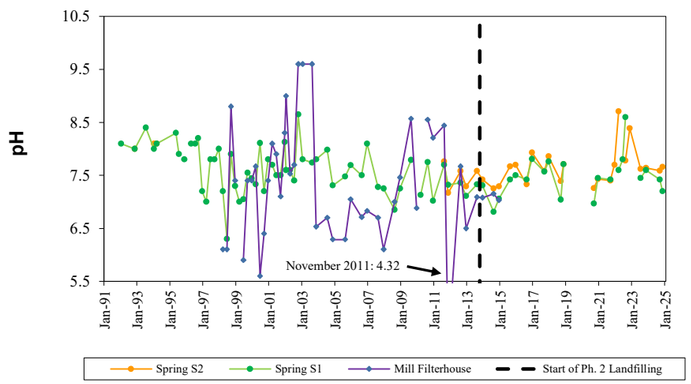
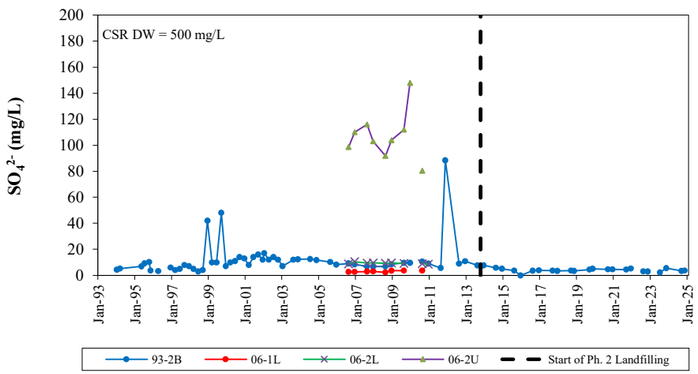
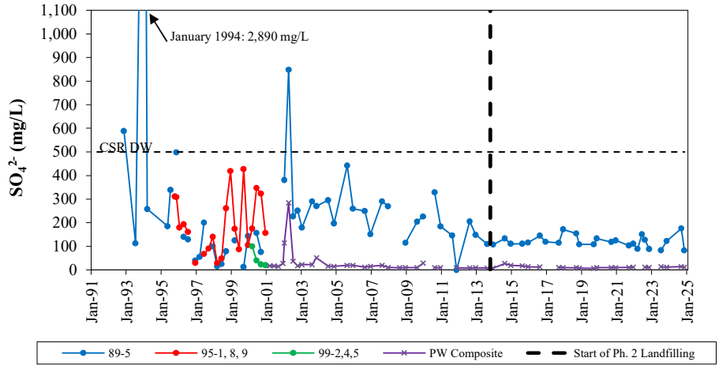


Figure 11C: Sulfate Concentration in Groundwater and Seepage from Springs S1 and S2

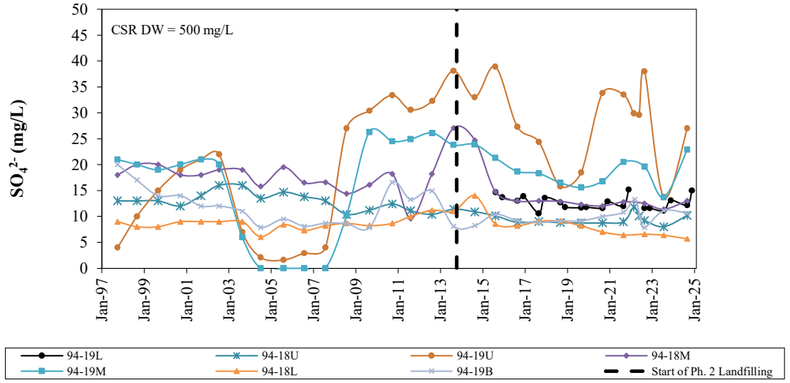
Upgradient of Landfill



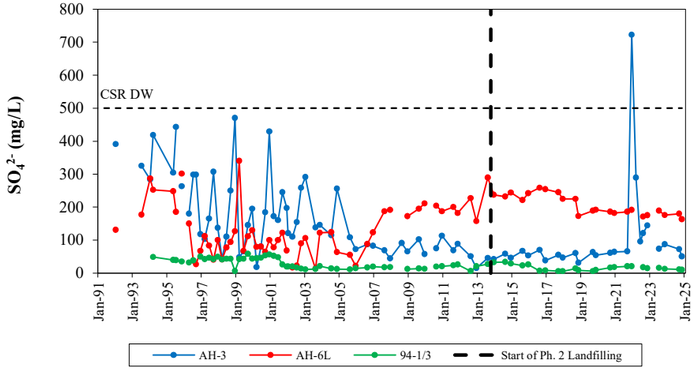
South Edge of Landfill



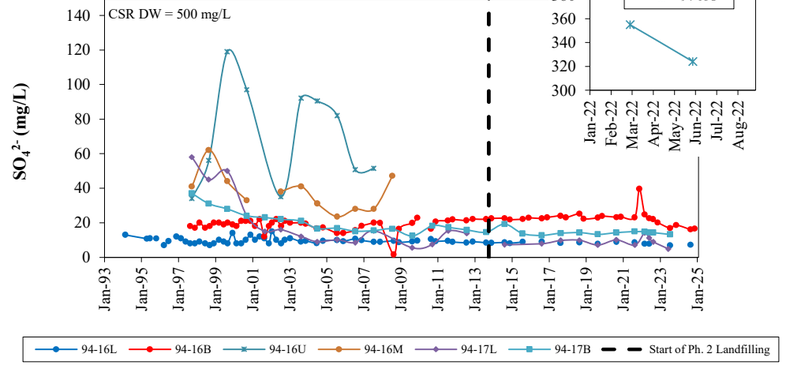
Wells Near Shoreline (2/2)



Downgradient of Landfill



Wells Near Shoreline (1/2)



Surface Water Near Shoreline & Mill Filterhouse

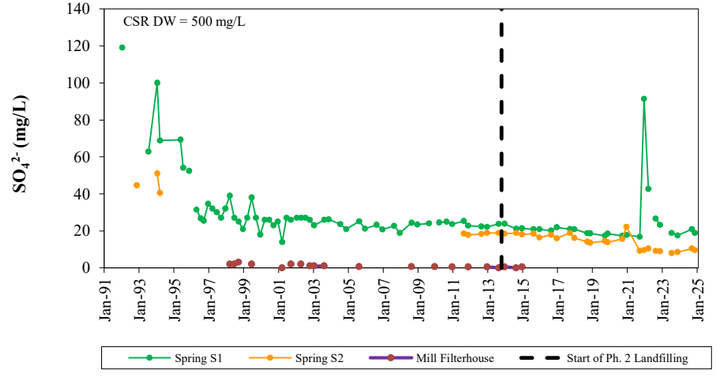
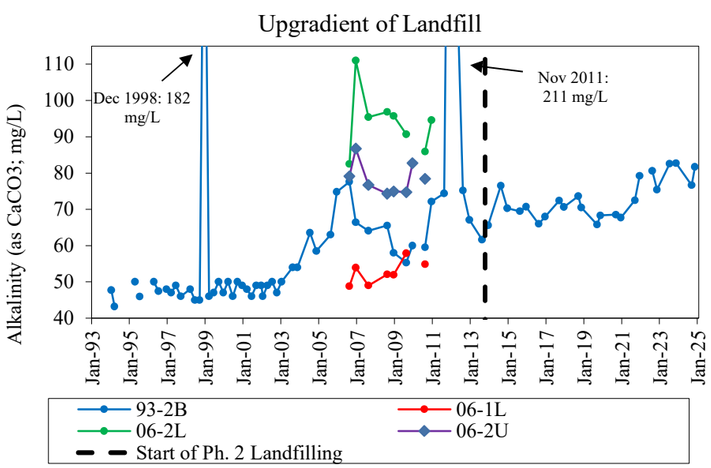
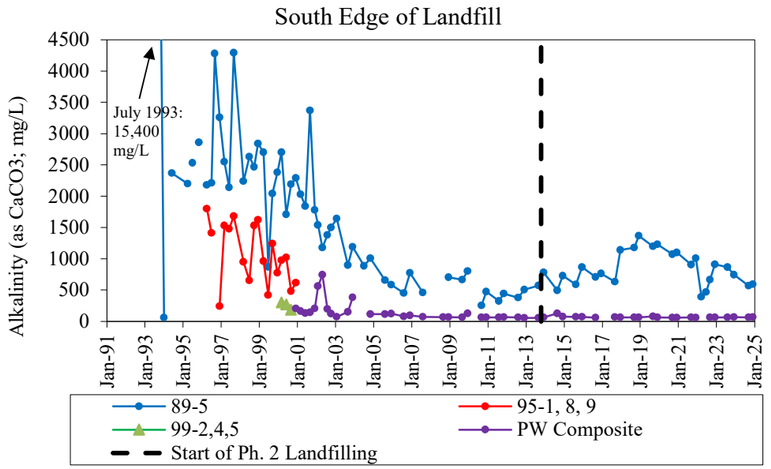
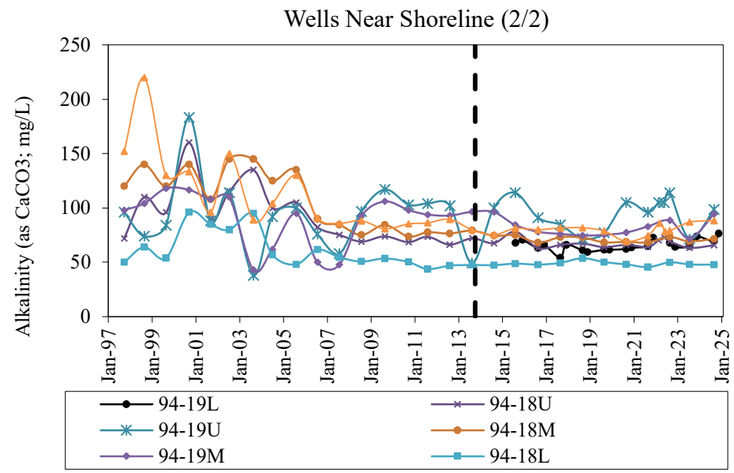
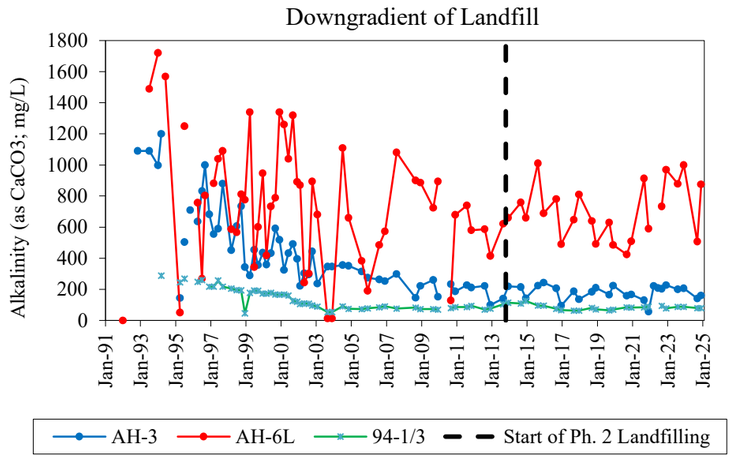


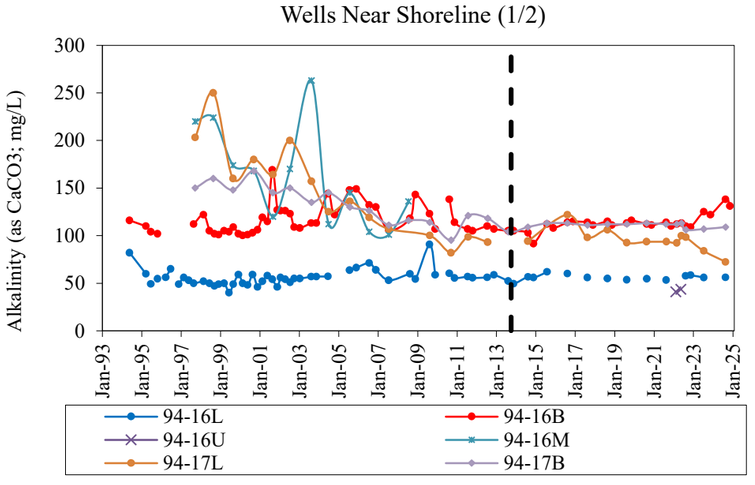
Figure 11D: Alkalinity of Groundwater and Seepage from Springs S1 and S2











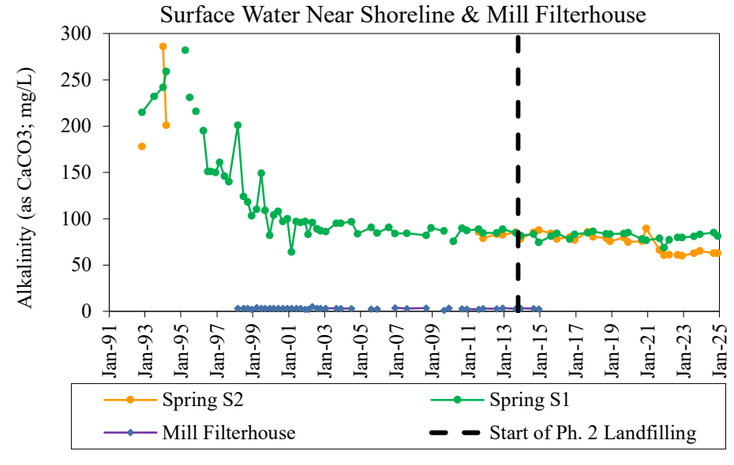
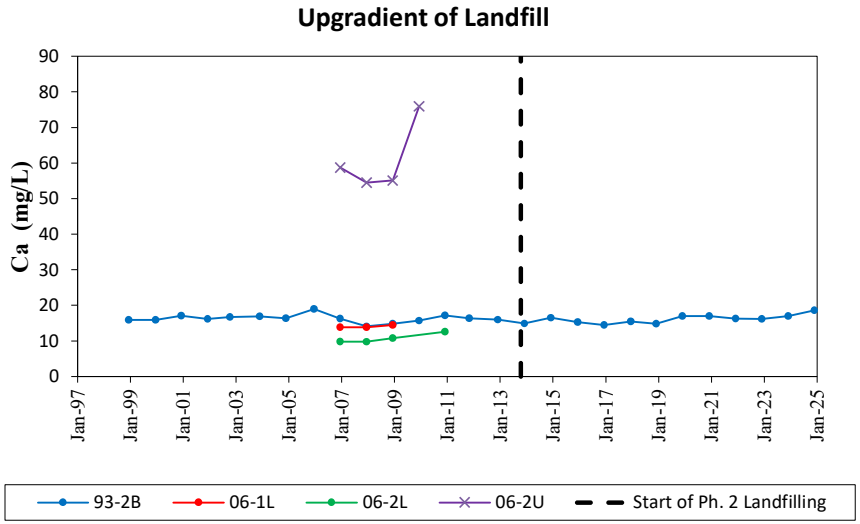
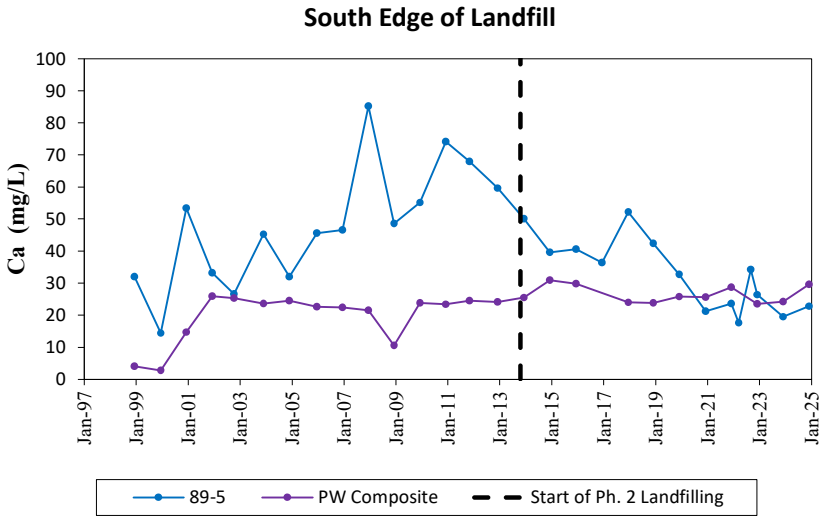
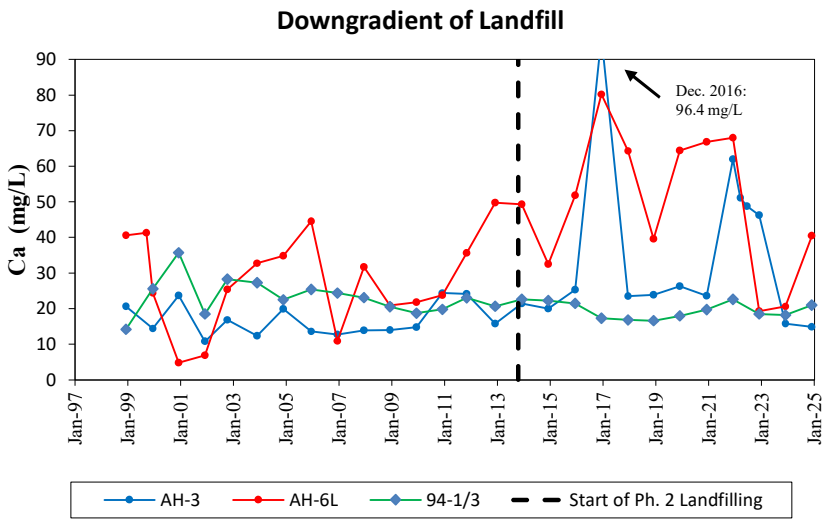


Figure 11E: Calcium Concentration in Groundwater and Seepage from Springs S1 and S2







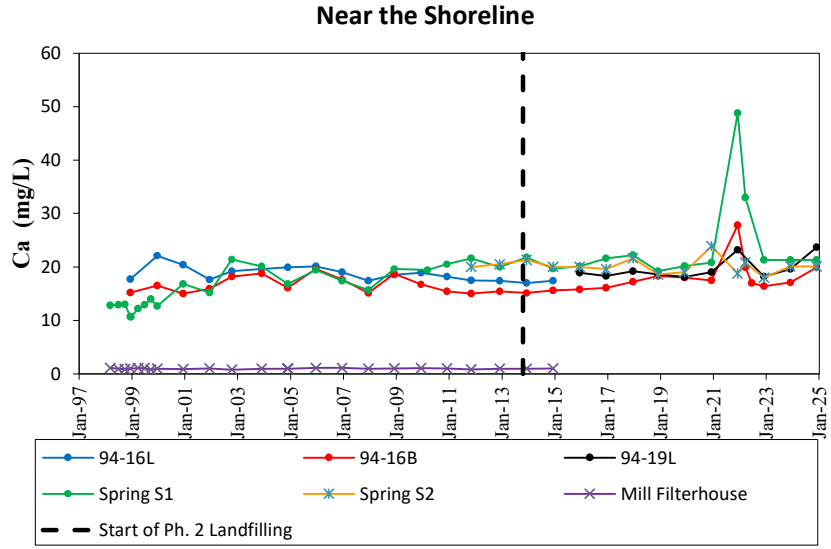
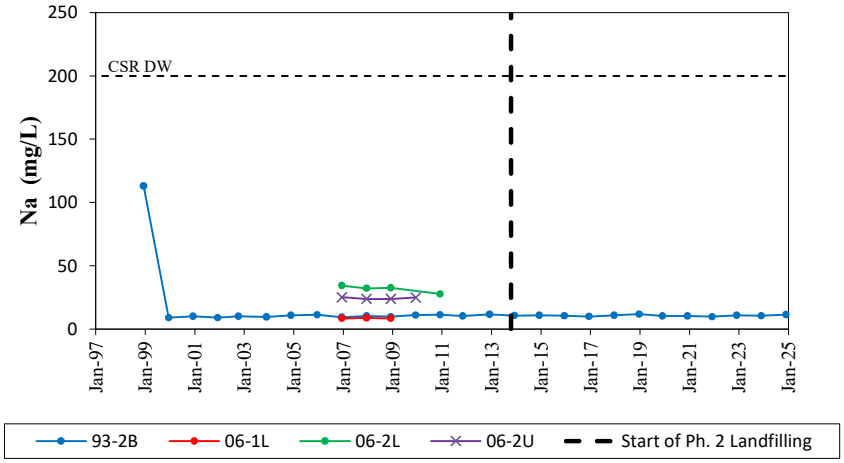
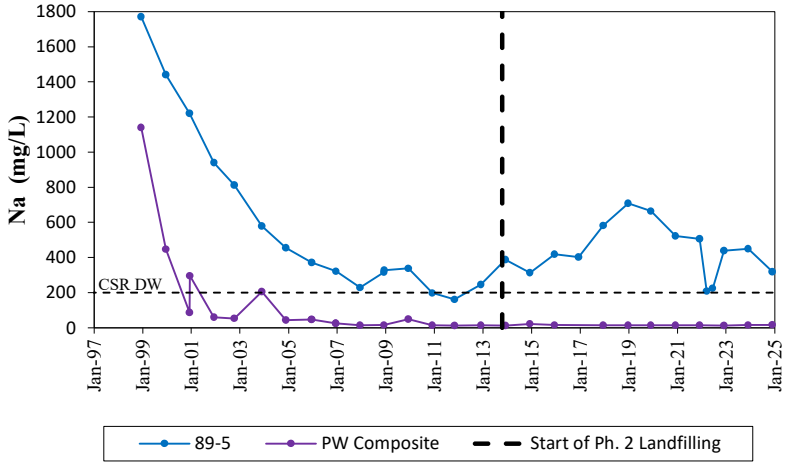


Figure 11F: Sodium Concentration in Groundwater and Seepage from Springs S1 and S2

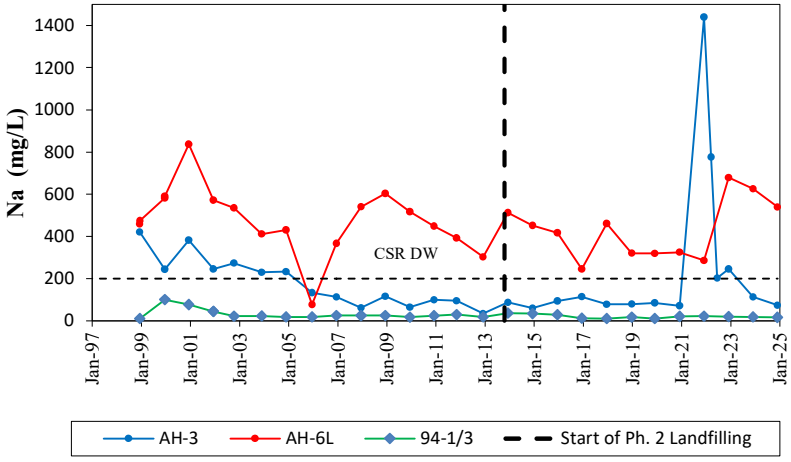
Upgradient of Landfill



South Edge of Landfill



Downgradient of Landfill



Near the Shoreline

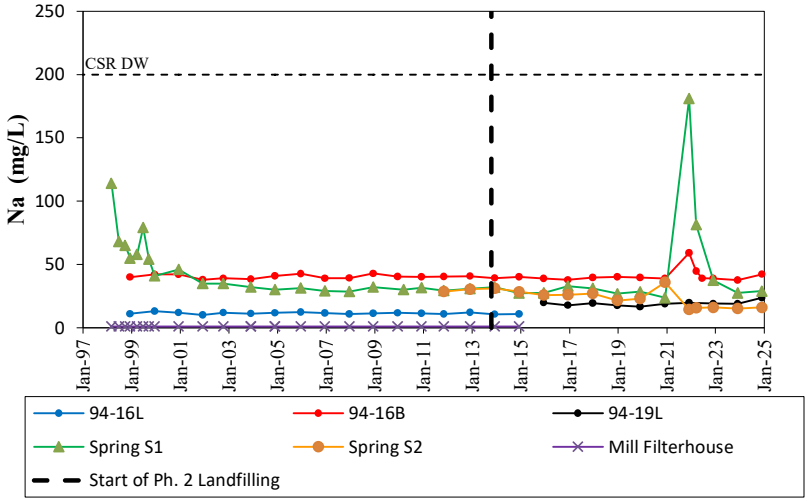
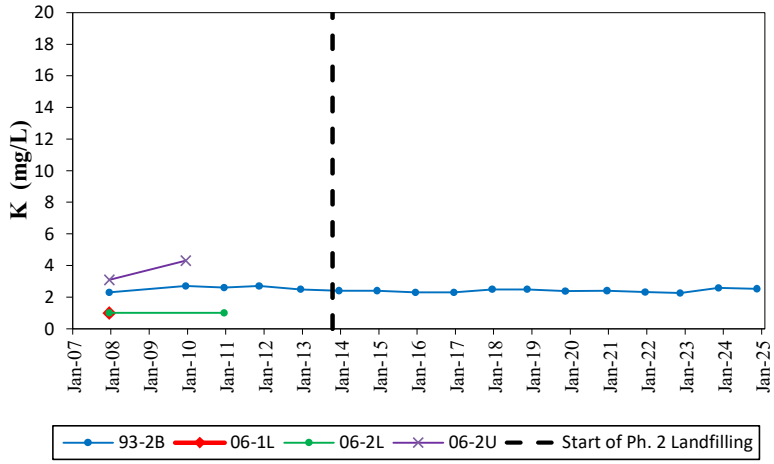


Figure 11G: Potassium Concentration in Groundwater and Seepage from Springs S1 and S2

Upgradient of Landfill



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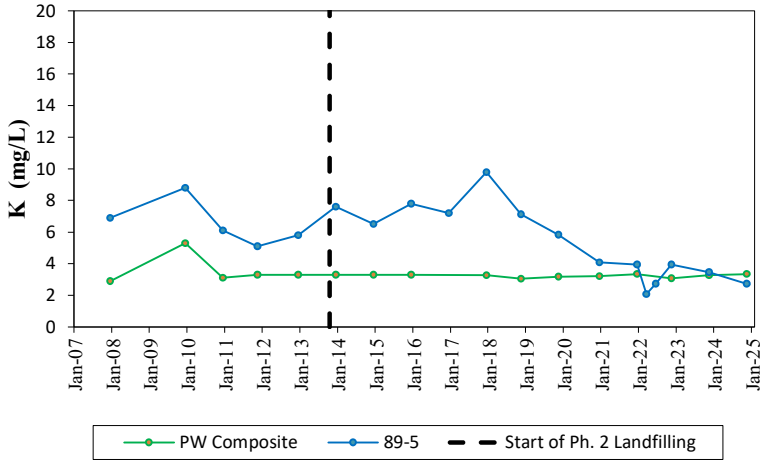

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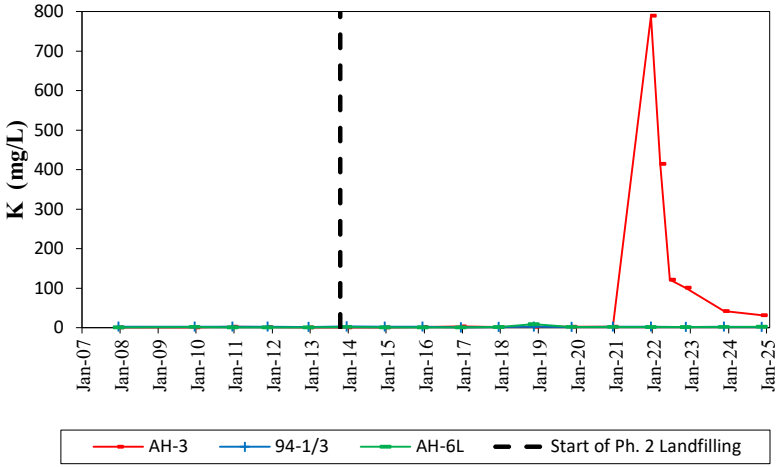


Near the Shoreline

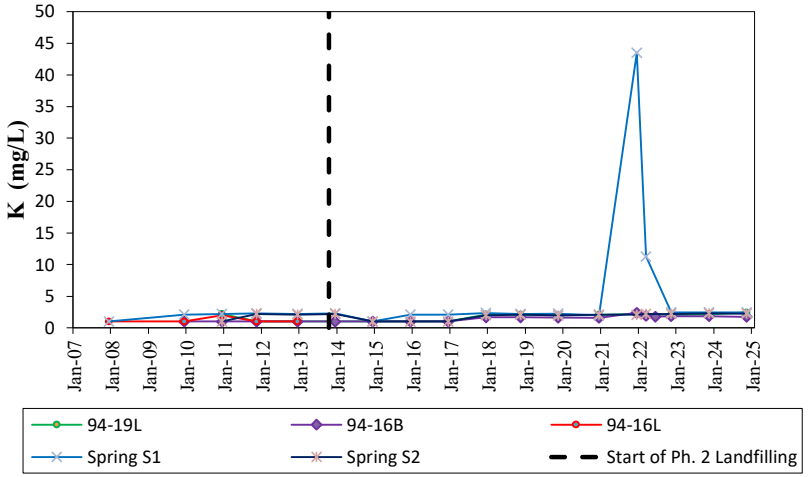
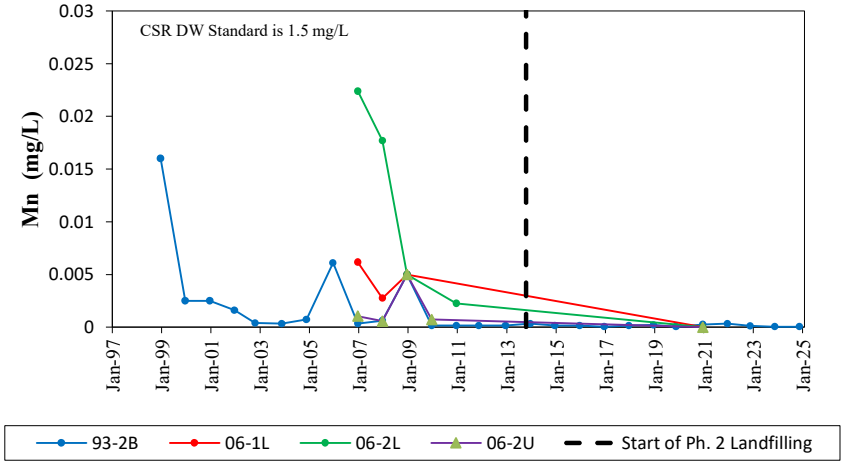


Figure 11H: Manganese Concentration in Groundwater and Seepage from Springs S1 and S2

Upgradient of Landfill



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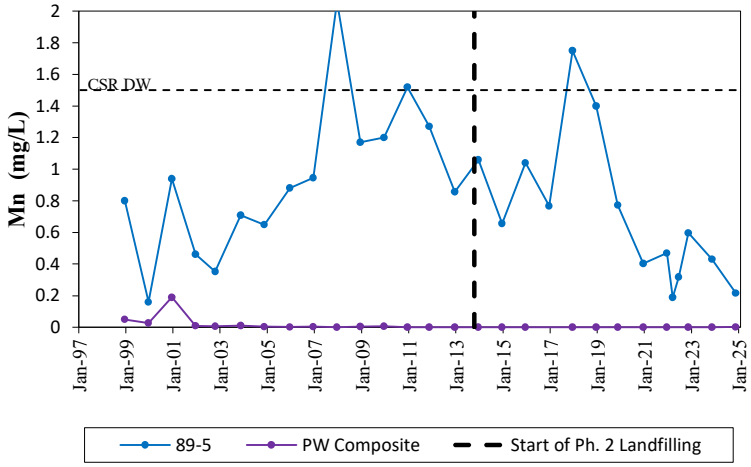
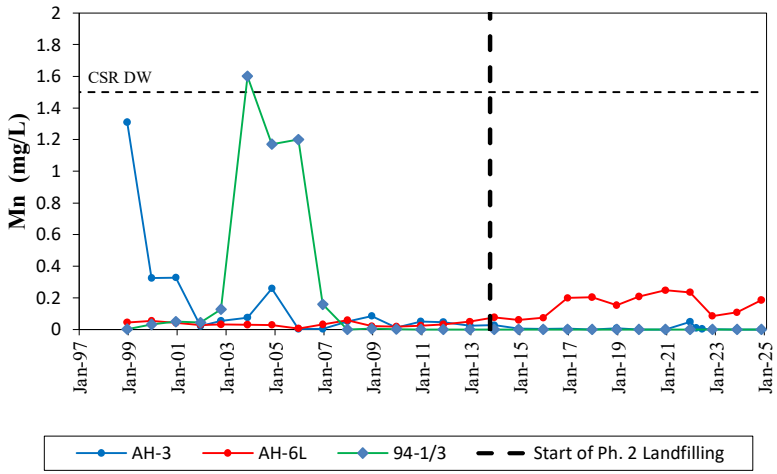


Downgradient of Landfill



Near the Shoreline

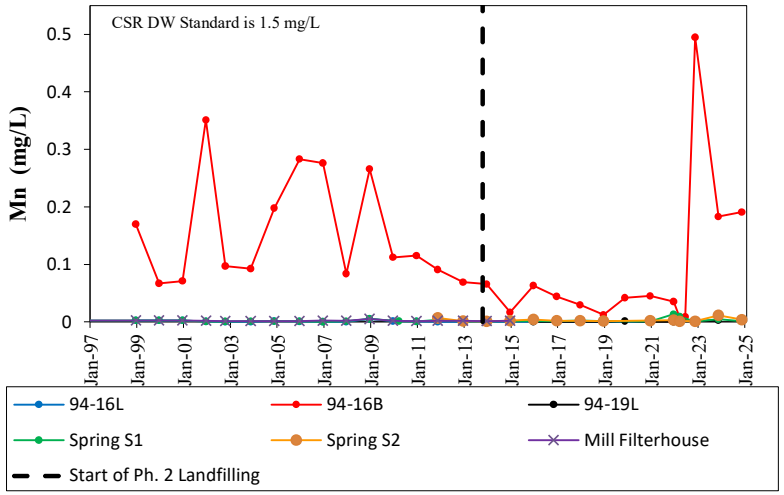
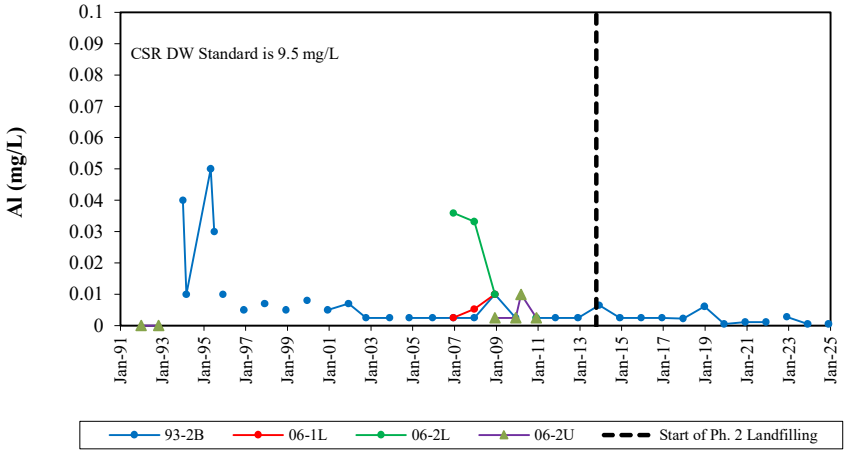
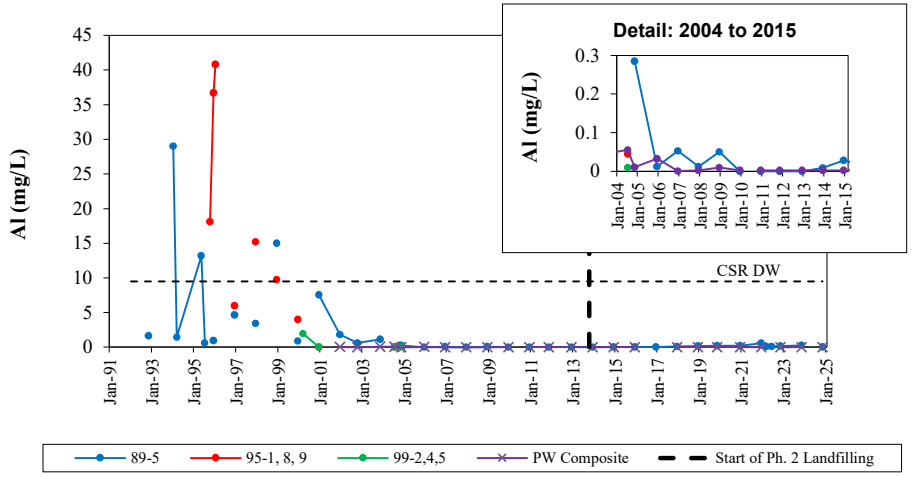


Figure 11I: Aluminum Concentration in Groundwater and Seepage from Springs S1 and S2

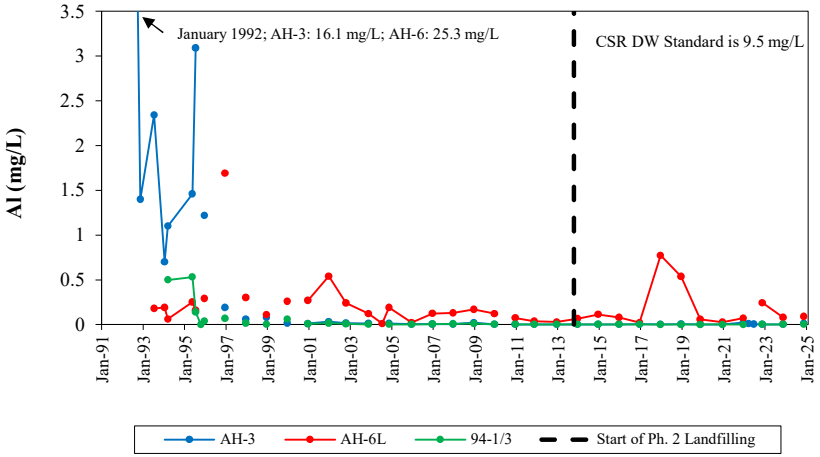
Upgradient of Landfill



South Edge of Landfill



Downgradient of Landfill



Near Shoreline

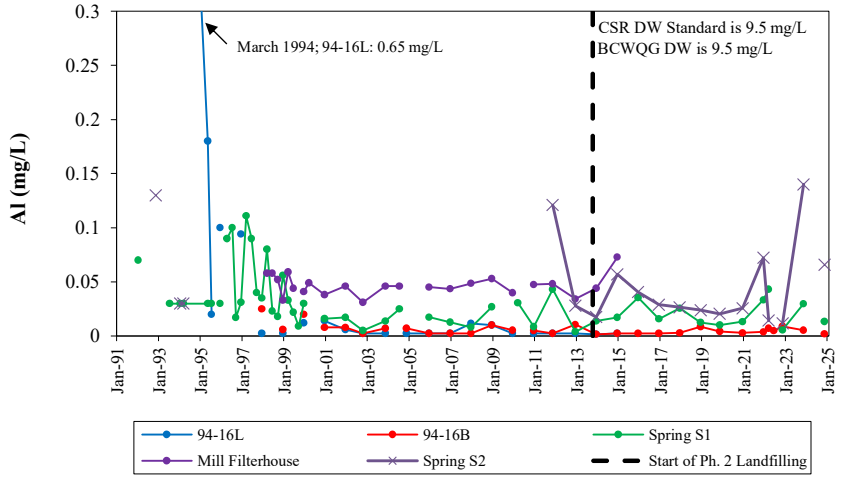
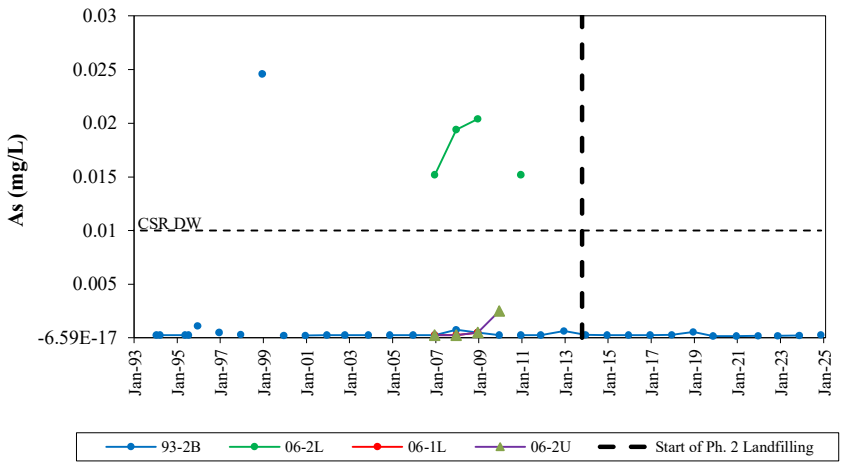
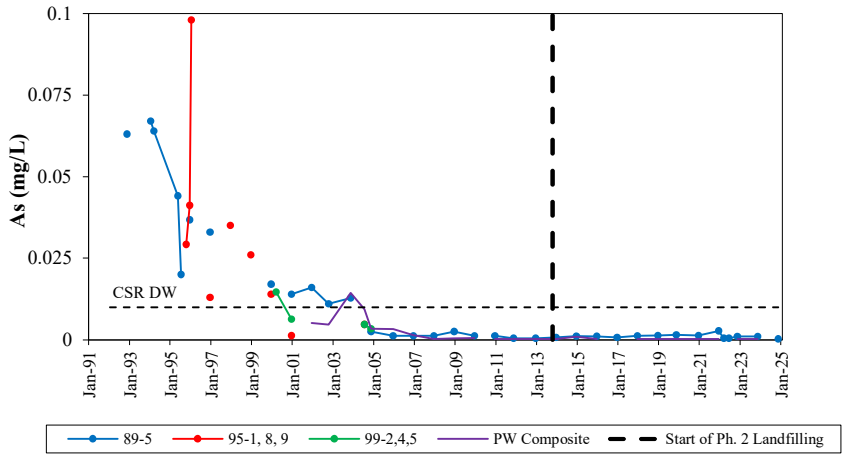


Figure 11J: Arsenic Concentration in Groundwater and Seepage from Springs S1 and S2

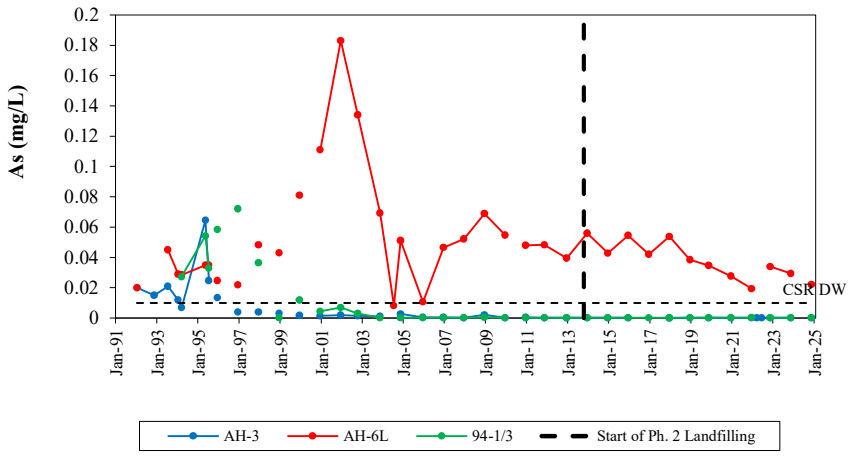
Upgradient of Landfill



South Edge of Landfill



Downgradient of Landfill



Near Shoreline

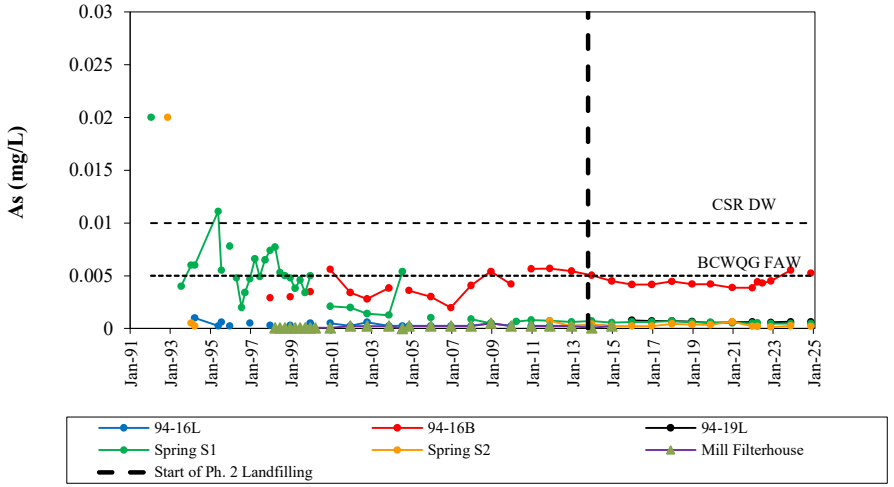
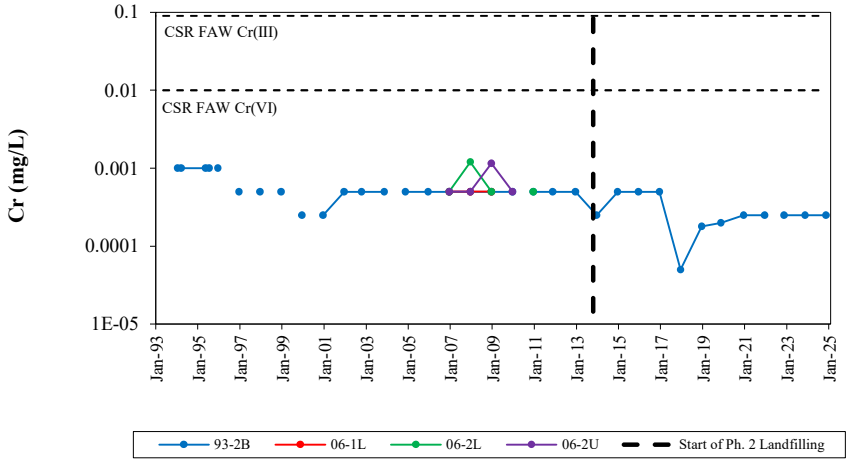


Figure 11K: Chromium Concentration in Groundwater and Seepage from Springs S1 and S2

Upgradient of Landfill



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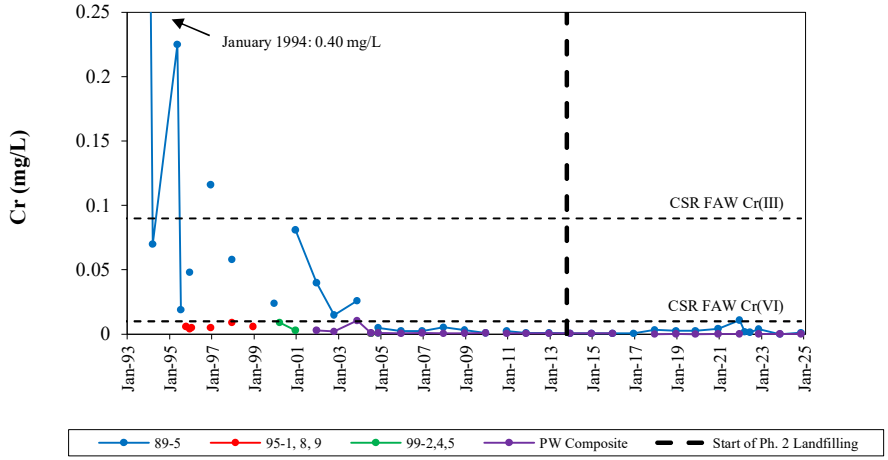
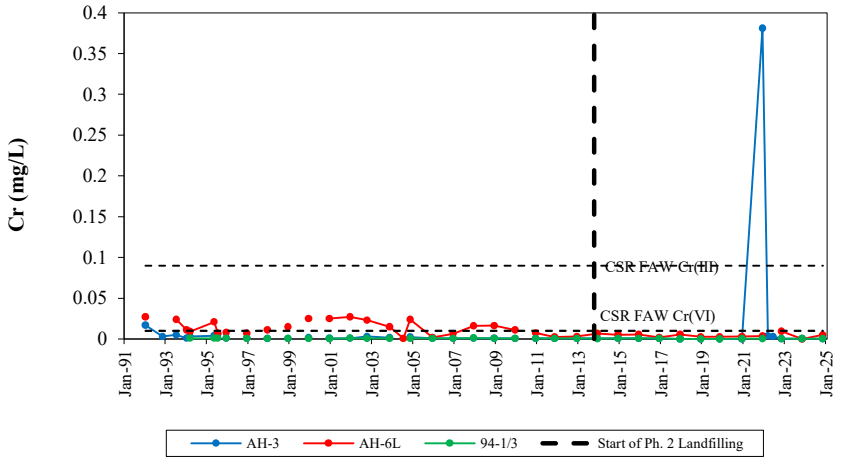


Downgradient of Landfill



Near Shoreline

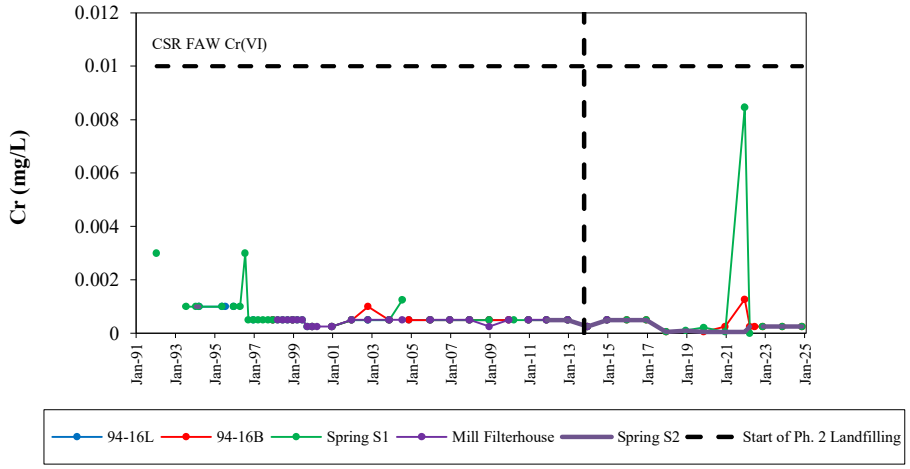
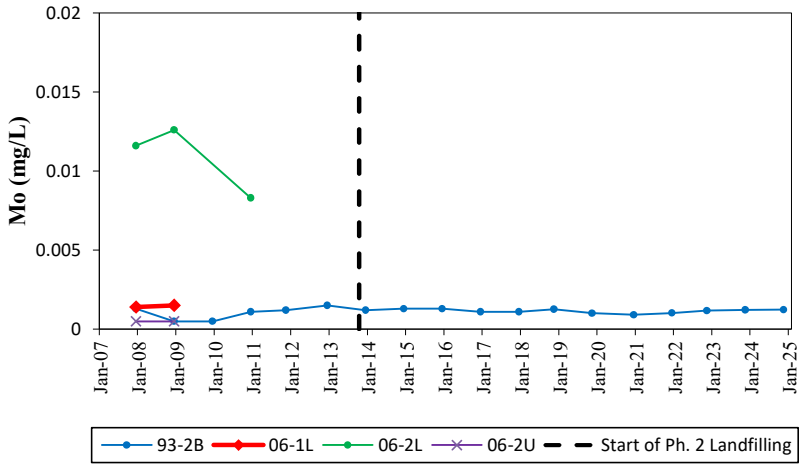


Figure 11L: Molybdenum Concentration in Groundwater and Seepage from Springs S1 and S2

Upgradient of Landfill



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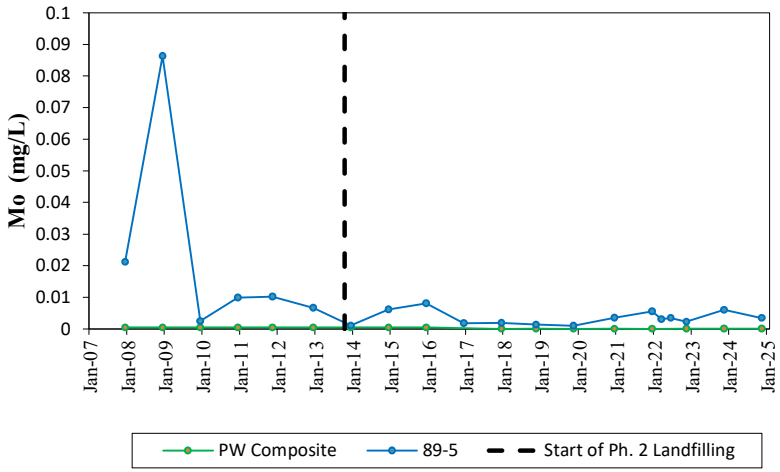
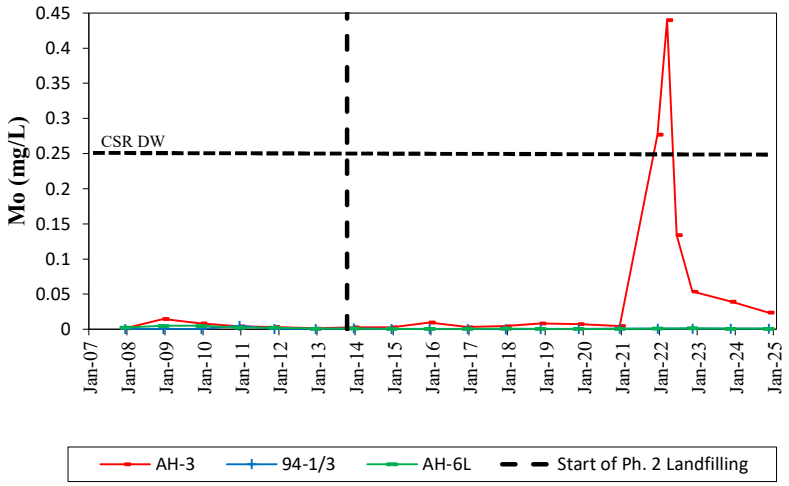


Downgradient of Landfill



Near the Shoreline

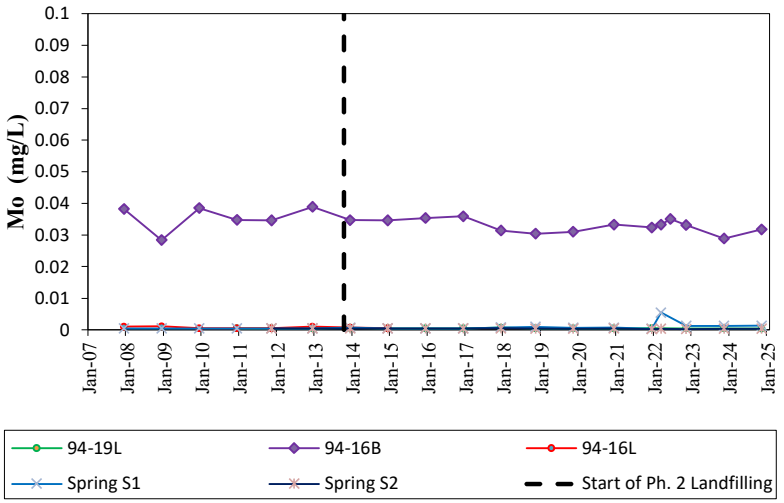
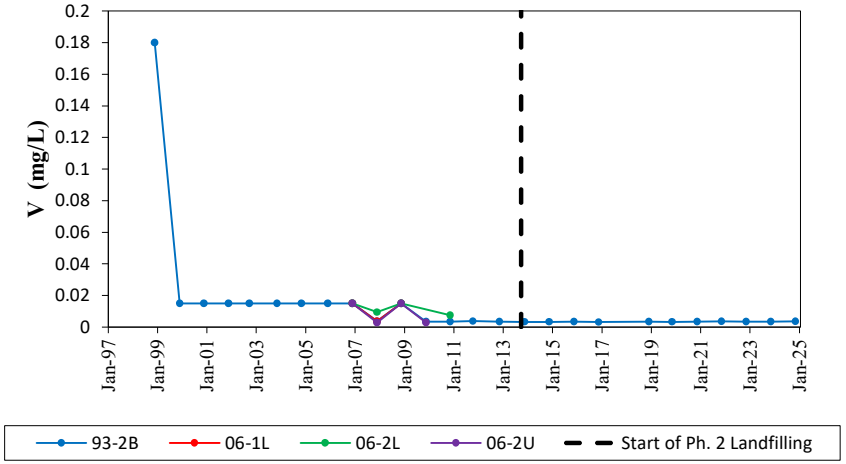
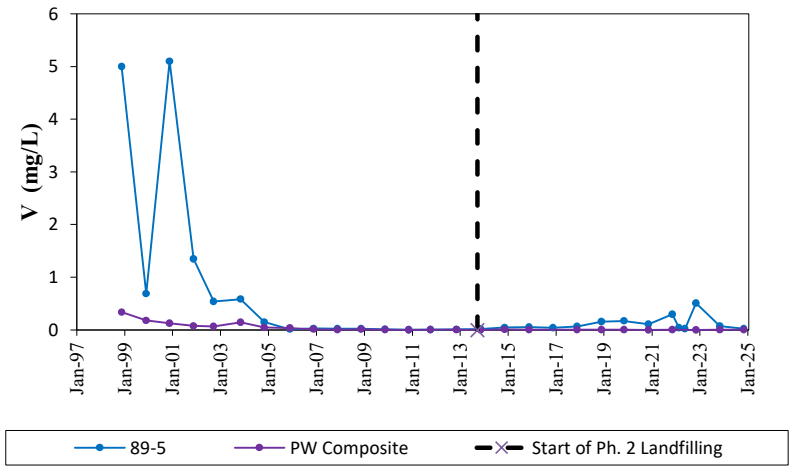


Figure 11M: Vanadium Concentration in Groundwater and Seepage from Spring S1

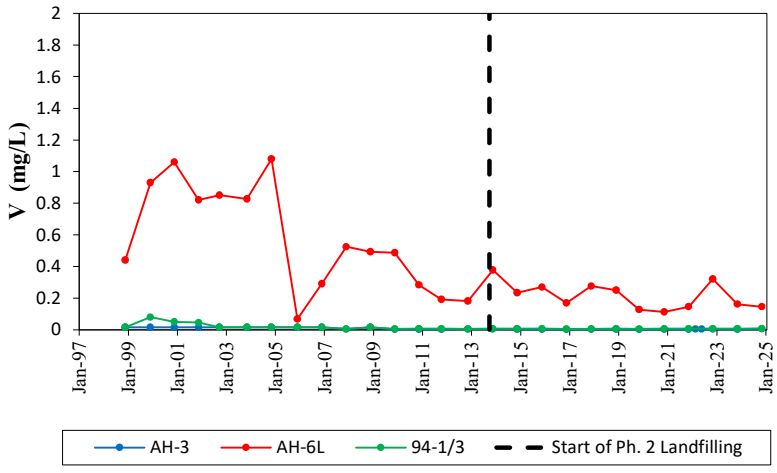
Upgradient of Landfill



South Edge of Landfill



Downgradient of Landfill



Near the Shoreline

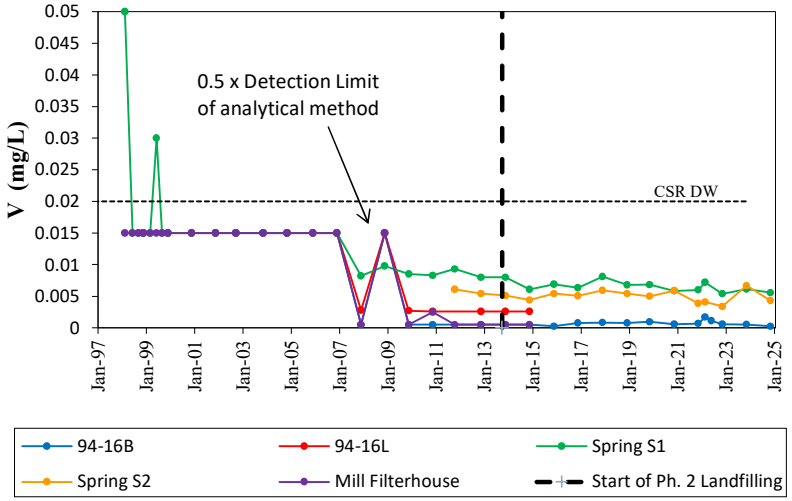
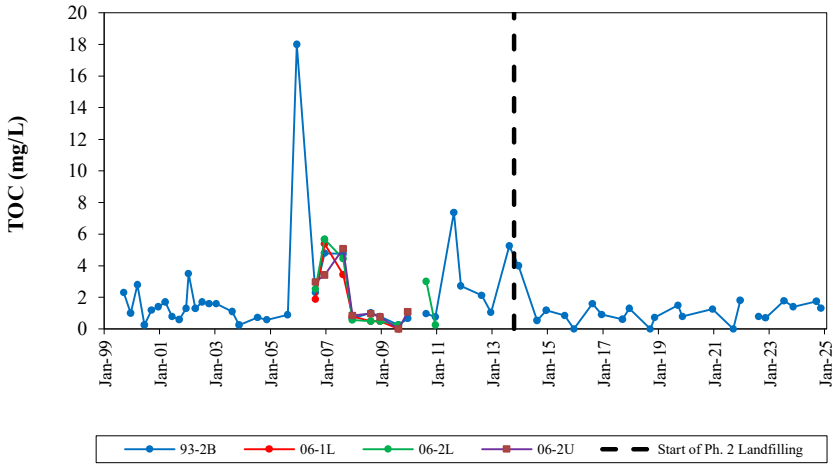
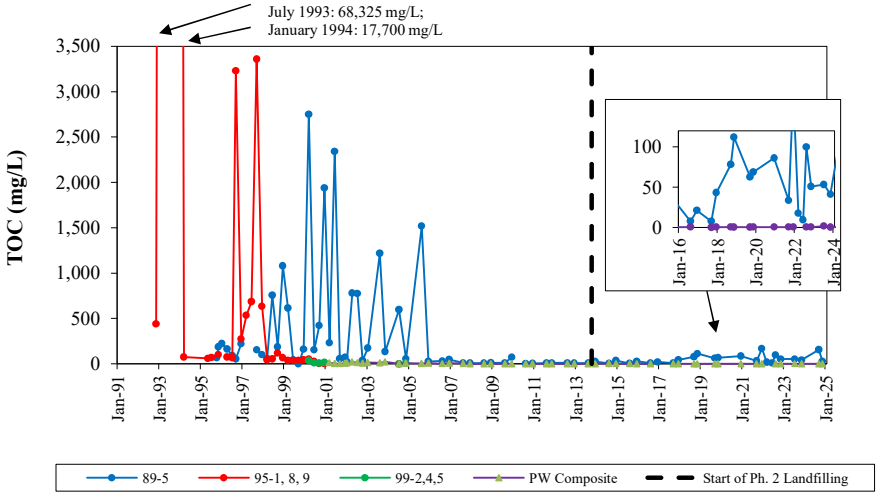


Figure 11N: Total Organic Carbon (TOC) Concentration in Groundwater and Seepage from Springs S1 and S2

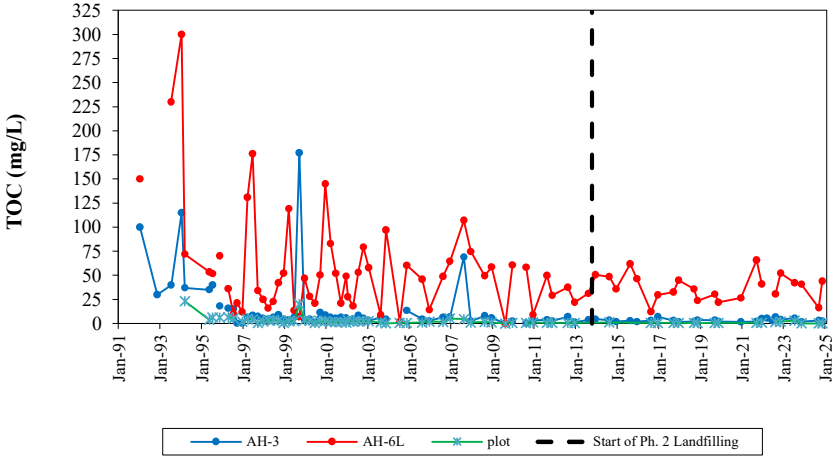
Upgradient of Landfill



South Edge of Landfill



Downgradient of Landfill



Near Shoreline

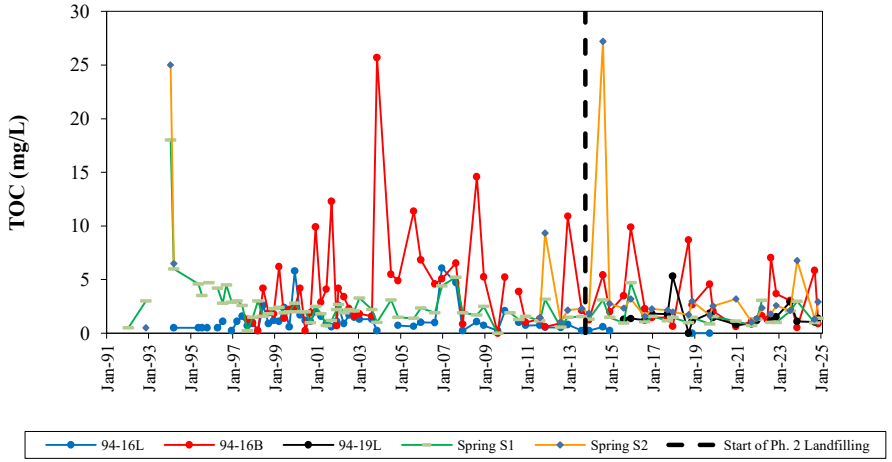
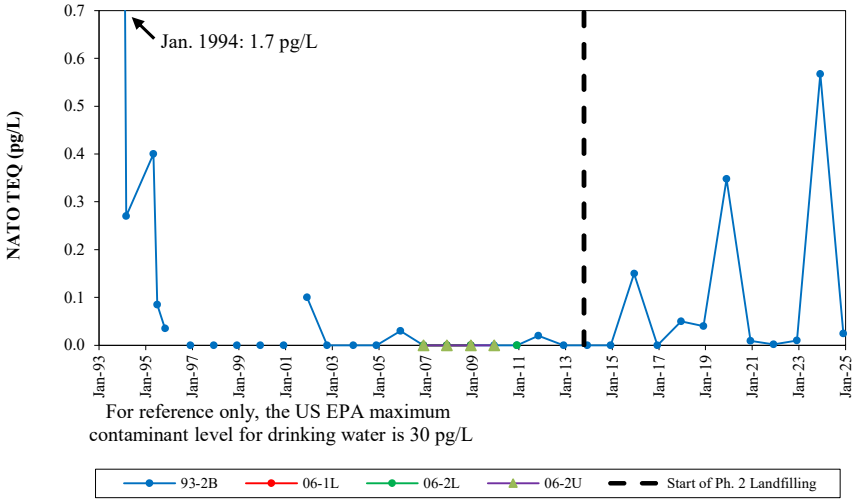
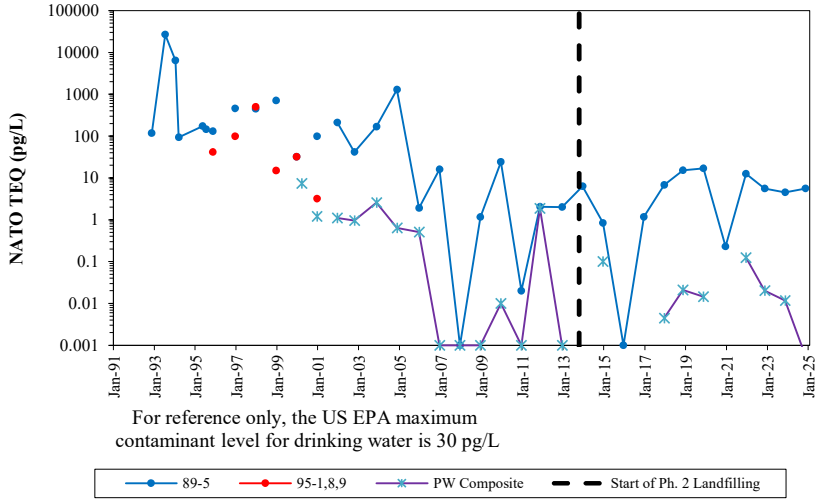


Figure 11O : Total Dioxin and Furan Concentration, as Toxic Equivelency (TEQ) above the detection limit*

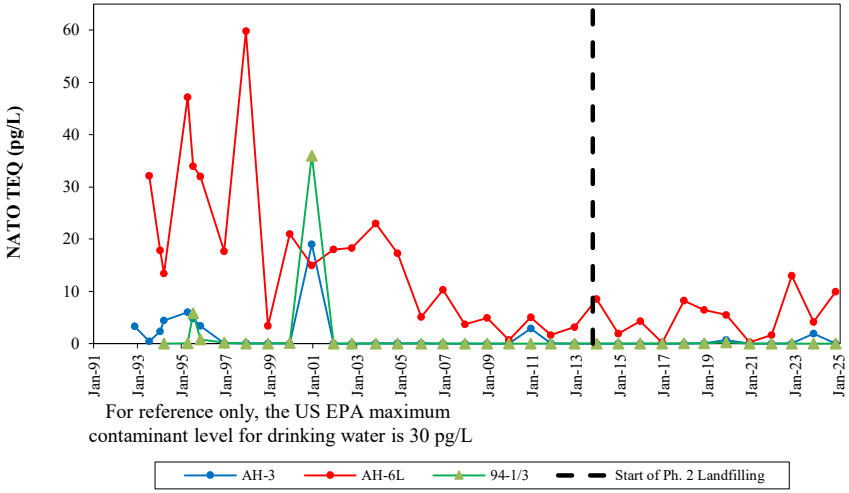
Upgradient of Landfill



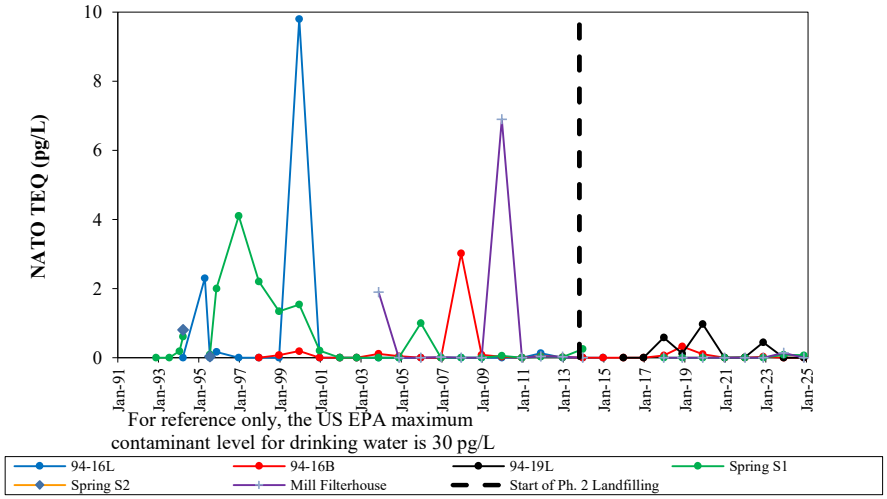
South Edge of Landfill



Downgradient of Landfill



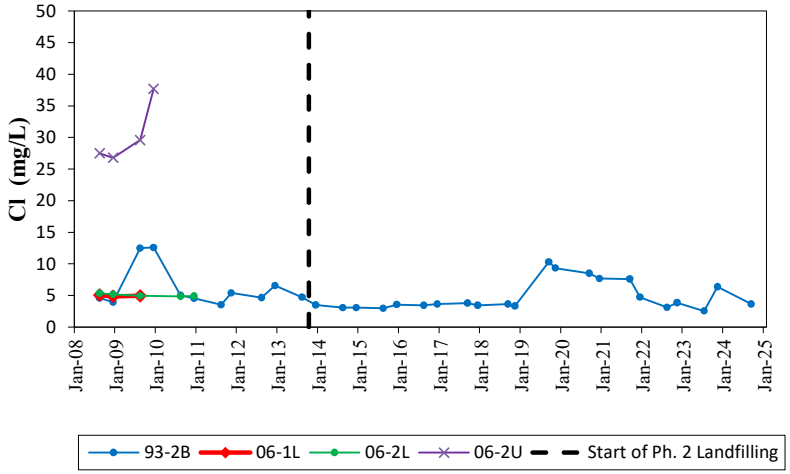
Near Shoreline



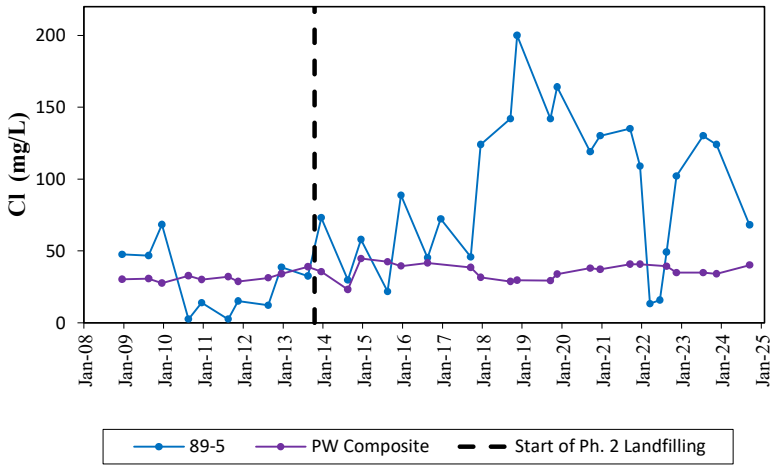
* For these plots non-detection is assumed to equal 0 pg/L TEQ dioxins and furans, or 0.001 pg/L where the axis is logarithmic.

Figure 11P: Chloride Concentration in Groundwater and Seepage from Springs S1 and S2

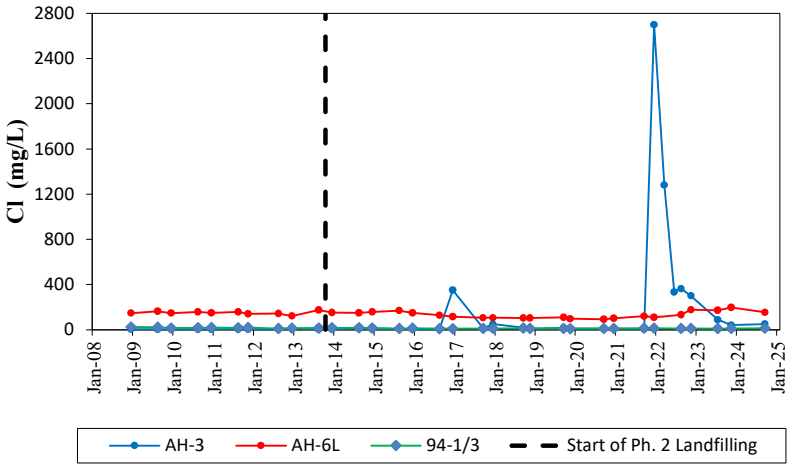
Upgradient of Landfill



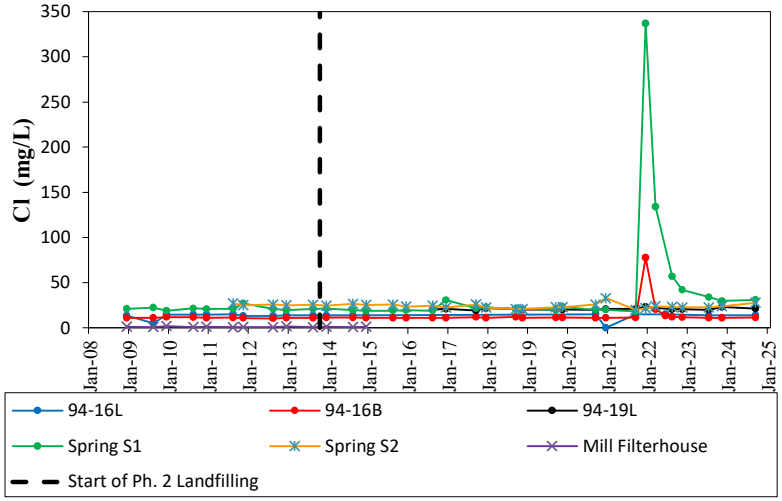
South Edge of Landfill



Downgradient of Landfill



Near the Shoreline



APPENDIX A

Landfill Permit

BRITISH COLUMBIA

December 19, 2018

Tracking Number: 377092
Authorization Number: 4565

REGISTERED MAIL

Phil Lum, Environmental Manager
Catalyst Paper Corporation and Catalyst Pulp Operations Limited doing business as Catalyst Paper, General Partnership
2nd Floor
3600 Lysander Lane
Richmond BC V7B 1C3

Dear Permittee:

Re: Ambient Air Monitoring Requirements under Permit PR-4565

Pursuant to Section 16 of the *Environmental Management Act* and Section 2.14 and 3.2.1 of permit PR-4565 (Permit), the Permit is hereby amended as follows:

1. The Permittee must continue carrying out the ambient air quality monitoring program as follows:

Station ID and Address	Location	Monitored Parameters
James Thompson School 6388 Sutherland Drive, Powell River BC	49.8893°N, 124.5624°W	PM_{10} (Particulate matter with an effective diameter of 10 µm or less)

2. After a period of one year of PM_{10} continuous monitoring at the above noted location, and pursuant to Subsection 2.14 of the Permit, the Permittee must include, as part of the annual report required in Subsection 3.7 (5) of the Permit and in a form and manner acceptable to the Director, an evaluation of air quality in the adjacent community of Wildwood. Based on the report information, the Director may make a decision on the continuation of PM_{10} monitoring.

3. The PM_{10} monitoring must be acceptable to the Director using technology that has been approved in British Columbia as FEM (Federal Equivalency Method).

4. All data collection and communication technology must be acceptable to the Director. The Permittee must upgrade the existing data acquisition system at the James Thomson School station by December 31, 2018, and must consult with the appropriate Ministry staff to ensure that the data acquisition system is adequate to support the monitoring technology discussed in point 3 above.

Environmental Protection Division
Ministry of Environment and Climate Change Strategy
2080-A Labieux Road.
Nanaimo BC V9T 6J9
Authorizations - South Region
Telephone: (250) 751-3100
Facsimile: (250) 751-3103

5. The Permittee must maintain the monitoring instrumentation in a manner acceptable to the Director including timely preventative maintenance and repairs to minimize instrument down-time such that a minimum of 75% data capture (1-hour averages) is achieved for each quarter of the calendar year. The types and data communication capabilities of instruments used must be consistent with the current Ministry standards.
6. The Permittee must be responsible for all costs associated with monitoring instruments supply, operation, maintenance, repair and replacement, shelter, power supply, data logging, communications, and the Ministry's audit program and routine instrument calibrations at the monitoring sites.
7. The Permittee must notify the Director if the collected monitoring data indicate deterioration of the ambient air quality in the adjacent area of Wildwood, by submission of a notification email to EnviornmentalCompliance@gov.bc.ca. A summary of the data evaluation must form part of the Annual Report required in Section 3.7 of the Permit.
8. The Permittee must utilize a qualified contractor to perform calibrations and maintenance on all ambient air quality analyzer(s) according to manufacturer specifications.
9. Reporting of monitoring data shall be according to Subsection 3.7 of the Permit as applicable. Additionally, operator logs must be submitted electronically at the end of each month and all calibration results must be reported electronically within one week of completion. Operator logs and calibration results must be submitted to the Routine Environmental Reporting Mailbox (EnvAuthorizationsReporting@gov.bc.ca) and to the Ministry's Knowledge Management Branch, as instructed by the Director.

All other requirements in the Permit remain in full effect.

This decision 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 Permittee. It is also the responsibility of the Permittee to ensure that all activities conducted under this decision are carried out with regard to the rights of third parties, and comply with other applicable legislation that may be in force.

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) thirty days from the date that notice of this decision is given. For further information, please contact the Environmental Appeal Board at (250) 387-3464.

If you have any questions please contact Safwan Soufan at (250) 751-3175, safwan.soufan@gov.bc.ca. or Tarek Ayache at (778) 974-4918, tarek.ayache@gov.bc.ca

Yours truly,

Andrea Doll
for Director, *Environmental Management Act*

March 19, 2015

Tracking Number: 337672
Authorization Number: 4565

REGISTERED MAIL

Catalyst Paper Corporation and Catalyst Pulp Operations Limited doing business as Catalyst Paper, General Partnership
2nd Floor
3600 Lysander Lane
Richmond BC V7B 1C3

Dear Permittee:

Enclosed is Amended Permit 4565 issued under the provisions of the *Environmental Management Act*. Your attention is respectfully directed to the terms and conditions outlined in the permit. An annual fee will be determined according to the Permit Fees Regulation.

This permit 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 permittee. This permit is issued pursuant to the provisions of the *Environmental Management Act* to ensure compliance with Section 120(3) of that statute, which makes it an offence to discharge waste, from a prescribed industry or activity, without proper authorization. It is also the responsibility of the permittee 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.

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.

Ministry of Environment
Environmental Protection Division
Suite 200,10470 - 152 Street
Surrey, BC V3R 0Y3
Coast Region
Telephone: (604) 582-5200
Facsimile: (604) 584-9751

Administration of this permit will be carried out by staff from the Coast Region. Plans, data and reports pertinent to the permit are to be submitted to the Regional Director, Environmental Protection, at Ministry of Environment, Regional Operations, Coast Region, Suite 200,10470 - 152 Street, Surrey, BC V3R 0Y3.

Yours truly,

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

Enclosure

cc: Environment Canada

Sarah Barkowski, Catalyst Paper, General Partnership
5775 Ash Avenue, Powell River, BC V8A 4R3

MINISTRY OF ENVIRONMENT

PERMIT

4565

Under the Provisions of the Environmental Management Act

Catalyst Paper Corporation and Catalyst Pulp Operations Limited doing business as Catalyst Paper, General Partnership

2nd Floor
3600 Lysander Lane
Richmond BC V7B 1C3

is authorized to discharge refuse to the ground from a pulp and paper mill located at 5775 Ash Avenue, Powell River, British Columbia, subject to the terms and conditions listed below. Contravention of any of these conditions is a violation of the *Environmental Management Act* and may lead to prosecution.

This Permit supersedes and amends all previous versions of Permit 4565 issued under Part 2, Section 14 of the *Environmental Management Act*.

1. AUTHORIZED DISCHARGES

1.1 This section applies to the discharge of **REFUSE FROM A PULP AND PAPER MILL**. The site reference number for this discharge is E208453.

1.1.1 The maximum authorized rate of discharge is 25,000 m^3/year (uncompacted volume). The total volume of refuse discharged to the landfill must not exceed 620,000 m^3 (uncompacted volume).

1.1.2 The components of the refuse which may be discharged are restricted to:

Flyash
Spent bed sand
Waste asbestos
Miscellaneous mill waste, subject to Section 2.9, to a maximum of 3000 m^3/year (uncompacted volume)

Date issued: December 7, 1976
Date amended: March 19, 2015
(most recent)

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

1.1.3 The authorized works are a landfill operation including a 6.1 ha landfill with a 1.5 mm high density polyethylene liner, a leachate management system consisting of a leak detection system, leachate collection system, leachate pond, pumping and conveyance system, surface water diversion ditches, surface water infiltration pit, truck wash facility, and related appurtenances approximately located as shown on Site Plan A.

1.1.4 The authorized works must be complete and in operation while discharging.

1.1.5 The location of the facilities from which the discharge originates is L3088 (PID 015-890-333), L7212 (PID 004-781-821), L7213 (PID 004-781-856), L6071, Water L 6174, L6237A, L5922, L5923, L5924, L4071, L4072, L3437 (PID 015-875-121), L3090 (PID 015-890-325), L3091(PID 015-890-317), Lot A2, Ref. Plan 490, DL 3091 (PID 015-890-309), Part of Block 43 (PID 002-554-682), Block 44 (PID 010-264-469), and Block 46 (PID 002-560-194) of DL 450, Plan 8096, New Westminster District.

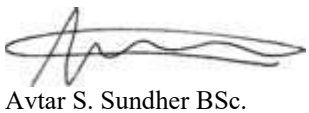
The location of the point of discharge is Part of Block 55, DL 450, Plan 8096 (PID 010-237-321) and Part of Block 48, DL 1901A, Plan 8096 (PID 010-267-361), Group 1, New Westminster District.

2. GENERAL REQUIREMENTS

2.1 Maintenance of Works and 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 permittee including, but not limited to, unauthorized fires arising from spontaneous combustion or other causes, or detection of leachate on the property, the permittee 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.

Date issued: December 7, 1976
Date amended: March 19, 2015
(most recent)



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

2.2 **Maintenance of Contiguous Point - Part of Block 55 and Block 48 with Block 43**

The permittee must ensure that Part of Block 55, DL 450 (PID 010-267-361),Plan 8096, Group 1, NWD, and Block 48, DL19O1A, Plan 8096, Group 1, NWD remain contiguous with Block 43, DL 450, Plan 8096, NWD. The permittee must notify the Regional Director, Environmental Protection in writing at least 90 days prior to any subdivision of Part of Block 55, DL 450 (PID 010-267-361), Plan 8096, Group 1, NWD or Block 48, DL19O1A, Plan 8096, Group 1, NWD or Block 43, DL 450, Plan 8096, NWD.

2.3 **Bypasses**

Any bypass of the authorized works is prohibited unless the approval of the Director is obtained and confirmed in writing.

2.4 **Process Modifications**

The Director must be notified prior to implementing changes to any process that may adversely affect the quality and/or quantity of the discharge. Despite notification under this section, permitted levels must not be exceeded.

2.5 **Site Security**

The permittee must maintain an inner and an outer perimeter fence and secure access to the landfill authorized in Section 1.1 during the active life of the landfill. A sign, acceptable to the Director, including the name and contact information of the owner/operator must be posted at the entrance of the landfill.

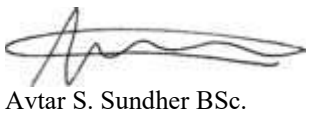
2.6 **Buffer Zone**

The permittee must maintain a minimum 50 metre buffer zone between the perimeter of the discharge area and the closest property boundary.

2.7 **Inspections**

Once each calendar quarter, the permittee must inspect the area between the landfill and the inner perimeter fence, determine the extent of any noted problem, and notify the Regional Director, Environmental Protection of any evidence of potential environmental impact on adjacent properties. Records of inspections must be kept available on-site.

Date issued: December 7, 1976
Date amended: March 19, 2015
(most recent)



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

2.8 Waste Reduction and Alternate Disposal

The Ministry of Environment has adopted a policy to reduce, recycle and reuse solid wastes. The permittee is encouraged to segregate for recycling and reuse, where possible, materials destined for disposal at this site.

The permittee must, on an ongoing basis, explore options for the use of flyash and spent bed sand as products, in order to reduce or eliminate the need for landfilling of those materials. Details of the efforts made must be included in the Annual Report required in Section 3.7.

2.9 Miscellaneous Mill Waste

The miscellaneous mill waste authorized for discharge in Section 1.1.2 is restricted to dirt contaminated wood chips/hog fuel, dirt contaminated pulp/paper, road sweepings, asphalt and concrete rubble from minor demolition/construction projects, elemental sulphur, spent activated carbon, lime, lime mud and lime dregs, effluent treatment solids, boiler feedwater treatment resins, and fibreglass. The discharge of any other types of miscellaneous mill wastes must be approved by the Director.

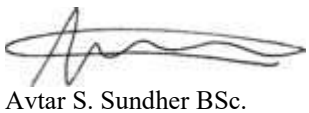
2.10 Refuse Deposition and Prohibitions

All refuse must be placed in a manner determined by a qualified professional registered in British Columbia and as specified in the Design and Operating Plan required in Section 2.15. Refuse must be discharged in lifts not exceeding 3 metres in height. Each lift must cover all of the available disposal area prior to the commencement of the next lift. Miscellaneous mill waste as defined in Section 2.9 must be discharged in layers, compacted to the smallest practical volume (where applicable), and covered with a minimum of 0.3 metres of suitable cover material at least once every thirty days.

The overall profile from the outer edge of the landfill must not exceed a maximum side slope of 1:3 (vertical:horizontal) at any time. The final side slopes of the landfill cover must not exceed a slope of 1:3 (vertical:horizontal). The working face must be confined to the smallest practical area. The permittee must take all necessary actions to minimize dust from the landfill, including but not limited to, more frequent application of cover material.

Waste asbestos authorized for discharge in section 1.1.2 must be managed in accordance with the Hazardous Waste Regulation.

Date issued: December 7, 1976
Date amended: March 19, 2015
(most recent)



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Coast Region

The discharge of the following waste is prohibited:

- Wood waste contaminated with wood preserving chemicals, or wastes that contain chemicals that penetrate the high density polyethylene liner.
- Hazardous waste, other than waste asbestos, as defined in the Hazardous Waste Regulation.

2.11 Leachate Management

The permittee must, to the satisfaction of the Director, take measures to minimize leachate generation, including but not limited to, providing effective surface water diversion and optimizing the amount of water used in producing the flyash slurry. Measures taken, their effectiveness and any proposed measures must be detailed in the Annual Report required in Section 3.7.

The leachate detection and collection works must be maintained in accordance with an approach designed by a qualified professional registered in British Columbia.

The leachate containment pond (active pond) must be lined to prevent infiltration of leachate into groundwater. A minimum level of 1.0 metres of freeboard must be maintained in the leachate containment pond to prevent overflow from the pond to the environment. Freeboard is defined as the difference in elevation between the contained liquid level and the top of the berm structure at its lowest point.

2.12 Slope Stability and Settlement

The permittee must retain a qualified professional registered in British Columbia to design a slope stability and settlement monitoring program, to the satisfaction of the Director, for the landfill authorized in Section 1.1. Areas of primary focus must include, but are not limited to:

- Slope stability of the south-east slope of the Phase 1 portion of the landfill.
- Settlement across the base of the Phase 2 portion of the landfill.

The details of the monitoring program must be included in the Design and Operating Plan required in Section 2.15. Monitoring results must form part of the Annual Report required in Section 3.7.

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Date amended: March 19, 2015
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2.13 Fugitive Particulate Emission

The permittee must control fugitive particulate emissions generated from the property. Should the Director have reasonable grounds to believe that fugitive particulate emissions cause pollution outside the property boundary; the permittee must undertake additional measures and/or curtail operations to control the emissions.

2.14 Ambient Air Quality

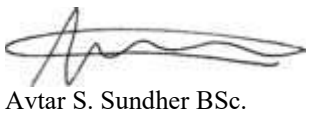
The permittee must evaluate ambient air quality (PM10 and PM2.5) in the adjacent community of Wildwood with respect to the applicable criteria on a continual basis. The Regional Director, Environmental Protection, must be notified if the data indicates deterioration of the ambient air quality. A summary of the evaluation must form part of the Annual Report required in Section 3.7.

2.15 Design and Operating Plan

The permittee must operate the landfill authorized in Section 1.1 in accordance with a design and operating plan certified by a qualified professional registered in British Columbia and acceptable to the Director. The plan must include, but is not limited to, information regarding:

- a fill plan 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,
- a contingency to close the landfill, including funding, prior to the design capacity being achieved should early closure be required for any reason,
- estimated elevations at 5 year intervals,
- cell size, progressive closure and intermediate and final cover details including types of materials used,
- details of how refuse will be managed/discharged,
- surface water diversion measures,
- measures to minimize leachate generation,
- leachate detection/collection maintenance details,
- operational hours, internal road network and truck wash facility,
- measures to prevent dust,
- contingencies to address slope stability issues and settlement issues should monitoring indicate slope movement or settling,

Date issued: December 7, 1976
Date amended: March 19, 2015
(most recent)



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- contingencies to address environmental protection issues, including leachate management, settlement and slope stability, in the event of an earthquake or any other emergency, and
- estimated closure/post-closure costs and details of how the closure/post-closure funds will be accrued.

The permittee must review the plan on an annual basis to determine if changes are required. Any revisions to the plan, certified by a qualified professional registered in British Columbia, must be submitted to the Regional Director, Environmental Protection, as part of the Annual Report required in Section 3.7.

2.16 Environmental Assessment Report

In addition to the annual report specified in Section 3.5, the permittee must submit an Environmental Assessment Report of the landfill authorized in Section 1.1 (acceptable to the Director) by December 31, 2019 and every five years thereafter for the life of the landfill. Terms of reference for each update must be submitted to the Regional Director, Environmental Protection at least 6 months prior to the due date. The Environmental Assessment Report must include, but is not limited to:

1. a review of all monitoring data collected since the date that discharge to the expanded landfill commenced (in the area outside of the existing mini-landfill),

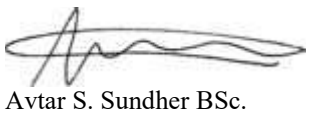
2. a comparison to baseline data which is established, by a qualified professional registered in British Columbia, as being representative of conditions prior to the date when discharge to the expanded landfill commenced,

3. an evaluation of the overall impact on the receiving environment as a result of the expanded landfill operation, and

4. an evaluation of the effectiveness of the monitoring program.

Data for this assessment must include, but is not limited to, monitoring data from groundwater wells, recovery wells, surface water, leachate, dustfall canisters, and ambient monitoring stations as well as slope stability and settlement measurements.

Date issued: December 7, 1976
Date amended: March 19, 2015
(most recent)



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The Environmental Assessment Report and subsequent updates must be conducted by a qualified professional registered in British Columbia. Actions recommended as a result of these updates must be incorporated into the Design and Operating Plan required in Section 2.15.

If any Environmental Assessment Report, or any other information, indicates that there is an adverse impact on the receiving environment, the Director may at his/her discretion require that the permittee immediately cease the discharge authorized in Section 1.1.1 and close the landfill in accordance with the Closure Plan required in Section 2.18.

2.17 Completed Areas of the Landfill

The permittee must apply final cover to any area of the landfill which will not receive any further refuse. The design, method, and frequency of application of final cover must be determined by a qualified professional registered in British Columbia and be acceptable to the Director.

2.18 Closure Plan

The permittee must submit a closure plan for the landfill authorized in Section 1.1 at least 6 months prior to the closure of the landfill to the Director for approval. The plan must be prepared by a qualified professional registered in British Columbia and include information regarding:

- estimated total waste volume and the closure date,
- 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, drainage layers details and information on topsoil, vegetative cover and erosion prevention controls,
- proposed end use of the property after closure,
- a post-closure monitoring program for groundwater, surface water, erosion and settlement 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.

Date issued: December 7, 1976
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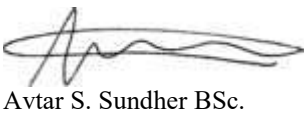
(most recent)



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2.19 Closure/Post-Closure Funding

The permittee must record a financial obligation on its books, consistent with relevant provisions of the current Canadian Generally Accepted Accounting Principles ("GAAP"), to reflect future closure and other regulatory requirements related to the landfill. The estimated cost of meeting these requirements, and how this cost is determined, must be included in the Design and Operating Plan required in Section 2.15.

The estimated cost of future closure, post closure and other regulatory requirements must be reviewed annually and reflected appropriately in the accrued obligation in the permittee's books. The outcome of this annual review must be reported to the Regional Director, Environmental Protection, as part of the Annual Report required in Section 3.7.

2.20 Site Decommissioning

In accordance with the *Environmental Management Act* and its regulations, the permittee must submit a site profile to the Regional Director, Environmental Protection, not less than 10 days prior to decommissioning the landfill authorized in Section1.1.

2.21 Legal Survey

Upon closure of the landfill, the permittee must register a covenant or other legal notification (acceptable to the Director) that the property described in Section 1.1.5 was used for the purpose of refuse disposal as a charge against the title of the property. The Regional Director, Environmental Protection, must be notified of the covenant or legal notification.

3. MONITORING AND REPORTING REQUIREMENTS

3.1 Discharge Monitoring

3.1.1 Leachate Monitoring

The permittee must obtain representative grab samples of the leachate collected in the mini-landfill sump and from the expanded landfill and have the samples analyzed for the following parameters:

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Parameter	Frequency
pH	Semi-annually
Specific Conductivity	Semi-annually
Biochemical Oxygen Demand	Semi-annually
Dioxins & Furans	Annually

The leakage detection/collection system must be monitored semi-annually for the presence of flow. If any groundwater is collected by the leakage detection/collection system, the collected groundwater must also be analyzed for the same parameters and on the same frequency as listed above.

Proper care must be taken in sampling, storing and transporting the samples to adequately control temperature and avoid contamination, breakage, etc.

3.1.2 Discharge Quantities

The permittee must record the types and volumes (uncompacted cubic metres) of refuse discharged to the landfill (excluding cover material).

3.2 Receiving Environment Monitoring

3.2.1 Dustfall Monitoring

In order to determine compliance with Section 2.13, the permittee must conduct an annual dustfall monitoring program, acceptable to the Director. The program must include a minimum of 4 dustfall sampling locations and one PM10 sampling location that take into consideration the horizontal and vertical aspects of the landfill.

3.2.2 Groundwater Monitoring

The permittee must maintain at least six groundwater monitoring wells and at least six groundwater recovery wells. The water collected in the groundwater pumping wells must be directed to the effluent treatment system. The exact design and location of the groundwater monitoring and groundwater recovery wells must be designed by a qualified professional registered in British Columbia and be acceptable to the Director.

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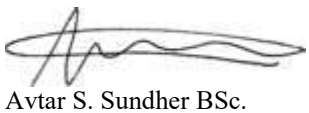
Date amended: March 19, 2015
(most recent)



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3.2.3 **Analysis**

For the groundwater monitoring wells specified in Section 3.2.2, the permittee must obtain grab samples for each of the wells and other monitoring sites and analyze the samples for the following contaminants at the specified frequencies.

The abbreviations used in this section are described in Section 3.2.4.

Sample Location	Dry Weather (July / August)	Wet Weather (November / December)
93-2b	GP	GP, D.MET, D&F
89-5	GP	GP, D.MET, D&F, S
AH-3	GP	GP, CP*, D.MET, D&F
AH-6L	GP	GP, CP*, D.MET, D&F
94-1/3	GP	GP, D.MET, D&F
94-19L	GP	GP, D.MET, D&F
94-16B	GP	GP, D.MET, D&F
PW-COMP	GP	GP, D.MET, D&F, S
SPRING-S1	GP, D&F	GP, D&F, T.MET
SPRING-S2	GP, D&F	GP, D&F, T.MET

* If, it appears that the concentration of this contaminant is increasing significantly, based on data collected; the Director may amend the permit to add additional sampling locations.

Sample Location	Dry Weather (July / August)	Wet Weather (November / December)
Snapshot * Monitoring	Field Indicator Parameters	N/A
All Ground-water Wells	Manual Water Levels	Manual Water Levels

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Sample Location	Monthly Monitoring
All Active Recovery Wells	Flow, pH, Conductivity

* Snapshot Monitoring Wells: upgradient well 93-2B and downgradient wells 94-16 (11m, 38 m, regional and bedrock flow zones), 94-17 (regional and bedrock flow zones), 94-18 (38 m and regional flow zones), 94-19 (38 m, regional and bedrock flow zones)

3.2.4 Abbreviations - Analysis

GP (General Parameters)	total suspended solids, total dissolved solids, alkalinity, sulphate and total organic carbon
CP	chlorinated / non- chlorinated phenols
T.MET	total metals
D.MET	dissolved metals
D&F	dioxins and furans
S	sulphide
Field Indicator parameters	pH, specific conductivity, alkalinity, sulphate (lab test), dissolved oxygen, temperature and redox

3.3 Polychlorinated Biphenyls (PCBs) Monitoring

PCB monitoring is no longer required, however, if new information regarding the presence of PCBs comes to the attention of the Director, the permit may be amended to require resumption of PCB monitoring.

3.4 Monitoring at the Mill Filterhouse

Sampling and monitoring at the Mill Filterhouse location is no longer required, however, if new information regarding the quality of the water at the Mill Filterhouse comes to the attention of the Director, the permit may be amended to require resumption of sampling and monitoring at that location.

Date issued: December 7, 1976
Date amended: March 19, 2015
(most recent)

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3.5 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 www.env.gov.bc.ca/epd/wamr/labsys/lab_meth_manual.html.

3.6 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/epd/wamr/labsys/lab_meth_manual.html.

3.7 Reporting

An annual report must be prepared by the permittee and submitted to the Regional Director, Environmental Protection, by April 30 of the following year. The report must include, but is not limited to the following items:

1. remaining design capacity of the landfill (uncompacted cubic metres) and an estimation of closure date at the current rate of disposal,
2. efforts made in waste reduction and alternate disposal as required in Section 2.8,
3. measures taken to minimize leachate generation, their effectiveness and any proposed measures as required in Section 2.11,
4. an evaluation of slope stability and settlement monitoring as required in Section 2.12,
5. an evaluation of air quality (PM10 and PM2.5) in the adjacent community of Wildwood as required in Section 2.14,
6. any changes to the design and operating plan as required in Section 2.15,
7. estimated costs of closure and post-closure activities as required in Section 2.19,
8. monitoring data as required in Section 3.1.1,

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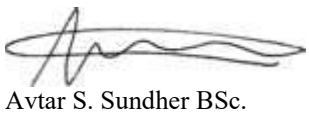
Date amended: March 19, 2015
(most recent)



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9. types and volumes (uncompacted cubic metres) of refuse discharged as required in Section 3.1.2,
10. details of the proposed dustfall monitoring program for the coming year.

The following information must be posted on the company web page at the specified frequencies:

1. Ambient Monitoring Data Graphs and Hivol Monitoring Results – within 30 calendar days of the end of each month;
2. Dustfall Monitoring Results – within 30 calendar days following receipt of the data; and
3. Groundwater Update Report, Annual Report (Section 3.5) – within 30 calendar days of receipt of the report.

Date issued: December 7, 1976
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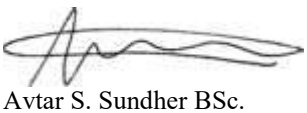
(most recent)



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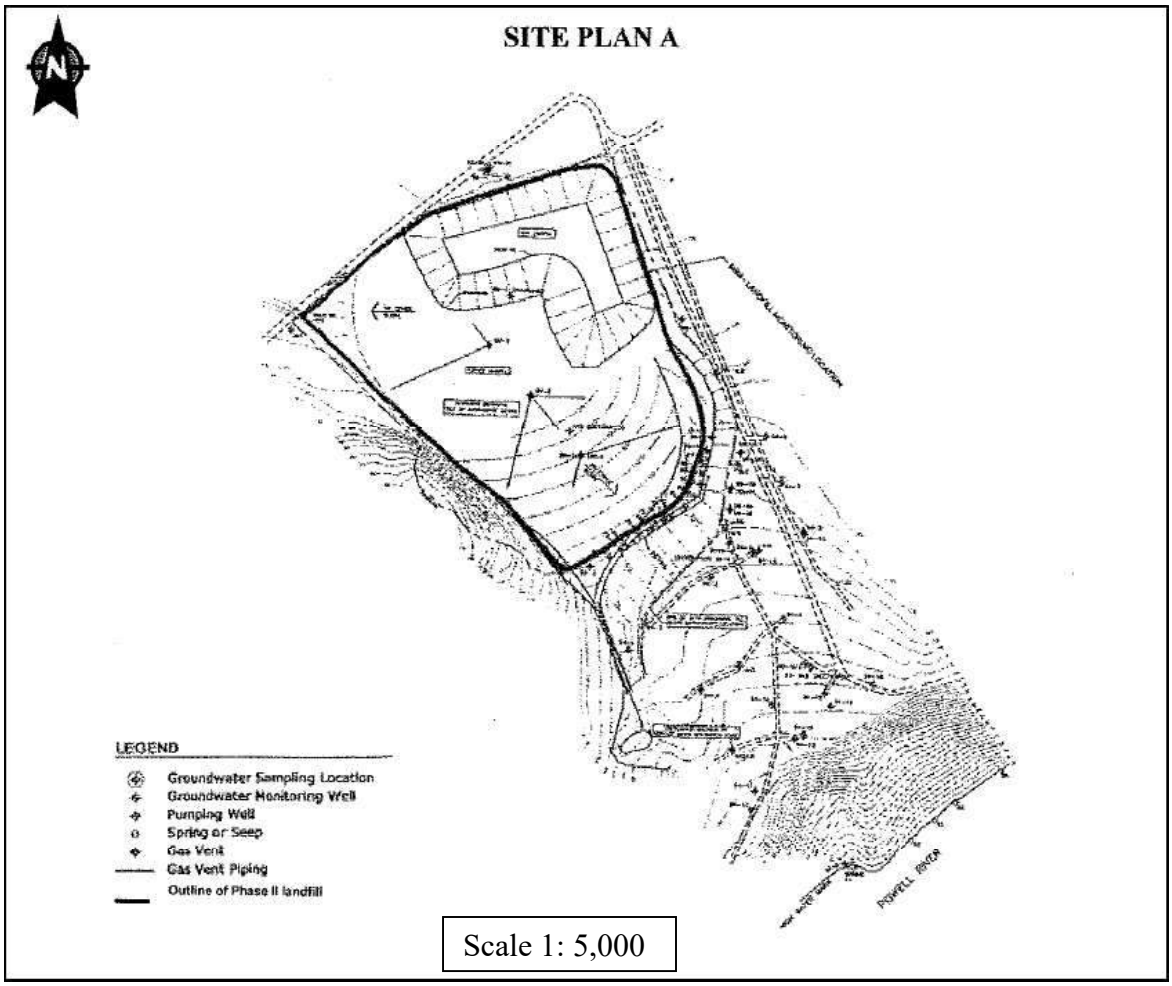
SITE PLAN A



Date issued: December 7, 1976
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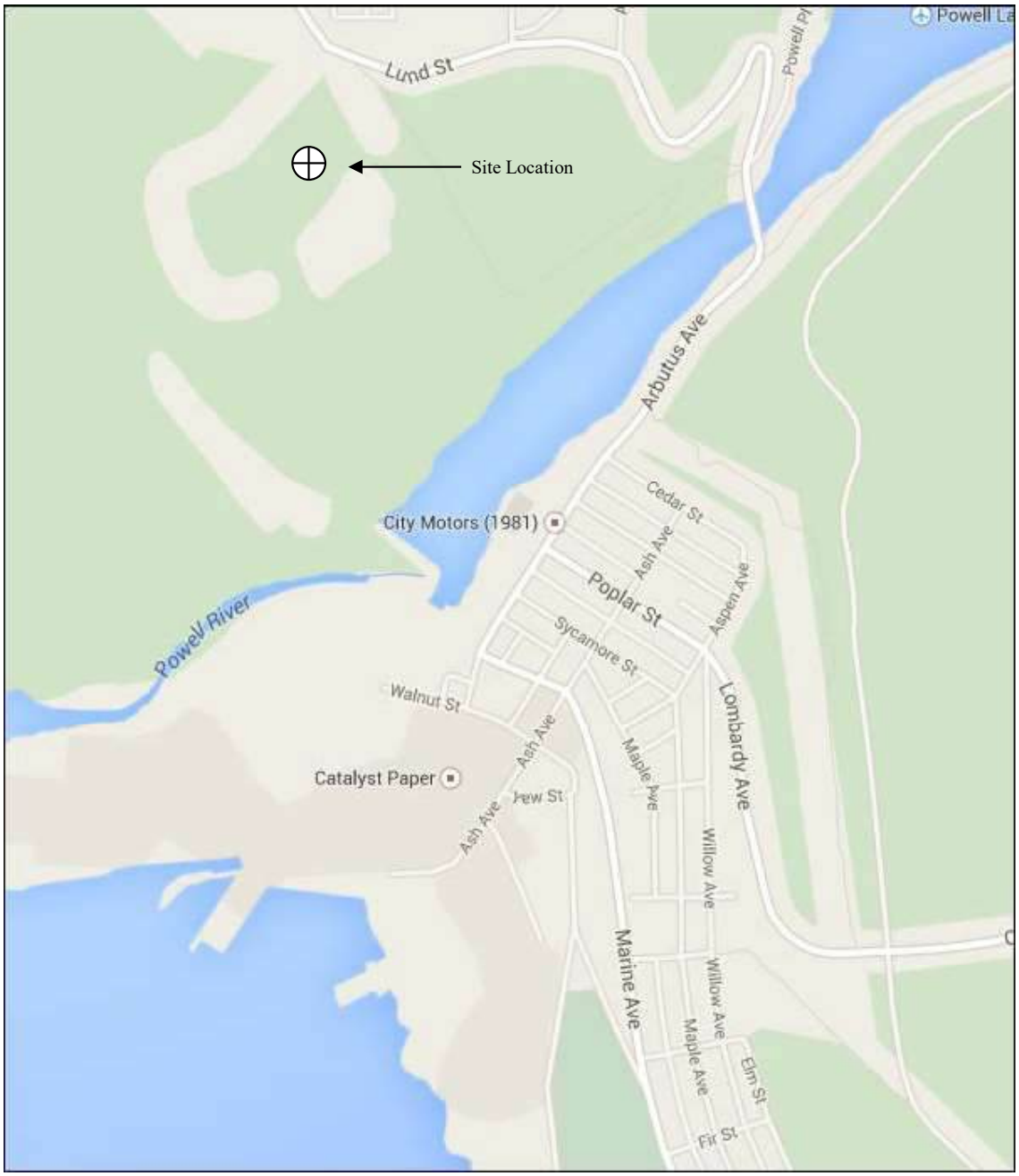
LOCATION MAP



Lat / Long 49.883234, -124.558023

Date issued: December 7, 1976
Date amended: March 19, 2015
(most recent)

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APPENDIX B

Landfill Volume and Capacity Survey and Historical Discharge Record

Table B-1: Historical Refuse Types and Quantities Discharged to the Mini-Landfill

Year	Fly Ash (m^3)	Misc. (m^3)	Asbestos (m^3)	Total (m^3)	Cumulative Total (m^3)	Miscellaneous Category Comments
1996	10,433	2,714.9	0	13,148	13,148	2,325 m^3 dregs
1997	9,974	3131	0	13,105	26,253	2,666 m^3 dregs, 405 m^3 PB 19, 46 m^3 Cont. chips, 11 m^3 lime, 3 m^3 vent dust
1998	6,792	6,346.9	0	13,139	39,392	2,890 m^3 bottom ash, 2,876 m^3 dregs, 543 m^3 No. 1 SP from 1997 stockpile, 23 m^3 sand/carbon from No. 1 S.P., 10 m^3 sulfur, 3 m^3 lime, 1m^3 PB 19 sewer cleaning, 1 m^3 activated carbon
1999	1,277	3,306	0	13,151	52,543	2,857 m^3 dregs, 362 m^3 bed sand, 87 m^3 lime from Kraft shut
2000	2	2,934	0	2,936	55,479	2,799 m^3 lime/dregs, 68 m^3 bed sand, 20 m^3 lime from recaust, 12 m^3 lime bricks, 12 m^3 black liquor contaminated cement blocks, 12 m^3 sand/gravel/hog, 9 m^3 lime from bioreactor inlet, 2 m^3 gravel
2001	0	3,344	0	3,344	58,823	3,342 m^3 lime/dregs, 2 m^3 lime from precip
2002	24	108	0	132	58,955	46 m^3 contaminated soil, 32 m^3 lime dregs, 23 m^3 chips/hog/rocks, 7 m^3 demolition debris
2003	63	20	0	83	59,038	12 m^3 asphalt/gravel mix, 8 m^3 wood/gravel mix
2004	315	82	0	397	59,435	63 m^3 bed sand, 12 m^3 contaminated pulp, 5 m^3 biosolids, 2 m^3 activated carbon
2005	196	80	0	276	59,711	24 m^3 cement, 12 m^3 bed sand, 11 m^3 contaminated pulp, 10 m^3 ion exchange resin, 10 m^3 boiler debris, 9 m^3 sand blast sand, 2 m^3 insulation, 1.6 m^3 secondary sludge
2006	6,601	1,043	66	7,710	67,421	689 m^3 contaminated hogfuel, 328 m^3 concrete and demolition debris, 14 m^3 cover sand, 12 m^3 road sweepings
2007	13,644	13	64	13,721	81,142	12 m^3 concrete rubble, 1 m^3 spent activated alumina
2008	14,548	1130	103	15,781	96,923	226 m^3 pulp, sludge, sand, gravel, ash from mill outage, 307 m^3 lime dregs, 364 m^3 lime mud, 226 m^3 soil and rubble, 8 m^3 sludge
2009	12,952	9	48	13,009	109,933	8 m^3 bed sand, 1 m^3 spent activated carbon
2010	11,505	92	40	11,637	121,570	91.7 m^3 calcined lime
2011	12,775	2,438	112	15,325	136,895	1800 m^3 concrete/dirt from lime kiln demo, 434 m^3 reject sand, 134 m^3 accepts sand, 55 m^3 lime kiln brick, 16 m^3 lime dregs
2012	17,013	1,783	40	18,836	155,731	1673 m^3 reject sand, 96 m^3 rock and dirt, 14 m^3 accepts sand
2013*	16,933	2,698	9	19,640	175,371	2,698 m^3 bed sand
2014	15,956	2,092	9	18,057	193,428	48 m^3 pulp, sludge, sand, gravel, ash from mill outage, 1 m^3 section of penstock pipe, 2,027 m^3 sand, 16 m^3 contaminated hog
2015	15,794	2,035	2	17,831	211,259	1,784 m^3 sand, 248 m^3 minor demolition debris, 3 m^3 section of penstock pipe
2016	17,250	2,435	277	19,962	231,221	2,339 m^3 sand, 96 m^3 clinkers
2017	16,075	1,728	32	17,835	249,056	1,728 m^3 sand
2018	15,223	3,426	24	18,673	267,729	3,362 m^3 sand, 64 m^3 minor demolition debris and knots
2019	15,570	4,018	32	19,620	287,349	4,018 m^3 sand
2020	9,740	2,685	0	12,425	299,774	2,685 m^3 sand
2021	13,752	4,248	40	18,040	317,814	4,248 m^3 sand
2022	90	81	0	171	317,985	70 m^3 sand, 7 m^3 ground calcium carbonate, 4 m^3 clay
2023	0	5,375	0	5,375	323,360	75 m^3 sand, 5300 m^3 contaminated hog fuel/pulp
2024	0	4	0	4	323,364	4 m^3 miscellaneous waste from demo activities

*Note: From October 2013 onwards waste is discharged into the Mini-landfill and the Phase 2 Landfill

CATALYST PAPER - POWELL RIVER DIVISION
WILDWOOD LANDFILL

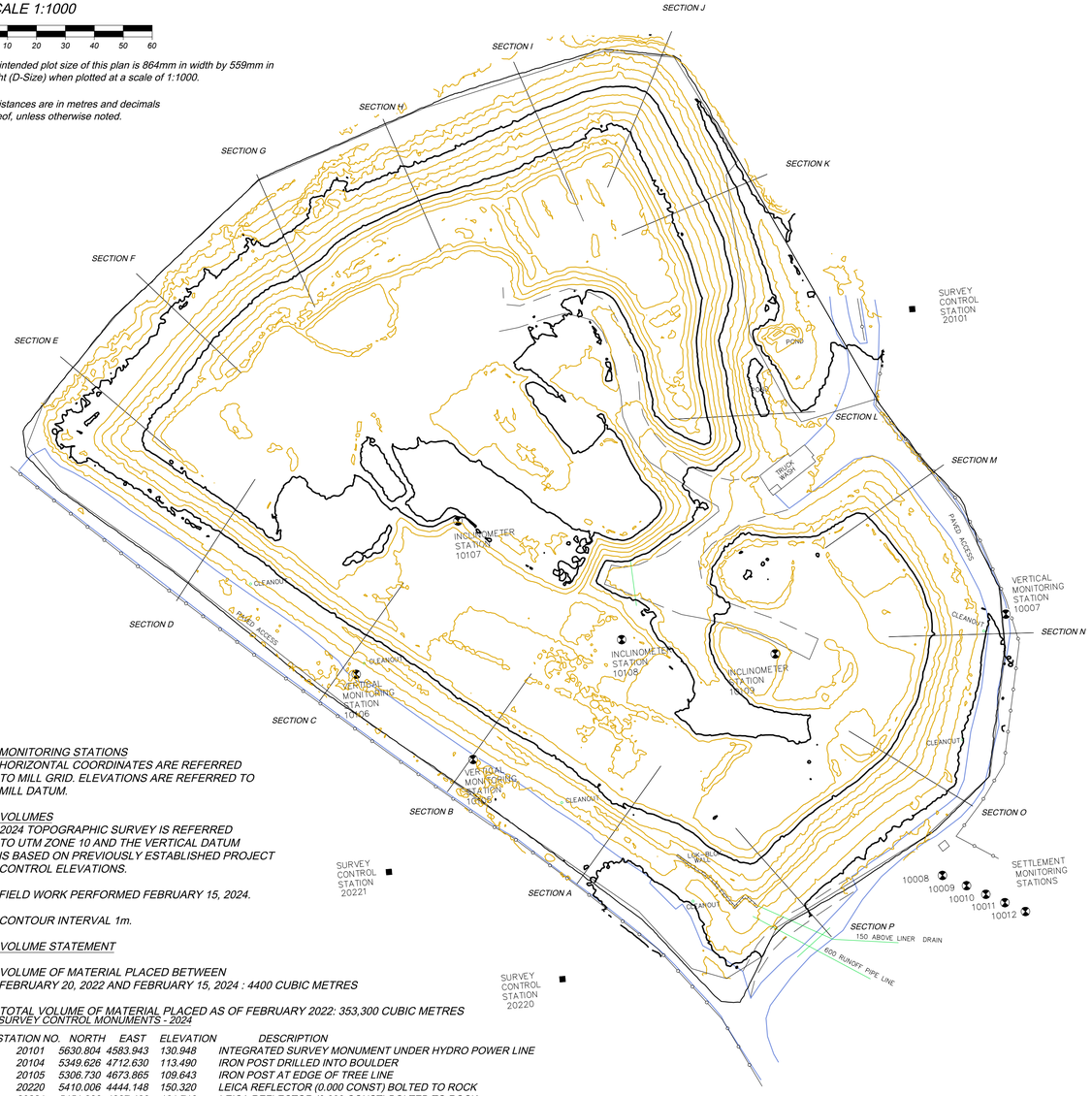
ANNUAL QUANTITY AND SETTLEMENT MONITORING
FEBRUARY, 2024

SCALE 1:1000

0 10 20 30 40 50 60

The intended plot size of this plan is 864mm in width by 559mm in height (D-Size) when plotted at a scale of 1:1000.

All distances are in metres and decimals thereof, unless otherwise noted.



MONITORING STATIONS
HORIZONTAL COORDINATES ARE REFERRED TO MILL GRID. ELEVATIONS ARE REFERRED TO MILL DATUM.

VOLUMES
2024 TOPOGRAPHIC SURVEY IS REFERRED TO UTM ZONE 10 AND THE VERTICAL DATUM IS BASED ON PREVIOUSLY ESTABLISHED PROJECT CONTROL ELEVATIONS.

FIELD WORK PERFORMED FEBRUARY 15, 2024.

CONTOUR INTERVAL 1m.

VOLUME STATEMENT

VOLUME OF MATERIAL PLACED BETWEEN FEBRUARY 20, 2022 AND FEBRUARY 15, 2024 : 4400 CUBIC METRES

TOTAL VOLUME OF MATERIAL PLACED AS OF FEBRUARY 2022: 353,300 CUBIC METRES

SURVEY CONTROL MONUMENTS - 2024

STATION NO.	NORTH	EAST	ELEVATION	DESCRIPTION
20101	5630.804	4583.943	130.948	INTEGRATED SURVEY MONUMENT UNDER HYDRO POWER LINE
20104	5349.626	4712.630	113.490	IRON POST DRILLED INTO BOULDER
20105	5306.730	4673.865	109.643	IRON POST AT EDGE OF TREE LINE
20220	5410.006	4444.148	150.320	LEICA REFLECTOR (0.000 CONST) BOLTED TO ROCK
20221	5451.933	4387.430	161.710	LEICA REFLECTOR (0.000 CONST) BOLTED TO ROCK

MONITORING - 2022 vs. 2024

		MONITORING 2022				MONITORING 2024				DELTA'S		
	STATION	NORTHING	EASTING	ELEVATION		NORTHING	EASTING	ELEVATION		dN	dE	dZ
VERTICAL MONITORING STATIONS	10105	5488.279	4419.684	134.415		5488.287	4419.670	134.413		-	-	-0.002
	10106	5520.960	4381.835	135.151		5520.970	4381.814	135.150		-	-	-0.001
	10007	5523.040	4607.435	133.246		5523.034	4607.416	133.239		-	-	-0.007
SETTLEMENT MONITORING STATIONS	10008	5434.825	4578.078	131.088		5434.824	4578.071	131.081		0	-0.01	-0.007
	10009	5430.595	4586.084	127.743		5430.593	4586.075	127.737		0	0.01	-0.006
	10010	5427.072	4592.497	125.625		5427.072	4592.491	125.627		0	-0.01	0.002
	10011	5423.651	4598.810	123.661		5423.652	4598.813	123.674		0	0	0.013
	10012	5420.008	4605.649	121.196		5420.011	4605.639	121.186		0	-0.01	-0.010

POLARIS Land Surveying Inc.

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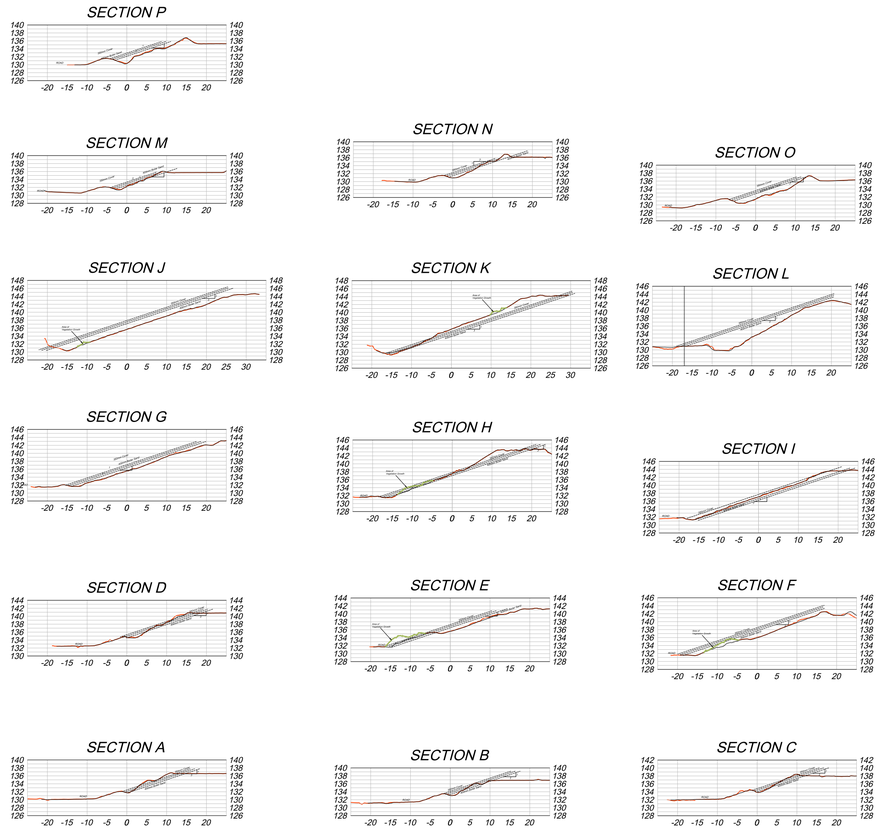
Powell River: (604) 485-4203
PR@plsi.ca
www.plsi.ca

CROSS SECTIONS
2024

SCALE 1:750

0 10 20 30 40

VERTICAL EXAGGERATION OF 1:100 ON ALL CROSS SECTIONS.



LEGEND

Denotes surface surveyed 2024-02-15

Denotes surface surveyed 2022-02-20

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Date: 2024-04-23
File: 0946-12
Drawing: 0946-12_UTM
Layout: D-Size

APPENDIX C

Leachate Analysis, Current and Historical Monitoring Data

Table C-1
Results of Leachate Analyses
Phase 1 Landfill, Mini-Landfill, and Phase 2 Landfill

Parameter	Units	CSR Groundwater Standards		Phase 1 Landfill Leachate†		Mini-Landfill Leachate						Phase 2 Landfill Leachate				Mini Landfill/Truck-Wash Pond
		FAW	DW	Max Historical	2013	2015	2016	2019	2020	2023 - Jan	2023 - Nov	2015	2019	2020	2023 - Nov	2023 - Jan
General Parameters																
Field pH	s.u.			12.1	7.22	9.8*	12.0*	11.6*	11.1*	9.42	9.73	11.6*	12.3*	12.12*	11.96	10.1
Specific Conductance	uS/cm			16700	1219	12300*	14800	7150*	8460*	17300	16,374	15620*	17150*	13290*	12,332	6770
Total Organic Carbon (TOC)	mg/L			68,325	6.9	-	-	39	50.9	107	132	-	12.9	13.9	16.0	47.5
Total Dissolved Solids (TDS)	mg/L			-	788	-	10000	4040	7340	10200	10400	-	363	6470	7560	4370
Hardness (CaCO3)	mg/L			-	180	112	140	60.3	72.1	87.2	79.5	101	59.5	70.2	27.0	66.6
Alkalinity-Tot (CaCO3)	mg/L			15,400	575	-	674	653	882	1200	1350	-	769	754	883	668
Chloride	mg/L	1500	250	88.7	33	**2820**	**4700**	**1560**	**3370**	**4310**	**4780**	**11900**	**2920**	**2890**	**2960**	**1350**
Nitrate (as N)	mg/L	400	10	-	0.42	-	<0.1	<0.25	<0.500	<0.500	<0.500	-	<0.50	<0.500	0.731	<0.250
Nitrite (as N)	mg/L	1-2[a]	1	-	0.016	-	<0.1	-	<0.100	<0.100	<0.100	-	-	0.157	0.308	0.0729
Sulfate	mg/L	1280-4290[b]	500	**2,890**	109	-	**549**	232	**529**	467	429	-	**680**	**735**	**890**	412
Other																
Total Chlorinated Phenols	mg/L			0.122	<0.0010	-	-	-	-	-	-	-	-	-	-	-
Dioxins and Furans (TEQ)[e]	pg/L			26,706	6.32	0	0	0	0	-	-	0	0	0	-	-
Dissolved Metals																
Aluminum	mg/L		9.5	**40.8**	0.0086	1.390	1.060	3.400	2.62	0.898	1.23	**9.86**	**9.62**	9.2	6.62	3.53
Antimony	mg/L	0.09	0.006	-	0.0004	<0.0020	<0.001	0.00105	0.00405	**0.00992**	**0.00845**	0.0027	0.0039	0.00489	0.00567	0.00558
Arsenic	mg/L	0.05	0.01	**0.098**	0.00069	0.0092	0.002	0.00487	**0.0253**	**0.0283**	**0.0316**	**0.0877**	**0.208**	**0.321**	**0.470**	**0.0894**
Barium	mg/L	10	1	-	0.028	0.01	0.02	0.00816	0.00966	0.0188	0.0170	0.089	0.039	0.0316	0.0117	0.0159
Beryllium	mg/L	0.0015	0.008	-	<0.0010	<0.00040	<0.0002	<0.00050	<0.00100	<0.000200	<0.000200	<0.00040	<0.0010	<0.00100	<0.000100	<0.000100
Bismuth	mg/L			-	<0.20	<0.010	<0.0050	<0.00025	<0.000500	<0.000500	<0.000500	<0.010	<0.00050	<0.000500	<0.000250	<0.000250
Boron	mg/L	12	5	-	0.54	1.030	1.410	1.19	1.3	1.82	2.26	0.867	1.36	1.77	2.17	0.909
Cadmium	mg/L	0.0005-0.015[b]	0.005	0.00080	<0.00010	<0.00010	<0.0004	<0.000025	<0.000100	<0.0000600	<0.0000500	0.00042	<0.00040	<0.000325	<0.000220	<0.000180
Calcium	mg/L			85.2	50.1	27.6	28	16.7	23.6	20.2	18.6	40.2	23.5	27.6	10.3	23.4
Chromium	mg/L	0.01-0.09[c]	0.05	**0.3990**	<0.0010	<0.0040	<0.002	0.00479	0.0107	0.0257	0.0316	**0.3630**	**0.5380**	**0.324**	**0.200**	0.0142
Cobalt	mg/L	0.04	0.001	-	<0.00020	0.00022	0.0003	<0.00050	<0.00100	<0.00100	<0.00100	0.00032	<0.0010	<0.00100	<0.00050	<0.00050
Copper	mg/L	0.02-0.09[b]	1.5	0.095	<0.0010	<0.010	0.001	<0.0010	<0.00200	0.0112	0.00746	0.022	0.0363	0.0262	0.0288	0.0156
Iron	mg/L		6.5	**26.1**	2.020	0.016	<0.02	<0.050	<0.100	<0.100	0.161	0.044	<0.10	<0.100	<0.050	0.307
Lead	mg/L	0.04-0.16[b]	0.01	-	<0.00010	<0.0010	<0.0005	<0.00025	<0.000500	<0.000500	<0.000500	<0.0010	<0.00050	<0.000500	<0.000250	0.00231
Lithium	mg/L		0.008	-	<0.010	**0.026**	**0.037**	**0.0165**	**0.0211**	**0.0314**	**0.0295**	<0.010	<0.010	**0.0159**	**0.0122**	**0.0104**
Magnesium	mg/L			-	13.4	10.4	18	4.52	3.21	8.92	8.02	0.14	0.202	0.304	0.314	1.98
Manganese	mg/L		1.5	**2.14**	1.060	0.080	0.084	0.0656	0.0335	0.0359	0.0581	0.011	0.0046	0.00239	0.00209	0.0819
Molybdenum	mg/L	10	0.25	-	0.0011	**0.2990**	0.0734	0.088	**0.483**	**0.254**	**0.287**	**1.860**	**1.820**	**1.47**	**1.57**	**0.570**
Nickel	mg/L	0.25-1.5[b]	0.08	-	<0.0010	<0.010	0.012	0.0093	0.0143	0.0262	0.0332	<0.010	<0.0050	<0.00500	<0.00250	0.0124
Phosphorus	mg/L			-	-	-	-	-	-	-	11.2	-	-	-	0.412	-
Potassium	mg/L			-	7.6	715	1290	684	1010	1420	1330	7570	1870	1380	1310	483
Rubidium	mg/L			-	-	-	-	-	-	-	2.06	-	-	-	3.07	-
Selenium	mg/L	0.02	0.01	-	<0.0020	<0.0060	**0.146**	**0.0151**	**0.0138**	**0.0212**	0.00403	**0.0283**	**0.027**	**0.0207**	**0.0236**	0.00508
Silicon	mg/L			-	10.50	2.84	2.54	5.99	6.46	1.61	1.69	8.60	16.40	22.6	18.9	13.3
Silver	mg/L	0.0005-0.015[b]	0.02	-	<0.000020	<0.00010	<0.0001	<0.000050	<0.000100	<0.000100	<0.000100	<0.00010	<0.00010	<0.000100	<0.000050	0.000078
Sodium	mg/L		200[d]	**2,680**	**387**	**1610**	**3000**	**1460**	**2100**	**2990**	**2970**	**2220**	**2310**	**1840**	**1840**	**1110**
Strontium	mg/L			-	1.10	0.242	0.271	0.136	0.238	0.254	0.248	0.591	0.28	0.286	0.0776	0.154
Sulfur	mg/L			-	-	626	338	598	270	537	452	333	333	288	318	174
Thallium	mg/L	0.003		-	<0.00020	<0.00010	<0.00005	<0.000050	<0.000100	<0.000100	<0.000100	<0.00010	<0.00010	<0.000100	<0.000050	<0.000050
Thorium	mg/L			-	-	-	-	-	-	-	<0.00100	-	-	-	<0.00050	-
Tin	mg/L		2.5	-	<0.00020	<0.0010	0.0008	0.00164	0.00766	0.0143	0.0122	<0.0010	<0.0010	<0.00100	<0.00050	0.00188
Titanium	mg/L	1		37.6	0.015	0.084	0.13	0.118	0.248	0.648	0.874	<0.010	<0.0033	<0.00300	0.00326	0.0355
Tungsten	mg/L		0.003	-	-	-	-	-	-	-	**0.406**	-	-	-	**0.489**	-
Uranium	mg/L	0.005	0.02	**0.032**	0.00241	<0.0040	<0.002	0.000693	0.000768	0.00182	0.00228	<0.0040	0.00116	0.000826	0.00327	0.00293
Vanadium	mg/L		0.02	**6.98**	**0.0216**	**0.0262**	**0.044**	**0.0465**	**0.0747**	**0.144**	**0.207**	**0.4630**	**0.8760**	**1.05**	**1.53**	**0.967**
Zinc	mg/L	0.075-2.4[b]	3	-	0.0052	<0.010	0.005	<0.0050	<0.0100	<0.0100	<0.0100	<0.010	<0.010	<0.0100	<0.0050	0.0057
Zirconium	mg/L			-	-	-	-	-	-	-	0.0126	-	-	-	<0.00100	-

Notes:
All concentrations are reported in mg/L unless otherwise noted.

CSR Standards = BC Contaminated Sites Regulation pursuant to the Environmental Management Act, [SBC 2003], Contaminated Sites Regulation, [B.C. Reg 375/96, O.C.1480/96 including amendments up to BC Reg. 133/2022, updated to 1 March 2023].

FAW = Freshwater Aquatic Life, DW = Drinking Water

1500 Indicates an exceedance of the CSR FAW standard

1500 Indicates an exceedance of the CSR DW standard

* Values are field data collected by Catalyst semi-annually on a different date than the rest of the analytes. Highest semi-annual value reported for each year.

† Phase 1 Leachate has been estimated as the maximum concentrations observed historically in groundwater from the recovery wells and 89-5 at the south edge of the landfill.

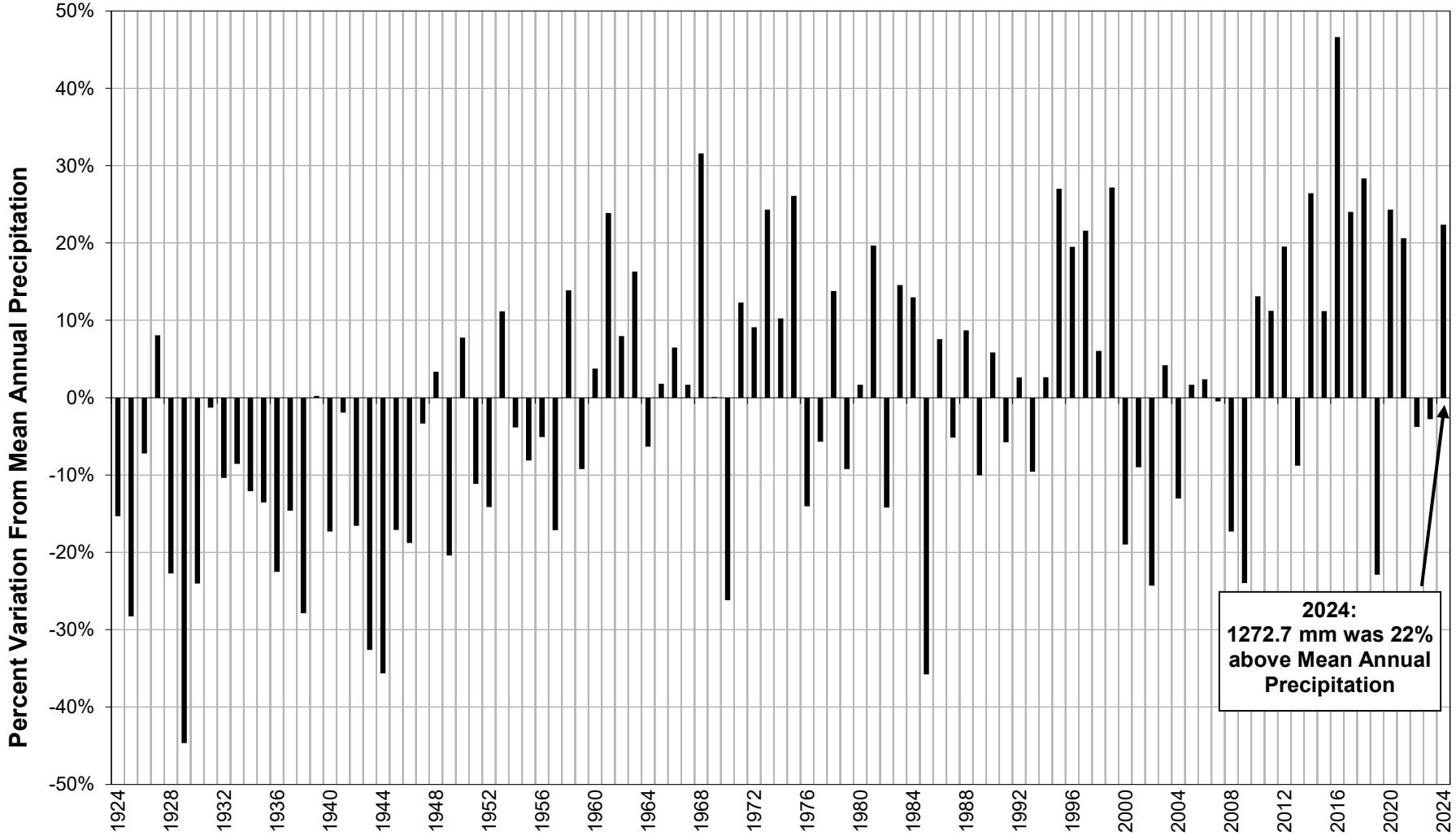
[a] Standard or Guideline is Chloride dependent.

[b] Indicates a hardness dependent calculated standard

[c] Indicates a valency-dependent standard;

[d] Indicates an aesthetic standard related to taste, odour, or colour, rather than health.

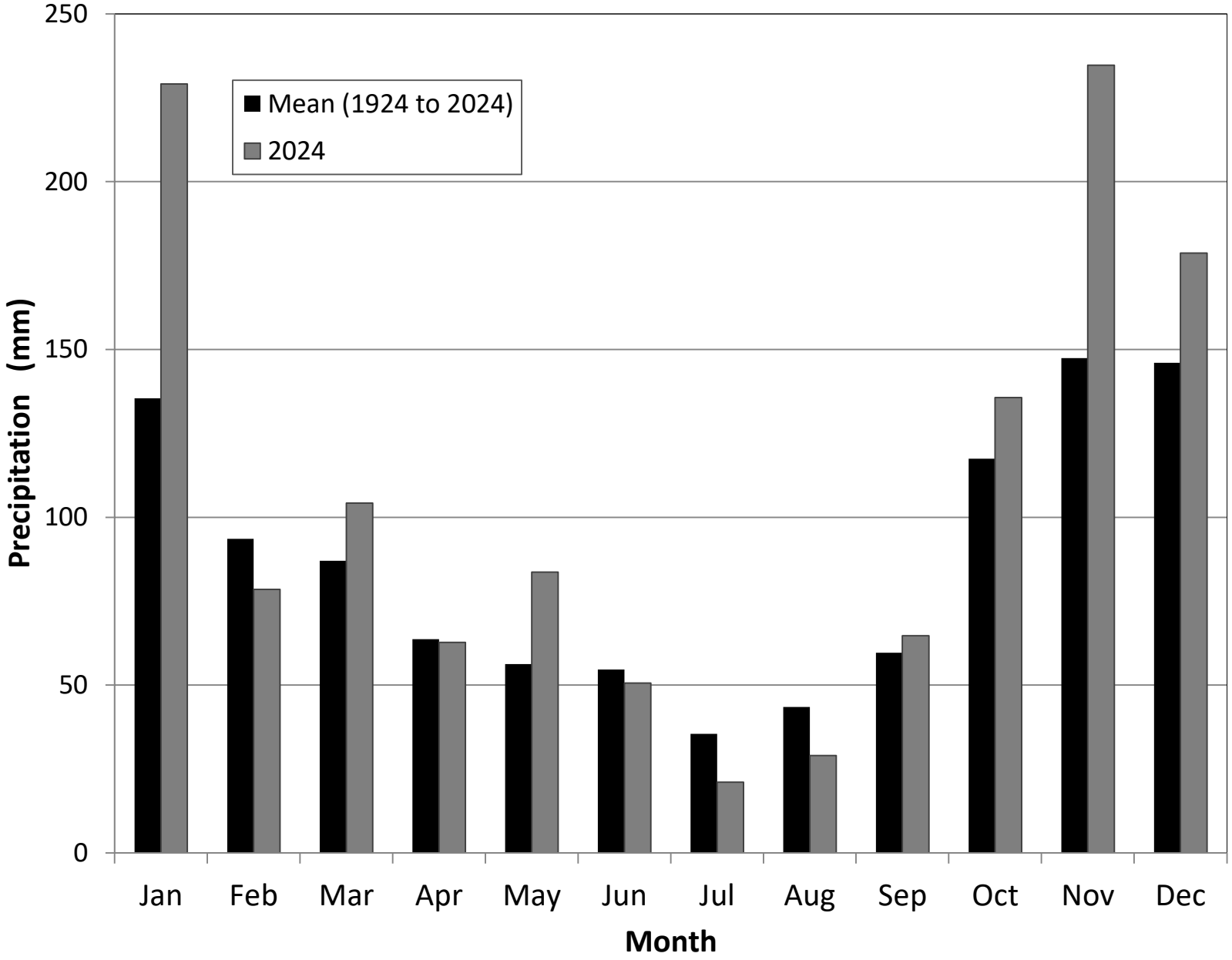
[e] The TEQ reported was calculated using the North Atlantic Treaty Organization (NATO) method where values less than the detection limit were set to zero.



Notes:
- Variation of 0% represents the mean annual precipitation recorded at Powell River of 1040 mm (calculated over the period 1924-2024).

Source: Environment Canada Weather Office <http://climate.weather.gc.ca/>

Figure C-2: Monthly Precipitation 2024 vs. Mean



APPENDIX D

Groundwater Sampling Forms

GROUNDWATER DEVELOPMENT AND SAMPLING DATA

☐ Development
☑ Purging/Sampling

Well No.: 89-5

Project Name:	Catalyst - Wildwood	**Project No.:**	CA0033349.0733//5010
Location:	Powell River, BC	**Date:**	09/08/2024
Weather:	Sunny **Temperature:** 22	**Completed By:**	Sean Sutherland
GPS Coordinates:	LAT: 49.882589 LON: -124.555145	**Reviewed By:**	

MONITORING WELL INFORMATION

Time of Measurement: 10:17

Depth to Product: N/A m Product Thickness: N/A m

Depth to Water (A): 23.188 m below Top of PVC

Depth to Bottom of Well (B): 26.8 m below Top of PVC

Diameter of Standpipe: 2.0 inch (51 mm)

Well Condition: Good

Tidally Influenced: ☐ Yes ☑ No

Pressure/Vacuum: ☐ Yes ☑ No

Well Headspace: _____ ppm

One Well Volume:

(B-A)*2.0 = 7.22 Litres - for a 51 mm (2.0 inch) diameter well

EQUIPMENT LIST

Pump
- ☐ Waterra
- ☑ Hydrolift
- ☐ Bailer (Type:)
- ☐ Peristaltic
- ☐ Submersible
- ☐ Bladder

Multimeter	Model:	YSI Pro Quatro (BUR000740)
pH/Temp Meter	Model:	YSI Pro Quatro (BUR000740)
Conductivity Meter	Model:	YSI Pro Quatro (BUR000740)
Dissolved Oxygen Meter	Model:	YSI Pro Quatro (BUR000740)
ORP (Redox) Meter	Model:	YSI Pro Quatro (BUR000740)
Organic Vapour Meter	Model:	

☐ Rental Equipment

☑ Field Bump

☑ Field Calibration

Pump Details:

Comments: Refer to Field Notes for Bump/Cal details

WELL DEVELOPMENT/PURGING

Purge Volume: Well. Vol. X _____ = _____ litres

Start: 10:21 Finish: _____

Avg. Flow Rate: _____ L/min.

Sample intake depth: 26 m

Time	Volume Removed (L)	Temp. (°C)	pH (Units)	Specific Cond. (µS/cm)	Redox (mV)	Diss. O_2* (mg/L)	Water Level (m)	Remarks
10:23	4	13.2	7.41	1,770	28.4	3.64		Tea-like colour
10:26	9	12.4	7.23	1,497	-17.2	1.33		
10:30	15	12.4	7.25	1,506	-41.6	1.41		
10:33	21	12.4	7.26	1,500	-58	2.46		Drying up @ 23L
13:55	25	15.9	7.22	1,512	85.9	0.71		Sampled after recharge / 25L

* Record DO in mg/L, not percentage

Sheen: ☐ Yes ☑ No If yes Sheen Type:

Comments:

Turbidity Start: 1 Turbidity End: 1

Range: 1 = clear, 10 = very silty

Analysis	Type	Container Size							Filtered	Preservatives
		40 mL	120 mL	250 mL	500 mL	1 L	2 L	4 L		
General	Plastic			1					No	
Nutrients	Glass		1						No	H2SO4

SCN/Unique Sample ID No: 23755-04 Field Duplicate: N/A

GROUNDWATER DEVELOPMENT AND SAMPLING DATA

☐ Development
☐ Purging/Sampling

Well No.: 93-2B

Project Name:	Catalyst - Wildwood	**Project No.:**	CA0033349.0733//5010
Location:	Powell River, BC	**Date:**	09/08/2024
Weather:	Sunny **Temperature:** 24	**Completed By:**	Sean Sutherland
GPS Coordinates:	LAT: 49.884493 LON: -124.558032	**Reviewed By:**	

MONITORING WELL INFORMATION

Time of Measurement: 14:25

Depth to Product: N/A m Product Thickness: N/A m

Depth to Water (A): 29.644 m below Top of PVC

Depth to Bottom of Well (B): 33 m below Top of PVC

Diameter of Standpipe: 2.0 inch (51 mm)

Well Condition: Good

Tidally Influenced: ☐ Yes ☑ No

Pressure/Vacuum: ☐ Yes ☑ No

Well Headspace: _____ ppm

One Well Volume:

(B-A)*2.0 = 6.71 Litres - for a 51 mm (2.0 inch) diameter well

EQUIPMENT LIST

Pump
- ☐ Waterra
- ☑ Hydrolift
- ☐ Bailer (Type:)
- ☐ Peristaltic
- ☐ Submersible
- ☐ Bladder

Multimeter	Model:	YSI Pro Quatro (BUR000740)
pH/Temp Meter	Model:	YSI Pro Quatro (BUR000740)
Conductivity Meter	Model:	YSI Pro Quatro (BUR000740)
Dissolved Oxygen Meter	Model:	YSI Pro Quatro (BUR000740)
ORP (Redox) Meter	Model:	YSI Pro Quatro (BUR000740)
Organic Vapour Meter	Model:	

☐ Rental Equipment

☑ Field Bump

☑ Field Calibration

Pump Details:

Comments: Refer to Field Notes for Bump/Cal details

WELL DEVELOPMENT/PURGING

Purge Volume: Well. Vol. X _____ = _____ litres

Start: _____ Finish: _____

Avg. Flow Rate: _____ L/min.

Sample intake depth: 32 m

Time	Volume Removed (L)	Temp. (°C)	pH (Units)	Specific Cond. (µS/cm)	Redox (mV)	Diss. O_2* (mg/L)	Water Level (m)	Remarks
14:26	5	11.1	7.24	191.3	60.6	10.9		Clear
14:29	12	10.4	6.79	172.6	104	8.46		
14:30	16	10.2	6.85	172	103.7	9.43		
14:32	21	10.3	6.83	172	102.9	7.96		Sampled after 21L

* Record DO in mg/L, not percentage

Sheen: ☐ Yes ☑ No If yes Sheen Type:

Turbidity Start: 1 Turbidity End: 1

Comments:

Range: 1 = clear, 10 = very silty

Analysis	Type	Container Size							Filtered	Preservatives
		40 mL	120 mL	250 mL	500 mL	1 L	2 L	4 L		
General	Plastic			1					No	
Nutrients	Glass		1						No	H2SO4

SCN/Unique Sample ID No: 23755-05 Field Duplicate: N/A

GROUNDWATER DEVELOPMENT AND SAMPLING DATA

☐ Development
☐ Purging/Sampling

Well No.: 94-1/3

Project Name:	Catalyst - Wildwood	**Project No.:**	CA0033347.0492//5010
Location:	Powell River, BC	**Date:**	09/10/2024
Weather:	Sunny **Temperature:** 16	**Completed By:**	Sean Sutherland
GPS Coordinates:	LAT: 49.881857 LON: -124.554459	**Reviewed By:**	

MONITORING WELL INFORMATION

Time of Measurement: 08:18
Depth to Product: N/A m Product Thickness: N/A m
Depth to Water (A): 36.295 m below Top of PVC
Depth to Bottom of Well (B): 44 m below Top of PVC
Diameter of Standpipe: 1 inch (25.4mm)
Well Condition: Good

Tidally Influenced: ☐ Yes ☑ No
Pressure/Vacuum: ☐ Yes ☑ No
Well Headspace: _____ ppm

One Well Volume:
(B-A)*0.5 = 3.85 Litres - for a 25.4 mm (1.0 inch) diameter well

EQUIPMENT LIST

Pump
☐ Waterra
☑ Hydrolift
☐ Bailer (Type:)
☐ Peristaltic
☐ Submersible
☐ Bladder

Multimeter	Model:	YSI Pro Quatro (BUR000740)
pH/Temp Meter	Model:	YSI Pro Quatro (BUR000740)
Conductivity Meter	Model:	YSI Pro Quatro (BUR000740)
Dissolved Oxygen Meter	Model:	YSI Pro Quatro (BUR000740)
ORP (Redox) Meter	Model:	YSI Pro Quatro (BUR000740)
Organic Vapour Meter	Model:	

☐ Rental Equipment
☑ Field Bump
☑ Field Calibration

Pump Details:

Comments: Refer to Field Notes for Bump/Cal details

WELL DEVELOPMENT/PURGING

Purge Volume: Well. Vol. X 3 = 12 litres
Start: _____ Finish: _____
Avg. Flow Rate: _____ L/min.
Sample intake depth: 44 m

Time	Volume Removed (L)	Temp. (°C)	pH (Units)	Specific Cond. (µS/cm)	Redox (mV)	Diss. O_2* (mg/L)	Water Level (m)	Remarks
08:46	5	11	6.52	239.7	41.6	5.31		Clear
08:48	7	10.9	6.65	208	21.5	4.74		
08:53	10	10.8	6.79	209.4	29.7	3.64		
08:55	16	10.7	6.81	208.8	34.9	4.13		Sampled after 18L

* Record DO in mg/L, not percentage

Sheen: ☐ Yes ☑ No If yes Sheen Type:
Turbidity Start: 1 Turbidity End: 1
Comments:
Range: 1 = clear, 10 = very silty

Analysis	Type	Container Size							Filtered	Preservatives
		40 mL	120 mL	250 mL	500 mL	1 L	2 L	4 L		
General	Plastic			1					No	
Nutrients	Glass		1						No	H2SO4

SCN/Unique Sample ID No: 23757-01 Field Duplicate: N/A

GROUNDWATER DEVELOPMENT AND SAMPLING DATA

☐ Development
☑ Purging/Sampling

Well No.: 94-2

Project Name:	Catalyst - Wildwood	**Project No.:**	CA0033349.0733//5010
Location:	Powell River, BC	**Date:**	09/08/2024
Weather:	Sunny **Temperature:** 24	**Completed By:**	Sean Sutherland
GPS Coordinates:	LAT: 49.881752 LON: -124.554876	**Reviewed By:**	

MONITORING WELL INFORMATION

Time of Measurement: 12:30

Depth to Product: N/A m Product Thickness: N/A m

Depth to Water (A): 8.898 m below Top of PVC

Depth to Bottom of Well (B): 10.2 m below Top of PVC

Diameter of Standpipe: 2.0 inch (51 mm)

Well Condition: Good

Tidally Influenced: ☐ Yes ☑ No

Pressure/Vacuum: ☐ Yes ☑ No

Well Headspace: _____ ppm

One Well Volume:

(B-A)*2.0 = 2.6 Litres - for a 51 mm (2.0 inch) diameter well

EQUIPMENT LIST

Pump
- ☐ Waterra
- ☐ Hydrolift
- ☑ Bailer (Type: 1.5)
- ☐ Peristaltic
- ☐ Submersible
- ☐ Bladder

Multimeter	Model:	YSI Pro Quatro (BUR000740)
pH/Temp Meter	Model:	YSI Pro Quatro (BUR000740)
Conductivity Meter	Model:	YSI Pro Quatro (BUR000740)
Dissolved Oxygen Meter	Model:	YSI Pro Quatro (BUR000740)
ORP (Redox) Meter	Model:	YSI Pro Quatro (BUR000740)
Organic Vapour Meter	Model:	

☐ Rental Equipment

☑ Field Bump

☑ Field Calibration

Pump Details:

Comments: Refer to Field Notes for Bump/Cal details

WELL DEVELOPMENT/PURGING

Purge Volume: Well. Vol. X _____ = _____ litres

Start: 12:27 Finish: _____

Avg. Flow Rate: _____ L/min.

Sample intake depth: 9.5 m

Time	Volume Removed (L)	Temp. (°C)	pH (Units)	Specific Cond. (µS/cm)	Redox (mV)	Diss. O_2* (mg/L)	Water Level (m)	Remarks
12:31	2	13.7	6.37	1,391	99.4	3.66		Turbid/silty
12:34	4	12.3	6.36	1,915	98.9	3.24		
12:36	6	12.2	6.37	1,918	92.9	2.6		
12:38	8	12	6.34	1,980	88.7	2.51		Sampled after 8L

* Record DO in mg/L, not percentage

Sheen: ☐ Yes ☑ No If yes Sheen Type:

Turbidity Start: 7 Turbidity End: 7

Comments:

Range: 1 = clear, 10 = very silty

Analysis	Type	Container Size							Filtered	Preservatives
		40 mL	120 mL	250 mL	500 mL	1 L	2 L	4 L		
General	Plastic			1					No	

SCN/Unique Sample ID No: 23755-02 Field Duplicate: N/A

GROUNDWATER DEVELOPMENT AND SAMPLING DATA

☐ Development
☑ Purging/Sampling

Well No.: 94-16B

Project Name:	Catalyst - Wildwood	**Project No.:**	CA0033347.0492/5010
Location:	Powell River, BC	**Date:**	09/09/2024
Weather:	Sunny **Temperature:** 20	**Completed By:**	Sean Sutherland
GPS Coordinates:	LAT: 49.880661 LON: -124.553593	**Reviewed By:**	

MONITORING WELL INFORMATION

Time of Measurement: 15:22

Depth to Product: N/A m Product Thickness: N/A m

Depth to Water (A): 38.161 m below Top of PVC

Depth to Bottom of Well (B): 50 m below Top of PVC

Diameter of Standpipe: 2.0 inch (51 mm)

Well Condition: Good

Tidally Influenced: ☐ Yes ☑ No

Pressure/Vacuum: ☐ Yes ☑ No

Well Headspace: _____ ppm

One Well Volume:

(B-A)*2.0 = 23.68 Litres - for a 51 mm (2.0 inch) diameter well

EQUIPMENT LIST

Pump
- ☐ Waterra
- ☑ Hydrolift
- ☐ Bailer (Type:)
- ☐ Peristaltic
- ☐ Submersible
- ☐ Bladder

Multimeter	Model:	YSI Pro Quatro (BUR000740)
pH/Temp Meter	Model:	YSI Pro Quatro (BUR000740)
Conductivity Meter	Model:	YSI Pro Quatro (BUR000740)
Dissolved Oxygen Meter	Model:	YSI Pro Quatro (BUR000740)
ORP (Redox) Meter	Model:	YSI Pro Quatro (BUR000740)
Organic Vapour Meter	Model:	

☐ Rental Equipment

☑ Field Bump

☑ Field Calibration

Pump Details:

Comments: Refer to Field Notes for Bump/Cal details

WELL DEVELOPMENT/PURGING

Purge Volume: Well. Vol. X 3 = 69 litres Start: 15:20 Finish: _____

Avg. Flow Rate: _____ L/min. Sample intake depth: 49 m

Time	Volume Removed (L)	Temp. (°C)	pH (Units)	Specific Cond. (µS/cm)	Redox (mV)	Diss. O_2* (mg/L)	Water Level (m)	Remarks
15:26	6	11.6	7.4	288.7	-170.8	4.23		Clear
15:28	11	11	7.41	284.7	-165.9	4.67		
15:30	16	10.8	7.44	297.2	-158.4	5.27		
15:33	21	10.8	7.45	288.3	-160.3	4.97		Dry
16:21	23	11.4	7.35	283.6	-139.4	3.93		Sampled

* Record DO in mg/L, not percentage

Sheen: ☐ Yes ☑ No If yes Sheen Type:

Turbidity Start: 2 Turbidity End: 2

Comments: Drying up at 21L. Allow recharge and sample

Range: 1 = clear, 10 = very silty

Analysis	Type	Container Size							Filtered	Preservatives
		40 mL	120 mL	250 mL	500 mL	1 L	2 L	4 L		
General	Plastic			1					No	
Nutrients	Glass		1						No	H2SO4

SCN/Unique Sample ID No: 23756-04 Field Duplicate: N/A

GROUNDWATER DEVELOPMENT AND SAMPLING DATA

☐ Development
☑ Purging/Sampling

Well No.: 94-16L

Project Name:	Catalyst - Wildwood	**Project No.:**	CA0033347.0492//5010
Location:	Powell River, BC	**Date:**	09/09/2024
Weather:	Sunny **Temperature:** 19	**Completed By:**	Sean Sutherland
GPS Coordinates:	LAT: 49.880627 LON: -124.553577	**Reviewed By:**	

MONITORING WELL INFORMATION

Time of Measurement: 15:41

Depth to Product: N/A m Product Thickness: N/A m

Depth to Water (A): 38.409 m below Top of PVC

Depth to Bottom of Well (B): 45 m below Top of PVC

Diameter of Standpipe: 1 inch (25.4mm)

Well Condition: Good

Tidally Influenced: ☐ Yes ☑ No

Pressure/Vacuum: ☐ Yes ☑ No

Well Headspace: _____ ppm

One Well Volume:

(B-A)*0.5 = 3.3 Litres - for a 25.4 mm (1.0 inch) diameter well

EQUIPMENT LIST

Pump
- ☐ Waterra
- ☑ Hydrolift
- ☐ Bailer (Type:)
- ☐ Peristaltic
- ☐ Submersible
- ☐ Bladder

Multimeter	Model:	YSI Pro Quatro (BUR000740)
pH/Temp Meter	Model:	YSI Pro Quatro (BUR000740)
Conductivity Meter	Model:	YSI Pro Quatro (BUR000740)
Dissolved Oxygen Meter	Model:	YSI Pro Quatro (BUR000740)
ORP (Redox) Meter	Model:	YSI Pro Quatro (BUR000740)
Organic Vapour Meter	Model:	

☐ Rental Equipment

☑ Field Bump

☑ Field Calibration

Pump Details:

Comments: Refer to Field Notes for Bump/Cal details

WELL DEVELOPMENT/PURGING

Purge Volume: Well. Vol. X 3 = 10 litres Start: 15:52 Finish: 15:58

Avg. Flow Rate: _____ L/min. Sample intake depth: 44 m

Time	Volume Removed (L)	Temp. (°C)	pH (Units)	Specific Cond. (µS/cm)	Redox (mV)	Diss. O_2* (mg/L)	Water Level (m)	Remarks
15:52	2	11	7.19	186.4	-29.2	5.84		Clear
15:53	5	10.6	7.08	169.2	-25.2	7.37		
15:54	8	10.6	6.98	166.3	-16.3	7.24		
15:56	11	10.6	6.95	165.3	-4.4	6.98		
15:57	14	10.6	6.83	164.9	3	6.7		Sampled

* Record DO in mg/L, not percentage

Sheen: ☐ Yes ☑ No If yes Sheen Type:

Turbidity Start: 1 Turbidity End: 1

Comments:

Range: 1 = clear, 10 = very silty

Analysis	Type	Container Size							Filtered	Preservatives
		40 mL	120 mL	250 mL	500 mL	1 L	2 L	4 L		
General	Plastic			1					No	

SCN/Unique Sample ID No: 23756-03 Field Duplicate: N/A

GROUNDWATER DEVELOPMENT AND SAMPLING DATA

☐ Development
☑ Purging/Sampling

Well No.: 94-17B

Project Name:	Catalyst - Wildwood	**Project No.:**	CA0033347.0492//5010
Location:	Powell River, BC	**Date:**	09/09/2024
Weather:	Sunny **Temperature:** 18	**Completed By:**	Sean Sutherland
GPS Coordinates:	LAT: 49.880208 LON: -124.554001	**Reviewed By:**	

MONITORING WELL INFORMATION

Time of Measurement: 13:17

Depth to Product: N/A m Product Thickness: N/A m

Depth to Water (A): 45 m below Top of PVC

Depth to Bottom of Well (B): 50 m below Top of PVC

Diameter of Standpipe: 2.0 inch (51 mm)

Well Condition: Good

Tidally Influenced: ☐ Yes ☑ No

Pressure/Vacuum: ☐ Yes ☑ No

Well Headspace: _____ ppm

One Well Volume:

(B-A)*2.0 = 10 Litres - for a 51 mm (2.0 inch) diameter well

EQUIPMENT LIST

Pump
- ☐ Waterra
- ☑ Hydrolift
- ☐ Bailer (Type:)
- ☐ Peristaltic
- ☐ Submersible
- ☐ Bladder

Multimeter	Model:	YSI Pro Quatro (BUR000740)
pH/Temp Meter	Model:	YSI Pro Quatro (BUR000740)
Conductivity Meter	Model:	YSI Pro Quatro (BUR000740)
Dissolved Oxygen Meter	Model:	YSI Pro Quatro (BUR000740)
ORP (Redox) Meter	Model:	YSI Pro Quatro (BUR000740)
Organic Vapour Meter	Model:	

☐ Rental Equipment

☑ Field Bump

☑ Field Calibration

Pump Details:

Comments: Refer to Field Notes for Bump/Cal details

WELL DEVELOPMENT/PURGING

Purge Volume: Well. Vol. X _____ = _____ litres

Start: _____ Finish: _____

Avg. Flow Rate: _____ L/min.

Sample intake depth: 39.3 m

Time	Volume Removed (L)	Temp. (°C)	pH (Units)	Specific Cond. (µS/cm)	Redox (mV)	Diss. O_2* (mg/L)	Water Level (m)	Remarks
13:26	1.75	10.8	7.46	235.7	92.3	4.63		Moderately turbid/grey tinge
13:28	4.5	10.4	7.53	230.9	90.9	7.58		
13:29	7.5	10.3	7.48	229.8	89.4	7.04		
13:31	9.5							Drying up
14:19	11.5	10.9	7.43	229.3	89.3	6.68		Sampled after 11.5L

* Record DO in mg/L, not percentage

Sheen: ☐ Yes ☑ No If yes Sheen Type:

Turbidity Start: 1 Turbidity End: 1

Comments: Drying up at 9.5L. Halt pump and sample after recharge

Range: 1 = clear, 10 = very silty

Analysis	Type	Container Size							Filtered	Preservatives
		40 mL	120 mL	250 mL	500 mL	1 L	2 L	4 L		
General	Plastic			1					No	

SCN/Unique Sample ID No: 23756-02 Field Duplicate: N/A

GROUNDWATER DEVELOPMENT AND SAMPLING DATA

☐ Development
☑ Purging/Sampling

Well No.: 94-17L

Project Name:	Catalyst - Wildwood	**Project No.:**	CA0033347.0492//5010
Location:	Powell River, BC	**Date:**	09/09/2024
Weather:	Sunny **Temperature:** 18	**Completed By:**	Sean Sutherland
GPS Coordinates:	LAT: 49.880197 LON: -124.554005	**Reviewed By:**	

MONITORING WELL INFORMATION

Time of Measurement: 13:24

Depth to Product: N/A m Product Thickness: N/A m

Depth to Water (A): 34.229 m below Top of PVC

Depth to Bottom of Well (B): 35 m below Top of PVC

Diameter of Standpipe: 1 inch (25.4mm)

Well Condition: Good

Tidally Influenced: ☐ Yes ☑ No

Pressure/Vacuum: ☐ Yes ☑ No

Well Headspace: _____ ppm

One Well Volume:

(B-A)*0.5 = 0.39 Litres - for a 25.4 mm (1.0 inch) diameter well

EQUIPMENT LIST

Pump
- ☐ Waterra
- ☐ Hydrolift
- ☑ Bailer (Type: 0.75")
- ☐ Peristaltic
- ☐ Submersible
- ☐ Bladder

Multimeter	Model:	YSI Pro Quatro (BUR000740)
pH/Temp Meter	Model:	YSI Pro Quatro (BUR000740)
Conductivity Meter	Model:	YSI Pro Quatro (BUR000740)
Dissolved Oxygen Meter	Model:	YSI Pro Quatro (BUR000740)
ORP (Redox) Meter	Model:	YSI Pro Quatro (BUR000740)
Organic Vapour Meter	Model:	

☐ Rental Equipment

☑ Field Bump

☑ Field Calibration

Pump Details:

Comments: Refer to Field Notes for Bump/Cal details

WELL DEVELOPMENT/PURGING

Purge Volume: Well. Vol. X 3 = 1.2 litres

Start: 13:32 Finish: _____

Avg. Flow Rate: _____ L/min.

Sample intake depth: 34.5 m

Time	Volume Removed (L)	Temp. (°C)	pH (Units)	Specific Cond. (µS/cm)	Redox (mV)	Diss. O_2* (mg/L)	Water Level (m)	Remarks
13:41	0.5	10.5	7.25	325.2	100.5	7.81		Clear
13:59	1	11.4	7.35	329.5	97.7	7.72		Sampled after 1.25L. Limited h2o for parameters

* Record DO in mg/L, not percentage

Sheen: ☐ Yes ☑ No If yes Sheen Type:

Turbidity Start: 1 Turbidity End: 1

Comments:

Range: 1 = clear, 10 = very silty

Analysis	Type	Container Size							Filtered	Preservatives
		40 mL	120 mL	250 mL	500 mL	1 L	2 L	4 L		
General	Plastic			1					No	

SCN/Unique Sample ID No: 23756-01 Field Duplicate: N/A

GROUNDWATER DEVELOPMENT AND SAMPLING DATA

☐ Development
☐ Purging/Sampling

Well No.: 94-18L

ANProject Name:	Catalyst - Wildwood	**Project No.:**	CA0033349.0733//5010
Location:	Powell River, BC	**Date:**	09/08/2024
Weather:	Sunny **Temperature:** 24	**Completed By:**	Sean Sutherland
GPS Coordinates:	LAT: 49.88111 LON: -124.55278	**Reviewed By:**	

MONITORING WELL INFORMATION

Time of Measurement: 16:09

Depth to Product: N/A m Product Thickness: N/A m

Depth to Water (A): 42.989 m below Top of PVC

Depth to Bottom of Well (B): 54 m below Top of PVC

Diameter of Standpipe: 1 inch (25.4mm)

Well Condition: Good

Tidally Influenced: ☐ Yes ☑ No

Pressure/Vacuum: ☐ Yes ☑ No

Well Headspace: _____ ppm

One Well Volume:

(B-A)*0.5 = 5.51 Litres - for a 25.4 mm (1.0 inch) diameter well

EQUIPMENT LIST

Pump
- ☐ Waterra
- ☑ Hydrolift
- ☐ Bailer (Type:)
- ☐ Peristaltic
- ☐ Submersible
- ☐ Bladder

Multimeter	Model:	YSI Pro Quatro (BUR000740)
pH/Temp Meter	Model:	YSI Pro Quatro (BUR000740)
Conductivity Meter	Model:	YSI Pro Quatro (BUR000740)
Dissolved Oxygen Meter	Model:	YSI Pro Quatro (BUR000740)
ORP (Redox) Meter	Model:	YSI Pro Quatro (BUR000740)
Organic Vapour Meter	Model:	

☐ Rental Equipment

☑ Field Bump

☑ Field Calibration

Pump Details:

Comments: Refer to Field Notes for Bump/Cal details

WELL DEVELOPMENT/PURGING

Purge Volume: Well. Vol. X 3 = 16.5 litres Start: 16:08 Finish: _____

Avg. Flow Rate: _____ L/min. Sample intake depth: 53 m

Time	Volume Removed (L)	Temp. (°C)	pH (Units)	Specific Cond. (µS/cm)	Redox (mV)	Diss. O_2* (mg/L)	Water Level (m)	Remarks
16:16	4	11.6	6.85	160.5	101.4	8.95		Slightly turbid/grey colour
16:18	8	11	6.81	159.3	106	9.31		
16:20	11.5	11.2	6.96	159.8	100.6	9.44		
16:21	14.5	11	6.93	158.8	100.8	9.56		
16:23	17.5	11	6.86	159	102.2	8.33		Sampled after 18L

* Record DO in mg/L, not percentage

Sheen: ☐ Yes ☑ No If yes Sheen Type:

Comments:

Turbidity Start: 2 Turbidity End: 2

Range: 1 = clear, 10 = very silty

Analysis	Type	Container Size							Filtered	Preservatives
		40 mL	120 mL	250 mL	500 mL	1 L	2 L	4 L		
General	Plastic			1					No	

SCN/Unique Sample ID No: 23755-07 Field Duplicate: N/A

GROUNDWATER DEVELOPMENT AND SAMPLING DATA

☐ Development
☐ Purging/Sampling

Well No.: 94-18M

Project Name:	Catalyst - Wildwood	**Project No.:**	CA0033349.0733//5010
Location:	Powell River, BC	**Date:**	09/08/2024
Weather:	Sunny **Temperature:** 24	**Completed By:**	Sean Sutherland
GPS Coordinates:	LAT: 49.880949 LON: -124.552839	**Reviewed By:**	

MONITORING WELL INFORMATION

Time of Measurement: 16:30

Depth to Product: N/A m Product Thickness: N/A m

Depth to Water (A): 38.92 m below Top of PVC

Depth to Bottom of Well (B): 48 m below Top of PVC

Diameter of Standpipe: 1 inch (25.4mm)

Well Condition: Good

Tidally Influenced: ☐ Yes ☑ No

Pressure/Vacuum: ☐ Yes ☑ No

Well Headspace: _____ ppm

One Well Volume:

(B-A)*0.5 = 4.54 Litres - for a 25.4 mm (1.0 inch) diameter well

EQUIPMENT LIST

Pump
- ☐ Waterra
- ☑ Hydrolift
- ☐ Bailer (Type:)
- ☐ Peristaltic
- ☐ Submersible
- ☐ Bladder

Multimeter	Model:	YSI Pro Quatro (BUR000740)
pH/Temp Meter	Model:	YSI Pro Quatro (BUR000740)
Conductivity Meter	Model:	YSI Pro Quatro (BUR000740)
Dissolved Oxygen Meter	Model:	YSI Pro Quatro (BUR000740)
ORP (Redox) Meter	Model:	YSI Pro Quatro (BUR000740)
Organic Vapour Meter	Model:	

☐ Rental Equipment

☑ Field Bump

☑ Field Calibration

Pump Details:

Comments: Refer to Field Notes for Bump/Cal details

WELL DEVELOPMENT/PURGING

Purge Volume: Well. Vol. X 3 = 13.5 litres Start: 16:29 Finish: _____

Avg. Flow Rate: _____ L/min. Sample intake depth: 47 m

Time	Volume Removed (L)	Temp. (°C)	pH (Units)	Specific Cond. (µS/cm)	Redox (mV)	Diss. O_2* (mg/L)	Water Level (m)	Remarks
16:35	3.5	11.4	6.81	257.7	102	8.15		Slightly turbid
16:37	7.5	11.1	6.69	257.7	105	7.83		
16:38	10	11	6.71	254.2	104.6	8.18		
16:41	13.5	11.1	6.67	253.8	102.9	6.87		Sampled after 14L

* Record DO in mg/L, not percentage

Sheen: ☐ Yes ☑ No If yes Sheen Type:

Turbidity Start: 2 Turbidity End: 2

Comments:

Range: 1 = clear, 10 = very silty

Analysis	Type	Container Size							Filtered	Preservatives
		40 mL	120 mL	250 mL	500 mL	1 L	2 L	4 L		
General	Plastic			1					No	

SCN/Unique Sample ID No: 23755-08 Field Duplicate: N/A

GROUNDWATER DEVELOPMENT AND SAMPLING DATA

☐ Development
☐ Purging/Sampling

Well No.: 94-18U

Project Name:	Catalyst - Wildwood	**Project No.:**	CA0033349.0733//5010
Location:	Powell River, BC	**Date:**	09/08/2024
Weather:	Sunny **Temperature:** 24	**Completed By:**	Sean Sutherland
GPS Coordinates:	LAT: 49.881027 LON: -124.552923	**Reviewed By:**	

MONITORING WELL INFORMATION

Time of Measurement: 15:52

Depth to Product: N/A m Product Thickness: N/A m

Depth to Water (A): 38.819 m below Top of PVC

Depth to Bottom of Well (B): 44 m below Top of PVC

Diameter of Standpipe: 1 inch (25.4mm)

Well Condition: Good

Tidally Influenced: ☐ Yes ☑ No

Pressure/Vacuum: ☐ Yes ☑ No

Well Headspace: _____ ppm

One Well Volume:

(B-A)*0.5 = 2.59 Litres - for a 25.4 mm (1.0 inch) diameter well

EQUIPMENT LIST

Pump
- ☐ Waterra
- ☑ Hydrolift
- ☐ Bailer (Type:)
- ☐ Peristaltic
- ☐ Submersible
- ☐ Bladder

Multimeter	Model:	YSI Pro Quatro (BUR000740)
pH/Temp Meter	Model:	YSI Pro Quatro (BUR000740)
Conductivity Meter	Model:	YSI Pro Quatro (BUR000740)
Dissolved Oxygen Meter	Model:	YSI Pro Quatro (BUR000740)
ORP (Redox) Meter	Model:	YSI Pro Quatro (BUR000740)
Organic Vapour Meter	Model:	

☐ Rental Equipment

☑ Field Bump

☑ Field Calibration

Pump Details:

Comments: Refer to Field Notes for Bump/Cal details

WELL DEVELOPMENT/PURGING

Purge Volume: Well. Vol. X _____ = _____ litres

Start: 15:53 Finish: _____

Avg. Flow Rate: _____ L/min.

Sample intake depth: 42 m

Time	Volume Removed (L)	Temp. (°C)	pH (Units)	Specific Cond. (µS/cm)	Redox (mV)	Diss. O_2* (mg/L)	Water Level (m)	Remarks
15:55	2	12	7.07	252	112.7	9.69		Turbid/grey colour
15:57	4	11.5	6.71	242	112.2	8.87		
15:58	6.5	11.5	6.67	238.7	110.8	9.03		
16:01	9	11.2	6.63	240	105.8	7.88		Sampled after 9L

* Record DO in mg/L, not percentage

Sheen: ☐ Yes ☑ No If yes Sheen Type:

Turbidity Start: 3 Turbidity End: 3

Comments:

Range: 1 = clear, 10 = very silty

Analysis	Type	Container Size							Filtered	Preservatives
		40 mL	120 mL	250 mL	500 mL	1 L	2 L	4 L		
General	Plastic			1					No	

SCN/Unique Sample ID No: 23755-06 Field Duplicate: N/A

GROUNDWATER DEVELOPMENT AND SAMPLING DATA

☐ Development
☐ Purging/Sampling

Well No.: 94-19B

Project Name:	Catalyst - Wildwood	**Project No.:**	CA0033347.0492//5010
Location:	Powell River, BC	**Date:**	09/09/2024
Weather:	Sunny **Temperature:** 24	**Completed By:**	Sean Sutherland
GPS Coordinates:	LAT: 49.880894 LON: -124.553185	**Reviewed By:**	

MONITORING WELL INFORMATION

Time of Measurement: 10:34

Depth to Product: N/A m Product Thickness: N/A m

Depth to Water (A): 40.189 m below Top of PVC

Depth to Bottom of Well (B): 56 m below Top of PVC

Diameter of Standpipe: 2.0 inch (51 mm)

Well Condition: Good - new tubing installed today

Tidally Influenced: ☐ Yes ☑ No

Pressure/Vacuum: ☐ Yes ☑ No

Well Headspace: _____ ppm

One Well Volume:

(B-A)*2.0 = 31.62 Litres - for a 51 mm (2.0 inch) diameter well

EQUIPMENT LIST

Pump
- ☐ Waterra
- ☑ Hydrolift
- ☐ Bailer (Type:)
- ☐ Peristaltic
- ☐ Submersible
- ☐ Bladder

Multimeter	Model:	YSI Pro Quatro (BUR000740)
pH/Temp Meter	Model:	YSI Pro Quatro (BUR000740)
Conductivity Meter	Model:	YSI Pro Quatro (BUR000740)
Dissolved Oxygen Meter	Model:	YSI Pro Quatro (BUR000740)
ORP (Redox) Meter	Model:	YSI Pro Quatro (BUR000740)
Organic Vapour Meter	Model:	

☐ Rental Equipment

☑ Field Bump

☑ Field Calibration

Pump Details:

Comments: Refer to Field Notes for Bump/Cal details

WELL DEVELOPMENT/PURGING

Purge Volume: Well. Vol. X 3 = 95 litres

Start: 10:28 Finish: 11:17

Avg. Flow Rate: _____ L/min.

Sample intake depth: 55 m

Time	Volume Removed (L)	Temp. (°C)	pH (Units)	Specific Cond. (µS/cm)	Redox (mV)	Diss. O_2* (mg/L)	Water Level (m)	Remarks
10:38	20	12	6.91	310.9	109	4.55		Clear
10:45	40	11.3	7.35	268.9	88.5	5.55		Slightly cloudy
10:57	60	12.1	7.24	292.5	96.8	3.65		Clear
11:07	80	11.3	7.74	225.4	94.9	6.06		
11:17	95	11.2	7.68	226.4	100.3	5.54		Sampled after 95L

* Record DO in mg/L, not percentage

Sheen: ☐ Yes ☑ No If yes Sheen Type:

Turbidity Start: 1 Turbidity End: 1

Comments:

Range: 1 = clear, 10 = very silty

Analysis	Type	Container Size							Filtered	Preservatives
		40 mL	120 mL	250 mL	500 mL	1 L	2 L	4 L		
General	Plastic			1					No	

SCN/Unique Sample ID No: 23755-09 Field Duplicate: N/A

GROUNDWATER DEVELOPMENT AND SAMPLING DATA

☐ Development
☐ Purging/Sampling

Well No.: 94-19L

Project Name:	Catalyst - Wildwood	**Project No.:**	CA0033347.0492//5010
Location:	Powell River, BC	**Date:**	09/09/2024
Weather:	Sunny **Temperature:** 16	**Completed By:**	Sean Sutherland
GPS Coordinates:	LAT: 49.880891 LON: -124.553392	**Reviewed By:**	

MONITORING WELL INFORMATION

Time of Measurement: 11:49

Depth to Product: N/A m Product Thickness: N/A m

Depth to Water (A): 40.303 m below Top of PVC

Depth to Bottom of Well (B): 51 m below Top of PVC

Diameter of Standpipe: 1 inch (25.4mm)

Well Condition: Good

Tidally Influenced: ☐ Yes ☑ No

Pressure/Vacuum: ☐ Yes ☑ No

Well Headspace: _____ ppm

One Well Volume:

(B-A)*0.5 = 5.35 Litres - for a 25.4 mm (1.0 inch) diameter well

EQUIPMENT LIST

Pump
- ☐ Waterra
- ☑ Hydrolift
- ☐ Bailer (Type:)
- ☐ Peristaltic
- ☐ Submersible
- ☐ Bladder

Multimeter	Model:	YSI Pro Quatro (BUR000740)
pH/Temp Meter	Model:	YSI Pro Quatro (BUR000740)
Conductivity Meter	Model:	YSI Pro Quatro (BUR000740)
Dissolved Oxygen Meter	Model:	YSI Pro Quatro (BUR000740)
ORP (Redox) Meter	Model:	YSI Pro Quatro (BUR000740)
Organic Vapour Meter	Model:	

☐ Rental Equipment

☑ Field Bump

☑ Field Calibration

Pump Details:

Comments: Refer to Field Notes for Bump/Cal details

WELL DEVELOPMENT/PURGING

Purge Volume: Well. Vol. X 3 = 16 litres Start: 11:46 Finish: 11:55

Avg. Flow Rate: _____ L/min. Sample intake depth: 50 m

Time	Volume Removed (L)	Temp. (°C)	pH (Units)	Specific Cond. (µS/cm)	Redox (mV)	Diss. O_2* (mg/L)	Water Level (m)	Remarks
11:47	2.5	10.9	6.82	245.8	104.7	4.9		Clear
11:50	7	10.9	6.92	220.8	102.4	6.02		
11:51	10.5	10.8	6.82	214.5	104.7	6.37		
11:53	13.5	10.9	6.89	216.1	102.5	6.26		
11:55	17	11	6.81	214.9	103.5	5.55		Sampled after 17L

* Record DO in mg/L, not percentage

Sheen: ☐ Yes ☑ No If yes Sheen Type:

Turbidity Start: 1 Turbidity End: 1

Comments:

Range: 1 = clear, 10 = very silty

Analysis	Type	Container Size							Filtered	Preservatives
		40 mL	120 mL	250 mL	500 mL	1 L	2 L	4 L		
General	Plastic			1					No	
Nutrients	Glass		1						No	H2SO4

SCN/Unique Sample ID No: 23755-11 Field Duplicate: N/A

GROUNDWATER DEVELOPMENT AND SAMPLING DATA

☐ Development
☐ Purging/Sampling

Well No.: 94-19M

Project Name:	Catalyst - Wildwood	**Project No.:**	CA0033347.0492//5010
Location:	Powell River, BC	**Date:**	09/09/2024
Weather:	Sunny **Temperature:** 17	**Completed By:**	Sean Sutherland
GPS Coordinates:	LAT: 49.880913 LON: -124.553281	**Reviewed By:**	

MONITORING WELL INFORMATION

Time of Measurement: 12:22

Depth to Product: N/A m Product Thickness: N/A m

Depth to Water (A): 36.198 m below Top of PVC

Depth to Bottom of Well (B): 48 m below Top of PVC

Diameter of Standpipe: 1 inch (25.4mm)

Well Condition: Good

Tidally Influenced: ☐ Yes ☑ No

Pressure/Vacuum: ☐ Yes ☑ No

Well Headspace: _____ ppm

One Well Volume:

(B-A)*0.5 = 5.9 Litres - for a 25.4 mm (1.0 inch) diameter well

EQUIPMENT LIST

Pump
- ☐ Waterra
- ☑ Hydrolift
- ☐ Bailer (Type:)
- ☐ Peristaltic
- ☐ Submersible
- ☐ Bladder

Multimeter	Model:	YSI Pro Quatro (BUR000740)
pH/Temp Meter	Model:	YSI Pro Quatro (BUR000740)
Conductivity Meter	Model:	YSI Pro Quatro (BUR000740)
Dissolved Oxygen Meter	Model:	YSI Pro Quatro (BUR000740)
ORP (Redox) Meter	Model:	YSI Pro Quatro (BUR000740)
Organic Vapour Meter	Model:	

☐ Rental Equipment

☑ Field Bump

☑ Field Calibration

Pump Details:

Comments: Refer to Field Notes for Bump/Cal details

WELL DEVELOPMENT/PURGING

Purge Volume: Well. Vol. X 3 = 18 litres Start: 12:22 Finish: 12:31

Avg. Flow Rate: _____ L/min. Sample intake depth: 47 m

Time	Volume Removed (L)	Temp. (°C)	pH (Units)	Specific Cond. (µS/cm)	Redox (mV)	Diss. O_2* (mg/L)	Water Level (m)	Remarks
12:23	6	11.1	6.81	297.8	15.7	4.78		Turbid
12:25	10.5	10.9	6.86	301.3	20.5	4.71		Brown tinge
12:27	14	11	6.85	300.2	24.7	4.47		
12:29	17	11	6.87	299.2	29.2	4.63		
12:31	20	10.9	6.88	297.3	37.5	4.29		Sampled after 20L

* Record DO in mg/L, not percentage

Sheen: ☐ Yes ☑ No If yes Sheen Type:

Turbidity Start: 4 Turbidity End: 4

Comments:

Range: 1 = clear, 10 = very silty

Analysis	Type	Container Size							Filtered	Preservatives
		40 mL	120 mL	250 mL	500 mL	1 L	2 L	4 L		
General	Plastic			1					No	

SCN/Unique Sample ID No: 23755-12 Field Duplicate: N/A

GROUNDWATER DEVELOPMENT AND SAMPLING DATA

☐ Development
☐ Purging/Sampling

Well No.: 94-19U

Project Name:	Catalyst - Wildwood	**Project No.:**	CA0033347.0492//5010
Location:	Powell River, BC	**Date:**	09/09/2024
Weather:	Sunny **Temperature:** 18	**Completed By:**	Sean Sutherland
GPS Coordinates:	LAT: 49.880924 LON: -124.553359	**Reviewed By:**	

MONITORING WELL INFORMATION

Time of Measurement: 11:25
Depth to Product: N/A m Product Thickness: N/A m
Depth to Water (A): 36.055 m below Top of PVC
Depth to Bottom of Well (B): 41 m below Top of PVC
Diameter of Standpipe: 1 inch (25.4mm)
Well Condition: Good

Tidally Influenced: ☐ Yes ☑ No
Pressure/Vacuum: ☐ Yes ☑ No
Well Headspace: _____ ppm

One Well Volume:
(B-A)*0.5 = 2.47 Litres - for a 25.4 mm (1.0 inch) diameter well

EQUIPMENT LIST

Pump
☐ Waterra
☑ Hydrolift
☐ Bailer (Type:)
☐ Peristaltic
☐ Submersible
☐ Bladder

Multimeter	Model:	YSI Pro Quatro (BUR000740)
pH/Temp Meter	Model:	YSI Pro Quatro (BUR000740)
Conductivity Meter	Model:	YSI Pro Quatro (BUR000740)
Dissolved Oxygen Meter	Model:	YSI Pro Quatro (BUR000740)
ORP (Redox) Meter	Model:	YSI Pro Quatro (BUR000740)
Organic Vapour Meter	Model:	

☐ Rental Equipment
☑ Field Bump
☑ Field Calibration

Pump Details:

Comments: Refer to Field Notes for Bump/Cal details

WELL DEVELOPMENT/PURGING

Purge Volume: Well. Vol. X 3 = 8 litres Start: 11:24 Finish: 11:39
Avg. Flow Rate: _____ L/min. Sample intake depth: 40 m

Time	Volume Removed (L)	Temp. (°C)	pH (Units)	Specific Cond. (µS/cm)	Redox (mV)	Diss. O_2* (mg/L)	Water Level (m)	Remarks
11:35	2	11.1	7.37	301.7	108.1	7.33		Turbid
11:36	4.5	10.9	7.1	302.5	108.7	3.51		
11:37	7	10.8	7.05	301.5	108.3	4.1		
11:39	9	10.9	6.86	301.7	109.3	2.86		Sampled after 9L

* Record DO in mg/L, not percentage

Sheen: ☐ Yes ☑ No If yes Sheen Type:
Comments:

Turbidity Start: 5 Turbidity End: 5
Range: 1 = clear, 10 = very silty

Analysis	Type	Container Size							Filtered	Preservatives
		40 mL	120 mL	250 mL	500 mL	1 L	2 L	4 L		
General	Plastic			1					No	

SCN/Unique Sample ID No: 23755-10 Field Duplicate: N/A

GROUNDWATER DEVELOPMENT AND SAMPLING DATA

☐ Development
☐ Purging/Sampling

Well No.: AH-6L

ANProject Name:	Catalyst - Wildwood	**Project No.:**	CA0033347.0492//5010
Location:	Powell River, BC	**Date:**	09/10/2024
Weather:	Sunny **Temperature:** 18	**Completed By:**	Sean Sutherland
GPS Coordinates:	LAT: 49.882103 LON: -124.55481	**Reviewed By:**	

MONITORING WELL INFORMATION

Time of Measurement: 09:09
Depth to Product: N/A m Product Thickness: N/A m
Depth to Water (A): 18.426 m below Top of PVC
Depth to Bottom of Well (B): 19.4 m below Top of PVC
Diameter of Standpipe: 2.0 inch (51 mm)
Well Condition: Good

Tidally Influenced: ☐ Yes ☑ No
Pressure/Vacuum: ☐ Yes ☑ No
Well Headspace: _____ ppm

One Well Volume:
(B-A)*2.0 = 1.95 Litres - for a 51 mm (2.0 inch) diameter well

EQUIPMENT LIST

Pump
☐ Waterra
☑ Hydrolift
☐ Bailer (Type:)
☐ Peristaltic
☐ Submersible
☐ Bladder

Multimeter	Model:	YSI Pro Quatro (BUR000740)
pH/Temp Meter	Model:	YSI Pro Quatro (BUR000740)
Conductivity Meter	Model:	YSI Pro Quatro (BUR000740)
Dissolved Oxygen Meter	Model:	YSI Pro Quatro (BUR000740)
ORP (Redox) Meter	Model:	YSI Pro Quatro (BUR000740)
Organic Vapour Meter	Model:	

☐ Rental Equipment
☑ Field Bump
☑ Field Calibration

Pump Details:

Comments: Refer to Field Notes for Bump/Cal details

WELL DEVELOPMENT/PURGING

Purge Volume: Well. Vol. X 3 = 6 litres
Start: 09:10 Finish: _____
Avg. Flow Rate: _____ L/min.
Sample intake depth: 19 m

Time	Volume Removed (L)	Temp. (°C)	pH (Units)	Specific Cond. (µS/cm)	Redox (mV)	Diss. O_2* (mg/L)	Water Level (m)	Remarks
09:15	1	11	8.61	1,807	67.9	1.79		Tea-like tinge
09:17	3	10.9	8.55	1,678	62.8	2.05		
09:19	5	10.9	8.42	1,588	64.1	1.82		
09:30	7	11.2	8.31	1,594	73.1	1.7		Sampled

* Record DO in mg/L, not percentage

Sheen: ☐ Yes ☑ No If yes Sheen Type:
Turbidity Start: 1 Turbidity End: 1
Comments:
Range: 1 = clear, 10 = very silty

Analysis	Type	Container Size							Filtered	Preservatives
		40 mL	120 mL	250 mL	500 mL	1 L	2 L	4 L		
General	Plastic			1					No	
Nutrients	Glass		1						No	H2SO4

SCN/Unique Sample ID No: 23757-02 Field Duplicate:

GROUNDWATER DEVELOPMENT AND SAMPLING DATA

☐ Development
☑ Purging/Sampling

Well No.: AH-3

Project Name:	Catalyst - Wildwood	**Project No.:**	CA0033349.0733//5010
Location:	Powell River, BC	**Date:**	09/08/2024
Weather:	Sunny **Temperature:** 24	**Completed By:**	Sean Sutherland
GPS Coordinates:	LAT: 49.881094 LON: -124.554428	**Reviewed By:**	

MONITORING WELL INFORMATION

Time of Measurement: 10:51

Depth to Product: _____ m Product Thickness: N/A m

Depth to Water (A): 14.397 m below Top of PVC

Depth to Bottom of Well (B): 16.3 m below Top of PVC

Diameter of Standpipe: 2.0 inch (51 mm)

Well Condition: Good. Lost Bailer to bottom in 2022, successfully retrieved!

Tidally Influenced: ☐ Yes ☑ No

Pressure/Vacuum: ☐ Yes ☑ No

Well Headspace: _____ ppm

One Well Volume:

(B-A)*2.0 = 3.81 Litres - for a 51 mm (2.0 inch) diameter well

EQUIPMENT LIST

Pump
- ☐ Waterra
- ☐ Hydrolift
- ☑ Bailer (Type: 1.75")
- ☐ Peristaltic
- ☐ Submersible
- ☐ Bladder

Multimeter	Model:	YSI Pro Quatro (BUR000740)
pH/Temp Meter	Model:	YSI Pro Quatro (BUR000740)
Conductivity Meter	Model:	YSI Pro Quatro (BUR000740)
Dissolved Oxygen Meter	Model:	YSI Pro Quatro (BUR000740)
ORP (Redox) Meter	Model:	YSI Pro Quatro (BUR000740)
Organic Vapour Meter	Model:	

☐ Rental Equipment

☑ Field Bump

☑ Field Calibration

Pump Details:

Comments: Refer to Field Notes for Bump/Cal details

WELL DEVELOPMENT/PURGING

Purge Volume: Well. Vol. X _____ = _____ litres

Start: 10:54 Finish: _____

Avg. Flow Rate: _____ L/min.

Sample intake depth: 15.3 m

Time	Volume Removed (L)	Temp. (°C)	pH (Units)	Specific Cond. (µS/cm)	Redox (mV)	Diss. O_2* (mg/L)	Water Level (m)	Remarks
10:54	1.5	12.9	7.16	608	34.8	6.87		Clear
11:20	2.5	14.7	6.66	667	80.3	4.35		Drying up at 3L
12:01	3.5	16.3	6.61	607	94.6	5.04		Lost bailer retrieved. Purged Dry
12:53	7.5	14	6.56	603	101.1	5.05		Sampled after recharge

* Record DO in mg/L, not percentage

Sheen: ☐ Yes ☑ No If yes Sheen Type:

Turbidity Start: 1 Turbidity End: 1

Comments:

Range: 1 = clear, 10 = very silty

Analysis	Type	Container Size							Filtered	Preservatives
		40 mL	120 mL	250 mL	500 mL	1 L	2 L	4 L		
General	Plastic			1					No	
Nutrients	Glass		1						No	H2SO4

SCN/Unique Sample ID No: 23755-03 Field Duplicate: N/A

GROUNDWATER DEVELOPMENT AND SAMPLING DATA

☐ Development
☐ Purging/Sampling

Well No.: PW-Composite

Project Name:	Catalyst - Wildwood	**Project No.:**	CA0033349.0733//5010
Location:	Powell River, BC	**Date:**	09/08/2024
Weather:	Sunny **Temperature:** 18	**Completed By:**	Sean Sutherland
GPS Coordinates:	LAT: 49.88217 LON: -124.555409	**Reviewed By:**	

MONITORING WELL INFORMATION

Time of Measurement:

Depth to Product: N/A m Product Thickness: N/A m

Depth to Water (A): N/A m below Top of PVC

Depth to Bottom of Well (B): N/A m below Top of PVC

Diameter of Standpipe:

Tidally Influenced: ☐ Yes ☑ No

Pressure/Vacuum: ☐ Yes ☑ No

Well Headspace: ppm

One Well Volume:

EQUIPMENT LIST

Pump
- ☐ Waterra
- ☑ Hydrolift
- ☐ Bailer (Type:)
- ☐ Peristaltic
- ☐ Submersible
- ☐ Bladder

Multimeter	Model:	YSI Pro Quatro (BUR000740)
pH/Temp Meter	Model:	YSI Pro Quatro (BUR000740)
Conductivity Meter	Model:	YSI Pro Quatro (BUR000740)
Dissolved Oxygen Meter	Model:	YSI Pro Quatro (BUR000740)
ORP (Redox) Meter	Model:	YSI Pro Quatro (BUR000740)
Organic Vapour Meter	Model:	

☐ Rental Equipment

☑ Field Bump

☑ Field Calibration

Pump Details:

Comments: Refer to Field Notes for Bump/Cal details

WELL DEVELOPMENT/PURGING

Purge Volume: Well. Vol. X = litres

Start: 09:18 Finish:

Avg. Flow Rate: L/min.

Sample intake depth: 33 m

Time	Volume Removed (L)	Temp. (°C)	pH (Units)	Specific Cond. (µS/cm)	Redox (mV)	Diss. O_2* (mg/L)	Water Level (m)	Remarks
09:22	10	14.2	6.94	308.9	50.4	9.99		
09:23	20	13.6	6.82	302.1	43.4	9.19		
09:25	30	13.3	6.74	294.7	40.2	11.51		
09:30	40	13.5	6.77	297.3	47.2	9.19		
09:33	50	13.3	6.86	288.7	45.3	8.5		99-5 only

* Record DO in mg/L, not percentage

Sheen: ☐ Yes ☑ No If yes Sheen Type:

Turbidity Start: 1 Turbidity End: 1

Comments:

Range: 1 = clear, 10 = very silty

Analysis	Type	Container Size							Filtered	Preservatives
		40 mL	120 mL	250 mL	500 mL	1 L	2 L	4 L		
General	Plastic			1					No	
Nutrients	Glass		1						No	H2SO4

SCN/Unique Sample ID No: 23755-01 Field Duplicate: N/A

99-5 ONLY

GROUNDWATER DEVELOPMENT AND SAMPLING DATA

☐ Development ☒ Purging/Sampling Well No.: PW-COMPOSITE

Project Name: CATALYST - WILDWOOD **Project No.:** CA0033347.0492
Location: Powell River, BC **Date:** 26 Nov 24
Weather: Overcast **Temperature:** 4°C **Completed By:** (full name) Jenn Sutherland
GPS Coordinates: **Reviewed By:**

MONITORING WELL INFORMATION

Time of Measurement: N/A
Depth to Product: N/A m Product Thickness: ____ m
Depth to Water (A): N/A m below ☐ TOP
Depth to Bottom of Well (B): N/A m below ☐ TOP
Diameter of Standpipe: N/A mm
Well Condition:

Tidally Influenced: ☐ Yes ☐ No
Pressurized: ☐ Yes ☐ No
Well Headspace: ____ ppm
One Well Volume:
(B-A)*2.0 = ____ Litres - for a 51 mm (2.0 inch) diameter well
(B-A)*1.1 = ____ Litres - for a 38 mm (1.5 inch) diameter well

EQUIPMENT LIST

Pump ☐ Waterra 6RAB ☐ Hydrolift ☐ Bailer (Type: ____) ☐ Peristaltic ☐ Submersible ☐ Bladder
Pump Details: ____

Multimeter Model: YSI Pro Quatro BUR000753
pH/Temp Meter Model:
Conductivity Meter Model:
Dissolved Oxygen Meter Model:
ORP (Redex) Meter Model:
Organic Vapour Meter Model:
☐ D.O. Ampoule

☐ Rental Equipment:
☒ Field Bump
☒ pH4 4.03 ☒ pH7 7.08
☒ pH10 10.25
☒ 1413 us/cm 1305
☒ Field Calibration SPCond/DO

WELL DEVELOPMENT/PURGING

Purge Volume: Well. Vol. X ____ = ____ litres Start: ____ Finish: ____
Avg. Flow Rate: ____ L/min. Sample intake depth: ____

Time	Volume Removed (L)	Temp. (°C)	pH (Units)	☐ Cond. ☒ Specific Cond. µS/cm or mS/cm (circle one)	Redox (mV)	Diss. O_2* (mg/L)	Water Level (m)	Remarks
11:18	10	11.1	7.08	293.7	25.8	8.58	/	clear.
11:22	20	11.6	6.87	282.3	25.9	8.28	/	
11:25	30	11.7	6.83	286.7	25.2	8.74	/	
11:28	40	11.6	6.81	282.1	29.3	9.40	/	
11:33	50	11.5	6.84	283.4	34.9	9.25	/	Sampled 11:35

* Record DO in mg/L, not percentage

Comments:
Sheen: ☐ Yes ☒ No If yes ☐ Hydrocarbon-like OR ☐ Metallic-like
Turbidity: Clear | | | | | | | |

GROUNDWATER DEVELOPMENT AND SAMPLING DATA

☐ Development ☒ Purging/Sampling Well No.: AH-3

Project Name: CATALYST - WILDWOOD **Project No.:** CA0033347.0497
Location: Powell River BC **Date:** 26 NOV 24
Weather: Overcast **Temperature:** 1°c **Completed By:** (full name) S Sutherland
GPS Coordinates: **Reviewed By:**

MONITORING WELL INFORMATION

Time of Measurement: Nov24
Depth to Product: / m Product Thickness: / m
Depth to Water (A): 13.458 m below ☐ TOP
Depth to Bottom of Well (B): 16.3 m below ☐ TOP
Diameter of Standpipe: 51 mm
Well Condition: Good.

Tidally Influenced: ☐ Yes ☒ No
Pressurized: ☐ Yes ☒ No
Well Headspace: / ppm
One Well Volume:
(B-A)*2.0 = 5.6 Litres - for a 51 mm (2.0 inch) diameter well
(B-A)*1.1 = / Litres - for a 38 mm (1.5 inch) diameter well

EQUIPMENT LIST

BVR000753

Pump ☐ Waterra ☐ Hydrolift ☒ Bailer (Type:) ☐ Peristaltic ☐ Submersible ☐ Bladder
Pump Details:

Multimeter Model: YSI Pro Quatro ☐ Rental Equipment:
pH/Temp Meter Model:
Conductivity Meter Model:
Dissolved Oxygen Meter Model:
ORP (Redex) Meter Model:
Organic Vapour Meter Model:
☐ D.O. Ampoule

☒ Field Bump ☐ pH4 ☐ pH7 ☐ pH10 ☐ 1413 us/cm
☒ Field Calibration See Field Notes

WELL DEVELOPMENT/PURGING

Purge Volume: Well. Vol. X 3 = 16.5 litres Start: Finish:
Avg. Flow Rate: L/min. Sample intake depth:

Time	Volume Removed (L)	Temp. (°C)	pH (Units)	☐ Cond. ☒ Specific Cond. µS/cm or mS/cm (circle one)	Redox (mV)	Diss. O_2* (mg/L)	Water Level (m)	Remarks
12:41	2	10.7	6.77	437.9	-12.1	7.29	/	Clear
12:46	5	11.6	6.83	435.4	-3.4	7.39	/	
12:49	7.5	11.7	6.67	460.1	11.4	6.92	/	
	Drying up at 7.5L - Allow Re-charge							
	Sampled at 13:20							
13:20	10	10.4	6.56	420.6	47.0	6.50		

* Record DO in mg/L, not percentage

Comments:
Sheen: ☐ Yes ☒ No If yes ☐ Hydrocarbon-like OR ☐ Metallic-like
Turbidity: Clear IIIII Very Silty
Other:

Analysis	Type		Container Size							Filtered		Preservatives
			40 mL	120 mL	250 mL	500 mL	1 L	2 L	4 L			
6P	☒ Plastic	☐ Glass			1					☐ Yes	☒ No	/
D. Metals	☐ Plastic	☒ Glass	1	1						☒ Yes	☐ No	/
TOC	☐ Plastic	☒ Glass		1						☐ Yes	☒ No	H_2SO_4
D. F	☐ Plastic	☒ Glass					2			☐ Yes	☒ No	
CP	☐ Plastic	☒ Glass		2						☐ Yes	☒ No	Sod Bisulphate
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	

(8) SCN No. 23822-02 Consumables: ☐ Waterra Tubing ☐ HDPE/Teflon Tubing ☐ Groundwater Filter
Field Dup. / ☐ Silicon Tubing ☐ D.O. Ampoules ☐ Footvalve

CP: chlorinated/non-chlorinated phenols
6P: T>SI TDS / T. Alk / Sulphate / TOC

GROUNDWATER DEVELOPMENT AND SAMPLING DATA

☐ Development ☒ Purging/Sampling Well No.: 94-3

Project Name: CATALYST - WILDWOOD **Project No.:** CA0033347.0492
Location: POWELL RIVER, BC **Date:** 26 NOV 24
Weather: OVERCAST **Temperature:** 1°C **Completed By:** (full name) S SUTHERLAND
GPS Coordinates: **Reviewed By:**

MONITORING WELL INFORMATION

Time of Measurement: NOV 24
Depth to Product: / m Product Thickness: / m
Depth to Water (A): 7.854 m below ☒ TOP
Depth to Bottom of Well (B): 9.55 m below ☒ TOP
Diameter of Standpipe: 51 mm
Well Condition: Good

Tidally Influenced: ☐ Yes ☒ No
Pressurized: ☐ Yes ☒ No
Well Headspace: / ppm
One Well Volume:
(B-A)*2.0 = 3.4 Litres - for a 51 mm (2.0 inch) diameter well
(B-A)*1.1 = / Litres - for a 38 mm (1.5 inch) diameter well

EQUIPMENT LIST

Pump ☐ Waterra ☐ Hydrolift ☒ Bailer (Type:) ☐ Peristaltic ☐ Submersible ☐ Bladder

Multimeter Model: YSI PRO QUATRO BU2000753
pH/Temp Meter Model:
Conductivity Meter Model:
Dissolved Oxygen Meter Model:
ORP (Redex) Meter Model:
Organic Vapour Meter Model:

Rental Equipment:
☒ Field Bump
☒ pH4 ☒ pH7
☒ pH10
☒ 1413 us/cm
☒ Field Calibration See SS Field Notes

Pump Details: ☐ D.O. Ampoule

WELL DEVELOPMENT/PURGING

Purge Volume: Well. Vol. X 3 = ~11 litres Start: Finish:
Avg. Flow Rate: L/min. Sample intake depth:

Time	Volume Removed (L)	Temp. (°C)	pH (Units)	☐ Cond. ☒ Specific Cond. µS/cm or mS/cm (circle one)	Redox (mV)	Diss. O_2* (mg/L)	Water Level (m)	Remarks
13:57	2	9.2	5.83	57.8	16.1	11.00	/	Clear.
14:01	5	9.4	5.77	43.1	5.9	7.88	/	
14:05	8	9.4	5.68	43.4	3.9	7.00	/	
14:11	11	9.4	5.69	43.4	10.4	6.63	/	Sampled.

* Record DO in mg/L, not percentage

Comments:
Sheen: ☐ Yes ☒ No If yes ☐ Hydrocarbon-like OR ☐ Metallic-like
Turbidity: Clear I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I Very Silty
Other:

Analysis	Type		Container Size							Filtered		Preservatives
			40 mL	120 mL	250 mL	500 mL	1 L	2 L	4 L			
67	☒ Plastic	☐ Glass			1					☐ Yes	☒ No	/
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	

SCN No. 23827-03 Consumables: ☐ Waterra Tubing ☐ HDPE/Teflon Tubing ☐ Groundwater Filter
Field Dup. / ☐ Silicon Tubing ☐ D.O. Ampoules ☐ Footvalve

GROUNDWATER DEVELOPMENT AND SAMPLING DATA

☐ Development ☒ Purging/Sampling Well No.: AH-6L

Project Name: CATALYST - WILDWOOD **Project No.:** CA0053347.0492

Location: Powell River, BC **Date:** 26 NOV 24

Weather: Overcast **Temperature:** 1°C **Completed By:** (full name) S Sutherland

GPS Coordinates: **Reviewed By:**

MONITORING WELL INFORMATION

Time of Measurement: NOV24

Depth to Product: / m Product Thickness: / m

Depth to Water (A): 8.448 m below ☐ TOP

Depth to Bottom of Well (B): 19.4 m below ☐ TOP

Diameter of Standpipe: 51 mm

Well Condition: Good - casing lid off at the time.

Tidally Influenced: ☐ Yes ☒ No

Pressurized: ☐ Yes ☒ No

Well Headspace: / ppm

One Well Volume:

(B-A)*2.0 = 2 Litres - for a 51 mm (2.0 inch) diameter well

(B-A)*1.1 = / Litres - for a 38 mm (1.5 inch) diameter well

EQUIPMENT LIST

Pump ☐ Waterra ☐ Hydrolift ☒ Bailer (Type:) ☐ Peristaltic ☐ Submersible ☐ Bladder

Multimeter Model: YSI Pro Quatro ☐

pH/Temp Meter Model:

Conductivity Meter Model:

Dissolved Oxygen Meter Model:

ORP (Redex) Meter Model: V

Organic Vapour Meter Model:

Rental Equipment: BUR000753

☒ Field Bump

☐ pH4 ☐ pH7

☐ pH10

☐ 1413 us/cm

Pump Details: ☐ D.O. Ampoule

☒ Field Calibration See S Sutherland Field Notes

WELL DEVELOPMENT/PURGING

Purge Volume: Well. Vol. X 3 = 6 litres Start: Finish:

Avg. Flow Rate: L/min. Sample intake depth:

Time	Volume Removed (L)	Temp. (°C)	pH (Units)	☐ Cond. ☒ Specific Cond. ~~uS/cm~~ or mS/cm (circle one)	Redox (mV)	Diss. O_2* (mg/L)	Water Level (m)	Remarks
1527	2	9.6	8.64	2484	72.7	1.91	/	Tea-like odour
1531	4	10.2	8.55	2412	65.3	1.56	/	
1533	6	10.3	8.47	2366	64.3	1.45	/	Sampled.

* Record DO in mg/L, not percentage

Comments:

Sheen: ☐ Yes ☒ No If yes ☐ Hydrocarbon-like OR ☐ Metallic-like

Turbidity: Clear Very Silty

Other:

F-M sand at bottom of well

Analysis	Type		Container Size							Filtered		Preservatives
			40 mL	120 mL	250 mL	500 mL	1 L	2 L	4 L			
GP	☒ Plastic	☐ Glass			1					☐ Yes	☒ No	/
Diss Metals	☒ Plastic	☒ Glass	1	1						☒ Yes	☐ No	/
TOC	☐ Plastic	☒ Glass		1						☐ Yes	☒ No	H_2SO_4
DIF	☐ Plastic	☒ Glass					2			☐ Yes	☒ No	/
CP	☐ Plastic	☒ Glass		1						☐ Yes	☒ No	Iod Si
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	

SCN No. 23822-04 Consumables: ☐ Waterra Tubing ☐ HDPE/Teflon Tubing ☐ Groundwater Filter

Field Dup. / ☐ Silicon Tubing ☐ D.O. Ampoules ☐ Footvalve

GROUNDWATER DEVELOPMENT AND SAMPLING DATA

☐ Development ☒ Purging/Sampling Well No.: 89-5

Project Name: CATALYST - WILDWOOD **Project No.:** CA0033347.0497
Location: Powell River, BC **Date:** 26 NOV 24
Weather: Overcast **Temperature:** 1°C **Completed By:** (full name) S Sutherland
GPS Coordinates: **Reviewed By:**

MONITORING WELL INFORMATION

Time of Measurement: NOV 24
Depth to Product: — m Product Thickness: — m
Depth to Water (A): 23.33 m below ☒ TOP
Depth to Bottom of Well (B): 26.3 m below ☒ TOP
Diameter of Standpipe: 51 mm
Well Condition: Good.

Tidally Influenced: ☐ Yes ☒ No
Pressurized: ☐ Yes ☒ No
Well Headspace: — ppm
One Well Volume:
(B-A)*2.0 = 6 Litres - for a 51 mm (2.0 inch) diameter well
(B-A)*1.1 = — Litres - for a 38 mm (1.5 inch) diameter well

EQUIPMENT LIST

Pump ☐ Waterra ☒ Hydrolift ☐ Bailer (Type:) ☐ Peristaltic ☐ Submersible ☐ Bladder
Pump Details:

Multimeter Model: YSI ProQuatro EQUIP 000753
pH/Temp Meter Model:
Conductivity Meter Model:
Dissolved Oxygen Meter Model:
ORP (Redex) Meter Model: ✓
Organic Vapour Meter Model:
☐ D.O. Ampoule

☐ Rental Equipment:
☒ Field Bump
☐ pH4 ☐ pH7
☐ pH10
☐ 1413 us/cm
☒ Field Calibration See SS Field Notes

WELL DEVELOPMENT/PURGING

Purge Volume: Well. Vol. X = litres Start: Finish:
Avg. Flow Rate: L/min. Sample intake depth:

Time	Volume Removed (L)	Temp. (°C)	pH (Units)	☐ Cond. ☒ Specific Cond. µS/cm or mS/cm (circle one)	Redox (mV)	Diss. O_2* (mg/L)	Water Level (m)	Remarks
NOV 26 12:08	4	11.3	7.27	1453	59.7	1.82	—	Tea-like odour
12:10	9	11.2	7.42	1460	33.5	1.74	—	
12:12	13	11.5	7.37	1495	22.5	1.47	—	
12:14	17	11.3	7.46	1490	19.2	3.55	—	
Drying up at 18L - Allow recharge					Sample Next Day			~~Stop~~
NOV 27 0905	20	9.7	7.31	1353	-15.8	4.67	—	Sampled
Sampled on NOV 27 at 09:00								

* Record DO in mg/L, not percentage

Comments:
Sheen: ☐ Yes ☒ No If yes ☐ Hydrocarbon-like OR ☐ Metallic-like
Turbidity: Clear | | | | | | | |

GROUNDWATER DEVELOPMENT AND SAMPLING DATA

☐ Development ☒ Purging/Sampling Well No.: 93-23

Project Name: CATALYST - WILDWOOD **Project No.:** CA0033347.0492
Location: Powell River, BC **Date:** 27 NOV 24
Weather: Overcast **Temperature:** 3°C **Completed By:** (full name) Sean Sutherland
GPS Coordinates: **Reviewed By:**

MONITORING WELL INFORMATION

Time of Measurement: /
Depth to Product: / m Product Thickness: / m
Depth to Water (A): 29.766 m below ☐ TOP
Depth to Bottom of Well (B): 33 m below ☐ TOP
Diameter of Standpipe: 51 mm
Well Condition: OK

Tidally Influenced: ☐ Yes ☒ No
Pressurized: ☐ Yes ☒ No
Well Headspace: / ppm
One Well Volume:
(B-A)*2.0 = 6.4 Litres - for a 51 mm (2.0 inch) diameter well
(B-A)*1.1 = / Litres - for a 38 mm (1.5 inch) diameter well

EQUIPMENT LIST

BUR000753

Pump ☐ Waterra ☒ Hydrolift ☐ Bailer (Type:) ☐ Peristaltic ☐ Submersible ☐ Bladder
Pump Details:

Multimeter Model: YSI ProQuatro
pH/Temp Meter Model:
Conductivity Meter Model:
Dissolved Oxygen Meter Model:
ORP (Redex) Meter Model:
Organic Vapour Meter Model:
☐ D.O. Ampoule

Rental Equipment:
☑ Field Bump
☐ pH4 ☐ pH7
☐ pH10
☐ 1413 us/cm
☑ Field Calibration See Field Notes

WELL DEVELOPMENT/PURGING

Purge Volume: Well. Vol. X 3. = 19. litres Start: Finish:
Avg. Flow Rate: L/min. Sample intake depth: 32.2

Time	Volume Removed (L)	Temp. (°C)	pH (Units)	☐ Cond. ☑ Specific Cond. µS/cm or mS/cm (circle one)	Redox (mV)	Diss. O_2* (mg/L)	Water Level (m)	Remarks
1007.	4	9.0	7.84	231.7	-59.6	6.45	—	Clear.
1009	8	9.4	7.32	183.2	-40.8	6.55	—	
1011	12	9.4	7.22	180.1	-33.7	6.87	—	
1013.	16.	9.4	7.12	179.6	-21.9	6.80	—	
1015	20.	9.4	6.84	179.5	-3.7	5.67	—	Sampled

* Record DO in mg/L, not percentage

Comments:
Sheen: ☐ Yes ☒ No If yes ☐ Hydrocarbon-like OR ☐ Metallic-like
Turbidity: Clear [| | |] Very Silty
Other:

Analysis	Type		Container Size 40 mL	120 mL	250 mL	500 mL	1 L	2 L	4 L	Filtered		Preservatives
6P	☑ Plastic	☐ Glass		1						☐ Yes	☒ No	—
TPC	☐ Plastic	☑ Glass		1						☐ Yes	☒ No	H_2SO_4
D. Metals	☑ Plastic	☑ Glass	1	1						☑ Yes	☐ No	—
DIC	☐ Plastic	☑ Glass					2			☐ Yes	☐ No	—
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	

SCN No. 23822-06 Consumables: ☐ Waterra Tubing ☐ HDPE/Teflon Tubing ☐ Groundwater Filter
Field Dup. ☐ Silicon Tubing ☐ D.O. Ampoules ☐ Footvalve

GROUNDWATER DEVELOPMENT AND SAMPLING DATA

☐ Development ☒ Purging/Sampling Well No.: 94-19L

Project Name: Catalyst - RTF
Location: Powell River, BC
Weather: Overcast **Temperature:** 3°c
GPS Coordinates:
Project No.: CA0033347.0492
Date: ~~Jul/Aug 2023~~ 27 Nov 24
Completed By: (full name) Jenn Sutherland
Reviewed By:

MONITORING WELL INFORMATION

Time of Measurement: 1025
Depth to Product: / m Product Thickness: / m
Depth to Water (A): 40.185 m below ☑ TOP
Depth to Bottom of Well (B): 51 m below ☑ TOP
Diameter of Standpipe: 25.4 mm
Well Condition: OK

Tidally Influenced: ☐ Yes ☑ No
Pressurized: ☐ Yes ☑ No
Well Headspace: / ppm
One Well Volume: 1 "
(0.5) (B-A)*2.0 = ~5.5 Litres - for a 51 mm (2.0 inch) diameter well
(B-A)*1.1 = / Litres - for a 38 mm (1.5 inch) diameter well

EQUIPMENT LIST

BVR000753

Pump ☐ Waterra ☒ Hydrolift ☐ Bailer (Type:) ☐ Peristaltic ☐ Submersible ☐ Bladder
Pump Details:

Multimeter Model: YSI ProQuatro ☐
pH/Temp Meter Model:
Conductivity Meter Model:
Dissolved Oxygen Meter Model:
ORP (Redex) Meter Model:
Organic Vapour Meter Model:
☐ D.O. Ampoule

☐ Rental Equipment
☑ Field Bump
☐ pH4 ☐ pH7
☐ pH10
☐ 1413 us/cm
☑ Field Calibration See Field Notes

WELL DEVELOPMENT/PURGING

Purge Volume: Well. Vol. X 3 = 16.5 litres
Avg. Flow Rate: L/min.
Start: Finish:
Sample intake depth: 50.2

Time	Volume Removed (L)	Temp. (°C)	pH (Units)	☐ Cond. ☐ Specific Cond. µS/cm or mS/cm (circle one)	Redox (mV)	Diss. O_2* (mg/L)	Water Level (m)	Remarks
11:53	3	10.1	7.33	304.4	-35.7	5.22	/	Slightly turbid.
11:55	7	10.3	7.12	289.5	-40.0	5.20	/	greyish tinge,
11:57	11	10.3	7.03	280.1	-34.9	5.31	/	
11:59	14	10.3	6.89	271.2	-26.0	5.07	/	
12:01	17	10.1	6.81	267.4	-12.4	4.60	/	Sampled.

* Record DO in mg/L, not percentage

Comments:
Sheen: ☐ Yes ☑ No If yes ☐ Hydrocarbon-like OR ☐ Metallic-like
Turbidity: Clear IIII

GROUNDWATER DEVELOPMENT AND SAMPLING DATA

☐ Development ☑ Purging/Sampling Well No.: 94-113

Project Name: Catalyst - RTF **Project No.:** ~~2[illegible]~~ CA0033347.0492
Location: Powell River, BC **Date:** ~~[illegible]~~ 27NOV24
Weather: Overcast **Temperature:** 3°c **Completed By:** (full name) Sean Litwiniuk
GPS Coordinates: **Reviewed By:**

MONITORING WELL INFORMATION

Time of Measurement: 1100 25
Depth to Product: / m Product Thickness: / m
Depth to Water (A): 36.309 m below ☐ TOP
Depth to Bottom of Well (B): 44 m below ☐ TOP
Diameter of Standpipe: 25.4 mm
Well Condition: OK.

Tidally Influenced: ☐ Yes ☑ No
Pressurized: ☐ Yes ☑ No
Well Headspace: / ppm
One Well Volume:
(B-A)*~~20~~ 14 = ~4. Litres - for a ~~51 mm (2.0 inch)~~ diameter well
(B-A)*1.1 = / Litres - for a 38 mm (1.5 inch) diameter well

EQUIPMENT LIST

Pump ☐ Waterra ☒ Hydrolift ☐ Bailer (Type:_____) ☐ Peristaltic ☐ Submersible ☐ Bladder
Pump Details:

Multimeter Model: YSI ProQuatro SWR000753 ☐ Rental Equipment:
pH/Temp Meter Model:
Conductivity Meter Model: ☑ Field Bump
Dissolved Oxygen Meter Model: ☐ pH4 ☐ pH7
ORP (Redex) Meter Model: ☐ pH10
Organic Vapour Meter Model: ☐ 1413 us/cm
☐ D.O. Ampoule ☑ Field Calibration See Field Notes

WELL DEVELOPMENT/PURGING

Purge Volume: Well. Vol. X 3 = 12 litres Start: Finish:
Avg. Flow Rate: L/min. Sample intake depth:

Time	Volume Removed (L)	Temp. (°C)	pH (Units)	☐ Cond. ☐ Specific Cond. ~~µS/cm~~ or mS/cm (circle one)	Redox (mV)	Diss. O_2* (mg/L)	Water Level (m)	Remarks
1253	3	10.5	7.46	219.7	16.9	9.64	—	Clear
12:55	6.5	10.4	7.21	216.6	16.8	4.80	—	
12:56	9	10.4	7.11	215.9	17.3	4.98	—	
12:57	12	10.4	7.03	214.2	17.9	4.61	—	Sampled.

* Record DO in mg/L, not percentage

Comments:
Sheen: ☐ Yes ☑ ~~No~~ If yes ☐ Hydrocarbon-like OR ☐ Metallic-like
Turbidity: Clear I I I I I I I I I I I I I I I I I I I I I I I I I I I Very Silty
Other:

Analysis	Type		Container Size							Filtered		Preservatives
			40 mL	120 mL	250 mL	500 mL	1 L	2 L	4 L			
GP	☑ Plastic	☐ Glass			1x2					☐ Yes	☐ No	
TOC	☐ Plastic	☑ Glass		1x2						☐ Yes	☐ No	
D.Metals	☑ Plastic	☑ Glass	1x2	1x2						☐ Yes	☐ No	
DIF	☐ Plastic	☑ Glass					2			☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	

SCN No. 23822-08 Consumables: ☐ Waterra Tubing _____ ☐ HDPE/Teflon Tubing _____ ☐ Groundwater Filter
Field Dup. 23822-09 ☐ Silicon Tubing _____ ☐ D.O. Ampoules _____ ☐ Footvalve

→ RUPE GP/TOC/D.Metals

GROUNDWATER DEVELOPMENT AND SAMPLING DATA

☐ Development
☑ Purging/Sampling

Well No.: 94-16B

Project Name: Catalyst Wildwood. **Project No.:** CA0033347.0492
Location: Powell River **Date:** 27 NOV 24
Weather: Overcast **Temperature:** 3°C **Completed By:** (full name) S Sutherland.
GPS Coordinates: **Reviewed By:**

MONITORING WELL INFORMATION

Time of Measurement: 27 NOV 25
Depth to Product: / m Product Thickness: / m
Depth to Water (A): 38.005 m below ☐ TOP
Depth to Bottom of Well (B): ~50 m below ☑ TOP
Diameter of Standpipe: 51 mm
Well Condition: OK

Tidally Influenced: ☐ Yes ☑ No
Pressurized: ☐ Yes ☑ No
Well Headspace: / ppm
One Well Volume:
(B-A)*2.0 = 24 Litres - for a 51 mm (2.0 inch) diameter well
(B-A)*1.1 = / Litres - for a 38 mm (1.5 inch) diameter well

EQUIPMENT LIST

Pump
☐ Waterra
☑ Hydrolift
☐ Bailer (Type: _____)
☐ Peristaltic
☐ Submersible
☐ Bladder

Multimeter Model: YSI ProQuatro 23200753 ☑ Rental Equipment:
pH/Temp Meter Model:
Conductivity Meter Model:
Dissolved Oxygen Meter Model:
ORP (Redex) Meter Model:
Organic Vapour Meter Model:

☑ Field Bump
☐ pH4 _____ ☐ pH7 _____
☐ pH10 _____
☐ 1413 us/cm _____

Pump Details: _____ ☐ D.O. Ampoule ☑ Field Calibration See Field Notes

WELL DEVELOPMENT/PURGING

Purge Volume: Well. Vol. X 3 = 72 litres Start: _____ Finish: _____
Avg. Flow Rate: _____ L/min. Sample intake depth: _____

Time	Volume Removed (L)	Temp. (°C)	pH (Units)	☐ Cond. ☑ Specific Cond. µS/cm or mS/cm (circle one)	Redox (mV)	Diss. O_2* (mg/L)	Water Level (m)	Remarks
1105	6	9.9	7.65	336.2	35.3	3.24	—	Clear. wl
1106	10	10.0	7.72	315.4	3.5	3.21	—	Some organics
1108	14	10.0	7.63	306.0	-70.1	7.89	—	
1110	18	10.0	7.62	304.9	-20.1	5.33	—	
1112	22	10.1	7.60	304.6	-27.7	5.24	—	
	DRYING UP AT 24L -> ALLOW FOR RECHARGE.							
1344	24	9.9	7.54	299.9	30.6	2.77	—	Sampled.

* Record DO in mg/L, not percentage

Comments:
Sheen: ☐ Yes ☑ No If yes ☐ Hydrocarbon-like OR ☐ Metallic-like
Turbidity: Clear |||||||||||||||||||||||||||| Very Silty
Other: _____

Analysis	Type		Container Size							Filtered		Preservatives
			40 mL	120 mL	250 mL	500 mL	1 L	2 L	4 L			
6P	☑ Plastic	☐ Glass			1					☐ Yes	☐ No	—
TOC	☐ Plastic	☑ Glass		1						☐ Yes	☐ No	H_2SO_4
D. Metals	☑ Plastic	☑ Glass	1	1						☐ Yes	☐ No	—
D:F	☐ Plastic	☑ Glass					2			☐ Yes	☐ No	—
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	

SCN No. 23822-10 Consumables: ☐ Waterra Tubing _____ ☐ HDPE/Teflon Tubing _____ ☐ Groundwater Filter
Field Dup. / ☐ Silicon Tubing _____ ☐ D.O. Ampoules _____ ☐ Footvalve

APPENDIX E

2024 Laboratory Reports

CERTIFICATE OF ANALYSIS

Work Order	: **VA24C3500**		
Client	: **WSP Canada Inc.**	Laboratory	: ALS Environmental - Vancouver
Contact	: Jarod Devries	Account Manager	: Amber Springer
Address	: 840 Howe St, 10th Floor Vancouver British Columbia Canada V6Z 2S9	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: ----	Telephone	: +1 604 253 4188
Project	: CA0033347.0492 Task 5010	Date Samples Received	: 10-Sep-2024 13:15
PO	: ----	Date Analysis Commenced	: 10-Sep-2024
C-O-C number	: 23603	Issue Date	: 15-Oct-2024 09:04
Sampler	: ----		
Site	: ----		
Quote number	: WSP Western Canada Standing Offer		
No. of samples received	: 4		
No. of samples analysed	: 4		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Elke Tabora	Lab Analyst	Inorganics, Calgary, Alberta
Leon Yang	Analyst	Inorganics, Burnaby, British Columbia

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key: CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances.
LOR: Limit of Reporting (detection limit).

Unit	*Description*
mg/L	milligrams per litre

<: less than.
>: greater than.
Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical Results

Sub-Matrix: Water
(Matrix: Water)

Analyte	CAS Number	Method/Lab/Accreditation	LOR	Unit	Client sample ID	23603-01	23603-02	23603-03	----	----
					Client sampling date / time	06-Sep-2024 11:35	06-Sep-2024 12:05	06-Sep-2024 11:35	----	----
						VA24C3500-001	VA24C3500-002	VA24C3500-003	----	----
						Result	Result	Result	----	----
Physical Tests										
Alkalinity, total (as CaCO3)	----	E290/VA	1.0	mg/L		85.0	62.7	82.1	----	----
Solids, total dissolved [TDS]	----	E162/VA	10	mg/L		176	160	194	----	----
Solids, total suspended [TSS]	----	E160/VA	3.0	mg/L		<3.0	<3.0	4.4	----	----
Anions and Nutrients										
Chloride	16887-00-6	E235.Cl/VA	0.50	mg/L		31.1	27.9	----	----	----
Sulfate (as SO4)	14808-79-8	E235.SO4/VA	0.30	mg/L		20.9	10.4	21.1	----	----
Organic / Inorganic Carbon										
Carbon, dissolved organic [DOC]	----	E358-L/CG	0.50	mg/L		0.86	1.07	----	----	----
Carbon, total organic [TOC]	----	E355-L/CG	0.50	mg/L		0.97	1.30	1.15	----	----

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

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QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **VA24C3500**	Page	: 1 of 8
Client	: **WSP Canada Inc.**	Laboratory	: ALS Environmental - Vancouver
Contact	: Jarod Devries	Account Manager	: Amber Springer
Address	: 840 Howe St, 10th Floor Vancouver BC Canada V6Z 2S9	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: ----	Telephone	: +1 604 253 4188
Project	: CA0033347.0492 Task 5010	Date Samples Received	: 10-Sep-2024 13:15
PO	: ----	Issue Date	: 15-Oct-2024 09:05
C-O-C number	: 23603		
Sampler	: ----		
Site	: ----		
Quote number	: WSP Western Canada Standing Offer		
No. of samples received	: 4		
No. of samples analysed	: 4		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- Analysis Holding Time Outliers exist - please see following pages for full details.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group : Analytical Method / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Chloride in Water by IC										
HDPE 23603-01	E235.Cl	06-Sep-2024	11-Sep-2024	28 days	5 days	✓	11-Sep-2024	28 days	5 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE 23603-02	E235.Cl	06-Sep-2024	11-Sep-2024	28 days	5 days	✓	11-Sep-2024	28 days	5 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE 23603-01	E235.SO4	06-Sep-2024	11-Sep-2024	28 days	5 days	✓	11-Sep-2024	28 days	5 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE 23603-02	E235.SO4	06-Sep-2024	11-Sep-2024	28 days	5 days	✓	11-Sep-2024	28 days	5 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE 23603-03	E235.SO4	06-Sep-2024	11-Sep-2024	28 days	5 days	✓	11-Sep-2024	28 days	5 days	✓
Dioxins and Furans : Dioxins and Furans in Water by GC-HRMS										
Amber glass/Teflon lined cap 23603-01	E766	06-Sep-2024	----	----	----		15-Oct-2024	365 days	39 days	✓
Dioxins and Furans : Dioxins and Furans in Water by GC-HRMS										
Amber glass/Teflon lined cap 23603-02	E766	06-Sep-2024	----	----	----		15-Oct-2024	365 days	39 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group : Analytical Method / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Dioxins and Furans : Dioxins and Furans in Water by GC-HRMS										
Amber glass/Teflon lined cap										
23603-03	E766	06-Sep-2024	----	----	----		15-Oct-2024	365 days	39 days	✓
Dioxins and Furans : Dioxins and Furans in Water by GC-HRMS										
Amber glass/Teflon lined cap										
23603-04	E766	06-Sep-2024	----	----	----		15-Oct-2024	365 days	39 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid)										
23603-01	E358-L	06-Sep-2024	15-Sep-2024	28 days	9 days	✓	16-Sep-2024	28 days	10 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid)										
23603-02	E358-L	06-Sep-2024	15-Sep-2024	28 days	9 days	✓	16-Sep-2024	28 days	10 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid)										
23603-01	E355-L	06-Sep-2024	15-Sep-2024	28 days	9 days	✓	16-Sep-2024	28 days	10 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid)										
23603-02	E355-L	06-Sep-2024	15-Sep-2024	28 days	9 days	✓	16-Sep-2024	28 days	10 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (lab preserved)										
23603-03	E355-L	06-Sep-2024	10-Sep-2024	3 days	4 days	× EHTR	11-Sep-2024	28 days	1 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE										
23603-01	E290	06-Sep-2024	11-Sep-2024	14 days	5 days	✓	12-Sep-2024	14 days	6 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE										
23603-02	E290	06-Sep-2024	11-Sep-2024	14 days	5 days	✓	12-Sep-2024	14 days	6 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group : Analytical Method / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Alkalinity Species by Titration										
HDPE										
23603-03	E290	06-Sep-2024	11-Sep-2024	14 days	5 days	✓	12-Sep-2024	14 days	6 days	✓
Physical Tests : TDS by Gravimetry										
HDPE										
23603-01	E162	06-Sep-2024	----	----	----		12-Sep-2024	7 days	6 days	✓
Physical Tests : TDS by Gravimetry										
HDPE										
23603-02	E162	06-Sep-2024	----	----	----		12-Sep-2024	7 days	6 days	✓
Physical Tests : TDS by Gravimetry										
HDPE										
23603-03	E162	06-Sep-2024	----	----	----		12-Sep-2024	7 days	6 days	✓
Physical Tests : TSS by Gravimetry										
HDPE										
23603-01	E160	06-Sep-2024	----	----	----		12-Sep-2024	7 days	6 days	✓
Physical Tests : TSS by Gravimetry										
HDPE										
23603-02	E160	06-Sep-2024	----	----	----		12-Sep-2024	7 days	6 days	✓
Physical Tests : TSS by Gravimetry										
HDPE										
23603-03	E160	06-Sep-2024	----	----	----		12-Sep-2024	7 days	6 days	✓

Legend & Qualifier Definitions

EHTR: Exceeded ALS recommended hold time prior to sample receipt.

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water**

Evaluation: × = *QC frequency outside specification*; ✓ = *QC frequency within specification.*

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Alkalinity Species by Titration	E290	1644541	1	6	16.6	5.0	✓
Chloride in Water by IC	E235.Cl	1644536	1	17	5.8	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	1652740	1	15	6.6	5.0	✓
Sulfate in Water by IC	E235.SO4	1644535	1	16	6.2	5.0	✓
TDS by Gravimetry	E162	1648241	1	20	5.0	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	1643239	1	13	7.6	5.0	✓
TSS by Gravimetry	E160	1648230	1	20	5.0	5.0	✓
Laboratory Control Samples (LCS)							
Alkalinity Species by Titration	E290	1644541	1	6	16.6	5.0	✓
Chloride in Water by IC	E235.Cl	1644536	1	17	5.8	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	1652740	1	15	6.6	5.0	✓
Sulfate in Water by IC	E235.SO4	1644535	1	16	6.2	5.0	✓
TDS by Gravimetry	E162	1648241	1	20	5.0	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	1643239	1	13	7.6	5.0	✓
TSS by Gravimetry	E160	1648230	1	20	5.0	5.0	✓
Method Blanks (MB)							
Alkalinity Species by Titration	E290	1644541	1	6	16.6	5.0	✓
Chloride in Water by IC	E235.Cl	1644536	1	17	5.8	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	1652740	1	15	6.6	5.0	✓
Sulfate in Water by IC	E235.SO4	1644535	1	16	6.2	5.0	✓
TDS by Gravimetry	E162	1648241	1	20	5.0	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	1643239	1	13	7.6	5.0	✓
TSS by Gravimetry	E160	1648230	1	20	5.0	5.0	✓
Matrix Spikes (MS)							
Chloride in Water by IC	E235.Cl	1644536	1	17	5.8	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	1652740	1	15	6.6	5.0	✓
Sulfate in Water by IC	E235.SO4	1644535	1	16	6.2	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	1643239	1	13	7.6	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
TSS by Gravimetry	E160 ALS Environmental - Vancouver	Water	APHA 2540 D (mod)	Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, following by drying of the filter at 104 ± 1°C, with gravimetric measurement of the filtered solids. Samples containing very high dissolved solid content (i.e. seawaters, brackish waters) may produce a positive bias by this method. Alternate analysis methods are available for these types of samples.
TDS by Gravimetry	E162 ALS Environmental - Vancouver	Water	APHA 2540 C (mod)	Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, with evaporation of the filtrate at 180 ± 2°C for 16 hours or to constant weight, with gravimetric measurement of the residue.
Chloride in Water by IC	E235.Cl ALS Environmental - Vancouver	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Sulfate in Water by IC	E235.SO4 ALS Environmental - Vancouver	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Alkalinity Species by Titration	E290 ALS Environmental - Vancouver	Water	APHA 2320 B (mod)	Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L ALS Environmental - Vancouver	Water	APHA 5310 B (mod)	Total Organic Carbon (Non-Purgeable), also known as NPOC (total), is a direct measurement of TOC after an acidified sample has been purged to remove inorganic carbon (IC). Analysis is by high temperature combustion with infrared detection of CO_2. NPOC does not include volatile organic species that are purged off with IC. For samples where the majority of total carbon (TC) is comprised of IC (which is common), this method is more accurate and more reliable than the TOC by subtraction method (i.e. TC minus TIC).
Dissolved Organic Carbon by Combustion (Low Level)	E358-L ALS Environmental - Calgary	Water	APHA 5310 B (mod)	Dissolved Organic Carbon (Non-Purgeable), also known as NPOC (dissolved), is a direct measurement of DOC after a filtered (0.45 micron) sample has been acidified and purged to remove inorganic carbon (IC). Analysis is by high temperature combustion with infrared detection of CO_2. NPOC does not include volatile organic species that are purged off with IC. For samples where the majority of DC (dissolved carbon) is comprised of IC (which is common), this method is more accurate and more reliable than the DOC by subtraction method (i.e. DC minus DIC).
Dioxins and Furans in Water by GC-HRMS	E766 ALS Environmental - Burlington	Water	USEPA 1613B	The sample is extracted by liquid/liquid extraction using dichloromethane. The extracts are prepared using column chromatography, reduced in volume and analyzed by isotope-dilution GC-HRMS.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Preparation for Total Organic Carbon by Combustion	EP355 ALS Environmental - Vancouver	Water		Preparation for Total Organic Carbon by Combustion
Preparation for Dissolved Organic Carbon for Combustion	EP358 ALS Environmental - Calgary	Water	APHA 5310 B (mod)	Preparation for Dissolved Organic Carbon

ALS Canada Ltd.

QUALITY CONTROL REPORT

Work Order	: **VA24C3500**	Page	: 1 of 6
Client	: WSP Canada Inc.	Laboratory	: ALS Environmental - Vancouver
Contact	: Jarod Devries	Account Manager	: Amber Springer
Address	: 840 Howe St, 10th Floor Vancouver BC Canada V6Z 2S9	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: ----	Telephone	: +1 604 253 4188
Project	: CA0033347.0492 Task 5010	Date Samples Received	: 10-Sep-2024 13:15
PO	: ----	Date Analysis Commenced	: 10-Sep-2024
C-O-C number	: 23603	Issue Date	: 15-Oct-2024 09:05
Sampler	: ----		
Site	: ----		
Quote number	: WSP Western Canada Standing Offer		
No. of samples received	: 4		
No. of samples analysed	: 4		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Elke Tabora	Lab Analyst	Calgary Inorganics, Calgary, Alberta
Leon Yang	Analyst	Vancouver Inorganics, Burnaby, British Columbia
Michael Challis	Client Services Manager	Burlington Organics, Burlington, Ontario

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Physical Tests (QC Lot: 1644541)											
VA24C3578-001	Anonymous	Alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	41.7	41.2	1.22%	20%	----
Physical Tests (QC Lot: 1648230)											
FJ2402699-001	Anonymous	Solids, total suspended [TSS]	----	E160	3.0	mg/L	61.0	66.6	8.78%	20%	----
Physical Tests (QC Lot: 1648241)											
FJ2402699-001	Anonymous	Solids, total dissolved [TDS]	----	E162	20	mg/L	346	328	5.19%	20%	----
Anions and Nutrients (QC Lot: 1644535)											
VA24C3490-001	Anonymous	Sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	31.6	31.7	0.261%	20%	----
Anions and Nutrients (QC Lot: 1644536)											
VA24C3490-001	Anonymous	Chloride	16887-00-6	E235.Cl	0.50	mg/L	6.37	6.37	0.00939%	20%	----
Organic / Inorganic Carbon (QC Lot: 1643239)											
VA24C2762-001	Anonymous	Carbon, total organic [TOC]	----	E355-L	50.0	mg/L	3240	3180	1.59%	20%	----
Organic / Inorganic Carbon (QC Lot: 1652739)											
FJ2402699-001	Anonymous	Carbon, total organic [TOC]	----	E355-L	0.50	mg/L	5.60	5.71	1.82%	20%	----
Organic / Inorganic Carbon (QC Lot: 1652740)											
FJ2402699-001	Anonymous	Carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L	0.71	0.84	0.12	Diff <2x LOR	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 1644541)						
Alkalinity, total (as CaCO3)	----	E290	1	mg/L	<1.0	----
Physical Tests (QCLot: 1648230)						
Solids, total suspended [TSS]	----	E160	3	mg/L	<3.0	----
Physical Tests (QCLot: 1648241)						
Solids, total dissolved [TDS]	----	E162	10	mg/L	<10	----
Anions and Nutrients (QCLot: 1644535)						
Sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	----
Anions and Nutrients (QCLot: 1644536)						
Chloride	16887-00-6	E235.Cl	0.5	mg/L	<0.50	----
Organic / Inorganic Carbon (QCLot: 1643239)						
Carbon, total organic [TOC]	----	E355-L	0.5	mg/L	<0.50	----
Organic / Inorganic Carbon (QCLot: 1652739)						
Carbon, total organic [TOC]	----	E355-L	0.5	mg/L	<0.50	----
Organic / Inorganic Carbon (QCLot: 1652740)						
Carbon, dissolved organic [DOC]	----	E358-L	0.5	mg/L	<0.50	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Target Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 1644541)									
Alkalinity, total (as CaCO3)	----	E290	1	mg/L	500 mg/L	106	85.0	115	----
Physical Tests (QCLot: 1648230)									
Solids, total suspended [TSS]	----	E160	3	mg/L	150 mg/L	93.0	85.0	115	----
Physical Tests (QCLot: 1648241)									
Solids, total dissolved [TDS]	----	E162	10	mg/L	1000 mg/L	106	85.0	115	----
Anions and Nutrients (QCLot: 1644535)									
Sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	101	90.0	110	----
Anions and Nutrients (QCLot: 1644536)									
Chloride	16887-00-6	E235.Cl	0.5	mg/L	100 mg/L	99.7	90.0	110	----
Organic / Inorganic Carbon (QCLot: 1643239)									
Carbon, total organic [TOC]	----	E355-L	0.5	mg/L	8.57 mg/L	104	80.0	120	----
Organic / Inorganic Carbon (QCLot: 1652739)									
Carbon, total organic [TOC]	----	E355-L	0.5	mg/L	8.57 mg/L	94.5	80.0	120	----
Organic / Inorganic Carbon (QCLot: 1652740)									
Carbon, dissolved organic [DOC]	----	E358-L	0.5	mg/L	8.57 mg/L	92.7	80.0	120	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Anions and Nutrients (QCLot: 1644535)										
VA24C3490-002	Anonymous	Sulfate (as SO4)	14808-79-8	E235.SO4	101 mg/L	100 mg/L	101	75.0	125	----
Anions and Nutrients (QCLot: 1644536)										
VA24C3490-002	Anonymous	Chloride	16887-00-6	E235.Cl	102 mg/L	100 mg/L	102	75.0	125	----
Organic / Inorganic Carbon (QCLot: 1643239)										
VA24C3209-001	Anonymous	Carbon, total organic [TOC]	----	E355-L	5.13 mg/L	5 mg/L	103	70.0	130	----
Organic / Inorganic Carbon (QCLot: 1652739)										
FJ2402699-001	Anonymous	Carbon, total organic [TOC]	----	E355-L	ND mg/L	----	ND	70.0	130	----
Organic / Inorganic Carbon (QCLot: 1652740)										
FJ2402699-001	Anonymous	Carbon, dissolved organic [DOC]	----	E358-L	5.49 mg/L	5 mg/L	110	70.0	130	----

CHAIN OF CUSTODY RECORD/ANALYSIS REQUEST

No. 23603 page 1 of 1

840 Howe St., 10th Floor
Vancouver, British Columbia, Canada V6Z 2M1
Telephone (604) 685-9381

Project Number: CA0033347.0492 Task 5010		Laboratory Name: ALS	
Short Title: Catalyst_Wildwood	WSP Contact: Jarod Devries	Address: 8081 Lougheed Hwy, Bby	
WSP E-mail Address 1: Jarod.Devries@wsp.com	WSP E-mail Address 2: Andrew.Stevens@wsp.com Jean.Sutherland@wsp.com	Telephone/Fax: 604 2534188	Contact: Amber Springer

Office Name: Vancouver

EQuIS Facility Code:

EQuIS upload: ☐

Turnaround Time: ☐ 24 hr ☐ 48 hr ☐ 72 hr ☒ Regular (5 Days)
Criteria: ☐ CSR ☐ CCME ☐ BC Water Quality ☐ Other

Note: Final Reports to be issued by e-mail

Quote No.:

Analyses Required

Sample Control Number (SCN)	Sample Location	Sa. #	Sample Depth (m)	Sample Matrix (over)	Date Sampled (D / M / Y)	Time Sampled (HH:MM)	Sample Type (over)	QAQC Code (over)	Related SCN (over)	Number of Containers	TSS ITAS	Total Alkalinity	Sulphate	TOC	Dioxins; Furans	DOC	RUSH (Select TAT above)	Remarks (over)
23603-01	Spring	1		SW	06/09/24	11:35	GRAB	FDA	23603-03	5	X	X	X	X	X	X		For 23603-03 run general analytes from 2x1L bottles if possible
23603-02	Spring	2		SW	↓	12:05	GRAB			5	X	X	X	X	X	X		
23603-03	Spring	1		SW	↓	11:35	GRAB	FD	23603-01	2	X	X	X	X	X			
~~23603-04~~ 23603-04	Field Blank				06/09/24	12:05				2					X			
SS 07/09/24 - 05																		
- 06																		
- 07																		
- 08																		
- 09																		
- 10																		
- 11																		
- 12																		

Environmental Division
Vancouver
Work Order Reference
VA24C3500

Telephone : +1 604 253 4188

Sampler's Signature:	Relinquished by: Signature	Company WSP	Date 07/09/24	Time 09:00	Received by: Signature	Company
Comments: ON ICE PACKS Provide NATO/WHO TEQ's For DIF Analysis.	Method of Shipment: AIR	Waybill No.:	Received for Lab by:	Date	Time 10:20 AM	
	Shipped by: Pacific Coastal.	Shipment Condition: Seal Intact:	Temp (°C) 4°C, 3°C	Cooler opened by:	Date	Time

WHITE: WSP Copy **YELLOW: Lab Copy**

Icepacks Sept 9th

ESED

ALS Canada Ltd.

right solutions. right partner.

CERTIFICATE OF ANALYSIS

Work Order	: **VA24C3601**	Page	: 1 of 5
Client	: **WSP Canada Inc.**	Laboratory	: ALS Environmental - Vancouver
Contact	: Jarod Devries	Account Manager	: Amber Springer
Address	: 840 Howe St, 10th Floor Vancouver BC Canada V6Z 2S9	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: ----	Telephone	: +1 604 253 4188
Project	: CA0033347.0492 Task 5010	Date Samples Received	: 10-Sep-2024 12:35
PO	: ----	Date Analysis Commenced	: 12-Sep-2024
C-O-C number	: 23755/56	Issue Date	: 17-Sep-2024 15:22
Sampler	: ----		
Site	: ----		
Quote number	: WSP Western Canada Standing Offer		
No. of samples received	: 16		
No. of samples analysed	: 16		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Elke Tabora	Lab Analyst	Inorganics, Calgary, Alberta
Kate Dimitrova	Supervisor - Inorganic	Inorganics, Burnaby, British Columbia

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances

LOR: Limit of Reporting (detection limit).

Unit	*Description*
mg/L	milligrams per litre

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	23755-01	23755-02	23755-03	23755-04	23755-05
					Client sampling date / time	08-Sep-2024 09:35	08-Sep-2024 12:45	08-Sep-2024 13:00	08-Sep-2024 13:55	08-Sep-2024 14:30
						VA24C3601-001	VA24C3601-002	VA24C3601-003	VA24C3601-004	VA24C3601-005
						Result	Result	Result	Result	Result
Physical Tests										
Alkalinity, total (as CaCO3)	----	E290/VA	1.0	mg/L		64.5	157	142	569	76.6
Solids, total dissolved [TDS]	----	E162/VA	10	mg/L		230	----	368	1170	117
Solids, total suspended [TSS]	----	E160/VA	3.0	mg/L		<3.0	----	5.4	48.0	7.0
Anions and Nutrients										
Chloride	16887-00-6	E235.Cl/VA	0.50	mg/L		40.2	393	50.6	68.1	3.64
Sulfate (as SO4)	14808-79-8	E235.SO4/VA	0.30	mg/L		13.7	287	72.6	176	3.48
Organic / Inorganic Carbon										
Carbon, total organic [TOC]	----	E355-L/CG	0.50	mg/L		0.57	----	3.22	158	1.75

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	23755-06	23755-07	23755-08	23755-09	23755-10
					Client sampling date / time	08-Sep-2024 16:00	08-Sep-2024 16:20	08-Sep-2024 16:40	09-Sep-2024 11:15	09-Sep-2024 11:40
						VA24C3601-006	VA24C3601-007	VA24C3601-008	VA24C3601-009	VA24C3601-010
						Result	Result	Result	Result	Result
Physical Tests										
Alkalinity, total (as CaCO3)	----	E290/VA	1.0	mg/L		65.8	47.9	71.5	88.3	98.6
Anions and Nutrients										
Chloride	16887-00-6	E235.Cl/VA	0.50	mg/L		27.6	13.8	26.4	16.9	28.6
Sulfate (as SO4)	14808-79-8	E235.SO4/VA	0.30	mg/L		10.2	5.68	13.0	10.6	27.0

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	23755-11	23755-12	23756-01	23756-02	23756-03
					Client sampling date / time	09-Sep-2024 11:55	09-Sep-2024 12:31	09-Sep-2024 14:15	09-Sep-2024 14:20	09-Sep-2024 16:00
						VA24C3601-011	VA24C3601-012	VA24C3601-013	VA24C3601-014	VA24C3601-015
						Result	Result	Result	Result	Result
Physical Tests										
Alkalinity, total (as CaCO3)	----	E290/VA	1.0	mg/L		69.3	94.4	72.4	109	56.3
Solids, total dissolved [TDS]	----	E162/VA	10	mg/L		151	----	----	----	----
Solids, total suspended [TSS]	----	E160/VA	3.0	mg/L		6.6	----	----	----	----
Anions and Nutrients										
Chloride	16887-00-6	E235.Cl/VA	0.50	mg/L		21.3	31.2	64.6	8.06	14.1
Sulfate (as SO4)	14808-79-8	E235.SO4/VA	0.30	mg/L		12.2	22.9	6.70	14.2	7.24
Organic / Inorganic Carbon										
Carbon, total organic [TOC]	----	E355-L/CG	0.50	mg/L		1.03	----	----	----	----

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

Analytical Results

Sub-Matrix: Water (Matrix: Water)					Client sample ID	23756-04	----	----	----	----
					Client sampling date / time	09-Sep-2024 16:15	----	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit	VA24C3601-016	--------	--------	--------	--------	
					Result	----	----	----	----	
Physical Tests										
Alkalinity, total (as CaCO3)	----	E290/VA	1.0	mg/L	138	----	----	----	----	
Solids, total dissolved [TDS]	----	E162/VA	10	mg/L	165	----	----	----	----	
Solids, total suspended [TSS]	----	E160/VA	3.0	mg/L	88.2	----	----	----	----	
Anions and Nutrients										
Chloride	16887-00-6	E235.Cl/VA	0.50	mg/L	11.3	----	----	----	----	
Sulfate (as SO4)	14808-79-8	E235.SO4/VA	0.30	mg/L	16.1	----	----	----	----	
Organic / Inorganic Carbon										
Carbon, total organic [TOC]	----	E355-L/CG	0.50	mg/L	5.86	----	----	----	----	

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

ALS Canada Ltd.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **VA24C3601**	Page	: 1 of 12
Client	: **WSP Canada Inc.**	Laboratory	: ALS Environmental - Vancouver
Contact	: Jarod Devries	Account Manager	: Amber Springer
Address	: 840 Howe St, 10th Floor Vancouver BC Canada V6Z 2S9	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: ----	Telephone	: +1 604 253 4188
Project	: CA0033347.0492 Task 5010	Date Samples Received	: 10-Sep-2024 12:35
PO	: ----	Issue Date	: 17-Sep-2024 15:23
C-O-C number	: 23755/56		
Sampler	: ----		
Site	: ----		
Quote number	: WSP Western Canada Standing Offer		
No. of samples received	: 16		
No. of samples analysed	: 16		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group : Analytical Method / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Chloride in Water by IC										
HDPE 23755-09	E235.Cl	09-Sep-2024	12-Sep-2024	28 days	3 days	✓	12-Sep-2024	28 days	3 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE 23755-10	E235.Cl	09-Sep-2024	12-Sep-2024	28 days	3 days	✓	12-Sep-2024	28 days	3 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE 23755-11	E235.Cl	09-Sep-2024	12-Sep-2024	28 days	3 days	✓	12-Sep-2024	28 days	3 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE 23755-12	E235.Cl	09-Sep-2024	12-Sep-2024	28 days	3 days	✓	12-Sep-2024	28 days	3 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE 23756-01	E235.Cl	09-Sep-2024	12-Sep-2024	28 days	3 days	✓	12-Sep-2024	28 days	3 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE 23756-02	E235.Cl	09-Sep-2024	12-Sep-2024	28 days	3 days	✓	12-Sep-2024	28 days	3 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE 23756-03	E235.Cl	09-Sep-2024	12-Sep-2024	28 days	3 days	✓	12-Sep-2024	28 days	3 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group : Analytical Method / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Chloride in Water by IC										
HDPE 23756-04	E235.Cl	09-Sep-2024	12-Sep-2024	28 days	3 days	✓	12-Sep-2024	28 days	3 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE 23755-01	E235.Cl	08-Sep-2024	12-Sep-2024	28 days	4 days	✓	12-Sep-2024	28 days	4 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE 23755-02	E235.Cl	08-Sep-2024	12-Sep-2024	28 days	4 days	✓	12-Sep-2024	28 days	4 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE 23755-03	E235.Cl	08-Sep-2024	12-Sep-2024	28 days	4 days	✓	12-Sep-2024	28 days	4 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE 23755-04	E235.Cl	08-Sep-2024	12-Sep-2024	28 days	4 days	✓	12-Sep-2024	28 days	4 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE 23755-05	E235.Cl	08-Sep-2024	12-Sep-2024	28 days	4 days	✓	12-Sep-2024	28 days	4 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE 23755-06	E235.Cl	08-Sep-2024	12-Sep-2024	28 days	4 days	✓	12-Sep-2024	28 days	4 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE 23755-07	E235.Cl	08-Sep-2024	12-Sep-2024	28 days	4 days	✓	12-Sep-2024	28 days	4 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE 23755-08	E235.Cl	08-Sep-2024	12-Sep-2024	28 days	4 days	✓	12-Sep-2024	28 days	4 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group : Analytical Method / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Sulfate in Water by IC										
HDPE 23755-09	E235.SO4	09-Sep-2024	14-Sep-2024	28 days	5 days	✓	14-Sep-2024	28 days	5 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE 23755-10	E235.SO4	09-Sep-2024	14-Sep-2024	28 days	5 days	✓	14-Sep-2024	28 days	5 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE 23755-11	E235.SO4	09-Sep-2024	14-Sep-2024	28 days	5 days	✓	14-Sep-2024	28 days	5 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE 23755-12	E235.SO4	09-Sep-2024	14-Sep-2024	28 days	5 days	✓	14-Sep-2024	28 days	5 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE 23756-01	E235.SO4	09-Sep-2024	14-Sep-2024	28 days	5 days	✓	14-Sep-2024	28 days	5 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE 23756-02	E235.SO4	09-Sep-2024	14-Sep-2024	28 days	5 days	✓	14-Sep-2024	28 days	5 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE 23756-03	E235.SO4	09-Sep-2024	14-Sep-2024	28 days	5 days	✓	14-Sep-2024	28 days	5 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE 23756-04	E235.SO4	09-Sep-2024	14-Sep-2024	28 days	5 days	✓	14-Sep-2024	28 days	5 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE 23755-01	E235.SO4	08-Sep-2024	14-Sep-2024	28 days	6 days	✓	14-Sep-2024	28 days	6 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group : Analytical Method / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Sulfate in Water by IC										
HDPE 23755-02	E235.SO4	08-Sep-2024	14-Sep-2024	28 days	6 days	✓	14-Sep-2024	28 days	6 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE 23755-03	E235.SO4	08-Sep-2024	14-Sep-2024	28 days	6 days	✓	14-Sep-2024	28 days	6 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE 23755-04	E235.SO4	08-Sep-2024	14-Sep-2024	28 days	6 days	✓	14-Sep-2024	28 days	6 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE 23755-05	E235.SO4	08-Sep-2024	14-Sep-2024	28 days	6 days	✓	14-Sep-2024	28 days	6 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE 23755-06	E235.SO4	08-Sep-2024	14-Sep-2024	28 days	6 days	✓	14-Sep-2024	28 days	6 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE 23755-07	E235.SO4	08-Sep-2024	14-Sep-2024	28 days	6 days	✓	14-Sep-2024	28 days	6 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE 23755-08	E235.SO4	08-Sep-2024	14-Sep-2024	28 days	6 days	✓	14-Sep-2024	28 days	6 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) 23755-11	E355-L	09-Sep-2024	16-Sep-2024	28 days	7 days	✓	16-Sep-2024	28 days	7 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) 23756-04	E355-L	09-Sep-2024	16-Sep-2024	28 days	7 days	✓	16-Sep-2024	28 days	7 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group : Analytical Method / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid)										
23755-01	E355-L	08-Sep-2024	16-Sep-2024	28 days	8 days	✓	16-Sep-2024	28 days	8 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid)										
23755-03	E355-L	08-Sep-2024	16-Sep-2024	28 days	8 days	✓	16-Sep-2024	28 days	8 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid)										
23755-04	E355-L	08-Sep-2024	16-Sep-2024	28 days	8 days	✓	16-Sep-2024	28 days	8 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid)										
23755-05	E355-L	08-Sep-2024	16-Sep-2024	28 days	8 days	✓	16-Sep-2024	28 days	8 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE										
23755-09	E290	09-Sep-2024	12-Sep-2024	14 days	3 days	✓	12-Sep-2024	14 days	3 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE										
23755-10	E290	09-Sep-2024	12-Sep-2024	14 days	3 days	✓	12-Sep-2024	14 days	3 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE										
23755-11	E290	09-Sep-2024	12-Sep-2024	14 days	3 days	✓	12-Sep-2024	14 days	3 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE										
23755-12	E290	09-Sep-2024	12-Sep-2024	14 days	3 days	✓	12-Sep-2024	14 days	3 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE										
23756-01	E290	09-Sep-2024	12-Sep-2024	14 days	3 days	✓	12-Sep-2024	14 days	3 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group : Analytical Method / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Alkalinity Species by Titration										
HDPE 23756-02	E290	09-Sep-2024	12-Sep-2024	14 days	3 days	✓	12-Sep-2024	14 days	3 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE 23756-03	E290	09-Sep-2024	12-Sep-2024	14 days	3 days	✓	12-Sep-2024	14 days	3 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE 23756-04	E290	09-Sep-2024	12-Sep-2024	14 days	3 days	✓	12-Sep-2024	14 days	3 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE 23755-01	E290	08-Sep-2024	12-Sep-2024	14 days	4 days	✓	12-Sep-2024	14 days	4 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE 23755-02	E290	08-Sep-2024	12-Sep-2024	14 days	4 days	✓	12-Sep-2024	14 days	4 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE 23755-03	E290	08-Sep-2024	12-Sep-2024	14 days	4 days	✓	12-Sep-2024	14 days	4 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE 23755-04	E290	08-Sep-2024	12-Sep-2024	14 days	4 days	✓	12-Sep-2024	14 days	4 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE 23755-05	E290	08-Sep-2024	12-Sep-2024	14 days	4 days	✓	12-Sep-2024	14 days	4 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE 23755-06	E290	08-Sep-2024	12-Sep-2024	14 days	4 days	✓	12-Sep-2024	14 days	4 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group : Analytical Method / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Alkalinity Species by Titration										
HDPE 23755-07	E290	08-Sep-2024	12-Sep-2024	14 days	4 days	✓	12-Sep-2024	14 days	4 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE 23755-08	E290	08-Sep-2024	12-Sep-2024	14 days	4 days	✓	12-Sep-2024	14 days	4 days	✓
Physical Tests : TDS by Gravimetry										
HDPE 23755-01	E162	08-Sep-2024	----	----	----		13-Sep-2024	7 days	5 days	✓
Physical Tests : TDS by Gravimetry										
HDPE 23755-11	E162	09-Sep-2024	----	----	----		14-Sep-2024	7 days	5 days	✓
Physical Tests : TDS by Gravimetry										
HDPE 23756-04	E162	09-Sep-2024	----	----	----		14-Sep-2024	7 days	5 days	✓
Physical Tests : TDS by Gravimetry										
HDPE 23755-03	E162	08-Sep-2024	----	----	----		14-Sep-2024	7 days	6 days	✓
Physical Tests : TDS by Gravimetry										
HDPE 23755-04	E162	08-Sep-2024	----	----	----		14-Sep-2024	7 days	6 days	✓
Physical Tests : TDS by Gravimetry										
HDPE 23755-05	E162	08-Sep-2024	----	----	----		14-Sep-2024	7 days	6 days	✓
Physical Tests : TSS by Gravimetry										
HDPE 23755-01	E160	08-Sep-2024	----	----	----		13-Sep-2024	7 days	5 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group : Analytical Method / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : TSS by Gravimetry										
HDPE										
23755-11	E160	09-Sep-2024	----	----	----		14-Sep-2024	7 days	5 days	✓
Physical Tests : TSS by Gravimetry										
HDPE										
23756-04	E160	09-Sep-2024	----	----	----		14-Sep-2024	7 days	5 days	✓
Physical Tests : TSS by Gravimetry										
HDPE										
23755-03	E160	08-Sep-2024	----	----	----		14-Sep-2024	7 days	6 days	✓
Physical Tests : TSS by Gravimetry										
HDPE										
23755-04	E160	08-Sep-2024	----	----	----		14-Sep-2024	7 days	6 days	✓
Physical Tests : TSS by Gravimetry										
HDPE										
23755-05	E160	08-Sep-2024	----	----	----		14-Sep-2024	7 days	6 days	✓

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water**

Evaluation: × = *QC frequency outside specification*; ✓ = *QC frequency within specification.*

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Alkalinity Species by Titration	E290	1646730	1	16	6.2	5.0	✓
Chloride in Water by IC	E235.Cl	1646728	1	19	5.2	5.0	✓
Sulfate in Water by IC	E235.SO4	1650571	1	16	6.2	5.0	✓
TDS by Gravimetry	E162	1651750	2	38	5.2	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	1654117	1	6	16.6	5.0	✓
TSS by Gravimetry	E160	1651748	2	38	5.2	5.0	✓
Laboratory Control Samples (LCS)							
Alkalinity Species by Titration	E290	1646730	1	16	6.2	5.0	✓
Chloride in Water by IC	E235.Cl	1646728	1	19	5.2	5.0	✓
Sulfate in Water by IC	E235.SO4	1650571	1	16	6.2	5.0	✓
TDS by Gravimetry	E162	1651750	2	38	5.2	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	1654117	1	6	16.6	5.0	✓
TSS by Gravimetry	E160	1651748	2	38	5.2	5.0	✓
Method Blanks (MB)							
Alkalinity Species by Titration	E290	1646730	1	16	6.2	5.0	✓
Chloride in Water by IC	E235.Cl	1646728	1	19	5.2	5.0	✓
Sulfate in Water by IC	E235.SO4	1650571	1	16	6.2	5.0	✓
TDS by Gravimetry	E162	1651750	2	38	5.2	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	1654117	1	6	16.6	5.0	✓
TSS by Gravimetry	E160	1651748	2	38	5.2	5.0	✓
Matrix Spikes (MS)							
Chloride in Water by IC	E235.Cl	1646728	1	19	5.2	5.0	✓
Sulfate in Water by IC	E235.SO4	1650571	1	16	6.2	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	1654117	1	6	16.6	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
TSS by Gravimetry	E160 ALS Environmental - Vancouver	Water	APHA 2540 D (mod)	Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, following by drying of the filter at 104 ± 1°C, with gravimetric measurement of the filtered solids. Samples containing very high dissolved solid content (i.e. seawaters, brackish waters) may produce a positive bias by this method. Alternate analysis methods are available for these types of samples.
TDS by Gravimetry	E162 ALS Environmental - Vancouver	Water	APHA 2540 C (mod)	Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, with evaporation of the filtrate at 180 ± 2°C for 16 hours or to constant weight, with gravimetric measurement of the residue.
Chloride in Water by IC	E235.Cl ALS Environmental - Vancouver	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Sulfate in Water by IC	E235.SO4 ALS Environmental - Vancouver	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Alkalinity Species by Titration	E290 ALS Environmental - Vancouver	Water	APHA 2320 B (mod)	Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L ALS Environmental - Calgary	Water	APHA 5310 B (mod)	Total Organic Carbon (Non-Purgeable), also known as NPOC (total), is a direct measurement of TOC after an acidified sample has been purged to remove inorganic carbon (IC). Analysis is by high temperature combustion with infrared detection of CO_2. NPOC does not include volatile organic species that are purged off with IC. For samples where the majority of total carbon (TC) is comprised of IC (which is common), this method is more accurate and more reliable than the TOC by subtraction method (i.e. TC minus TIC).

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Preparation for Total Organic Carbon by Combustion	EP355 ALS Environmental - Calgary	Water		Preparation for Total Organic Carbon by Combustion

QUALITY CONTROL REPORT

Work Order	: **VA24C3601**	Page	: 1 of 6
Client	: WSP Canada Inc.	Laboratory	: ALS Environmental - Vancouver
Contact	: Jarod Devries	Account Manager	: Amber Springer
Address	: 840 Howe St, 10th Floor Vancouver BC Canada V6Z 2S9	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: ----	Telephone	: +1 604 253 4188
Project	: CA0033347.0492 Task 5010	Date Samples Received	: 10-Sep-2024 12:35
PO	: ----	Date Analysis Commenced	: 12-Sep-2024
C-O-C number	: 23755/56	Issue Date	: 17-Sep-2024 15:22
Sampler	: ----		
Site	: ----		
Quote number	: WSP Western Canada Standing Offer		
No. of samples received	: 16		
No. of samples analysed	: 16		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Elke Tabora	Lab Analyst	Calgary Inorganics, Calgary, Alberta
Kate Dimitrova	Supervisor - Inorganic	Vancouver Inorganics, Burnaby, British Columbia

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Physical Tests (QC Lot: 1646730)											
VA24C3601-003	23755-03	Alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	142	142	0.0703%	20%	----
Physical Tests (QC Lot: 1650688)											
VA24C3447-001	Anonymous	Solids, total suspended [TSS]	----	E160	3.0	mg/L	<3.0	<3.0	0	Diff <2x LOR	----
Physical Tests (QC Lot: 1650697)											
VA24C3447-001	Anonymous	Solids, total dissolved [TDS]	----	E162	10	mg/L	34	32	2	Diff <2x LOR	----
Physical Tests (QC Lot: 1651748)											
VA24C3467-001	Anonymous	Solids, total suspended [TSS]	----	E160	7.5	mg/L	315	361	13.6%	20%	----
Physical Tests (QC Lot: 1651750)											
VA24C3467-001	Anonymous	Solids, total dissolved [TDS]	----	E162	20	mg/L	300	301	0.499%	20%	----
Anions and Nutrients (QC Lot: 1646728)											
VA24C3601-001	23755-01	Chloride	16887-00-6	E235.Cl	0.50	mg/L	40.2	40.1	0.156%	20%	----
Anions and Nutrients (QC Lot: 1650571)											
VA24C3601-001	23755-01	Sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	13.7	13.7	0.196%	20%	----
Organic / Inorganic Carbon (QC Lot: 1654117)											
VA24C3601-001	23755-01	Carbon, total organic [TOC]	----	E355-L	0.50	mg/L	0.57	0.65	0.08	Diff <2x LOR	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 1646730)						
Alkalinity, total (as CaCO3)	----	E290	1	mg/L	<1.0	----
Physical Tests (QCLot: 1650688)						
Solids, total suspended [TSS]	----	E160	3	mg/L	<3.0	----
Physical Tests (QCLot: 1650697)						
Solids, total dissolved [TDS]	----	E162	10	mg/L	<10	----
Physical Tests (QCLot: 1651748)						
Solids, total suspended [TSS]	----	E160	3	mg/L	<3.0	----
Physical Tests (QCLot: 1651750)						
Solids, total dissolved [TDS]	----	E162	10	mg/L	<10	----
Anions and Nutrients (QCLot: 1646728)						
Chloride	16887-00-6	E235.Cl	0.5	mg/L	<0.50	----
Anions and Nutrients (QCLot: 1650571)						
Sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	----
Organic / Inorganic Carbon (QCLot: 1654117)						
Carbon, total organic [TOC]	----	E355-L	0.5	mg/L	<0.50	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Target Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 1646730)									
Alkalinity, total (as CaCO3)	----	E290	1	mg/L	500 mg/L	105	85.0	115	----
Physical Tests (QCLot: 1650688)									
Solids, total suspended [TSS]	----	E160	3	mg/L	150 mg/L	91.8	85.0	115	----
Physical Tests (QCLot: 1650697)									
Solids, total dissolved [TDS]	----	E162	10	mg/L	1000 mg/L	106	85.0	115	----
Physical Tests (QCLot: 1651748)									
Solids, total suspended [TSS]	----	E160	3	mg/L	150 mg/L	103	85.0	115	----
Physical Tests (QCLot: 1651750)									
Solids, total dissolved [TDS]	----	E162	10	mg/L	1000 mg/L	98.6	85.0	115	----
Anions and Nutrients (QCLot: 1646728)									
Chloride	16887-00-6	E235.Cl	0.5	mg/L	100 mg/L	99.3	90.0	110	----
Anions and Nutrients (QCLot: 1650571)									
Sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	101	90.0	110	----
Organic / Inorganic Carbon (QCLot: 1654117)									
Carbon, total organic [TOC]	----	E355-L	0.5	mg/L	8.57 mg/L	93.1	80.0	120	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Anions and Nutrients (QCLot: 1646728)										
VA24C3601-002	23755-02	Chloride	16887-00-6	E235.Cl	1020 mg/L	1000 mg/L	102	75.0	125	----
Anions and Nutrients (QCLot: 1650571)										
VA24C3601-002	23755-02	Sulfate (as SO4)	14808-79-8	E235.SO4	1000 mg/L	1000 mg/L	100	75.0	125	----
Organic / Inorganic Carbon (QCLot: 1654117)										
VA24C3601-001	23755-01	Carbon, total organic [TOC]	----	E355-L	3.94 mg/L	5 mg/L	78.7	70.0	130	----

CHAIN OF CUSTODY RECORD/ANALYSIS REQUEST

No. 23755 page 1 of 2

840 Howe St., 10th Floor
Vancouver, British Columbia, Canada V6Z 2M1
Telephone (604) 685-9381

Project Number: CA0033347.0492 Task 5010		Laboratory Name: ALS	
Short Title: Catalyst - Wildwood	WSP Contact: Jarod Devries	Address: 8081 Lougheed Hwy, BTY	
WSP E-mail Address 1: Jarod.Devries@wsp.com	WSP E-mail Address 2: Andrew.Stevens@wsp.com	Telephone/Fax: 6042534188	Contact: Amber Stringer

Office Name: Vancouver

EQuIS Facility Code: _____
EQuIS upload: ☐

Sean.Sutherland@WSP.com

Turnaround Time: ☐ 24 hr ☐ 48 hr ☐ 72 hr ☒ Regular (5 Days)
Criteria: ☐ CSR ☐ CCME ☐ BC Water Quality ☐ Other

Note: Final Reports to be issued by e-mail

Quote No.:

Sample Control Number (SCN)	Sample Location	Sa. #	Sample Depth (m)	Sample Matrix (over)	Date Sampled (D / M / Y)	Time Sampled (HH:MM)	Sample Type (over)	QAQC Code (over)	Related SCN (over)	Number of Containers	Analyses Required: T. TDS	T. Alkalinity	Sulphate	TOC	Chloride	RUSH (Select TAT above)	Remarks (over)
23755 - 01	PW-Composite			WG	08/09/24	09:35	GRAB			2	X	X	X	X	X		
23755 - 02	94-2					12:45				1	~~X~~	X	X		X		
23755 - 03	AH-3					13:00				2	X	X	X	X	X		
23755 - 04	89-5					13:55				2	X	X	X	X	X		
23755 - 05	93-2B					14:30				2	X	X	X	X	X		
23755 - 06	94-18U					16:00				1	~~X~~	X	X		X		
23755 - 07	94-18L					16:20				1	~~X~~	X	X		X		
23755 - 08	94-18M					16:40				1	~~X~~	X	X		X		
23755 - 09	94-19B				09/09/24	11:15				1	~~X~~	X	X		X		
23755 - 10	94-19U					11:40				1		X	X		X		
23755 - 11	94-19L					11:55				2	X	X	X	X	X		
23755 - 12	94-19M					12:31				1		X	X		X		

Environmental Division
Vancouver
Work Order Reference
VA24C3601
Telephone : +1 604 253 4188

Sampler's Signature:	Relinquished by: Signature	Company: WSP	Date: 09/09/24	Time: 17:00	Received by: Signature:	Company
Comments: NO ICE PACKS ~~Provide WATOX/WTOX TOX's for DIF Analysis~~	Method of Shipment: AIR	Waybill No.:	Received for Lab by:	Date: Sep 10th	Time: 12:35pm
	Shipped by: Pacific Coastal	Shipment Condition: Seal Intact:	Temp (°C)	Cooler opened by:	Date	Time

WHITE: WSP Copy YELLOW: Lab Copy

2°C Deepaks

ESED

CHAIN OF CUSTODY RECORD/ANALYSIS REQUEST

No. 23756 page 2 of 2

840 Howe St., 10th Floor
Vancouver, British Columbia, Canada V6Z 2M1
Telephone (604) 685-9381

Project Number: CA0033347.0492 Task 5010		Laboratory Name: ALS Environmental	
Short Title: Catalyst - Wildwood	WSP Contact: Jarod Devries	Address: 8081 Lougheed Hwy, B3Y	
WSP E-mail Address 1: Jarod.Devries@wsp.com	WSP E-mail Address 2: Andrew.Stevens @wsp.com	Telephone/Fax: 6042534188	Contact: Amber Springer

Office Name: Vancouver

EQuIS Facility Code: _____
EQuIS upload: ☐

Turnaround Time: ☐ 24 hr ☐ 48 hr ☐ 72 hr ☒ Regular (5 Days)
Criteria: ☐ CSR ☐ CCME ☐ BC Water Quality ☐ Other

Note: Final Reports to be issued by e-mail

Quote No.:

Analyses Required

Sample Control Number (SCN)	Sample Location	Sa. #	Sample Depth (m)	Sample Matrix (over)	Date Sampled (D / M / Y)	Time Sampled (HH:MM)	Sample Type (over)	QAQC Code (over)	Related SCN (over)	Number of Containers	TSS/TDS	Total Alkalinity	Sulphate	TOC	Chloride					RUSH (Select TAT above)	Remarks (over)
23756-01	94-17L			WG	09/09/24	14:15	GRAB			1		X	X		X						
23756-02	94-17B			↓	↓	14:20	↓			1		X	X		X						
23756-03	94-16L			↓	↓	16:00	↓			1		X	X		X						
23756-04	94-16B			↓	↓	16:15	↓			2	X	X	X	X	X						
-05																					
-06																					
-07																					
-08																					
-09																					
-10																					
-11																					
-12																					

Sampler's Signature:	Relinquished by: Signature	Company WSP	Date 09/09/24	Time 17:00	Received by: Signature / Company
Comments: ON ICE PACKS	Method of Shipment: AIR	Waybill No.:	Received for Lab by:	Date Sept 10th	Time 12:35pm
	Shipped by: Pacific Coastal	Shipment Condition: / Seal Intact:	Temp (°C) / Cooler opened by:	Date	Time

WHITE: WSP Copy **YELLOW:** Lab Copy

2°C
Icepacks

ESED

WSP Canada Inc.
ATTN: Jarod Devries
200-2920 Virtual Way
Vancouver BC V5M 0C4

Date Received: 09-SEP-24
Report Date: 14-NOV-24 16:45 (MT)
Version: FINAL

Client Phone: 604-298-6623

Certificate of Analysis

Lab Work Order #: L2757330

Project P.O. #: NOT SUBMITTED
Job Reference: CA0033347.0492 TASK 5010
C of C Numbers:
Legal Site Desc:

Amber Springer, B.Sc
Account Manager

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ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2757330-1	L2757330-2	L2757330-3	L2757330-4	
	Description	WATER	WATER	WATER	WATER	
	Sampled Date	06-SEP-24	06-SEP-24	06-SEP-24	06-SEP-24	
	Sampled Time	11:35	12:05	11:35	12:05	
	Client ID	23603-01	23603-02	23603-03	23603-04	
Grouping	**Analyte**					
WATER						
Dioxins and Furans	2,3,7,8-TCDD (pg/L)	<0.41 [U]	<0.67 [U]	<0.38 [U]	<0.37 [U]	
	1,2,3,7,8-PeCDD (pg/L)	<0.53 [U]	<0.86 [U]	<0.44 [U]	<0.34 [U]	
	1,2,3,4,7,8-HxCDD (pg/L)	<0.38 [U]	<0.46 [U]	<0.36 [U]	<0.51 [U]	
	1,2,3,6,7,8-HxCDD (pg/L)	<0.39 [U]	<0.44 [U]	<0.37 [U]	<0.53 [U]	
	1,2,3,7,8,9-HxCDD (pg/L)	<0.37 [U]	<0.44 [U]	<0.35 [U]	<0.50 [U]	
	1,2,3,4,6,7,8-HpCDD (pg/L)	0.93 M,J,R	<0.90 [U]	1.10 J,R	<0.50 [U]	
	OCDD (pg/L)	4.2 M,J	6.40 M,J,R	3.10 M,J,R	3.40 M,J,R	
	Total-TCDD (pg/L)	<0.41 [U]	<0.67 [U]	<0.38 [U]	<0.37 [U]	
	Total TCDD # Homologues	0	0	0	0	
	Total-PeCDD (pg/L)	<0.53 [U]	<0.86 [U]	<0.44 [U]	<0.34 [U]	
	Total PeCDD # Homologues	0	0	0	0	
	Total-HxCDD (pg/L)	<0.39 [U]	<0.46 [U]	0.64	<0.53 [U]	
	Total HxCDD # Homologues	0	0	1	0	
	Total-HpCDD (pg/L)	<0.50 [U]	<0.90 [U]	<0.72 [U]	<0.50 [U]	
	Total HpCDD # Homologues	0	0	0	0	
	2,3,7,8-TCDF (pg/L)	<0.54 [U]	<0.32 [U]	<0.56 [U]	<0.45 [U]	
	1,2,3,7,8-PeCDF (pg/L)	1.27 [J]	<0.54 [U]	0.45 J,R	<0.39 [U]	
	2,3,4,7,8-PeCDF (pg/L)	<0.59 [U]	<0.42 [U]	<0.36 [U]	<0.36 [U]	
	1,2,3,4,7,8-HxCDF (pg/L)	<0.23 [U]	<0.41 [U]	<0.24 [U]	<0.22 [U]	
	1,2,3,6,7,8-HxCDF (pg/L)	<0.22 [U]	<0.43 [U]	0.24 J,R	<0.22 [U]	
	1,2,3,7,8,9-HxCDF (pg/L)	<0.29 [U]	<0.53 [U]	<0.31 [U]	<0.30 [U]	
	2,3,4,6,7,8-HxCDF (pg/L)	0.36 M,J,R	<0.43 [U]	<0.23 [U]	<0.22 [U]	
	1,2,3,4,6,7,8-HpCDF (pg/L)	1.16 [J]	<0.62 [U]	0.38 M,J,R	0.47 M,J	
	1,2,3,4,7,8,9-HpCDF (pg/L)	<0.45 [U]	<0.96 [U]	<0.37 [U]	<0.54 [U]	
	OCDF (pg/L)	1.00 M,J,R	<0.63 [U]	<1.0 [U]	<0.92 [U]	
	Total-TCDF (pg/L)	<0.54 [U]	<0.32 [U]	<0.56 [U]	<0.45 [U]	
	Total TCDF # Homologues	0	0	0	0	
	Total-PeCDF (pg/L)	1.27	<0.54 [U]	<0.44 [U]	<0.39 [U]	
	Total PeCDF # Homologues	1	0	0	0	
	Total-HxCDF (pg/L)	<0.29 [U]	<0.53 [U]	<0.31 [U]	<0.30 [U]	
	Total HxCDF # Homologues	0	0	0	0	
	Total-HpCDF (pg/L)	1.16	<0.96 [U]	<0.37 [U]	<0.54 [U]	
	Total HpCDF # Homologues	1	0	0	0	
	Surrogate: 13C12-2,3,7,8-TCDD (%)	73.0	76.0	72.0	71.0	
	Surrogate: 13C12-1,2,3,7,8-PeCDD (%)	72.0	75.0	67.0	64.0	
	Surrogate: 13C12-1,2,3,4,7,8-HxCDD (%)	82.0	82.0	79.0	77.0	
	Surrogate: 13C12-1,2,3,6,7,8-HxCDD (%)	81.0	82.0	79.0	78.0	

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2757330-1	L2757330-2	L2757330-3	L2757330-4	
	Description	WATER	WATER	WATER	WATER	
	Sampled Date	06-SEP-24	06-SEP-24	06-SEP-24	06-SEP-24	
	Sampled Time	11:35	12:05	11:35	12:05	
	Client ID	23603-01	23603-02	23603-03	23603-04	
Grouping	**Analyte**					
WATER						
Dioxins and Furans	Surrogate: 13C12-1,2,3,4,6,7,8-HpCDD (%)	82.0	77.0	75.0	73.0	
	Surrogate: 13C12-OCDD (%)	60.0	62.0	52.0	50.0	
	Surrogate: 13C12-2,3,7,8-TCDF (%)	79.0	74.0	77.0	77.0	
	Surrogate: 13C12-1,2,3,7,8-PeCDF (%)	75.0	60.0	71.0	69.0	
	Surrogate: 13C12-2,3,4,7,8-PeCDF (%)	82.0	71.0	77.0	74.0	
	Surrogate: 13C12-1,2,3,4,7,8-HxCDF (%)	94.0	77.0	93.0	90.0	
	Surrogate: 13C12-1,2,3,6,7,8-HxCDF (%)	98.0	77.0	95.0	91.0	
	Surrogate: 13C12-2,3,4,6,7,8-HxCDF (%)	95.0	78.0	93.0	91.0	
	Surrogate: 13C12-1,2,3,7,8,9-HxCDF (%)	93.0	79.0	89.0	87.0	
	Surrogate: 13C12-1,2,3,4,6,7,8-HpCDF (%)	87.0	67.0	83.0	78.0	
	Surrogate: 13C12-1,2,3,4,7,8,9-HpCDF (%)	83.0	64.0	75.0	72.0	
	Surrogate: 37Cl4-2,3,7,8-TCDD (Cleanup) (%)	80.0	77.0	79.0	82.0	
Toxic Equivalency	Lower Bound PCDD/F TEQ (WHO 2005) (pg/L)	0.051	0.00	0	0.00471	
	Mid Point PCDD/F TEQ (WHO 2005) (pg/L)	0.778	1.02	0.64	0.573	
	Upper Bound PCDD/F TEQ (WHO 2005) (pg/L)	1.46	2.05	1.23	1.14	
	Lower Bound PCDD/F TEQ (NATO) (pg/L)	0.0793	0.00	0	0.00471	
	Mid Point PCDD/F TEQ (NATO) (pg/L)	0.734	0.861	0.578	0.531	
	Upper Bound PCDD/F TEQ (NATO) (pg/L)	1.34	1.71	1.09	1.05	

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Method Blank	Total-PeCDF	A	L2757330-1, -3, -4
Comments:	There were low level of select target in the blank that were within the reference method control limit.		
Method Blank	1,2,3,4,6,7,8-HpCDF	J,R	L2757330-1, -3, -4
Comments:	There were low level of select target in the blank that were within the reference method control limit.		
Method Blank	OCDD	J,R	L2757330-2
Method Blank	1,2,3,7,8-PeCDF	M,J,R	L2757330-2
Method Blank	OCDD	M,J,R	L2757330-1, -3, -4
Comments:	There were low level of select target in the blank that were within the reference method control limit.		
Method Blank	OCDF	M,J,R	L2757330-1, -3, -4
Comments:	There were low level of select target in the blank that were within the reference method control limit.		
Method Blank	1,2,3,4,6,7,8-HpCDD	M,U	L2757330-2
Method Blank	1,2,3,4,7,8-HxCDF	M,U	L2757330-2
Method Blank	1,2,3,7,8-PeCDF	M,U	L2757330-1, -3, -4
Comments:	There were low level of select target in the blank that were within the reference method control limit.		
Method Blank	1,2,3,4,6,7,8-HpCDD	[U]	L2757330-1, -3, -4
Comments:	There were low level of select target in the blank that were within the reference method control limit.		
Method Blank	1,2,3,4,6,7,8-HpCDF	[U]	L2757330-2
Method Blank	1,2,3,4,7,8,9-HpCDF	[U]	L2757330-1, -3, -4
Comments:	There were low level of select target in the blank that were within the reference method control limit.		
Method Blank	1,2,3,4,7,8,9-HpCDF	[U]	L2757330-2
Method Blank	1,2,3,4,7,8-HxCDD	[U]	L2757330-1, -3, -4
Comments:	There were low level of select target in the blank that were within the reference method control limit.		
Method Blank	1,2,3,4,7,8-HxCDD	[U]	L2757330-2
Method Blank	1,2,3,4,7,8-HxCDF	[U]	L2757330-1, -3, -4
Comments:	There were low level of select target in the blank that were within the reference method control limit.		
Method Blank	1,2,3,6,7,8-HxCDD	[U]	L2757330-1, -3, -4
Comments:	There were low level of select target in the blank that were within the reference method control limit.		
Method Blank	1,2,3,6,7,8-HxCDD	[U]	L2757330-2
Method Blank	1,2,3,6,7,8-HxCDF	[U]	L2757330-1, -3, -4
Comments:	There were low level of select target in the blank that were within the reference method control limit.		
Method Blank	1,2,3,6,7,8-HxCDF	[U]	L2757330-2
Method Blank	1,2,3,7,8,9-HxCDD	[U]	L2757330-1, -3, -4
Comments:	There were low level of select target in the blank that were within the reference method control limit.		
Method Blank	1,2,3,7,8,9-HxCDD	[U]	L2757330-2
Method Blank	1,2,3,7,8,9-HxCDF	[U]	L2757330-1, -3, -4
Comments:	There were low level of select target in the blank that were within the reference method control limit.		
Method Blank	1,2,3,7,8,9-HxCDF	[U]	L2757330-2
Method Blank	1,2,3,7,8-PeCDD	[U]	L2757330-1, -3, -4
Comments:	There were low level of select target in the blank that were within the reference method control limit.		
Method Blank	1,2,3,7,8-PeCDD	[U]	L2757330-2
Method Blank	2,3,4,6,7,8-HxCDF	[U]	L2757330-1, -3, -4
Comments:	There were low level of select target in the blank that were within the reference method control limit.		
Method Blank	2,3,4,6,7,8-HxCDF	[U]	L2757330-2
Method Blank	2,3,4,7,8-PeCDF	[U]	L2757330-1, -3, -4
Comments:	There were low level of select target in the blank that were within the reference method control limit.		
Method Blank	2,3,4,7,8-PeCDF	[U]	L2757330-2
Method Blank	2,3,7,8-TCDD	[U]	L2757330-1, -3, -4
Comments:	There were low level of select target in the blank that were within the reference method control limit.		
Method Blank	2,3,7,8-TCDD	[U]	L2757330-2
Method Blank	2,3,7,8-TCDF	[U]	L2757330-1, -3, -4
Comments:	There were low level of select target in the blank that were within the reference method control limit.		
Method Blank	2,3,7,8-TCDF	[U]	L2757330-2

Reference Information

	Parameter	Qualifier	Applies to Sample Number(s)
Method Blank	OCDF	[U]	L2757330-2
Method Blank	Total-HpCDD	[U]	L2757330-1, -3, -4
Comments:	There were low level of select target in the blank that were within the reference method control limit.		
Method Blank	Total-HpCDD	[U]	L2757330-2
Method Blank	Total-HpCDF	[U]	L2757330-1, -3, -4
Comments:	There were low level of select target in the blank that were within the reference method control limit.		
Method Blank	Total-HpCDF	[U]	L2757330-2
Method Blank	Total-HxCDD	[U]	L2757330-1, -3, -4
Comments:	There were low level of select target in the blank that were within the reference method control limit.		
Method Blank	Total-HxCDD	[U]	L2757330-2
Method Blank	Total-HxCDF	[U]	L2757330-1, -3, -4
Comments:	There were low level of select target in the blank that were within the reference method control limit.		
Method Blank	Total-HxCDF	[U]	L2757330-2
Method Blank	Total-PeCDD	[U]	L2757330-1, -3, -4
Comments:	There were low level of select target in the blank that were within the reference method control limit.		
Method Blank	Total-PeCDD	[U]	L2757330-2
Method Blank	Total-PeCDF	[U]	L2757330-2
Method Blank	Total-TCDD	[U]	L2757330-1, -3, -4
Comments:	There were low level of select target in the blank that were within the reference method control limit.		
Method Blank	Total-TCDD	[U]	L2757330-2
Method Blank	Total-TCDF	[U]	L2757330-1, -3, -4
Comments:	There were low level of select target in the blank that were within the reference method control limit.		
Method Blank	Total-TCDF	[U]	L2757330-2

Qualifiers for Individual Parameters Listed:

Qualifier	Description
A	Method Blank exceeds ALS DQO. Refer to narrative comments for further information.
J,R	The analyte was detected below the calibrated range but above the EDL, and the ion abundance ratio(s) did not meet the acceptance criteria. Value is an estimated maximum.
M,J	A peak has been manually integrated, and the analyte was detected below the calibrated range but above the EDL.
M,J,R	A peak has been manually integrated, the analyte was detected below the calibrated range but above the EDL, and the ion abundance ratio(s) did not meet the acceptance criteria. Value is an estimated maximum.
M,U	A peak has been manually integrated, and the analyte was not detected above the EDL.
[J]	The analyte was detected below the calibrated range but above the EDL.
[U]	The analyte was not detected above the EDL.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
DX-1613B-HRMS-BU	Water	Dioxins and Furans HR 1613B	USEPA 1613B

Samples are filtered if required. Solids are extracted by Soxhlet using toluene. The liquid portion is extracted by liquid/liquid extraction using dichloromethane. The extracts are prepared using column chromatography, reduced in volume and analyzed by isotope-dilution GC/HRMS

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
BU	ALS ENVIRONMENTAL - BURLINGTON, ONTARIO, CANADA

Chain of Custody Numbers:

Reference Information

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Client: WSP Canada Inc.
200-2920 Virtual Way
Vancouver BC V5M 0C4
Contact: Jarod Devries

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
DX-1613B-HRMS-BU	**Water**							
Batch R5988316								
WG3790516-2 LCS								
2,3,7,8-TCDD			94.0		%		67-158	01-OCT-24
1,2,3,7,8-PeCDD			115.0		%		70-142	01-OCT-24
1,2,3,4,7,8-HxCDD			106.0		%		70-164	01-OCT-24
1,2,3,6,7,8-HxCDD			105.0		%		76-134	01-OCT-24
1,2,3,7,8,9-HxCDD			107.0		%		64-162	01-OCT-24
1,2,3,4,6,7,8-HpCDD			105.0		%		70-140	01-OCT-24
OCDD			102.0		%		78-144	01-OCT-24
2,3,7,8-TCDF			109.0		%		75-158	01-OCT-24
1,2,3,7,8-PeCDF			119.0		%		80-134	01-OCT-24
2,3,4,7,8-PeCDF			104.0		%		68-160	01-OCT-24
1,2,3,4,7,8-HxCDF			105.0		%		72-134	01-OCT-24
1,2,3,6,7,8-HxCDF			102.0		%		84-130	01-OCT-24
2,3,4,6,7,8-HxCDF			97.0		%		70-156	01-OCT-24
1,2,3,7,8,9-HxCDF			101.0		%		78-130	01-OCT-24
1,2,3,4,6,7,8-HpCDF			106.0		%		82-122	01-OCT-24
1,2,3,4,7,8,9-HpCDF			115.0		%		78-138	01-OCT-24
OCDF			122.0		%		63-170	01-OCT-24
WG3790516-1 MB								
2,3,7,8-TCDD			<0.37	[U]	pg/L		10	01-OCT-24
1,2,3,7,8-PeCDD			<0.43	[U]	pg/L		50	01-OCT-24
1,2,3,4,7,8-HxCDD			<0.41	[U]	pg/L		50	01-OCT-24
1,2,3,6,7,8-HxCDD			<0.43	[U]	pg/L		50	01-OCT-24
1,2,3,7,8,9-HxCDD			<0.41	[U]	pg/L		50	01-OCT-24
1,2,3,4,6,7,8-HpCDD			<0.57	[U]	pg/L		50	01-OCT-24
OCDD			2.90	M,J,R	pg/L		100	01-OCT-24
2,3,7,8-TCDF			<0.52	[U]	pg/L		10	01-OCT-24
1,2,3,7,8-PeCDF			<0.83	M,U	pg/L		50	01-OCT-24
2,3,4,7,8-PeCDF			<0.70	[U]	pg/L		50	01-OCT-24
1,2,3,4,7,8-HxCDF			<0.26	[U]	pg/L		50	01-OCT-24
1,2,3,6,7,8-HxCDF			<0.24	[U]	pg/L		50	01-OCT-24
2,3,4,6,7,8-HxCDF			<0.24	[U]	pg/L		50	01-OCT-24
1,2,3,7,8,9-HxCDF			<0.34	[U]	pg/L		50	01-OCT-24
1,2,3,4,6,7,8-HpCDF			0.61	J,R	pg/L		50	01-OCT-24
1,2,3,4,7,8,9-HpCDF			<0.43	[U]	pg/L		50	01-OCT-24

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
DX-1613B-HRMS-BU	**Water**							
Batch	**R5988316**							
WG3790516-1	**MB**							
OCDF			0.98	M,J,R	pg/L		100	01-OCT-24
Total-TCDD			<0.37	[U]	pg/L		0.37	01-OCT-24
Total-PeCDD			<0.43	[U]	pg/L		0.43	01-OCT-24
Total-HxCDD			<0.43	[U]	pg/L		0.43	01-OCT-24
Total-HpCDD			<0.57	[U]	pg/L		0.57	01-OCT-24
Total-TCDF			<0.52	[U]	pg/L		0.52	01-OCT-24
Total-PeCDF			1.11	A	pg/L		0.83	01-OCT-24
Total-HxCDF			<0.34	[U]	pg/L		0.34	01-OCT-24
Total-HpCDF			<0.43	[U]	pg/L		0.43	01-OCT-24
Surrogate: 13C12-2,3,7,8-TCDD			71.0		%		20-175	01-OCT-24
Surrogate: 13C12-1,2,3,7,8-PeCDD			67.0		%		21-227	01-OCT-24
Surrogate: 13C12-1,2,3,4,7,8-HxCDD			78.0		%		21-193	01-OCT-24
Surrogate: 13C12-1,2,3,6,7,8-HxCDD			78.0		%		25-163	01-OCT-24
Surrogate: 13C12-1,2,3,4,6,7,8-HpCDD			76.0		%		23-166	01-OCT-24
Surrogate: 13C12-OCDD			54.0		%		13-138	01-OCT-24
Surrogate: 13C12-2,3,7,8-TCDF			77.0		%		22-152	01-OCT-24
Surrogate: 13C12-1,2,3,7,8-PeCDF			71.0		%		24-185	01-OCT-24
Surrogate: 13C12-2,3,4,7,8-PeCDF			77.0		%		21-178	01-OCT-24
Surrogate: 13C12-1,2,3,4,7,8-HxCDF			92.0		%		26-152	01-OCT-24
Surrogate: 13C12-1,2,3,6,7,8-HxCDF			95.0		%		21-159	01-OCT-24
Surrogate: 13C12-2,3,4,6,7,8-HxCDF			94.0		%		17-205	01-OCT-24
Surrogate: 13C12-1,2,3,7,8,9-HxCDF			87.0		%		28-136	01-OCT-24
Surrogate: 13C12-1,2,3,4,6,7,8-HpCDF			82.0		%		21-158	01-OCT-24
Surrogate: 13C12-1,2,3,4,7,8,9-HpCDF			73.0		%		20-186	01-OCT-24
Surrogate: 37Cl4-2,3,7,8-TCDD (Cleanup)			80.0		%		31-191	01-OCT-24
COMMENTS: There were low level of select target in the blank that were within the reference method control limit.								
Batch	**R5988597**							
WG3790596-2	**LCS**							
2,3,7,8-TCDD			90.0		%		67-158	08-OCT-24
1,2,3,7,8-PeCDD			99.0		%		70-142	08-OCT-24
1,2,3,4,7,8-HxCDD			88.0		%		70-164	08-OCT-24
1,2,3,6,7,8-HxCDD			87.0		%		76-134	08-OCT-24
1,2,3,7,8,9-HxCDD			87.0		%		64-162	08-OCT-24
1,2,3,4,6,7,8-HpCDD			87.0		%		70-140	08-OCT-24

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
DX-1613B-HRMS-BU	**Water**							
Batch R5988597								
WG3790596-2 LCS								
OCDD			84.0		%		78-144	08-OCT-24
2,3,7,8-TCDF			85.0		%		75-158	08-OCT-24
1,2,3,7,8-PeCDF			89.0		%		80-134	08-OCT-24
2,3,4,7,8-PeCDF			79.0		%		68-160	08-OCT-24
1,2,3,4,7,8-HxCDF			86.0		%		72-134	08-OCT-24
1,2,3,6,7,8-HxCDF			90.0		%		84-130	08-OCT-24
2,3,4,6,7,8-HxCDF			84.0		%		70-156	08-OCT-24
1,2,3,7,8,9-HxCDF			89.0		%		78-130	08-OCT-24
1,2,3,4,6,7,8-HpCDF			87.0		%		82-122	08-OCT-24
1,2,3,4,7,8,9-HpCDF			99.0		%		78-138	08-OCT-24
OCDF			92.0		%		63-170	08-OCT-24
WG3790596-1 MB								
2,3,7,8-TCDD			<0.44	[U]	pg/L		10	09-OCT-24
1,2,3,7,8-PeCDD			<0.53	[U]	pg/L		50	09-OCT-24
1,2,3,4,7,8-HxCDD			<0.61	[U]	pg/L		50	09-OCT-24
1,2,3,6,7,8-HxCDD			<0.54	[U]	pg/L		50	09-OCT-24
1,2,3,7,8,9-HxCDD			<0.56	[U]	pg/L		50	09-OCT-24
1,2,3,4,6,7,8-HpCDD			<0.61	M,U	pg/L		50	09-OCT-24
OCDD			6.6	J,R	pg/L		100	09-OCT-24
2,3,7,8-TCDF			<0.49	[U]	pg/L		10	09-OCT-24
1,2,3,7,8-PeCDF			0.32	M,J,R	pg/L		50	09-OCT-24
2,3,4,7,8-PeCDF			<0.17	[U]	pg/L		50	09-OCT-24
1,2,3,4,7,8-HxCDF			<0.21	M,U	pg/L		50	09-OCT-24
1,2,3,6,7,8-HxCDF			<0.25	[U]	pg/L		50	09-OCT-24
2,3,4,6,7,8-HxCDF			<0.24	[U]	pg/L		50	09-OCT-24
1,2,3,7,8,9-HxCDF			<0.31	[U]	pg/L		50	09-OCT-24
1,2,3,4,6,7,8-HpCDF			<0.58	[U]	pg/L		50	09-OCT-24
1,2,3,4,7,8,9-HpCDF			<0.79	[U]	pg/L		50	09-OCT-24
OCDF			<0.85	[U]	pg/L		100	09-OCT-24
Total-TCDD			<0.44	[U]	pg/L		0.44	09-OCT-24
Total-PeCDD			<0.53	[U]	pg/L		0.53	09-OCT-24
Total-HxCDD			<0.61	[U]	pg/L		0.61	09-OCT-24
Total-HpCDD			<0.61	[U]	pg/L		0.61	09-OCT-24
Total-TCDF			<0.49	[U]	pg/L		0.49	09-OCT-24

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
DX-1613B-HRMS-BU	**Water**							
Batch	**R5988597**							
WG3790596-1	**MB**							
Total-PeCDF			<0.21	[U]	pg/L		0.21	09-OCT-24
Total-HxCDF			<0.31	[U]	pg/L		0.31	09-OCT-24
Total-HpCDF			<0.79	[U]	pg/L		0.79	09-OCT-24
Surrogate: 13C12-2,3,7,8-TCDD			75.0		%		20-175	09-OCT-24
Surrogate: 13C12-1,2,3,7,8-PeCDD			72.0		%		21-227	09-OCT-24
Surrogate: 13C12-1,2,3,4,7,8-HxCDD			83.0		%		21-193	09-OCT-24
Surrogate: 13C12-1,2,3,6,7,8-HxCDD			83.0		%		25-163	09-OCT-24
Surrogate: 13C12-1,2,3,4,6,7,8-HpCDD			78.0		%		23-166	09-OCT-24
Surrogate: 13C12-OCDD			61.0		%		13-138	09-OCT-24
Surrogate: 13C12-2,3,7,8-TCDF			75.0		%		22-152	09-OCT-24
Surrogate: 13C12-1,2,3,7,8-PeCDF			58.0		%		24-185	09-OCT-24
Surrogate: 13C12-2,3,4,7,8-PeCDF			64.0	R	%		21-178	09-OCT-24
Surrogate: 13C12-1,2,3,4,7,8-HxCDF			84.0		%		26-152	09-OCT-24
Surrogate: 13C12-1,2,3,6,7,8-HxCDF			78.0		%		21-159	09-OCT-24
Surrogate: 13C12-2,3,4,6,7,8-HxCDF			81.0		%		17-205	09-OCT-24
Surrogate: 13C12-1,2,3,7,8,9-HxCDF			78.0		%		28-136	09-OCT-24
Surrogate: 13C12-1,2,3,4,6,7,8-HpCDF			66.0		%		21-158	09-OCT-24
Surrogate: 13C12-1,2,3,4,7,8,9-HpCDF			64.0		%		20-186	09-OCT-24
Surrogate: 37Cl4-2,3,7,8-TCDD (Cleanup)			74.0		%		31-191	09-OCT-24

Quality Control Report

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
A	Method Blank exceeds ALS DQO. Refer to narrative comments for further information.
J,R	The analyte was detected below the calibrated range but above the EDL, and the ion abundance ratio(s) did not meet the acceptance criteria. Value is an estimated maximum.
M,J,R	A peak has been manually integrated, the analyte was detected below the calibrated range but above the EDL, and the ion abundance ratio(s) did not meet the acceptance criteria. Value is an estimated maximum.
M,U	A peak has been manually integrated, and the analyte was not detected above the EDL.
R	The ion abundance ratio(s) did not meet the acceptance criteria. Value is an estimated maximum.
[U]	The analyte was not detected above the EDL.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

L2757330-COFC

IN OF CUSTODY RECORD/ANALYSIS REQUEST

No. 23603 page 1 of 1

840 Howe St., 10th Floor
Vancouver, British Columbia, Canada V6Z 2M1
Telephone (604) 685-9381

Project Number: CA0033347.0492 Task 5010		Laboratory Name: ALS	
Short Title: Catalyst - Wildwood	WSP Contact: Jarod Devries	Address: 8081 Lougheed Hwy, BBY	
WSP E-mail Address 1: Jarod.Devries @wsp.com	WSP E-mail Address 2: Andrew.Stevens @wsp.com	Telephone/Fax: 604 2534188	Contact: Amber Stringer

Office Name: Vancouver

EQuIS Facility Code: _____
EQuIS upload: ☐

Jean.Sutherland@wsp.com

Turnaround Time: ☐ 24 hr ☐ 48 hr ☐ 72 hr ☒ Regular (5 Days)
Criteria: ☐ CSR ☐ CCME ☐ BC Water Quality ☐ Other

Note: Final Reports to be issued by e-mail

Quote No.:

Analyses Required

Sample Control Number (SCN)	Sample Location	Sa. #	Sample Depth (m)	Sample Matrix (over)	Date Sampled (D / M / Y)	Time Sampled (HH:MM)	Sample Type (over)	QAQC Code (over)	Related SCN (over)	Number of Containers	FSS ITDS	Total Alkalinity	Sulphate	TOC	Dioxins + Furans	DOC				RUSH (Select TAT above)	Remarks (over)
23603-01	Spring	1		SW	06/09/24	11:35	GRAB	FDA	23603-03	5	X	X	X	X	X	X					For 23603-03 run general analytes from 2x1L bottles if possible
23603-02	Spring	2		SW	↓	12:05	GRAB			5	X	X	X	X	X	X					
23603-03	Spring	1		SW	↓	11:35	GRAB	FD	23603-01	2	X	X	X	X	X						
~~23603-04~~ 23603-04	Field Blank				06/09/24	12:05				2					X						
SS 07/09/24 - 05																					
- 06																					
- 07																					
- 08																					
- 09																					
- 10																					
- 11																					
- 12																					

Environmental Division
Vancouver
Work Order Reference
VA24C3500

Telephone : +1 604 253 4188

Sampler's Signature:	Relinquished by: Signature	Company WSP	Date 07/09/24	Time 09:00	Received by: Signature	Company
Comments: DO ICE PACKS Provide NAPO/WHO TEQ's For DIF Analysis.	Method of Shipment: Air	Waybill No.:	Received for Lab by:		Date	Time 10:20 AM
	Shipped by: Pacific Coastal	Shipment Condition: Seal Intact:	Temp (°C) 4°C, 3°C	Cooler opened by:	Date	Time

Icepacks Sept 9th

WHITE: WSP Copy **YELLOW: Lab Copy**

ESED

ALS Canada Ltd.

CERTIFICATE OF ANALYSIS

Work Order	: **VA24C3730**	Page	: 1 of 3
Client	: **WSP Canada Inc.**	Laboratory	: ALS Environmental - Vancouver
Contact	: Jarod Devries	Account Manager	: Amber Springer
Address	: 840 Howe St, 10th Floor Vancouver BC Canada V6Z 2S9	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: ----	Telephone	: +1 604 253 4188
Project	: CA0033347.0492 Task 5010	Date Samples Received	: 10-Sep-2024 20:45
PO	: ----	Date Analysis Commenced	: 12-Sep-2024
C-O-C number	: 23757	Issue Date	: 18-Sep-2024 15:08
Sampler	: ----		
Site	: ----		
Quote number	: WSP Western Canada Standing Offer		
No. of samples received	: 3		
No. of samples analysed	: 2		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Kate Dimitrova	Supervisor - Inorganic	Inorganics, Burnaby, British Columbia

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances

LOR: Limit of Reporting (detection limit).

Unit	*Description*
mg/L	milligrams per litre

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	23757-01	23757-02	----	----	----
					Client sampling date / time	10-Sep-2024 09:00	10-Sep-2024 09:30	----	----	----
						VA24C3730-001	VA24C3730-002	--------	--------	--------
						Result	Result	----	----	----
Physical Tests										
Alkalinity, total (as CaCO3)	----	E290/VA	1.0	mg/L		79.7	507	----	----	----
Solids, total dissolved [TDS]	----	E162/VA	10	mg/L		168	1080	----	----	----
Solids, total suspended [TSS]	----	E160/VA	3.0	mg/L		9.1	44.7	----	----	----
Anions and Nutrients										
Chloride	16887-00-6	E235.Cl/VA	0.50	mg/L		12.1	153	----	----	----
Sulfate (as SO4)	14808-79-8	E235.SO4/VA	0.30	mg/L		11.1	180	----	----	----
Organic / Inorganic Carbon										
Carbon, total organic [TOC]	----	E355-L/VA	0.50	mg/L		<0.50	16.3	----	----	----

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

ALS Canada Ltd.

right solutions. right partner.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **VA24C3730**	Page	: 1 of 6
Client	: **WSP Canada Inc.**	Laboratory	: ALS Environmental - Vancouver
Contact	: Jarod Devries	Account Manager	: Amber Springer
Address	: 840 Howe St, 10th Floor Vancouver BC Canada V6Z 2S9	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: ----	Telephone	: +1 604 253 4188
Project	: CA0033347.0492 Task 5010	Date Samples Received	: 10-Sep-2024 20:45
PO	: ----	Issue Date	: 18-Sep-2024 15:09
C-O-C number	: 23757		
Sampler	: ----		
Site	: ----		
Quote number	: WSP Western Canada Standing Offer		
No. of samples received	: 3		
No. of samples analysed	: 2		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- Quality Control Sample Frequency Outliers occur - please see following pages for full details.

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group : Analytical Method / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Chloride in Water by IC										
HDPE										
23757-01	E235.Cl	10-Sep-2024	13-Sep-2024	28 days	3 days	✓	13-Sep-2024	28 days	3 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE										
23757-02	E235.Cl	10-Sep-2024	13-Sep-2024	28 days	3 days	✓	13-Sep-2024	28 days	3 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
23757-01	E235.SO4	10-Sep-2024	13-Sep-2024	28 days	3 days	✓	13-Sep-2024	28 days	3 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
23757-02	E235.SO4	10-Sep-2024	13-Sep-2024	28 days	3 days	✓	13-Sep-2024	28 days	3 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid)										
23757-01	E355-L	10-Sep-2024	12-Sep-2024	28 days	2 days	✓	12-Sep-2024	28 days	2 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid)										
23757-02	E355-L	10-Sep-2024	12-Sep-2024	28 days	2 days	✓	12-Sep-2024	28 days	2 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE										
23757-01	E290	10-Sep-2024	13-Sep-2024	14 days	3 days	✓	13-Sep-2024	14 days	3 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group : Analytical Method / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Alkalinity Species by Titration										
HDPE										
23757-02	E290	10-Sep-2024	13-Sep-2024	14 days	3 days	✓	13-Sep-2024	14 days	3 days	✓
Physical Tests : TDS by Gravimetry										
HDPE										
23757-01	E162	10-Sep-2024	----	----	----		17-Sep-2024	7 days	7 days	✓
Physical Tests : TDS by Gravimetry										
HDPE										
23757-02	E162	10-Sep-2024	----	----	----		17-Sep-2024	7 days	7 days	✓
Physical Tests : TSS by Gravimetry										
HDPE										
23757-01	E160	10-Sep-2024	----	----	----		17-Sep-2024	7 days	7 days	✓
Physical Tests : TSS by Gravimetry										
HDPE										
23757-02	E160	10-Sep-2024	----	----	----		17-Sep-2024	7 days	7 days	✓

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water**

Evaluation: × = *QC frequency outside specification*; ✓ = *QC frequency within specification.*

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Alkalinity Species by Titration	E290	1649673	1	6	16.6	5.0	✓
Chloride in Water by IC	E235.Cl	1649677	1	8	12.5	5.0	✓
Sulfate in Water by IC	E235.SO4	1649681	1	8	12.5	5.0	✓
TDS by Gravimetry	E162	1656707	1	20	5.0	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	1647053	1	11	9.0	5.0	✓
TSS by Gravimetry	E160	1656684	1	20	5.0	5.0	✓
Laboratory Control Samples (LCS)							
Alkalinity Species by Titration	E290	1649673	1	6	16.6	5.0	✓
Chloride in Water by IC	E235.Cl	1649677	1	8	12.5	5.0	✓
Sulfate in Water by IC	E235.SO4	1649681	1	8	12.5	5.0	✓
TDS by Gravimetry	E162	1656707	1	20	5.0	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	1647053	1	11	9.0	5.0	✓
TSS by Gravimetry	E160	1656684	1	20	5.0	5.0	✓
Method Blanks (MB)							
Alkalinity Species by Titration	E290	1649673	1	6	16.6	5.0	✓
Chloride in Water by IC	E235.Cl	1649677	1	8	12.5	5.0	✓
Sulfate in Water by IC	E235.SO4	1649681	1	8	12.5	5.0	✓
TDS by Gravimetry	E162	1656707	1	20	5.0	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	1647053	1	11	9.0	5.0	✓
TSS by Gravimetry	E160	1656684	1	20	5.0	5.0	✓
Matrix Spikes (MS)							
Chloride in Water by IC	E235.Cl	1649677	0	8	0.0	5.0	×
Sulfate in Water by IC	E235.SO4	1649681	0	8	0.0	5.0	×
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	1647053	1	11	9.0	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
TSS by Gravimetry	E160 ALS Environmental - Vancouver	Water	APHA 2540 D (mod)	Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, following by drying of the filter at 104 ± 1°C, with gravimetric measurement of the filtered solids. Samples containing very high dissolved solid content (i.e. seawaters, brackish waters) may produce a positive bias by this method. Alternate analysis methods are available for these types of samples.
TDS by Gravimetry	E162 ALS Environmental - Vancouver	Water	APHA 2540 C (mod)	Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, with evaporation of the filtrate at 180 ± 2°C for 16 hours or to constant weight, with gravimetric measurement of the residue.
Chloride in Water by IC	E235.Cl ALS Environmental - Vancouver	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Sulfate in Water by IC	E235.SO4 ALS Environmental - Vancouver	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Alkalinity Species by Titration	E290 ALS Environmental - Vancouver	Water	APHA 2320 B (mod)	Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L ALS Environmental - Vancouver	Water	APHA 5310 B (mod)	Total Organic Carbon (Non-Purgeable), also known as NPOC (total), is a direct measurement of TOC after an acidified sample has been purged to remove inorganic carbon (IC). Analysis is by high temperature combustion with infrared detection of CO_2. NPOC does not include volatile organic species that are purged off with IC. For samples where the majority of total carbon (TC) is comprised of IC (which is common), this method is more accurate and more reliable than the TOC by subtraction method (i.e. TC minus TIC).

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Preparation for Total Organic Carbon by Combustion	EP355 ALS Environmental - Vancouver	Water		Preparation for Total Organic Carbon by Combustion

QUALITY CONTROL REPORT

Work Order	: **VA24C3730**	Page	: 1 of 4
Client	: WSP Canada Inc.	Laboratory	: ALS Environmental - Vancouver
Contact	: Jarod Devries	Account Manager	: Amber Springer
Address	: 840 Howe St, 10th Floor Vancouver BC Canada V6Z 2S9	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: ----	Telephone	: +1 604 253 4188
Project	: CA0033347.0492 Task 5010	Date Samples Received	: 10-Sep-2024 20:45
PO	: ----	Date Analysis Commenced	: 12-Sep-2024
C-O-C number	: 23757	Issue Date	: 18-Sep-2024 15:08
Sampler	: ----		
Site	: ----		
Quote number	: WSP Western Canada Standing Offer		
No. of samples received	: 3		
No. of samples analysed	: 2		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Kate Dimitrova	Supervisor - Inorganic	Vancouver Inorganics, Burnaby, British Columbia

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Physical Tests (QC Lot: 1649673)											
FJ2402750-001	Anonymous	Alkalinity, total (as CaCO3)	----	E290	2.0	mg/L	119	120	0.0837%	20%	----
Physical Tests (QC Lot: 1656684)											
FJ2402724-001	Anonymous	Solids, total suspended [TSS]	----	E160	3.0	mg/L	<3.0	<3.0	0	Diff <2x LOR	----
Physical Tests (QC Lot: 1656707)											
FJ2402724-001	Anonymous	Solids, total dissolved [TDS]	----	E162	20	mg/L	162	160	2	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 1649677)											
FJ2402750-001	Anonymous	Chloride	16887-00-6	E235.Cl	0.50	mg/L	2.83	2.83	0.006	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 1649681)											
FJ2402750-001	Anonymous	Sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	21.5	21.6	0.572%	20%	----
Organic / Inorganic Carbon (QC Lot: 1647053)											
VA24C3430-003	Anonymous	Carbon, total organic [TOC]	----	E355-L	0.50	mg/L	2.71	2.71	0.004	Diff <2x LOR	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 1649673)						
Alkalinity, total (as CaCO3)	----	E290	1	mg/L	<1.0	----
Physical Tests (QCLot: 1656684)						
Solids, total suspended [TSS]	----	E160	3	mg/L	<3.0	----
Physical Tests (QCLot: 1656707)						
Solids, total dissolved [TDS]	----	E162	10	mg/L	<10	----
Anions and Nutrients (QCLot: 1649677)						
Chloride	16887-00-6	E235.Cl	0.5	mg/L	<0.50	----
Anions and Nutrients (QCLot: 1649681)						
Sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	----
Organic / Inorganic Carbon (QCLot: 1647053)						
Carbon, total organic [TOC]	----	E355-L	0.5	mg/L	<0.50	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Target Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 1649673)									
Alkalinity, total (as CaCO3)	----	E290	1	mg/L	500 mg/L	104	85.0	115	----
Physical Tests (QCLot: 1656684)									
Solids, total suspended [TSS]	----	E160	3	mg/L	150 mg/L	98.5	85.0	115	----
Physical Tests (QCLot: 1656707)									
Solids, total dissolved [TDS]	----	E162	10	mg/L	1000 mg/L	109	85.0	115	----
Anions and Nutrients (QCLot: 1649677)									
Chloride	16887-00-6	E235.Cl	0.5	mg/L	100 mg/L	101	90.0	110	----
Anions and Nutrients (QCLot: 1649681)									
Sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	102	90.0	110	----
Organic / Inorganic Carbon (QCLot: 1647053)									
Carbon, total organic [TOC]	----	E355-L	0.5	mg/L	8.57 mg/L	101	80.0	120	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Organic / Inorganic Carbon (QCLot: 1647053)										
VA24C3430-004	Anonymous	Carbon, total organic [TOC]	----	E355-L	5.09 mg/L	5 mg/L	102	70.0	130	----

CHAIN OF CUSTODY RECORD/ANALYSIS REQUEST

No. 23757 page 1 of 1

840 Howe St., 10th Floor
Vancouver, British Columbia, Canada V6Z 2M1
Telephone (604) 685-9381

Project Number: CA0033547.0492 Task 5010		Laboratory Name: ALS	
Short Title: Catalyst - Wildwood	WSP Contact: Jarad Dewries	Address: 8081 Lougheed Hwy Burn	
WSP E-mail Address 1: Jarad.Dewries@wsp.com	WSP E-mail Address 2: Andrew.Stevens@wsp.com	Telephone/Fax: 6042534158	Contact: Amber Springs

Jarad.Sutherland@wsp.com

Office Name: Vancouver

EQuIS Facility Code:

EQuIS upload: ☐

Turnaround Time: ☐ 24 hr ☐ 48 hr ☐ 72 hr ☒ Regular (5 Days)

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

Note: Final Reports to be issued by e-mail

Quote No.:

Analyses Required

Sample Control Number (SCN)	Sample Location	Sa. #	Sample Depth (m)	Sample Matrix (over)	Date Sampled (D / M / Y)	Time Sampled (HH:MM)	Sample Type (over)	QAQC Code (over)	Related SCN (over)	Number of Containers	TSS HTDS	Total Alkalinity	Sulphate	TOC	Chloride				HOLD	RUSH (Select TAT above)	Remarks (over)
23757 - 01	94-113			WG	10/09/24	09:00	GRAB			2	X	X	X	X	X						
23757 - 02	AH-6L			↓	↓	09:30	↓	FDA	23757-03	2	X	X	X	X	X						
23757 - 03	AH-6L			↓	↓	09:30	↓	FD	23757-02-2										X		
- 04																					
- 05																					
- 06																					
- 07																					
- 08																					
- 09																					
- 10																					
- 11																					
- 12																					

Environmental Division
Vancouver
Work Order Reference
VA24C3730

Telephone : +1 604 253 4188

Sampler's Signature:	Relinquished by: Signature	Company WSP	Date 10/09/2024	Time 10:30	Received by: Signature	Company	
Comments: ON ICE PACKS	Method of Shipment: AIR	Waybill No.:	Received for Lab by:	Date Sept 10	Time 9:45		
	Shipped by: Pacific Coastal	Shipment Condition: Seal Intact:	Temp (°C) 5	Cooler opened by:	Date	Time	

3740

WHITE: WSP Copy YELLOW: Lab Copy

ESED

CERTIFICATE OF ANALYSIS

Work Order	:	**VA24D1977**		
Client	:	**WSP Canada Inc.**	Laboratory	: ALS Environmental - Vancouver
Contact	:	Jarod Devries	Account Manager	: Amber Springer
Address	:	301 - 3600 Uptown Blvd Victoria British Columbia Canada V8Z 0B9	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	:	----	Telephone	: +1 604 253 4188
Project	:	CA0033347.0492 Task 5020	Date Samples Received	: 26-Nov-2024 11:25
PO	:	----	Date Analysis Commenced	: 27-Nov-2024
C-O-C number	:	23605	Issue Date	: 31-Dec-2024 09:59
Sampler	:	----		
Site	:	----		
Quote number	:	WSP Western Canada Standing Offer		
No. of samples received	:	2		
No. of samples analysed	:	2		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Lindsay Gung	Supervisor - Water Chemistry	Inorganics, Burnaby, British Columbia
Maya Urquhart	Lab Analyst	Metals, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	Metals, Burnaby, British Columbia

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key: CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances.
LOR: Limit of Reporting (detection limit).

Unit	*Description*
mg/L	milligrams per litre

<: less than.
>: greater than.
Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical Results

Sub-Matrix: Water
(Matrix: Water)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	23605-01	23605-02	----	----	----
					Client sampling date / time	25-Nov-2024 10:45	25-Nov-2024 11:10	----	----	----
						VA24D1977-001	VA24D1977-002	----	----	----
						Result	Result	----	----	----
Physical Tests										
Alkalinity, total (as CaCO3)	----	E290/VA	1.0	mg/L		81.2	62.6	----	----	----
Hardness (as CaCO3), from total Ca/Mg	----	EC100A/VA	0.60	mg/L		80.6	75.6	----	----	----
Solids, total dissolved [TDS]	----	E162/VA	10	mg/L		178	146	----	----	----
Solids, total suspended [TSS]	----	E160/VA	3.0	mg/L		<3.0	9.1	----	----	----
Anions and Nutrients										
Sulfate (as SO4)	14808-79-8	E235.SO4/VA	0.30	mg/L		18.8	9.62	----	----	----
Organic / Inorganic Carbon										
Carbon, dissolved organic [DOC]	----	E358-L/VA	0.50	mg/L		1.12	1.44	----	----	----
Carbon, total organic [TOC]	----	E355-L/VA	0.50	mg/L		1.42	2.91	----	----	----
Total Metals										
Aluminum, total	7429-90-5	E420/VA	0.0030	mg/L		0.0134	0.0659	----	----	----
Antimony, total	7440-36-0	E420/VA	0.00010	mg/L		<0.00010	<0.00010	----	----	----
Arsenic, total	7440-38-2	E420/VA	0.00010	mg/L		0.00047	0.00021	----	----	----
Barium, total	7440-39-3	E420/VA	0.00010	mg/L		0.00561	0.00462	----	----	----
Beryllium, total	7440-41-7	E420/VA	0.000100	mg/L		<0.000100	<0.000100	----	----	----
Bismuth, total	7440-69-9	E420/VA	0.000050	mg/L		<0.000050	<0.000050	----	----	----
Boron, total	7440-42-8	E420/VA	0.010	mg/L		0.019	0.014	----	----	----
Cadmium, total	7440-43-9	E420/VA	0.0000050	mg/L		0.0000075	0.0000121	----	----	----
Calcium, total	7440-70-2	E420/VA	0.050	mg/L		21.3	20.1	----	----	----
Cesium, total	7440-46-2	E420/VA	0.000010	mg/L		<0.000010	<0.000010	----	----	----
Chromium, total	7440-47-3	E420/VA	0.00050	mg/L		<0.00050	<0.00050	----	----	----

Analytical Results

Sub-Matrix: Water
(Matrix: Water)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	23605-01	23605-02	----	----	----
					Client sampling date / time	25-Nov-2024 10:45	25-Nov-2024 11:10	----	----	----
						VA24D1977-001	VA24D1977-002	----	----	----
						Result	Result	----	----	----
Total Metals										
Cobalt, total	7440-48-4	E420/VA	0.00010	mg/L		<0.00010	<0.00010	----	----	----
Copper, total	7440-50-8	E420/VA	0.00050	mg/L		<0.00050	<0.00050	----	----	----
Iron, total	7439-89-6	E420/VA	0.010	mg/L		0.020	0.121	----	----	----
Lead, total	7439-92-1	E420/VA	0.000050	mg/L		<0.000050	0.000203	----	----	----
Lithium, total	7439-93-2	E420/VA	0.0010	mg/L		0.0015	0.0016	----	----	----
Magnesium, total	7439-95-4	E420/VA	0.0050	mg/L		6.67	6.17	----	----	----
Manganese, total	7439-96-5	E420/VA	0.00010	mg/L		0.00154	0.00372	----	----	----
Mercury, total	7439-97-6	E508/VA	0.0000050	mg/L		<0.0000050	<0.0000050	----	----	----
Molybdenum, total	7439-98-7	E420/VA	0.000050	mg/L		0.00134	0.000295	----	----	----
Nickel, total	7440-02-0	E420/VA	0.00050	mg/L		<0.00050	<0.00050	----	----	----
Phosphorus, total	7723-14-0	E420/VA	0.050	mg/L		<0.050	<0.050	----	----	----
Potassium, total	7440-09-7	E420/VA	0.050	mg/L		2.46	2.28	----	----	----
Rubidium, total	7440-17-7	E420/VA	0.00020	mg/L		0.00026	0.00025	----	----	----
Selenium, total	7782-49-2	E420/VA	0.000050	mg/L		0.000056	0.000092	----	----	----
Silicon, total	7440-21-3	E420/VA	0.10	mg/L		14.0	14.2	----	----	----
Silver, total	7440-22-4	E420/VA	0.000010	mg/L		<0.000010	<0.000010	----	----	----
Sodium, total	7440-23-5	E420/VA	0.050	mg/L		28.9	16.1	----	----	----
Strontium, total	7440-24-6	E420/VA	0.00020	mg/L		0.142	0.130	----	----	----
Sulfur, total	7704-34-9	E420/VA	0.50	mg/L		6.27	3.49	----	----	----
Tellurium, total	13494-80-9	E420/VA	0.00020	mg/L		<0.00020	<0.00020	----	----	----
Thallium, total	7440-28-0	E420/VA	0.000010	mg/L		<0.000010	<0.000010	----	----	----

Analytical Results

Sub-Matrix: Water (Matrix: Water)					Client sample ID	23605-01	23605-02	----	----	----
					Client sampling date / time	25-Nov-2024 10:45	25-Nov-2024 11:10	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit		VA24D1977-001	VA24D1977-002	----	----	----
						Result	Result	----	----	----
Total Metals										
Thorium, total	7440-29-1	E420/VA	0.00010	mg/L		<0.00010	<0.00010	----	----	----
Tin, total	7440-31-5	E420/VA	0.00010	mg/L		<0.00010	<0.00010	----	----	----
Titanium, total	7440-32-6	E420/VA	0.00030	mg/L		0.00041	0.00135	----	----	----
Tungsten, total	7440-33-7	E420/VA	0.00010	mg/L		<0.00010	<0.00010	----	----	----
Uranium, total	7440-61-1	E420/VA	0.000010	mg/L		0.000604	0.000739	----	----	----
Vanadium, total	7440-62-2	E420/VA	0.00050	mg/L		0.00556	0.00431	----	----	----
Zinc, total	7440-66-6	E420/VA	0.0030	mg/L		<0.0030	<0.0030	----	----	----
Zirconium, total	7440-67-7	E420/VA	0.00020	mg/L		<0.00020	<0.00020	----	----	----

Please refer to the General Comments section for an explanation of any result qualifiers detected.

ALS Canada Ltd.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **VA24D1977**	Page	: 1 of 8
Client	: **WSP Canada Inc.**	Laboratory	: ALS Environmental - Vancouver
Contact	: Jarod Devries	Account Manager	: Amber Springer
Address	: 301 - 3600 Uptown Blvd Victoria BC Canada V8Z 0B9	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: ----	Telephone	: +1 604 253 4188
Project	: CA0033347.0492 Task 5020	Date Samples Received	: 26-Nov-2024 11:25
PO	: ----	Issue Date	: 31-Dec-2024 09:59
C-O-C number	: 23605		
Sampler	: ----		
Site	: ----		
Quote number	: WSP Western Canada Standing Offer		
No. of samples received	: 2		
No. of samples analysed	: 2		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group : Analytical Method / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
23605-01	E235.SO4	25-Nov-2024	27-Nov-2024	28 days	2 days	✓	27-Nov-2024	28 days	2 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
23605-02	E235.SO4	25-Nov-2024	27-Nov-2024	28 days	2 days	✓	27-Nov-2024	28 days	2 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid)										
23605-01	E358-L	25-Nov-2024	27-Nov-2024	28 days	2 days	✓	27-Nov-2024	28 days	2 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid)										
23605-02	E358-L	25-Nov-2024	27-Nov-2024	28 days	2 days	✓	27-Nov-2024	28 days	2 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid)										
23605-01	E355-L	25-Nov-2024	27-Nov-2024	28 days	2 days	✓	27-Nov-2024	28 days	2 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid)										
23605-02	E355-L	25-Nov-2024	27-Nov-2024	28 days	2 days	✓	27-Nov-2024	28 days	2 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE										
23605-01	E290	25-Nov-2024	27-Nov-2024	14 days	2 days	✓	27-Nov-2024	14 days	2 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group : Analytical Method / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Alkalinity Species by Titration										
HDPE										
23605-02	E290	25-Nov-2024	27-Nov-2024	14 days	2 days	✓	27-Nov-2024	14 days	2 days	✓
Physical Tests : TDS by Gravimetry										
HDPE										
23605-01	E162	25-Nov-2024	----	----	----		29-Nov-2024	7 days	4 days	✓
Physical Tests : TDS by Gravimetry										
HDPE										
23605-02	E162	25-Nov-2024	----	----	----		29-Nov-2024	7 days	4 days	✓
Physical Tests : TSS by Gravimetry										
HDPE										
23605-01	E160	25-Nov-2024	----	----	----		29-Nov-2024	7 days	4 days	✓
Physical Tests : TSS by Gravimetry										
HDPE										
23605-02	E160	25-Nov-2024	----	----	----		29-Nov-2024	7 days	4 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial - total (lab preserved)										
23605-01	E508	25-Nov-2024	02-Dec-2024	28 days	7 days	✓	02-Dec-2024	28 days	7 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial - total (lab preserved)										
23605-02	E508	25-Nov-2024	02-Dec-2024	28 days	7 days	✓	02-Dec-2024	28 days	7 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved)										
23605-01	E420	25-Nov-2024	28-Nov-2024	180 days	3 days	✓	29-Nov-2024	180 days	4 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved)										
23605-02	E420	25-Nov-2024	28-Nov-2024	180 days	3 days	✓	29-Nov-2024	180 days	4 days	✓

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water**

Evaluation: × = *QC frequency outside specification*; ✓ = *QC frequency within specification.*

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Alkalinity Species by Titration	E290	1785602	1	11	9.0	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	1785026	1	15	6.6	5.0	✓
Sulfate in Water by IC	E235.SO4	1785605	1	11	9.0	5.0	✓
TDS by Gravimetry	E162	1790009	1	20	5.0	5.0	✓
Total Mercury in Water by CVAAS	E508	1792002	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	1785744	2	12	16.6	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	1785022	1	11	9.0	5.0	✓
TSS by Gravimetry	E160	1790007	1	20	5.0	5.0	✓
Laboratory Control Samples (LCS)							
Alkalinity Species by Titration	E290	1785602	1	11	9.0	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	1785026	1	15	6.6	5.0	✓
Sulfate in Water by IC	E235.SO4	1785605	1	11	9.0	5.0	✓
TDS by Gravimetry	E162	1790009	1	20	5.0	5.0	✓
Total Mercury in Water by CVAAS	E508	1792002	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	1785744	1	12	8.3	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	1785022	1	11	9.0	5.0	✓
TSS by Gravimetry	E160	1790007	1	20	5.0	5.0	✓
Method Blanks (MB)							
Alkalinity Species by Titration	E290	1785602	1	11	9.0	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	1785026	1	15	6.6	5.0	✓
Sulfate in Water by IC	E235.SO4	1785605	1	11	9.0	5.0	✓
TDS by Gravimetry	E162	1790009	1	20	5.0	5.0	✓
Total Mercury in Water by CVAAS	E508	1792002	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	1785744	1	12	8.3	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	1785022	1	11	9.0	5.0	✓
TSS by Gravimetry	E160	1790007	1	20	5.0	5.0	✓
Matrix Spikes (MS)							
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	1785026	1	15	6.6	5.0	✓
Sulfate in Water by IC	E235.SO4	1785605	1	11	9.0	5.0	✓
Total Mercury in Water by CVAAS	E508	1792002	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	1785744	1	12	8.3	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	1785022	1	11	9.0	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
TSS by Gravimetry	E160 ALS Environmental - Vancouver	Water	APHA 2540 D (mod)	Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, following by drying of the filter at 104 ± 1°C, with gravimetric measurement of the filtered solids. Samples containing very high dissolved solid content (i.e. seawaters, brackish waters) may produce a positive bias by this method. Alternate analysis methods are available for these types of samples.
TDS by Gravimetry	E162 ALS Environmental - Vancouver	Water	APHA 2540 C (mod)	Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, with evaporation of the filtrate at 180 ± 2°C for 16 hours or to constant weight, with gravimetric measurement of the residue.
Sulfate in Water by IC	E235.SO4 ALS Environmental - Vancouver	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Alkalinity Species by Titration	E290 ALS Environmental - Vancouver	Water	APHA 2320 B (mod)	Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L ALS Environmental - Vancouver	Water	APHA 5310 B (mod)	Total Organic Carbon (Non-Purgeable), also known as NPOC (total), is a direct measurement of TOC after an acidified sample has been purged to remove inorganic carbon (IC). Analysis is by high temperature combustion with infrared detection of CO_2. NPOC does not include volatile organic species that are purged off with IC. For samples where the majority of total carbon (TC) is comprised of IC (which is common), this method is more accurate and more reliable than the TOC by subtraction method (i.e. TC minus TIC).
Dissolved Organic Carbon by Combustion (Low Level)	E358-L ALS Environmental - Vancouver	Water	APHA 5310 B (mod)	Dissolved Organic Carbon (Non-Purgeable), also known as NPOC (dissolved), is a direct measurement of DOC after a filtered (0.45 micron) sample has been acidified and purged to remove inorganic carbon (IC). Analysis is by high temperature combustion with infrared detection of CO_2. NPOC does not include volatile organic species that are purged off with IC. For samples where the majority of DC (dissolved carbon) is comprised of IC (which is common), this method is more accurate and more reliable than the DOC by subtraction method (i.e. DC minus DIC).
Total Metals in Water by CRC ICPMS	E420 ALS Environmental - Vancouver	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Total Mercury in Water by CVAAS	E508 ALS Environmental - Vancouver	Water	EPA 1631E (mod)	Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Hardness (Calculated) from Total Ca/Mg	EC100A ALS Environmental - Vancouver	Water	APHA 2340B	"Hardness (as CaCO3), from total Ca/Mg" is calculated from the sum of total Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations. Hardness from total Ca/Mg is normally comparable to Dissolved Hardness in non-turbid waters.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Preparation for Total Organic Carbon by Combustion	EP355 ALS Environmental - Vancouver	Water		Preparation for Total Organic Carbon by Combustion
Preparation for Dissolved Organic Carbon for Combustion	EP358 ALS Environmental - Vancouver	Water	APHA 5310 B (mod)	Preparation for Dissolved Organic Carbon

ALS Canada Ltd.

QUALITY CONTROL REPORT

Work Order	: **VA24D1977**	Page	: 1 of 10
Client	: WSP Canada Inc.	Laboratory	: ALS Environmental - Vancouver
Contact	: Jarod Devries	Account Manager	: Amber Springer
Address	: 301 - 3600 Uptown Blvd Victoria BC Canada V8Z 0B9	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: ----	Telephone	: +1 604 253 4188
Project	: CA0033347.0492 Task 5020	Date Samples Received	: 26-Nov-2024 11:25
PO	: ----	Date Analysis Commenced	: 27-Nov-2024
C-O-C number	: 23605	Issue Date	: 31-Dec-2024 09:59
Sampler	: ----		
Site	: ----		
Quote number	: WSP Western Canada Standing Offer		
No. of samples received	: 2		
No. of samples analysed	: 2		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Lindsay Gung	Supervisor - Water Chemistry	Vancouver Inorganics, Burnaby, British Columbia
Maya Urquhart	Lab Analyst	Vancouver Metals, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	Vancouver Metals, Burnaby, British Columbia

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Physical Tests (QC Lot: 1785602)											
VA24D1850-001	Anonymous	Alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	164	158	3.13%	20%	----
Physical Tests (QC Lot: 1790007)											
FJ2403573-001	Anonymous	Solids, total suspended [TSS]	----	E160	3.0	mg/L	8.7	9.9	1.2	Diff <2x LOR	----
Physical Tests (QC Lot: 1790009)											
FJ2403573-001	Anonymous	Solids, total dissolved [TDS]	----	E162	20	mg/L	290	302	4.05%	20%	----
Anions and Nutrients (QC Lot: 1785605)											
VA24D1939-001	Anonymous	Sulfate (as SO4)	14808-79-8	E235.SO4	1.50	mg/L	502	500	0.375%	20%	----
Organic / Inorganic Carbon (QC Lot: 1785022)											
VA24D1912-001	Anonymous	Carbon, total organic [TOC]	----	E355-L	0.50	mg/L	6.14	7.11	14.5%	20%	----
Organic / Inorganic Carbon (QC Lot: 1785026)											
KS2404894-001	Anonymous	Carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L	6.61	7.04	6.27%	20%	----
Total Metals (QC Lot: 1785744)											
VA24D2024-001	Anonymous	Aluminum, total	7429-90-5	E420	0.0030	mg/L	0.0469	0.0488	3.85%	20%	----
VA24D2024-001	Anonymous	Antimony, total	7440-36-0	E420	0.00010	mg/L	0.00950	0.00957	0.660%	20%	----
		Arsenic, total	7440-38-2	E420	0.00010	mg/L	0.00405	0.00396	2.04%	20%	----
		Barium, total	7440-39-3	E420	0.00010	mg/L	0.0396	0.0397	0.284%	20%	----
		Beryllium, total	7440-41-7	E420	0.000020	mg/L	<0.000020	<0.000020	0	Diff <2x LOR	----
		Bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		Boron, total	7440-42-8	E420	0.010	mg/L	0.111	0.114	2.58%	20%	----
		Cadmium, total	7440-43-9	E420	0.0000050	mg/L	0.0000167	0.0000191	0.0000024	Diff <2x LOR	----
		Calcium, total	7440-70-2	E420	0.050	mg/L	28.3	28.5	0.769%	20%	----
		Cesium, total	7440-46-2	E420	0.000010	mg/L	0.00176	0.00177	0.590%	20%	----
		Chromium, total	7440-47-3	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Cobalt, total	7440-48-4	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Copper, total	7440-50-8	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Iron, total	7439-89-6	E420	0.010	mg/L	0.011	0.012	0.0004	Diff <2x LOR	----
		Lead, total	7439-92-1	E420	0.000050	mg/L	0.000244	0.000249	0.000004	Diff <2x LOR	----
		Lithium, total	7439-93-2	E420	0.0010	mg/L	0.0577	0.0570	1.26%	20%	----
		Magnesium, total	7439-95-4	E420	0.0050	mg/L	2.14	2.16	1.19%	20%	----
		Manganese, total	7439-96-5	E420	0.00010	mg/L	0.0662	0.0666	0.562%	20%	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Total Metals (QC Lot: 1785744) - continued											
VA24D2024-001	Anonymous	Molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.0106	0.0107	0.428%	20%	----
		Nickel, total	7440-02-0	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Phosphorus, total	7723-14-0	E420	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		Potassium, total	7440-09-7	E420	0.050	mg/L	15.7	15.4	2.28%	20%	----
		Rubidium, total	7440-17-7	E420	0.00020	mg/L	0.0180	0.0183	1.65%	20%	----
		Selenium, total	7782-49-2	E420	0.000050	mg/L	0.000920	0.000912	0.924%	20%	----
		Silicon, total	7440-21-3	E420	0.10	mg/L	1.70	1.82	6.52%	20%	----
		Silver, total	7440-22-4	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		Sodium, total	7440-23-5	E420	0.050	mg/L	32.4	32.7	0.871%	20%	----
		Strontium, total	7440-24-6	E420	0.00020	mg/L	0.502	0.499	0.536%	20%	----
		Sulfur, total	7704-34-9	E420	0.50	mg/L	26.7	27.3	2.00%	20%	----
		Tellurium, total	13494-80-9	E420	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		Thallium, total	7440-28-0	E420	0.000010	mg/L	0.000047	0.000050	0.000003	Diff <2x LOR	----
		Thorium, total	7440-29-1	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Tin, total	7440-31-5	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Titanium, total	7440-32-6	E420	0.00030	mg/L	<0.00030	0.00050	0.00020	Diff <2x LOR	----
		Tungsten, total	7440-33-7	E420	0.00010	mg/L	0.00119	0.00122	2.20%	20%	----
		Uranium, total	7440-61-1	E420	0.000010	mg/L	0.000486	0.000481	1.04%	20%	----
		Vanadium, total	7440-62-2	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Zinc, total	7440-66-6	E420	0.0030	mg/L	<0.0030	<0.0030	0	Diff <2x LOR	----
		Zirconium, total	7440-67-7	E420	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
Total Metals (QC Lot: 1792002)											
VA24D1962-001	Anonymous	Mercury, total	7439-97-6	E508	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 1785602)						
Alkalinity, total (as CaCO3)	----	E290	1	mg/L	<1.0	----
Physical Tests (QCLot: 1790007)						
Solids, total suspended [TSS]	----	E160	3	mg/L	<3.0	----
Physical Tests (QCLot: 1790009)						
Solids, total dissolved [TDS]	----	E162	10	mg/L	<10	----
Anions and Nutrients (QCLot: 1785605)						
Sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	----
Organic / Inorganic Carbon (QCLot: 1785022)						
Carbon, total organic [TOC]	----	E355-L	0.5	mg/L	<0.50	----
Organic / Inorganic Carbon (QCLot: 1785026)						
Carbon, dissolved organic [DOC]	----	E358-L	0.5	mg/L	<0.50	----
Total Metals (QCLot: 1785744)						
Aluminum, total	7429-90-5	E420	0.003	mg/L	<0.0030	----
Antimony, total	7440-36-0	E420	0.0001	mg/L	<0.00010	----
Arsenic, total	7440-38-2	E420	0.0001	mg/L	<0.00010	----
Barium, total	7440-39-3	E420	0.0001	mg/L	<0.00010	----
Beryllium, total	7440-41-7	E420	0.00002	mg/L	<0.000020	----
Bismuth, total	7440-69-9	E420	0.00005	mg/L	<0.000050	----
Boron, total	7440-42-8	E420	0.01	mg/L	<0.010	----
Cadmium, total	7440-43-9	E420	0.000005	mg/L	<0.0000050	----
Calcium, total	7440-70-2	E420	0.05	mg/L	<0.050	----
Cesium, total	7440-46-2	E420	0.00001	mg/L	<0.000010	----
Chromium, total	7440-47-3	E420	0.0005	mg/L	<0.00050	----
Cobalt, total	7440-48-4	E420	0.0001	mg/L	<0.00010	----
Copper, total	7440-50-8	E420	0.0005	mg/L	<0.00050	----
Iron, total	7439-89-6	E420	0.01	mg/L	<0.010	----
Lead, total	7439-92-1	E420	0.00005	mg/L	<0.000050	----
Lithium, total	7439-93-2	E420	0.001	mg/L	<0.0010	----
Magnesium, total	7439-95-4	E420	0.005	mg/L	<0.0050	----
Manganese, total	7439-96-5	E420	0.0001	mg/L	<0.00010	----
Molybdenum, total	7439-98-7	E420	0.00005	mg/L	<0.000050	----
Nickel, total	7440-02-0	E420	0.0005	mg/L	<0.00050	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Total Metals (QCLot: 1785744) - continued						
Phosphorus, total	7723-14-0	E420	0.05	mg/L	<0.050	----
Potassium, total	7440-09-7	E420	0.05	mg/L	<0.050	----
Rubidium, total	7440-17-7	E420	0.0002	mg/L	<0.00020	----
Selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	----
Silicon, total	7440-21-3	E420	0.1	mg/L	<0.10	----
Silver, total	7440-22-4	E420	0.00001	mg/L	<0.000010	----
Sodium, total	7440-23-5	E420	0.05	mg/L	<0.050	----
Strontium, total	7440-24-6	E420	0.0002	mg/L	<0.00020	----
Sulfur, total	7704-34-9	E420	0.5	mg/L	<0.50	----
Tellurium, total	13494-80-9	E420	0.0002	mg/L	<0.00020	----
Thallium, total	7440-28-0	E420	0.00001	mg/L	<0.000010	----
Thorium, total	7440-29-1	E420	0.0001	mg/L	<0.00010	----
Tin, total	7440-31-5	E420	0.0001	mg/L	<0.00010	----
Titanium, total	7440-32-6	E420	0.0003	mg/L	<0.00030	----
Tungsten, total	7440-33-7	E420	0.0001	mg/L	<0.00010	----
Uranium, total	7440-61-1	E420	0.00001	mg/L	<0.000010	----
Vanadium, total	7440-62-2	E420	0.0005	mg/L	<0.00050	----
Zinc, total	7440-66-6	E420	0.003	mg/L	<0.0030	----
Zirconium, total	7440-67-7	E420	0.0002	mg/L	<0.00020	----
Total Metals (QCLot: 1792002)						
Mercury, total	7439-97-6	E508	0.000005	mg/L	<0.0000050	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Target Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 1785602)									
Alkalinity, total (as CaCO3)	----	E290	1	mg/L	500 mg/L	105	85.0	115	----
Physical Tests (QCLot: 1790007)									
Solids, total suspended [TSS]	----	E160	3	mg/L	150 mg/L	99.5	85.0	115	----
Physical Tests (QCLot: 1790009)									
Solids, total dissolved [TDS]	----	E162	10	mg/L	1000 mg/L	102	85.0	115	----
Anions and Nutrients (QCLot: 1785605)									
Sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	98.6	90.0	110	----
Organic / Inorganic Carbon (QCLot: 1785022)									
Carbon, total organic [TOC]	----	E355-L	0.5	mg/L	8.57 mg/L	110	80.0	120	----
Organic / Inorganic Carbon (QCLot: 1785026)									
Carbon, dissolved organic [DOC]	----	E358-L	0.5	mg/L	8.57 mg/L	100	80.0	120	----
Total Metals (QCLot: 1785744)									
Aluminum, total	7429-90-5	E420	0.003	mg/L	2 mg/L	103	80.0	120	----
Antimony, total	7440-36-0	E420	0.0001	mg/L	1 mg/L	104	80.0	120	----
Arsenic, total	7440-38-2	E420	0.0001	mg/L	1 mg/L	107	80.0	120	----
Barium, total	7440-39-3	E420	0.0001	mg/L	0.25 mg/L	102	80.0	120	----
Beryllium, total	7440-41-7	E420	0.00002	mg/L	0.1 mg/L	98.7	80.0	120	----
Bismuth, total	7440-69-9	E420	0.00005	mg/L	1 mg/L	99.3	80.0	120	----
Boron, total	7440-42-8	E420	0.01	mg/L	1 mg/L	98.2	80.0	120	----
Cadmium, total	7440-43-9	E420	0.000005	mg/L	0.1 mg/L	103	80.0	120	----
Calcium, total	7440-70-2	E420	0.05	mg/L	50 mg/L	97.1	80.0	120	----
Cesium, total	7440-46-2	E420	0.00001	mg/L	0.05 mg/L	97.8	80.0	120	----
Chromium, total	7440-47-3	E420	0.0005	mg/L	0.25 mg/L	103	80.0	120	----
Cobalt, total	7440-48-4	E420	0.0001	mg/L	0.25 mg/L	101	80.0	120	----
Copper, total	7440-50-8	E420	0.0005	mg/L	0.25 mg/L	102	80.0	120	----
Iron, total	7439-89-6	E420	0.01	mg/L	1 mg/L	95.4	80.0	120	----
Lead, total	7439-92-1	E420	0.00005	mg/L	0.5 mg/L	101	80.0	120	----
Lithium, total	7439-93-2	E420	0.001	mg/L	0.25 mg/L	97.7	80.0	120	----
Magnesium, total	7439-95-4	E420	0.005	mg/L	50 mg/L	104	80.0	120	----
Manganese, total	7439-96-5	E420	0.0001	mg/L	0.25 mg/L	105	80.0	120	----

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Target Concentration	LCS	Low	High	Qualifier
Total Metals (QCLot: 1785744) - continued									
Molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.25 mg/L	99.7	80.0	120	----
Nickel, total	7440-02-0	E420	0.0005	mg/L	0.5 mg/L	100	80.0	120	----
Phosphorus, total	7723-14-0	E420	0.05	mg/L	10 mg/L	108	80.0	120	----
Potassium, total	7440-09-7	E420	0.05	mg/L	50 mg/L	105	80.0	120	----
Rubidium, total	7440-17-7	E420	0.0002	mg/L	0.1 mg/L	101	80.0	120	----
Selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	102	80.0	120	----
Silicon, total	7440-21-3	E420	0.1	mg/L	10 mg/L	104	80.0	120	----
Silver, total	7440-22-4	E420	0.00001	mg/L	0.1 mg/L	92.6	80.0	120	----
Sodium, total	7440-23-5	E420	0.05	mg/L	50 mg/L	103	80.0	120	----
Strontium, total	7440-24-6	E420	0.0002	mg/L	0.25 mg/L	100	80.0	120	----
Sulfur, total	7704-34-9	E420	0.5	mg/L	50 mg/L	88.2	80.0	120	----
Tellurium, total	13494-80-9	E420	0.0002	mg/L	0.1 mg/L	96.9	80.0	120	----
Thallium, total	7440-28-0	E420	0.00001	mg/L	1 mg/L	100	80.0	120	----
Thorium, total	7440-29-1	E420	0.0001	mg/L	0.1 mg/L	97.4	80.0	120	----
Tin, total	7440-31-5	E420	0.0001	mg/L	0.5 mg/L	99.6	80.0	120	----
Titanium, total	7440-32-6	E420	0.0003	mg/L	0.25 mg/L	102	80.0	120	----
Tungsten, total	7440-33-7	E420	0.0001	mg/L	0.1 mg/L	100	80.0	120	----
Uranium, total	7440-61-1	E420	0.00001	mg/L	0.005 mg/L	103	80.0	120	----
Vanadium, total	7440-62-2	E420	0.0005	mg/L	0.5 mg/L	104	80.0	120	----
Zinc, total	7440-66-6	E420	0.003	mg/L	0.5 mg/L	101	80.0	120	----
Zirconium, total	7440-67-7	E420	0.0002	mg/L	0.1 mg/L	97.9	80.0	120	----
Total Metals (QCLot: 1792002)									
Mercury, total	7439-97-6	E508	0.000005	mg/L	0 mg/L	100	80.0	120	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Anions and Nutrients (QCLot: 1785605)										
VA24D2007-001	Anonymous	Sulfate (as SO4)	14808-79-8	E235.SO4	103 mg/L	100 mg/L	103	75.0	125	----
Organic / Inorganic Carbon (QCLot: 1785022)										
VA24D1973-004	Anonymous	Carbon, total organic [TOC]	----	E355-L	5.32 mg/L	5 mg/L	106	70.0	130	----
Organic / Inorganic Carbon (QCLot: 1785026)										
KS2404894-002	Anonymous	Carbon, dissolved organic [DOC]	----	E358-L	4.63 mg/L	5 mg/L	92.6	70.0	130	----
Total Metals (QCLot: 1785744)										
VA24D2024-002	Anonymous	Aluminum, total	7429-90-5	E420	0.193 mg/L	0.2 mg/L	96.7	70.0	130	----
		Antimony, total	7440-36-0	E420	0.0187 mg/L	0.02 mg/L	93.3	70.0	130	----
		Arsenic, total	7440-38-2	E420	0.0205 mg/L	0.02 mg/L	103	70.0	130	----
		Barium, total	7440-39-3	E420	ND mg/L	----	ND	70.0	130	----
		Beryllium, total	7440-41-7	E420	0.0378 mg/L	0.04 mg/L	94.4	70.0	130	----
		Bismuth, total	7440-69-9	E420	0.00989 mg/L	0.01 mg/L	98.9	70.0	130	----
		Boron, total	7440-42-8	E420	ND mg/L	----	ND	70.0	130	----
		Cadmium, total	7440-43-9	E420	0.00395 mg/L	0.004 mg/L	98.8	70.0	130	----
		Calcium, total	7440-70-2	E420	ND mg/L	----	ND	70.0	130	----
		Cesium, total	7440-46-2	E420	0.00943 mg/L	0.01 mg/L	94.3	70.0	130	----
		Chromium, total	7440-47-3	E420	0.0386 mg/L	0.04 mg/L	96.6	70.0	130	----
		Cobalt, total	7440-48-4	E420	0.0195 mg/L	0.02 mg/L	97.7	70.0	130	----
		Copper, total	7440-50-8	E420	0.0190 mg/L	0.02 mg/L	94.8	70.0	130	----
		Iron, total	7439-89-6	E420	1.93 mg/L	2 mg/L	96.5	70.0	130	----
		Lead, total	7439-92-1	E420	0.0194 mg/L	0.02 mg/L	97.0	70.0	130	----
		Lithium, total	7439-93-2	E420	0.0870 mg/L	0.1 mg/L	87.0	70.0	130	----
		Magnesium, total	7439-95-4	E420	ND mg/L	----	ND	70.0	130	----
		Manganese, total	7439-96-5	E420	ND mg/L	----	ND	70.0	130	----
		Molybdenum, total	7439-98-7	E420	0.0191 mg/L	0.02 mg/L	95.5	70.0	130	----
		Nickel, total	7440-02-0	E420	0.0390 mg/L	0.04 mg/L	97.4	70.0	130	----
		Phosphorus, total	7723-14-0	E420	9.63 mg/L	10 mg/L	96.3	70.0	130	----
		Potassium, total	7440-09-7	E420	ND mg/L	----	ND	70.0	130	----
		Rubidium, total	7440-17-7	E420	0.0188 mg/L	0.02 mg/L	94.2	70.0	130	----
		Selenium, total	7782-49-2	E420	0.0412 mg/L	0.04 mg/L	103	70.0	130	----
		Silicon, total	7440-21-3	E420	9.95 mg/L	10 mg/L	99.5	70.0	130	----
		Silver, total	7440-22-4	E420	0.00376 mg/L	0.004 mg/L	93.9	70.0	130	----
		Sodium, total	7440-23-5	E420	ND mg/L	----	ND	70.0	130	----
		Strontium, total	7440-24-6	E420	ND mg/L	----	ND	70.0	130	----
		Sulfur, total	7704-34-9	E420	ND mg/L	----	ND	70.0	130	----
		Tellurium, total	13494-80-9	E420	0.0389 mg/L	0.04 mg/L	97.3	70.0	130	----
		Thallium, total	7440-28-0	E420	0.00388 mg/L	0.004 mg/L	97.0	70.0	130	----
		Thorium, total	7440-29-1	E420	0.0181 mg/L	0.02 mg/L	90.4	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Total Metals (QCLot: 1785744) - continued										
VA24D2024-002	Anonymous	Tin, total	7440-31-5	E420	0.0194 mg/L	0.02 mg/L	97.0	70.0	130	----
		Titanium, total	7440-32-6	E420	0.0406 mg/L	0.04 mg/L	102	70.0	130	----
		Tungsten, total	7440-33-7	E420	0.0195 mg/L	0.02 mg/L	97.6	70.0	130	----
		Uranium, total	7440-61-1	E420	0.00410 mg/L	0.004 mg/L	103	70.0	130	----
		Vanadium, total	7440-62-2	E420	0.0991 mg/L	0.1 mg/L	99.1	70.0	130	----
		Zinc, total	7440-66-6	E420	0.395 mg/L	0.4 mg/L	98.8	70.0	130	----
		Zirconium, total	7440-67-7	E420	0.0388 mg/L	0.04 mg/L	96.9	70.0	130	----
Total Metals (QCLot: 1792002)										
VA24D1963-001	Anonymous	Mercury, total	7439-97-6	E508	0.0000927 mg/L	0 mg/L	92.7	70.0	130	----

CHAIN OF CUSTODY RECORD/ANALYSIS REQUEST

No. 23605 page 1 of 1

840 Howe St., 10th Floor
Vancouver, British Columbia, Canada V6Z 2M1
Telephone (604) 685-9381

Project Number: CA0033347.0492 Task 5020		Laboratory Name: ALS	
Short Title: Catalyst - Wildwood	WSP Contact: Jarod Devries	Address: 8081 Lougheed Hwy B5y	
WSP E-mail Address 1: Jarod.Devries@wsp.com	WSP E-mail Address 2: Andrew.Stevens@wsp.com	Telephone/Fax: 6042534188	Contact: Amber Springer

Jean.Sutherland@wsp.com.

Office Name: Victoria.

EQuIS Facility Code: _____
EQuIS upload: ☐

Turnaround Time: ☐ 24 hr ☐ 48 hr ☐ 72 hr ☒ Regular (5 Days)
Criteria: ☐ CSR ☐ CCME ☐ BC Water Quality ☐ Other

Note: Final Reports to be issued by e-mail

Quote No.:

Analyses Required

Sample Control Number (SCN)	Sample Location	Sa. #	Sample Depth (m)	Sample Matrix (over)	Date Sampled (D / M / Y)	Time Sampled (HH:MM)	Sample Type (over)	QAQC Code (over)	Related SCN (over)	Number of Containers	TSS / TDS	Total Alkalinity	Sulphate	TOC	DOC	Total Metals	Dissolved Metals			RUSH (Select TAT above)	Remarks (over)
23605 - 01	Spring	1		WG	25/11/24	10:45	GRAB			7	X	X	X	X	X	X	X				
23605 - 02	Spring	2		WG	25/11/24	11:10	↓			7	X	X	X	X	X	X	X				
- 03																					
- 04																					
- 05																					
- 06																					
- 07																					
- 08																					
- 09																					
- 10																					
- 11																					
- 12																					

Environmental Division
Vancouver
Work Order Reference
VA24D1977

Telephone : +1 604 253 4188

Sampler's Signature:	Relinquished by: Signature	Company: WSP	Date: 25/11/24	Time: 12:30	Received by: Signature / Company
Comments: DO ICE PACKS Provide NATO/NITO TEQs for DIF Analysis	Method of Shipment: AIR Shipped by: Pacific Coastal.	Waybill No.: Shipment Condition: Seal Intact:	Received for Lab by: Temp (°C): 7 Cooler opened by: JC ice pk	Date: Rcvd 26Nov2024	Time: 1125am

WHITE: WSP Copy **YELLOW: Lab Copy**

ESED

ALS Canada Ltd.

CERTIFICATE OF ANALYSIS

Work Order	:	**VA24D2162**			
Client	:	**WSP Canada Inc.**	Laboratory	:	ALS Environmental - Vancouver
Contact	:	Jarod Devries	Account Manager	:	Amber Springer
Address	:	301 - 3600 Uptown Blvd Victoria British Columbia Canada V8Z 0B9	Address	:	8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	:	----	Telephone	:	+1 604 253 4188
Project	:	CA0033347.0492 Task 5020	Date Samples Received	:	27-Nov-2024 21:00
PO	:	----	Date Analysis Commenced	:	28-Nov-2024
C-O-C number	:	23822	Issue Date	:	03-Jan-2025 13:25
Sampler	:	----			
Site	:	----			
Quote number	:	WSP Western Canada Standing Offer			
No. of samples received	:	10			
No. of samples analysed	:	10			

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Dan Gebert	Laboratory Analyst	Metals, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Lindsay Gung	Supervisor - Water Chemistry	Inorganics, Burnaby, British Columbia
Maya Urquhart	Lab Analyst	Metals, Burnaby, British Columbia
Paul Cushing	Team Leader - Organics	Organics, Burnaby, British Columbia

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key: CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances.
LOR: Limit of Reporting (detection limit).

Unit	*Description*
-	no units
mg/L	milligrams per litre
µg/L	micrograms per litre

<: less than.
>: greater than.
Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Qualifiers

Qualifier	Description
DLA	Detection Limit adjusted for required dilution.
DLM	Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).
DLQ	Detection Limit raised due to co-eluting interference. Mass Spectrometry qualifier ion ratio did not meet acceptance criteria.

Analytical Results

Sub-Matrix: Water
(Matrix: Water)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	23822-01	23822-02	23822-03	23822-04	23822-05
					Client sampling date / time	26-Nov-2024 11:35	26-Nov-2024 13:20	26-Nov-2024 14:10	26-Nov-2024 15:35	27-Nov-2024 09:00
						VA24D2162-001	VA24D2162-002	VA24D2162-003	VA24D2162-004	VA24D2162-005
						Result	Result	Result	Result	Result
Physical Tests										
Alkalinity, total (as CaCO3)	----	E290/VA	1.0	mg/L		66.3	160	14.0	875	592
Hardness (as CaCO3), dissolved	----	EC100/VA	0.60	mg/L		110	54.5	----	142	90.4
Solids, total dissolved [TDS]	----	E162/VA	10	mg/L		222	309	47	1590	907
Solids, total suspended [TSS]	----	E160/VA	3.0	mg/L		<3.0	<3.0	6.4	44.4	24.4
Anions and Nutrients										
Chloride	16887-00-6	E235.Cl/VA	0.50	mg/L		----	----	1.85	----	----
Sulfate (as SO4)	14808-79-8	E235.SO4/VA	0.30	mg/L		11.7	50.6	2.23	163	82.1
Organic / Inorganic Carbon										
Carbon, total organic [TOC]	----	E355-L/VA	0.50	mg/L		0.55	2.66	1.30	44.0	30.0
Total Sulfides										
Sulfide, total (as S)	18496-25-8	E395/VA	0.0015	mg/L		<0.0015	----	----	----	0.0277
Sulfide, total (as H2S)	7783-06-4	E395/VA	0.0016	mg/L		<0.0016	----	----	----	0.0295
Dissolved Metals										
Aluminum, dissolved	7429-90-5	E421/VA	0.0010	mg/L		<0.0010	0.0122	----	0.0888	0.0463
Antimony, dissolved	7440-36-0	E421/VA	0.00010	mg/L		<0.00010	0.00063	----	0.00154	0.00068
Arsenic, dissolved	7440-38-2	E421/VA	0.00010	mg/L		0.00024	0.00026	----	0.0221	0.00028
Barium, dissolved	7440-39-3	E421/VA	0.00010	mg/L		0.00810	0.0158	----	0.0190	0.0156
Beryllium, dissolved	7440-41-7	E421/VA	0.000100	mg/L		<0.000100	<0.000100	----	<0.000100 DLA	<0.000100
Bismuth, dissolved	7440-69-9	E421/VA	0.000050	mg/L		<0.000050	<0.000050	----	<0.000100 DLA	<0.000100 DLA
Boron, dissolved	7440-42-8	E421/VA	0.010	mg/L		0.018	0.059	----	0.194	0.458
Cadmium, dissolved	7440-43-9	E421/VA	0.0000050	mg/L		0.0000076	<0.0000350 DLM	----	0.0000949	0.0000119

Analytical Results

Sub-Matrix: Water
(Matrix: Water)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	23822-01	23822-02	23822-03	23822-04	23822-05
					Client sampling date / time	26-Nov-2024 11:35	26-Nov-2024 13:20	26-Nov-2024 14:10	26-Nov-2024 15:35	27-Nov-2024 09:00
						VA24D2162-001	VA24D2162-002	VA24D2162-003	VA24D2162-004	VA24D2162-005
						Result	Result	Result	Result	Result
Dissolved Metals										
Calcium, dissolved	7440-70-2	E421/VA	0.050	mg/L		29.6	14.9	----	40.5	22.8
Cesium, dissolved	7440-46-2	E421/VA	0.000010	mg/L		<0.000010	<0.000010	----	<0.000020 DLA	<0.000020 DLA
Chromium, dissolved	7440-47-3	E421/VA	0.00050	mg/L		<0.00050	<0.00050	----	0.00507	0.00105
Cobalt, dissolved	7440-48-4	E421/VA	0.00010	mg/L		<0.00010	<0.00010	----	0.00156	0.00022
Copper, dissolved	7440-50-8	E421/VA	0.00020	mg/L		0.00494	0.00060	----	0.0136	0.00544
Iron, dissolved	7439-89-6	E421/VA	0.010	mg/L		<0.010	<0.010	----	0.286	0.296
Lead, dissolved	7439-92-1	E421/VA	0.000050	mg/L		0.000124	<0.000050	----	0.00110	0.000155
Lithium, dissolved	7439-93-2	E421/VA	0.0010	mg/L		0.0035	<0.0010	----	<0.0020 DLA	<0.0020 DLA
Magnesium, dissolved	7439-95-4	E421/VA	0.0050	mg/L		8.80	4.20	----	9.99	8.12
Manganese, dissolved	7439-96-5	E421/VA	0.00010	mg/L		0.00138	0.00096	----	0.186	0.217
Mercury, dissolved	7439-97-6	E509/VA	0.0000050	mg/L		<0.0000050	<0.0000050	----	0.0000106	<0.0000050
Molybdenum, dissolved	7439-98-7	E421/VA	0.000050	mg/L		0.000080	0.0239	----	0.000824	0.00349
Nickel, dissolved	7440-02-0	E421/VA	0.00050	mg/L		<0.00050	<0.00050	----	0.00316	<0.00100 DLA
Phosphorus, dissolved	7723-14-0	E421/VA	0.050	mg/L		<0.050	<0.050	----	1.17	0.122
Potassium, dissolved	7440-09-7	E421/VA	0.050	mg/L		3.35	31.6	----	2.39	2.74
Rubidium, dissolved	7440-17-7	E421/VA	0.00020	mg/L		<0.00020	0.0438	----	<0.00040 DLA	<0.00040 DLA
Selenium, dissolved	7782-49-2	E421/VA	0.000050	mg/L		0.000055	0.000073	----	0.000132	<0.000100 DLA
Silicon, dissolved	7440-21-3	E421/VA	0.050	mg/L		16.2	8.72	----	8.69	8.48
Silver, dissolved	7440-22-4	E421/VA	0.000010	mg/L		<0.000010	<0.000010	----	0.000043	<0.000020 DLA
Sodium, dissolved	7440-23-5	E421/VA	0.050	mg/L		17.2	73.2	----	539	319
Strontium, dissolved	7440-24-6	E421/VA	0.00020	mg/L		0.158	0.145	----	0.360	0.484

Analytical Results

Sub-Matrix: Water
(Matrix: Water)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	23822-01	23822-02	23822-03	23822-04	23822-05
					Client sampling date / time	26-Nov-2024 11:35	26-Nov-2024 13:20	26-Nov-2024 14:10	26-Nov-2024 15:35	27-Nov-2024 09:00
						VA24D2162-001	VA24D2162-002	VA24D2162-003	VA24D2162-004	VA24D2162-005
						Result	Result	Result	Result	Result
Dissolved Metals										
Sulfur, dissolved	7704-34-9	E421/VA	0.50	mg/L		3.89	16.8	----	75.1	30.0
Tellurium, dissolved	13494-80-9	E421/VA	0.00020	mg/L		<0.00020	<0.00020	----	<0.00040 DLA	<0.00040 DLA
Thallium, dissolved	7440-28-0	E421/VA	0.000010	mg/L		<0.000010	0.000010	----	<0.000020 DLA	<0.000020 DLA
Thorium, dissolved	7440-29-1	E421/VA	0.00010	mg/L		<0.00010	<0.00010	----	0.00037	0.00060
Tin, dissolved	7440-31-5	E421/VA	0.00010	mg/L		0.00010	<0.00010	----	0.00125	<0.00020 DLA
Titanium, dissolved	7440-32-6	E421/VA	0.00030	mg/L		0.00048	0.00038	----	0.124	0.0273
Tungsten, dissolved	7440-33-7	E421/VA	0.00010	mg/L		<0.00010	0.00108	----	0.00282	0.00061
Uranium, dissolved	7440-61-1	E421/VA	0.000010	mg/L		0.000749	0.000047	----	0.00636	0.00215
Vanadium, dissolved	7440-62-2	E421/VA	0.00050	mg/L		0.00504	0.00555	----	0.146	0.0236
Zinc, dissolved	7440-66-6	E421/VA	0.0010	mg/L		0.0055	0.0016	----	<0.0020 DLA	<0.0020 DLA
Zirconium, dissolved	7440-67-7	E421/VA	0.00020	mg/L		<0.00020	<0.00020	----	0.00324	0.00084
Dissolved mercury filtration location	----	EP509/VA	-	-		Field	Field	----	Field	Field
Dissolved metals filtration location	----	EP421/VA	-	-		Field	Field	----	Field	Field
Chlorinated Phenolics										
Chlorophenol, 2-	95-57-8	E651A/VA	0.050	µg/L		----	<0.050	----	<0.050	----
Chlorophenol, 3-	108-43-0	E651A/VA	0.050	µg/L		----	<0.050	----	<0.050	----
Chlorophenol, 4-	106-48-9	E651A/VA	0.050	µg/L		----	<0.050	----	<0.050	----
Monochlorophenols, total	----	E651A/VA	0.10	µg/L		----	<0.10	----	<0.10	----
Dichlorophenol, 2,3-	576-24-9	E651A/VA	0.050	µg/L		----	<0.050	----	<0.050	----
Dichlorophenol, 2,4- + 2,5-	----	E651A/VA	0.050	µg/L		----	<0.050	----	<0.050	----
Dichlorophenol, 2,6-	87-65-0	E651A/VA	0.050	µg/L		----	<0.050	----	<0.050	----

Analytical Results

Sub-Matrix: Water
(Matrix: Water)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	23822-01	23822-02	23822-03	23822-04	23822-05
					Client sampling date / time	26-Nov-2024 11:35	26-Nov-2024 13:20	26-Nov-2024 14:10	26-Nov-2024 15:35	27-Nov-2024 09:00
						VA24D2162-001	VA24D2162-002	VA24D2162-003	VA24D2162-004	VA24D2162-005
						Result	Result	Result	Result	Result
Chlorinated Phenolics										
Dichlorophenol, 3,4-	95-77-2	E651A/VA	0.050	µg/L		----	<0.050	----	0.255	----
Dichlorophenol, 3,5-	591-35-5	E651A/VA	0.050	µg/L		----	<0.050	----	<0.050	----
Dichlorophenols, total	----	E651A/VA	0.15	µg/L		----	<0.15	----	0.26	----
Trichlorophenol, 2,3,4-	15950-66-0	E651A/VA	0.10	µg/L		----	<0.10	----	<0.10	----
Trichlorophenol, 2,3,5-	933-78-8	E651A/VA	0.10	µg/L		----	<0.10	----	<0.10	----
Trichlorophenol, 2,3,6-	933-75-5	E651A/VA	0.10	µg/L		----	<0.10	----	<0.21 DLQ	----
Trichlorophenol, 2,4,5-	95-95-4	E651A/VA	0.10	µg/L		----	<0.10	----	<0.10	----
Trichlorophenol, 2,4,6-	88-06-2	E651A/VA	0.10	µg/L		----	<0.10	----	<0.10	----
Trichlorophenol, 3,4,5-	609-19-8	E651A/VA	0.10	µg/L		----	<0.10	----	<0.10	----
Trichlorophenols, total	----	E651A/VA	0.25	µg/L		----	<0.25	----	<0.31	----
Tetrachlorophenol, 2,3,4,5-	4901-51-3	E651A/VA	0.10	µg/L		----	<0.10	----	<0.10	----
Tetrachlorophenol, 2,3,4,6-	58-90-2	E651A/VA	0.10	µg/L		----	<0.10	----	<0.10	----
Tetrachlorophenol, 2,3,5,6-	935-95-5	E651A/VA	0.10	µg/L		----	<0.10	----	<0.10	----
Tetrachlorophenols, total	----	E651A/VA	0.20	µg/L		----	<0.20	----	<0.20	----
Pentachlorophenol [PCP]	87-86-5	E651A/VA	0.10	µg/L		----	<0.10	----	<0.10	----
Methylphenol, 4-chloro-3-	59-50-7	E651A/VA	0.10	µg/L		----	<0.10	----	<0.10	----
Phenols, total chlorinated	----	E651A/VA	1.0	µg/L		----	<1.0	----	<1.0	----
Non-Chlorinated Phenolics										
Dimethylphenol, 2,4-	105-67-9	E651A/VA	0.20	µg/L		----	<0.20	----	<0.20	----
Methylphenol, 2-	95-48-7	E651A/VA	0.50	µg/L		----	<0.50	----	<0.50	----
Methylphenol, 3-	108-39-4	E651A/VA	0.20	µg/L		----	<0.20	----	<0.20	----

Analytical Results

Sub-Matrix: Water
(Matrix: Water)

					Client sample ID	23822-01	23822-02	23822-03	23822-04	23822-05
					Client sampling date / time	26-Nov-2024 11:35	26-Nov-2024 13:20	26-Nov-2024 14:10	26-Nov-2024 15:35	27-Nov-2024 09:00
Analyte	CAS Number	Method/Lab	LOR	Unit		VA24D2162-001	VA24D2162-002	VA24D2162-003	VA24D2162-004	VA24D2162-005
						Result	Result	Result	Result	Result
Non-Chlorinated Phenolics										
Methylphenol, 4-	106-44-5	E651A/VA	0.20	µg/L		----	<0.20	----	<0.20	----
Methylphenols, total	----	E651A/VA	0.60	µg/L		----	<0.60	----	<0.60	----
Phenol	108-95-2	E651A/VA	0.20	µg/L		----	<0.75	----	<0.75	----
Phenols, total non-chlorinated	----	E651A/VA	0.65	µg/L		----	<0.96	----	<0.96	----
Phenolics Surrogates										
Chlorophenol-d4, 2-	93951-73-6	E651A/VA	0.1	%		----	95.0	----	77.3	----
Dichlorophenol-d3, 2,4-	93951-74-7	E651A/VA	0.1	%		----	94.1	----	78.7	----
Tribromophenol, 2,4,6-	118-79-6	E651A/VA	0.1	%		----	105	----	89.6	----

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Analytical Results

Sub-Matrix: Water
(Matrix: Water)

					Client sample ID	23822-06	23822-07	23822-08	23822-09	23822-10
					Client sampling date / time	27-Nov-2024 10:15	27-Nov-2024 12:05	27-Nov-2024 13:00	27-Nov-2024 13:00	27-Nov-2024 13:45
Analyte	CAS Number	Method/Lab	LOR	Unit		VA24D2162-006	VA24D2162-007	VA24D2162-008	VA24D2162-009	VA24D2162-010
						Result	Result	Result	Result	Result
Physical Tests										
Alkalinity, total (as CaCO3)	----	E290/VA	1.0	mg/L		81.7	76.5	79.0	79.1	131
Hardness (as CaCO3), dissolved	----	EC100/VA	0.60	mg/L		76.1	87.6	83.0	81.6	71.6
Solids, total dissolved [TDS]	----	E162/VA	10	mg/L		138	202	150	150	180
Solids, total suspended [TSS]	----	E160/VA	3.0	mg/L		<3.0	267	10.0	10.4	6.0
Anions and Nutrients										
Sulfate (as SO4)	14808-79-8	E235.SO4/VA	0.30	mg/L		3.75	15.0	9.60	9.74	16.6

Analytical Results

Sub-Matrix: Water
(Matrix: Water)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	23822-06	23822-07	23822-08	23822-09	23822-10
					Client sampling date / time	27-Nov-2024 10:15	27-Nov-2024 12:05	27-Nov-2024 13:00	27-Nov-2024 13:00	27-Nov-2024 13:45
						VA24D2162-006	VA24D2162-007	VA24D2162-008	VA24D2162-009	VA24D2162-010
						Result	Result	Result	Result	Result
Organic / Inorganic Carbon										
Carbon, total organic [TOC]	----	E355-L/VA	0.50	mg/L		1.31	1.39	<0.50	0.52	0.89
Dissolved Metals										
Aluminum, dissolved	7429-90-5	E421/VA	0.0010	mg/L		<0.0010	0.639	0.0011	<0.0010	0.0020
Antimony, dissolved	7440-36-0	E421/VA	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Arsenic, dissolved	7440-38-2	E421/VA	0.00010	mg/L		0.00026	0.00063	0.00028	0.00029	0.00524
Barium, dissolved	7440-39-3	E421/VA	0.00010	mg/L		0.00365	0.00681	0.00533	0.00525	0.0361
Beryllium, dissolved	7440-41-7	E421/VA	0.000100	mg/L		<0.000100	<0.000100	<0.000100	<0.000100	<0.000100
Bismuth, dissolved	7440-69-9	E421/VA	0.000050	mg/L		<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Boron, dissolved	7440-42-8	E421/VA	0.010	mg/L		<0.010	0.016	0.010	<0.010	0.048
Cadmium, dissolved	7440-43-9	E421/VA	0.0000050	mg/L		0.0000052	0.0000062	<0.0000050	<0.0000050	<0.0000150 DLM
Calcium, dissolved	7440-70-2	E421/VA	0.050	mg/L		18.6	23.7	21.0	21.0	19.9
Cesium, dissolved	7440-46-2	E421/VA	0.000010	mg/L		<0.000010	0.000019	<0.000010	<0.000010	<0.000010
Chromium, dissolved	7440-47-3	E421/VA	0.00050	mg/L		<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Cobalt, dissolved	7440-48-4	E421/VA	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Copper, dissolved	7440-50-8	E421/VA	0.00020	mg/L		<0.00020	0.00050	<0.00020	<0.00020	<0.00020
Iron, dissolved	7439-89-6	E421/VA	0.010	mg/L		<0.010	0.179	<0.010	<0.010	0.538
Lead, dissolved	7439-92-1	E421/VA	0.000050	mg/L		<0.000050	0.000509	<0.000050	<0.000050	<0.000050
Lithium, dissolved	7439-93-2	E421/VA	0.0010	mg/L		0.0022	0.0020	0.0022	0.0022	0.0077
Magnesium, dissolved	7439-95-4	E421/VA	0.0050	mg/L		7.20	6.89	7.42	7.08	5.33
Manganese, dissolved	7439-96-5	E421/VA	0.00010	mg/L		<0.00010	0.00516	0.00012	<0.00010	0.191
Mercury, dissolved	7439-97-6	E509/VA	0.0000050	mg/L		<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050

Analytical Results

Sub-Matrix: Water
(Matrix: Water)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	23822-06	23822-07	23822-08	23822-09	23822-10
					Client sampling date / time	27-Nov-2024 10:15	27-Nov-2024 12:05	27-Nov-2024 13:00	27-Nov-2024 13:00	27-Nov-2024 13:45
						VA24D2162-006	VA24D2162-007	VA24D2162-008	VA24D2162-009	VA24D2162-010
						Result	Result	Result	Result	Result
Dissolved Metals										
Molybdenum, dissolved	7439-98-7	E421/VA	0.000050	mg/L		0.00124	0.000405	0.000894	0.000867	0.0318
Nickel, dissolved	7440-02-0	E421/VA	0.00050	mg/L		<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Phosphorus, dissolved	7723-14-0	E421/VA	0.050	mg/L		<0.050	0.058	<0.050	<0.050	0.071
Potassium, dissolved	7440-09-7	E421/VA	0.050	mg/L		2.53	2.42	2.32	2.32	1.74
Rubidium, dissolved	7440-17-7	E421/VA	0.00020	mg/L		<0.00020	0.00036	0.00025	0.00029	0.00056
Selenium, dissolved	7782-49-2	E421/VA	0.000050	mg/L		0.000117	0.000054	0.000104	0.000095	0.000058
Silicon, dissolved	7440-21-3	E421/VA	0.050	mg/L		14.2	16.4	15.7	15.9	7.02
Silver, dissolved	7440-22-4	E421/VA	0.000010	mg/L		<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Sodium, dissolved	7440-23-5	E421/VA	0.050	mg/L		11.4	23.6	15.9	15.8	42.2
Strontium, dissolved	7440-24-6	E421/VA	0.00020	mg/L		0.0973	0.140	0.131	0.128	0.0765
Sulfur, dissolved	7704-34-9	E421/VA	0.50	mg/L		1.14	5.08	3.34	3.30	6.83
Tellurium, dissolved	13494-80-9	E421/VA	0.00020	mg/L		<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Thallium, dissolved	7440-28-0	E421/VA	0.000010	mg/L		<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Thorium, dissolved	7440-29-1	E421/VA	0.00010	mg/L		<0.00010	0.00052	<0.00010	<0.00010	<0.00010
Tin, dissolved	7440-31-5	E421/VA	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium, dissolved	7440-32-6	E421/VA	0.00030	mg/L		<0.00030	0.00511	<0.00030	<0.00030	<0.00030
Tungsten, dissolved	7440-33-7	E421/VA	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	0.00039
Uranium, dissolved	7440-61-1	E421/VA	0.000010	mg/L		0.000589	0.000758	0.000108	0.000110	0.00183
Vanadium, dissolved	7440-62-2	E421/VA	0.00050	mg/L		0.00365	0.00576	0.00620	0.00621	<0.00050
Zinc, dissolved	7440-66-6	E421/VA	0.0010	mg/L		<0.0010	0.0015	<0.0010	<0.0010	<0.0010
Zirconium, dissolved	7440-67-7	E421/VA	0.00020	mg/L		<0.00020	0.00048	<0.00020	<0.00020	<0.00020

Analytical Results

Sub-Matrix: Water (Matrix: Water)				Client sample ID	23822-06	23822-07	23822-08	23822-09	23822-10
				Client sampling date / time	27-Nov-2024 10:15	27-Nov-2024 12:05	27-Nov-2024 13:00	27-Nov-2024 13:00	27-Nov-2024 13:45
Analyte	CAS Number	Method/Lab	LOR	Unit	VA24D2162-006	VA24D2162-007	VA24D2162-008	VA24D2162-009	VA24D2162-010
					Result	Result	Result	Result	Result
Dissolved Metals									
Dissolved mercury filtration location	----	EP509/VA	-	-	Field	Field	Field	Field	Field
Dissolved metals filtration location	----	EP421/VA	-	-	Field	Field	Field	Field	Field

Please refer to the General Comments section for an explanation of any result qualifiers detected.

ALS Canada Ltd.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **VA24D2162**	Page	: 1 of 16
Client	: **WSP Canada Inc.**	Laboratory	: ALS Environmental - Vancouver
Contact	: Jarod Devries	Account Manager	: Amber Springer
Address	: 301 - 3600 Uptown Blvd Victoria BC Canada V8Z 0B9	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: ----	Telephone	: +1 604 253 4188
Project	: CA0033347.0492 Task 5020	Date Samples Received	: 27-Nov-2024 21:00
PO	: ----	Issue Date	: 03-Jan-2025 13:25
C-O-C number	: 23822		
Sampler	: ----		
Site	: ----		
Quote number	: WSP Western Canada Standing Offer		
No. of samples received	: 10		
No. of samples analysed	: 10		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- Method Blank value outliers occur - please see following pages for full details.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **Water**

Analyte Group	Laboratory sample ID	Client/Ref Sample ID	Analyte	CAS Number	Method	Result	Limits	Comment
Method Blank (MB) Values								
Non-Chlorinated Phenolics	QC-MRG3-1787864 001	----	Phenol	108-95-2	E651A	<0.75 µg/L	0.2 µg/L	Blank result exceeds permitted value

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group : Analytical Method / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Chloride in Water by IC										
HDPE 23822-03	E235.Cl	26-Nov-2024	30-Nov-2024	28 days	4 days	✓	30-Nov-2024	28 days	4 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE 23822-05	E235.SO4	27-Nov-2024	30-Nov-2024	28 days	3 days	✓	30-Nov-2024	28 days	3 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE 23822-06	E235.SO4	27-Nov-2024	30-Nov-2024	28 days	3 days	✓	30-Nov-2024	28 days	3 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE 23822-07	E235.SO4	27-Nov-2024	30-Nov-2024	28 days	3 days	✓	30-Nov-2024	28 days	3 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE 23822-08	E235.SO4	27-Nov-2024	30-Nov-2024	28 days	3 days	✓	30-Nov-2024	28 days	3 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE 23822-09	E235.SO4	27-Nov-2024	30-Nov-2024	28 days	3 days	✓	30-Nov-2024	28 days	3 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE 23822-10	E235.SO4	27-Nov-2024	30-Nov-2024	28 days	3 days	✓	30-Nov-2024	28 days	3 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group : Analytical Method / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
23822-01	E235.SO4	26-Nov-2024	30-Nov-2024	28 days	4 days	✓	30-Nov-2024	28 days	4 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
23822-02	E235.SO4	26-Nov-2024	30-Nov-2024	28 days	4 days	✓	30-Nov-2024	28 days	4 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
23822-03	E235.SO4	26-Nov-2024	30-Nov-2024	28 days	4 days	✓	30-Nov-2024	28 days	4 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
23822-04	E235.SO4	26-Nov-2024	30-Nov-2024	28 days	4 days	✓	30-Nov-2024	28 days	4 days	✓
Chlorinated Phenolics : Phenolics (Western Canada List, No Nitro-Phenols) by GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate)										
23822-02	E651A	26-Nov-2024	28-Nov-2024	14 days	2 days	✓	29-Nov-2024	40 days	1 days	✓
Chlorinated Phenolics : Phenolics (Western Canada List, No Nitro-Phenols) by GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate)										
23822-04	E651A	26-Nov-2024	28-Nov-2024	14 days	2 days	✓	29-Nov-2024	40 days	1 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial - dissolved (lab preserved)										
23822-05	E509	27-Nov-2024	04-Dec-2024	28 days	7 days	✓	04-Dec-2024	28 days	7 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial - dissolved (lab preserved)										
23822-06	E509	27-Nov-2024	04-Dec-2024	28 days	7 days	✓	04-Dec-2024	28 days	7 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial - dissolved (lab preserved)										
23822-07	E509	27-Nov-2024	04-Dec-2024	28 days	7 days	✓	04-Dec-2024	28 days	7 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group : Analytical Method / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial - dissolved (lab preserved)										
23822-08	E509	27-Nov-2024	04-Dec-2024	28 days	7 days	✓	04-Dec-2024	28 days	7 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial - dissolved (lab preserved)										
23822-09	E509	27-Nov-2024	04-Dec-2024	28 days	7 days	✓	04-Dec-2024	28 days	7 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial - dissolved (lab preserved)										
23822-10	E509	27-Nov-2024	04-Dec-2024	28 days	7 days	✓	04-Dec-2024	28 days	7 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial - dissolved (lab preserved)										
23822-01	E509	26-Nov-2024	04-Dec-2024	28 days	8 days	✓	04-Dec-2024	28 days	8 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial - dissolved (lab preserved)										
23822-02	E509	26-Nov-2024	04-Dec-2024	28 days	8 days	✓	04-Dec-2024	28 days	8 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial - dissolved (lab preserved)										
23822-04	E509	26-Nov-2024	04-Dec-2024	28 days	8 days	✓	04-Dec-2024	28 days	8 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved)										
23822-05	E421	27-Nov-2024	29-Nov-2024	180 days	2 days	✓	30-Nov-2024	180 days	3 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved)										
23822-06	E421	27-Nov-2024	29-Nov-2024	180 days	2 days	✓	30-Nov-2024	180 days	3 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved)										
23822-07	E421	27-Nov-2024	29-Nov-2024	180 days	2 days	✓	30-Nov-2024	180 days	3 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group : Analytical Method / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved)										
23822-08	E421	27-Nov-2024	29-Nov-2024	180 days	2 days	✓	30-Nov-2024	180 days	3 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved)										
23822-09	E421	27-Nov-2024	29-Nov-2024	180 days	2 days	✓	30-Nov-2024	180 days	3 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved)										
23822-10	E421	27-Nov-2024	29-Nov-2024	180 days	2 days	✓	30-Nov-2024	180 days	3 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved)										
23822-01	E421	26-Nov-2024	29-Nov-2024	180 days	3 days	✓	30-Nov-2024	180 days	4 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved)										
23822-02	E421	26-Nov-2024	29-Nov-2024	180 days	3 days	✓	30-Nov-2024	180 days	4 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved)										
23822-04	E421	26-Nov-2024	29-Nov-2024	180 days	3 days	✓	30-Nov-2024	180 days	4 days	✓
Non-Chlorinated Phenolics : Phenolics (Western Canada List, No Nitro-Phenols) by GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate)										
23822-02	E651A	26-Nov-2024	28-Nov-2024	14 days	2 days	✓	29-Nov-2024	40 days	1 days	✓
Non-Chlorinated Phenolics : Phenolics (Western Canada List, No Nitro-Phenols) by GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate)										
23822-04	E651A	26-Nov-2024	28-Nov-2024	14 days	2 days	✓	29-Nov-2024	40 days	1 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid)										
23822-05	E355-L	27-Nov-2024	28-Nov-2024	28 days	1 days	✓	29-Nov-2024	28 days	2 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group : Analytical Method / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid)										
23822-06	E355-L	27-Nov-2024	28-Nov-2024	28 days	1 days	✓	29-Nov-2024	28 days	2 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid)										
23822-07	E355-L	27-Nov-2024	28-Nov-2024	28 days	1 days	✓	29-Nov-2024	28 days	2 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid)										
23822-08	E355-L	27-Nov-2024	28-Nov-2024	28 days	1 days	✓	29-Nov-2024	28 days	2 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid)										
23822-09	E355-L	27-Nov-2024	28-Nov-2024	28 days	1 days	✓	29-Nov-2024	28 days	2 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid)										
23822-10	E355-L	27-Nov-2024	28-Nov-2024	28 days	1 days	✓	29-Nov-2024	28 days	2 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid)										
23822-01	E355-L	26-Nov-2024	28-Nov-2024	28 days	2 days	✓	29-Nov-2024	28 days	3 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid)										
23822-02	E355-L	26-Nov-2024	28-Nov-2024	28 days	2 days	✓	29-Nov-2024	28 days	3 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid)										
23822-04	E355-L	26-Nov-2024	28-Nov-2024	28 days	2 days	✓	29-Nov-2024	28 days	3 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (lab preserved)										
23822-03	E355-L	26-Nov-2024	28-Nov-2024	3 days	2 days	✓	28-Nov-2024	28 days	0 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group : Analytical Method / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Alkalinity Species by Titration										
HDPE 23822-05	E290	27-Nov-2024	30-Nov-2024	14 days	3 days	✓	30-Nov-2024	14 days	3 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE 23822-06	E290	27-Nov-2024	30-Nov-2024	14 days	3 days	✓	30-Nov-2024	14 days	3 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE 23822-07	E290	27-Nov-2024	30-Nov-2024	14 days	3 days	✓	30-Nov-2024	14 days	3 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE 23822-08	E290	27-Nov-2024	30-Nov-2024	14 days	3 days	✓	30-Nov-2024	14 days	3 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE 23822-09	E290	27-Nov-2024	30-Nov-2024	14 days	3 days	✓	30-Nov-2024	14 days	3 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE 23822-10	E290	27-Nov-2024	30-Nov-2024	14 days	3 days	✓	30-Nov-2024	14 days	3 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE 23822-01	E290	26-Nov-2024	30-Nov-2024	14 days	4 days	✓	30-Nov-2024	14 days	4 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE 23822-02	E290	26-Nov-2024	30-Nov-2024	14 days	4 days	✓	30-Nov-2024	14 days	4 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE 23822-03	E290	26-Nov-2024	30-Nov-2024	14 days	4 days	✓	30-Nov-2024	14 days	4 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group : Analytical Method / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Alkalinity Species by Titration										
HDPE 23822-04	E290	26-Nov-2024	30-Nov-2024	14 days	4 days	✓	30-Nov-2024	14 days	4 days	✓
Physical Tests : TDS by Gravimetry										
HDPE 23822-05	E162	27-Nov-2024	----	----	----		01-Dec-2024	7 days	4 days	✓
Physical Tests : TDS by Gravimetry										
HDPE 23822-06	E162	27-Nov-2024	----	----	----		01-Dec-2024	7 days	4 days	✓
Physical Tests : TDS by Gravimetry										
HDPE 23822-07	E162	27-Nov-2024	----	----	----		01-Dec-2024	7 days	4 days	✓
Physical Tests : TDS by Gravimetry										
HDPE 23822-08	E162	27-Nov-2024	----	----	----		01-Dec-2024	7 days	4 days	✓
Physical Tests : TDS by Gravimetry										
HDPE 23822-09	E162	27-Nov-2024	----	----	----		01-Dec-2024	7 days	4 days	✓
Physical Tests : TDS by Gravimetry										
HDPE 23822-10	E162	27-Nov-2024	----	----	----		01-Dec-2024	7 days	4 days	✓
Physical Tests : TDS by Gravimetry										
HDPE 23822-01	E162	26-Nov-2024	----	----	----		01-Dec-2024	7 days	5 days	✓
Physical Tests : TDS by Gravimetry										
HDPE 23822-02	E162	26-Nov-2024	----	----	----		01-Dec-2024	7 days	5 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group : Analytical Method / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : TDS by Gravimetry										
HDPE										
23822-03	E162	26-Nov-2024	----	----	----		01-Dec-2024	7 days	5 days	✓
Physical Tests : TDS by Gravimetry										
HDPE										
23822-04	E162	26-Nov-2024	----	----	----		01-Dec-2024	7 days	5 days	✓
Physical Tests : TSS by Gravimetry										
HDPE										
23822-05	E160	27-Nov-2024	----	----	----		01-Dec-2024	7 days	4 days	✓
Physical Tests : TSS by Gravimetry										
HDPE										
23822-06	E160	27-Nov-2024	----	----	----		01-Dec-2024	7 days	4 days	✓
Physical Tests : TSS by Gravimetry										
HDPE										
23822-07	E160	27-Nov-2024	----	----	----		01-Dec-2024	7 days	4 days	✓
Physical Tests : TSS by Gravimetry										
HDPE										
23822-08	E160	27-Nov-2024	----	----	----		01-Dec-2024	7 days	4 days	✓
Physical Tests : TSS by Gravimetry										
HDPE										
23822-09	E160	27-Nov-2024	----	----	----		01-Dec-2024	7 days	4 days	✓
Physical Tests : TSS by Gravimetry										
HDPE										
23822-10	E160	27-Nov-2024	----	----	----		01-Dec-2024	7 days	4 days	✓
Physical Tests : TSS by Gravimetry										
HDPE										
23822-01	E160	26-Nov-2024	----	----	----		01-Dec-2024	7 days	5 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group : Analytical Method / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : TSS by Gravimetry										
HDPE										
23822-02	E160	26-Nov-2024	----	----	----		01-Dec-2024	7 days	5 days	✓
Physical Tests : TSS by Gravimetry										
HDPE										
23822-03	E160	26-Nov-2024	----	----	----		01-Dec-2024	7 days	5 days	✓
Physical Tests : TSS by Gravimetry										
HDPE										
23822-04	E160	26-Nov-2024	----	----	----		01-Dec-2024	7 days	5 days	✓
Total Sulfides : Total Sulfide by Colourimetry (Automated Flow)										
HDPE total (zinc acetate+sodium hydroxide)										
23822-05	E395	27-Nov-2024	----	----	----		28-Nov-2024	7 days	1 days	✓
Total Sulfides : Total Sulfide by Colourimetry (Automated Flow)										
HDPE total (zinc acetate+sodium hydroxide)										
23822-01	E395	26-Nov-2024	----	----	----		28-Nov-2024	7 days	2 days	✓

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water**

Evaluation: × = QC frequency outside specification; ✓ = QC frequency within specification.

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Alkalinity Species by Titration	E290	1790594	1	14	7.1	5.0	✓
Chloride in Water by IC	E235.Cl	1790591	1	3	33.3	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	1795888	1	13	7.6	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	1788299	1	17	5.8	5.0	✓
Sulfate in Water by IC	E235.SO4	1790592	1	14	7.1	5.0	✓
TDS by Gravimetry	E162	1791121	1	20	5.0	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	1787858	2	20	10.0	5.0	✓
Total Sulfide by Colourimetry (Automated Flow)	E395	1787887	1	15	6.6	5.0	✓
TSS by Gravimetry	E160	1791101	1	20	5.0	5.0	✓
Laboratory Control Samples (LCS)							
Alkalinity Species by Titration	E290	1790594	1	14	7.1	5.0	✓
Chloride in Water by IC	E235.Cl	1790591	1	3	33.3	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	1795888	1	13	7.6	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	1788299	1	17	5.8	5.0	✓
Phenolics (Western Canada List, No Nitro-Phenols) by GC-MS	E651A	1787864	1	17	5.8	5.0	✓
Sulfate in Water by IC	E235.SO4	1790592	1	14	7.1	5.0	✓
TDS by Gravimetry	E162	1791121	1	20	5.0	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	1787858	2	20	10.0	5.0	✓
Total Sulfide by Colourimetry (Automated Flow)	E395	1787887	1	15	6.6	5.0	✓
TSS by Gravimetry	E160	1791101	1	20	5.0	5.0	✓
Method Blanks (MB)							
Alkalinity Species by Titration	E290	1790594	1	14	7.1	5.0	✓
Chloride in Water by IC	E235.Cl	1790591	1	3	33.3	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	1795888	1	13	7.6	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	1788299	1	17	5.8	5.0	✓
Phenolics (Western Canada List, No Nitro-Phenols) by GC-MS	E651A	1787864	1	17	5.8	5.0	✓
Sulfate in Water by IC	E235.SO4	1790592	1	14	7.1	5.0	✓
TDS by Gravimetry	E162	1791121	1	20	5.0	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	1787858	2	20	10.0	5.0	✓
Total Sulfide by Colourimetry (Automated Flow)	E395	1787887	1	15	6.6	5.0	✓
TSS by Gravimetry	E160	1791101	1	20	5.0	5.0	✓
Matrix Spikes (MS)							
Chloride in Water by IC	E235.Cl	1790591	1	3	33.3	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	1795888	1	13	7.6	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	1788299	1	17	5.8	5.0	✓

Matrix: **Water**

Evaluation: × = *QC frequency outside specification*; ✓ = *QC frequency within specification.*

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Matrix Spikes (MS) - Continued							
Sulfate in Water by IC	E235.SO4	1790592	1	14	7.1	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	1787858	1	20	5.0	5.0	✓
Total Sulfide by Colourimetry (Automated Flow)	E395	1787887	1	15	6.6	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
TSS by Gravimetry	E160 ALS Environmental - Vancouver	Water	APHA 2540 D (mod)	Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, following by drying of the filter at 104 ± 1°C, with gravimetric measurement of the filtered solids. Samples containing very high dissolved solid content (i.e. seawaters, brackish waters) may produce a positive bias by this method. Alternate analysis methods are available for these types of samples.
TDS by Gravimetry	E162 ALS Environmental - Vancouver	Water	APHA 2540 C (mod)	Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, with evaporation of the filtrate at 180 ± 2°C for 16 hours or to constant weight, with gravimetric measurement of the residue.
Chloride in Water by IC	E235.Cl ALS Environmental - Vancouver	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Sulfate in Water by IC	E235.SO4 ALS Environmental - Vancouver	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Alkalinity Species by Titration	E290 ALS Environmental - Vancouver	Water	APHA 2320 B (mod)	Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L ALS Environmental - Vancouver	Water	APHA 5310 B (mod)	Total Organic Carbon (Non-Purgeable), also known as NPOC (total), is a direct measurement of TOC after an acidified sample has been purged to remove inorganic carbon (IC). Analysis is by high temperature combustion with infrared detection of CO_2. NPOC does not include volatile organic species that are purged off with IC. For samples where the majority of total carbon (TC) is comprised of IC (which is common), this method is more accurate and more reliable than the TOC by subtraction method (i.e. TC minus TIC).
Total Sulfide by Colourimetry (Automated Flow)	E395 ALS Environmental - Vancouver	Water	APHA 4500 -S E-Auto-Colorimetry	Sulfide is determined using the gas dialysis automated methlyene blue colourimetric method. Results expressed "as H2S" if reported represent the maximum possible H_2S concentration based on the total sulfide concentration in the sample. The H_2S calculation converts Total Sulphide as (S2-) and reports it as Total Sulphide as (H2S)
Dissolved Metals in Water by CRC ICPMS	E421 ALS Environmental - Vancouver	Water	APHA 3030B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Dissolved Mercury in Water by CVAAS	E509 ALS Environmental - Vancouver	Water	APHA 3030B/EPA 1631E (mod)	Water samples are filtered (0.45 um), preserved with HCl, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.
Phenolics (Western Canada List, No Nitro-Phenols) by GC-MS	E651A ALS Environmental - Vancouver	Water	EPA 8270E (mod)	Phenolics are analyzed by GC-MS. Total Dichlorophenols is the sum of (3,5), (3,4), (2,6), (2,3), & (2,4+2,5)-Dichlorophenols. Total Methylphenols is the sum of (4), (3), & (2)-Methylphenols. Total Monochlorophenols is the sum of (4), (3), & (2)-Chlorophenols. Total Trichlorophenols is the sum of (3,4,5), (2,4,6), (2,4,5), (2,3,6), (2,3,5), & (2,3,4)-Trichlorophenols. Total Tetrachlorophenols is the sum of (2,3,5,6), (2,3,4,6), & (2,3,4,5)-Tetrachlorophenols. Total Chlorinated Phenols is the sum of Total Trichlorophenols, Tetrachlorophenols, Monochlorophenols, Dichlorophenols, Pentachlorophenol [PCP], & 4-Chloro-3-Methylphenol. Total Non-chlorinated Phenols is the sum of (4), (3), & (2)-Methylphenols plus 2,4-Dimethylphenol & Phenol.
Dissolved Hardness (Calculated)	EC100 ALS Environmental - Vancouver	Water	APHA 2340B	“Hardness (as CaCO3), dissolved” is calculated from the sum of dissolved Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. “Total Hardness” refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Preparation for Total Organic Carbon by Combustion	EP355 ALS Environmental - Vancouver	Water		Preparation for Total Organic Carbon by Combustion
Dissolved Metals Water Filtration	EP421 ALS Environmental - Vancouver	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO3.
Dissolved Mercury Water Filtration	EP509 ALS Environmental - Vancouver	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HCl.
Phenolics Extraction	EP651 ALS Environmental - Vancouver	Water	EPA 3511 (mod)	Phenolics are extracted from acidic aqueous sample using DCM liquid-liquid extraction.

ALS Canada Ltd.

QUALITY CONTROL REPORT

Work Order	: **VA24D2162**	Page	: 1 of 12
Client	: WSP Canada Inc.	Laboratory	: ALS Environmental - Vancouver
Contact	: Jarod Devries	Account Manager	: Amber Springer
Address	: 301 - 3600 Uptown Blvd Victoria BC Canada V8Z 0B9	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: ----	Telephone	: +1 604 253 4188
Project	: CA0033347.0492 Task 5020	Date Samples Received	: 27-Nov-2024 21:00
PO	: ----	Date Analysis Commenced	: 28-Nov-2024
C-O-C number	: 23822	Issue Date	: 03-Jan-2025 13:25
Sampler	: ----		
Site	: ----		
Quote number	: WSP Western Canada Standing Offer		
No. of samples received	: 10		
No. of samples analysed	: 10		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Dan Gebert	Laboratory Analyst	Vancouver Metals, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Vancouver Metals, Burnaby, British Columbia
Lindsay Gung	Supervisor - Water Chemistry	Vancouver Inorganics, Burnaby, British Columbia
Maya Urquhart	Lab Analyst	Vancouver Metals, Burnaby, British Columbia
Paul Cushing	Team Leader - Organics	Vancouver Organics, Burnaby, British Columbia

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Physical Tests (QC Lot: 1790594)											
VA24D2162-003	23822-03	Alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	14.0	13.3	5.13%	20%	----
Physical Tests (QC Lot: 1791101)											
FJ2403608-001	Anonymous	Solids, total suspended [TSS]	----	E160	3.0	mg/L	<3.0	<3.0	0	Diff <2x LOR	----
Physical Tests (QC Lot: 1791121)											
FJ2403608-001	Anonymous	Solids, total dissolved [TDS]	----	E162	20	mg/L	220	235	6.60%	20%	----
Anions and Nutrients (QC Lot: 1790591)											
KS2405030-002	Anonymous	Chloride	16887-00-6	E235.Cl	2.50	mg/L	20.3	19.9	0.42	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 1790592)											
VA24D2162-001	23822-01	Sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	11.7	11.7	0.272%	20%	----
Organic / Inorganic Carbon (QC Lot: 1787858)											
VA24D2162-003	23822-03	Carbon, total organic [TOC]	----	E355-L	0.50	mg/L	1.30	1.52	0.22	Diff <2x LOR	----
Organic / Inorganic Carbon (QC Lot: 1787879)											
VA24D2031-001	Anonymous	Carbon, total organic [TOC]	----	E355-L	0.50	mg/L	1.10	0.99	0.10	Diff <2x LOR	----
Total Sulfides (QC Lot: 1787887)											
VA24D2113-001	Anonymous	Sulfide, total (as S)	18496-25-8	E395	0.0075	mg/L	3.30	3.43	3.71%	20%	----
Dissolved Metals (QC Lot: 1788299)											
VA24D2094-001	Anonymous	Aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	0.0594	0.0611	2.78%	20%	----
		Antimony, dissolved	7440-36-0	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.00011	0.00011	0.000006	Diff <2x LOR	----
		Barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.0427	0.0429	0.587%	20%	----
		Beryllium, dissolved	7440-41-7	E421	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	----
		Bismuth, dissolved	7440-69-9	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		Boron, dissolved	7440-42-8	E421	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
		Cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L	0.0000411	0.0000364	0.0000047	Diff <2x LOR	----
		Calcium, dissolved	7440-70-2	E421	0.050	mg/L	51.0	49.3	3.29%	20%	----
		Cesium, dissolved	7440-46-2	E421	0.000010	mg/L	0.000014	0.000014	0.00000008	Diff <2x LOR	----
		Chromium, dissolved	7440-47-3	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	0.00027	0.00027	0.000004	Diff <2x LOR	----
		Copper, dissolved	7440-50-8	E421	0.00020	mg/L	0.00102	0.00102	0.000002	Diff <2x LOR	----
		Iron, dissolved	7439-89-6	E421	0.010	mg/L	0.323	0.334	3.38%	20%	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Dissolved Metals (QC Lot: 1788299) - continued											
VA24D2094-001	Anonymous	Lead, dissolved	7439-92-1	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		Lithium, dissolved	7439-93-2	E421	0.0010	mg/L	0.0013	0.0012	0.00007	Diff <2x LOR	----
		Magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	4.14	4.31	4.12%	20%	----
		Manganese, dissolved	7439-96-5	E421	0.00010	mg/L	0.214	0.219	2.36%	20%	----
		Molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.000235	0.000247	0.000012	Diff <2x LOR	----
		Nickel, dissolved	7440-02-0	E421	0.00050	mg/L	0.00144	0.00142	0.00002	Diff <2x LOR	----
		Phosphorus, dissolved	7723-14-0	E421	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		Potassium, dissolved	7440-09-7	E421	0.050	mg/L	6.87	7.08	3.08%	20%	----
		Rubidium, dissolved	7440-17-7	E421	0.00020	mg/L	0.00698	0.00721	3.14%	20%	----
		Selenium, dissolved	7782-49-2	E421	0.000050	mg/L	0.000245	0.000201	0.000044	Diff <2x LOR	----
		Silicon, dissolved	7440-21-3	E421	0.050	mg/L	2.72	2.73	0.543%	20%	----
		Silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		Sodium, dissolved	7440-23-5	E421	0.050	mg/L	8.72	8.83	1.21%	20%	----
		Strontium, dissolved	7440-24-6	E421	0.00020	mg/L	0.107	0.108	1.47%	20%	----
		Sulfur, dissolved	7704-34-9	E421	0.50	mg/L	24.8	24.3	2.03%	20%	----
		Tellurium, dissolved	13494-80-9	E421	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		Thallium, dissolved	7440-28-0	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		Thorium, dissolved	7440-29-1	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Tin, dissolved	7440-31-5	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Titanium, dissolved	7440-32-6	E421	0.00030	mg/L	0.00217	0.00224	0.00007	Diff <2x LOR	----
		Tungsten, dissolved	7440-33-7	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Uranium, dissolved	7440-61-1	E421	0.000010	mg/L	0.000154	0.000151	2.36%	20%	----
		Vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Zinc, dissolved	7440-66-6	E421	0.0010	mg/L	0.0021	0.0021	0.00005	Diff <2x LOR	----
		Zirconium, dissolved	7440-67-7	E421	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 1795888)											
VA24D2094-005	Anonymous	Mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 1790594)						
Alkalinity, total (as CaCO3)	----	E290	1	mg/L	<1.0	----
Physical Tests (QCLot: 1791101)						
Solids, total suspended [TSS]	----	E160	3	mg/L	<3.0	----
Physical Tests (QCLot: 1791121)						
Solids, total dissolved [TDS]	----	E162	10	mg/L	<10	----
Anions and Nutrients (QCLot: 1790591)						
Chloride	16887-00-6	E235.Cl	0.5	mg/L	<0.50	----
Anions and Nutrients (QCLot: 1790592)						
Sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	----
Organic / Inorganic Carbon (QCLot: 1787858)						
Carbon, total organic [TOC]	----	E355-L	0.5	mg/L	<0.50	----
Organic / Inorganic Carbon (QCLot: 1787879)						
Carbon, total organic [TOC]	----	E355-L	0.5	mg/L	<0.50	----
Total Sulfides (QCLot: 1787887)						
Sulfide, total (as S)	18496-25-8	E395	0.0015	mg/L	<0.0015	----
Dissolved Metals (QCLot: 1788299)						
Aluminum, dissolved	7429-90-5	E421	0.001	mg/L	<0.0010	----
Antimony, dissolved	7440-36-0	E421	0.0001	mg/L	<0.00010	----
Arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	<0.00010	----
Barium, dissolved	7440-39-3	E421	0.0001	mg/L	<0.00010	----
Beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	<0.000020	----
Bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	<0.000050	----
Boron, dissolved	7440-42-8	E421	0.01	mg/L	<0.010	----
Cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	<0.0000050	----
Calcium, dissolved	7440-70-2	E421	0.05	mg/L	<0.050	----
Cesium, dissolved	7440-46-2	E421	0.00001	mg/L	<0.000010	----
Chromium, dissolved	7440-47-3	E421	0.0005	mg/L	<0.00050	----
Cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	<0.00010	----
Copper, dissolved	7440-50-8	E421	0.0002	mg/L	<0.00020	----
Iron, dissolved	7439-89-6	E421	0.01	mg/L	<0.010	----
Lead, dissolved	7439-92-1	E421	0.00005	mg/L	<0.000050	----
Lithium, dissolved	7439-93-2	E421	0.001	mg/L	<0.0010	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 1788299) - continued						
Magnesium, dissolved	7439-95-4	E421	0.005	mg/L	<0.0050	----
Manganese, dissolved	7439-96-5	E421	0.0001	mg/L	<0.00010	----
Molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	<0.000050	----
Nickel, dissolved	7440-02-0	E421	0.0005	mg/L	<0.00050	----
Phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	<0.050	----
Potassium, dissolved	7440-09-7	E421	0.05	mg/L	<0.050	----
Rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	<0.00020	----
Selenium, dissolved	7782-49-2	E421	0.00005	mg/L	<0.000050	----
Silicon, dissolved	7440-21-3	E421	0.05	mg/L	<0.050	----
Silver, dissolved	7440-22-4	E421	0.00001	mg/L	<0.000010	----
Sodium, dissolved	7440-23-5	E421	0.05	mg/L	<0.050	----
Strontium, dissolved	7440-24-6	E421	0.0002	mg/L	<0.00020	----
Sulfur, dissolved	7704-34-9	E421	0.5	mg/L	<0.50	----
Tellurium, dissolved	13494-80-9	E421	0.0002	mg/L	<0.00020	----
Thallium, dissolved	7440-28-0	E421	0.00001	mg/L	<0.000010	----
Thorium, dissolved	7440-29-1	E421	0.0001	mg/L	<0.00010	----
Tin, dissolved	7440-31-5	E421	0.0001	mg/L	<0.00010	----
Titanium, dissolved	7440-32-6	E421	0.0003	mg/L	<0.00030	----
Tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	<0.00010	----
Uranium, dissolved	7440-61-1	E421	0.00001	mg/L	<0.000010	----
Vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	<0.00050	----
Zinc, dissolved	7440-66-6	E421	0.001	mg/L	<0.0010	----
Zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	<0.00020	----
Dissolved Metals (QCLot: 1795888)						
Mercury, dissolved	7439-97-6	E509	0.000005	mg/L	<0.0000050	----
Chlorinated Phenolics (QCLot: 1787864)						
Chlorophenol, 2-	95-57-8	E651A	0.05	µg/L	<0.050	----
Chlorophenol, 3-	108-43-0	E651A	0.05	µg/L	<0.050	----
Chlorophenol, 4-	106-48-9	E651A	0.05	µg/L	<0.050	----
Dichlorophenol, 2,3-	576-24-9	E651A	0.05	µg/L	<0.050	----
Dichlorophenol, 2,4- + 2,5-	----	E651A	0.05	µg/L	<0.050	----
Dichlorophenol, 2,6-	87-65-0	E651A	0.05	µg/L	<0.050	----
Dichlorophenol, 3,4-	95-77-2	E651A	0.05	µg/L	<0.050	----
Dichlorophenol, 3,5-	591-35-5	E651A	0.05	µg/L	<0.050	----
Methylphenol, 4-chloro-3-	59-50-7	E651A	0.1	µg/L	<0.10	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Chlorinated Phenolics (QCLot: 1787864) - continued						
Monochlorophenols, total	----	E651A	0.1	µg/L	<0.10	----
Pentachlorophenol [PCP]	87-86-5	E651A	0.1	µg/L	<0.10	----
Tetrachlorophenol, 2,3,4,5-	4901-51-3	E651A	0.1	µg/L	<0.10	----
Tetrachlorophenol, 2,3,4,6-	58-90-2	E651A	0.1	µg/L	<0.10	----
Tetrachlorophenol, 2,3,5,6-	935-95-5	E651A	0.1	µg/L	<0.10	----
Trichlorophenol, 2,3,4-	15950-66-0	E651A	0.1	µg/L	<0.10	----
Trichlorophenol, 2,3,5-	933-78-8	E651A	0.1	µg/L	<0.10	----
Trichlorophenol, 2,3,6-	933-75-5	E651A	0.1	µg/L	<0.10	----
Trichlorophenol, 2,4,5-	95-95-4	E651A	0.1	µg/L	<0.10	----
Trichlorophenol, 2,4,6-	88-06-2	E651A	0.1	µg/L	<0.10	----
Trichlorophenol, 3,4,5-	609-19-8	E651A	0.1	µg/L	<0.10	----
Non-Chlorinated Phenolics (QCLot: 1787864)						
Dimethylphenol, 2,4-	105-67-9	E651A	0.2	µg/L	<0.20	----
Methylphenol, 2-	95-48-7	E651A	0.5	µg/L	<0.50	----
Methylphenol, 3-	108-39-4	E651A	0.2	µg/L	<0.20	----
Methylphenol, 4-	106-44-5	E651A	0.2	µg/L	<0.20	----
Phenol	108-95-2	E651A	0.2	µg/L	# <0.75	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Target Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 1790594)									
Alkalinity, total (as CaCO3)	----	E290	1	mg/L	500 mg/L	104	85.0	115	----
Physical Tests (QCLot: 1791101)									
Solids, total suspended [TSS]	----	E160	3	mg/L	150 mg/L	104	85.0	115	----
Physical Tests (QCLot: 1791121)									
Solids, total dissolved [TDS]	----	E162	10	mg/L	1000 mg/L	99.0	85.0	115	----
Anions and Nutrients (QCLot: 1790591)									
Chloride	16887-00-6	E235.Cl	0.5	mg/L	100 mg/L	100	90.0	110	----
Anions and Nutrients (QCLot: 1790592)									
Sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	101	90.0	110	----
Organic / Inorganic Carbon (QCLot: 1787858)									
Carbon, total organic [TOC]	----	E355-L	0.5	mg/L	8.57 mg/L	99.1	80.0	120	----
Organic / Inorganic Carbon (QCLot: 1787879)									
Carbon, total organic [TOC]	----	E355-L	0.5	mg/L	8.57 mg/L	101	80.0	120	----
Total Sulfides (QCLot: 1787887)									
Sulfide, total (as S)	18496-25-8	E395	0.0015	mg/L	0.08 mg/L	91.2	80.0	120	----
Dissolved Metals (QCLot: 1788299)									
Aluminum, dissolved	7429-90-5	E421	0.001	mg/L	2 mg/L	98.9	80.0	120	----
Antimony, dissolved	7440-36-0	E421	0.0001	mg/L	1 mg/L	104	80.0	120	----
Arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	1 mg/L	101	80.0	120	----
Barium, dissolved	7440-39-3	E421	0.0001	mg/L	0.25 mg/L	102	80.0	120	----
Beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	0.1 mg/L	96.9	80.0	120	----
Bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	1 mg/L	91.7	80.0	120	----
Boron, dissolved	7440-42-8	E421	0.01	mg/L	1 mg/L	94.6	80.0	120	----
Cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	0.1 mg/L	97.0	80.0	120	----
Calcium, dissolved	7440-70-2	E421	0.05	mg/L	50 mg/L	96.0	80.0	120	----
Cesium, dissolved	7440-46-2	E421	0.00001	mg/L	0.05 mg/L	93.1	80.0	120	----
Chromium, dissolved	7440-47-3	E421	0.0005	mg/L	0.25 mg/L	102	80.0	120	----
Cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	0.25 mg/L	96.2	80.0	120	----
Copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.25 mg/L	94.3	80.0	120	----

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Target Concentration	LCS	Low	High	Qualifier
Dissolved Metals (QCLot: 1788299) - continued									
Iron, dissolved	7439-89-6	E421	0.01	mg/L	1 mg/L	89.1	80.0	120	----
Lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.5 mg/L	98.2	80.0	120	----
Lithium, dissolved	7439-93-2	E421	0.001	mg/L	0.25 mg/L	93.7	80.0	120	----
Magnesium, dissolved	7439-95-4	E421	0.005	mg/L	50 mg/L	98.0	80.0	120	----
Manganese, dissolved	7439-96-5	E421	0.0001	mg/L	0.25 mg/L	98.5	80.0	120	----
Molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	0.25 mg/L	93.8	80.0	120	----
Nickel, dissolved	7440-02-0	E421	0.0005	mg/L	0.5 mg/L	94.7	80.0	120	----
Phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	10 mg/L	111	80.0	120	----
Potassium, dissolved	7440-09-7	E421	0.05	mg/L	50 mg/L	98.8	80.0	120	----
Rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	0.1 mg/L	99.7	80.0	120	----
Selenium, dissolved	7782-49-2	E421	0.00005	mg/L	1 mg/L	93.6	80.0	120	----
Silicon, dissolved	7440-21-3	E421	0.05	mg/L	10 mg/L	107	80.0	120	----
Silver, dissolved	7440-22-4	E421	0.00001	mg/L	0.1 mg/L	88.2	80.0	120	----
Sodium, dissolved	7440-23-5	E421	0.05	mg/L	50 mg/L	106	80.0	120	----
Strontium, dissolved	7440-24-6	E421	0.0002	mg/L	0.25 mg/L	99.2	80.0	120	----
Sulfur, dissolved	7704-34-9	E421	0.5	mg/L	50 mg/L	90.8	80.0	120	----
Tellurium, dissolved	13494-80-9	E421	0.0002	mg/L	0.1 mg/L	89.8	80.0	120	----
Thallium, dissolved	7440-28-0	E421	0.00001	mg/L	1 mg/L	96.4	80.0	120	----
Thorium, dissolved	7440-29-1	E421	0.0001	mg/L	0.1 mg/L	92.8	80.0	120	----
Tin, dissolved	7440-31-5	E421	0.0001	mg/L	0.5 mg/L	96.3	80.0	120	----
Titanium, dissolved	7440-32-6	E421	0.0003	mg/L	0.25 mg/L	95.8	80.0	120	----
Tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	0.1 mg/L	95.2	80.0	120	----
Uranium, dissolved	7440-61-1	E421	0.00001	mg/L	0.005 mg/L	96.0	80.0	120	----
Vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	0.5 mg/L	98.0	80.0	120	----
Zinc, dissolved	7440-66-6	E421	0.001	mg/L	0.5 mg/L	100	80.0	120	----
Zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	0.1 mg/L	95.0	80.0	120	----
Mercury, dissolved	7439-97-6	E509	0.000005	mg/L	0 mg/L	102	80.0	120	----
Chlorinated Phenolics (QCLot: 1787864)									
Chlorophenol, 2-	95-57-8	E651A	0.05	µg/L	10.5 µg/L	96.3	50.0	130	----
Chlorophenol, 3-	108-43-0	E651A	0.05	µg/L	10.5 µg/L	100	50.0	130	----
Chlorophenol, 4-	106-48-9	E651A	0.05	µg/L	10.5 µg/L	98.9	50.0	130	----
Dichlorophenol, 2,3-	576-24-9	E651A	0.05	µg/L	10.5 µg/L	97.3	50.0	130	----
Dichlorophenol, 2,4- + 2,5-	----	E651A	0.05	µg/L	21.1 µg/L	98.4	50.0	130	----
Dichlorophenol, 2,6-	87-65-0	E651A	0.05	µg/L	10.5 µg/L	97.1	50.0	130	----
Dichlorophenol, 3,4-	95-77-2	E651A	0.05	µg/L	10.5 µg/L	97.6	50.0	130	----

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Target Concentration	LCS	Low	High	Qualifier
Chlorinated Phenolics (QCLot: 1787864) - continued									
Dichlorophenol, 3,5-	591-35-5	E651A	0.05	µg/L	10.5 µg/L	101	50.0	130	----
Methylphenol, 4-chloro-3-	59-50-7	E651A	0.1	µg/L	10.5 µg/L	100	60.0	130	----
Pentachlorophenol [PCP]	87-86-5	E651A	0.1	µg/L	10.5 µg/L	87.7	60.0	130	----
Tetrachlorophenol, 2,3,4,5-	4901-51-3	E651A	0.1	µg/L	10.5 µg/L	94.0	60.0	130	----
Tetrachlorophenol, 2,3,4,6-	58-90-2	E651A	0.1	µg/L	10.5 µg/L	95.6	60.0	130	----
Tetrachlorophenol, 2,3,5,6-	935-95-5	E651A	0.1	µg/L	10.5 µg/L	95.9	60.0	130	----
Trichlorophenol, 2,3,4-	15950-66-0	E651A	0.1	µg/L	10.5 µg/L	94.9	50.0	130	----
Trichlorophenol, 2,3,5-	933-78-8	E651A	0.1	µg/L	10.5 µg/L	94.5	50.0	130	----
Trichlorophenol, 2,3,6-	933-75-5	E651A	0.1	µg/L	10.5 µg/L	96.0	50.0	130	----
Trichlorophenol, 2,4,5-	95-95-4	E651A	0.1	µg/L	10.5 µg/L	95.9	50.0	130	----
Trichlorophenol, 2,4,6-	88-06-2	E651A	0.1	µg/L	10.5 µg/L	98.3	50.0	130	----
Trichlorophenol, 3,4,5-	609-19-8	E651A	0.1	µg/L	10.5 µg/L	95.9	50.0	130	----
Non-Chlorinated Phenolics (QCLot: 1787864)									
Dimethylphenol, 2,4-	105-67-9	E651A	0.2	µg/L	10.5 µg/L	122	50.0	130	----
Methylphenol, 2-	95-48-7	E651A	0.5	µg/L	10.5 µg/L	82.6	50.0	130	----
Methylphenol, 3-	108-39-4	E651A	0.2	µg/L	10.5 µg/L	95.3	50.0	130	----
Methylphenol, 4-	106-44-5	E651A	0.2	µg/L	10.5 µg/L	95.2	50.0	130	----
Phenol	108-95-2	E651A	0.2	µg/L	10.5 µg/L	112	50.0	130	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Anions and Nutrients (QCLot: 1790591)										
KS2405030-003	Anonymous	Chloride	16887-00-6	E235.Cl	502 mg/L	500 mg/L	100	75.0	125	----
Anions and Nutrients (QCLot: 1790592)										
VA24D2162-002	23822-02	Sulfate (as SO4)	14808-79-8	E235.SO4	98.0 mg/L	100 mg/L	98.0	75.0	125	----
Organic / Inorganic Carbon (QCLot: 1787879)										
VA24D2031-002	Anonymous	Carbon, total organic [TOC]	----	E355-L	4.94 mg/L	5 mg/L	98.9	70.0	130	----
Total Sulfides (QCLot: 1787887)										
VA24D2113-002	Anonymous	Sulfide, total (as S)	18496-25-8	E395	0.195 mg/L	0.2 mg/L	97.6	75.0	125	----
Dissolved Metals (QCLot: 1788299)										
VA24D2094-002	Anonymous	Aluminum, dissolved	7429-90-5	E421	0.206 mg/L	0.2 mg/L	103	70.0	130	----
		Antimony, dissolved	7440-36-0	E421	0.0201 mg/L	0.02 mg/L	100	70.0	130	----
		Arsenic, dissolved	7440-38-2	E421	0.0206 mg/L	0.02 mg/L	103	70.0	130	----
		Barium, dissolved	7440-39-3	E421	ND mg/L	----	ND	70.0	130	----
		Beryllium, dissolved	7440-41-7	E421	0.0391 mg/L	0.04 mg/L	97.8	70.0	130	----
		Bismuth, dissolved	7440-69-9	E421	0.00935 mg/L	0.01 mg/L	93.5	70.0	130	----
		Boron, dissolved	7440-42-8	E421	0.097 mg/L	0.1 mg/L	96.7	70.0	130	----
		Cadmium, dissolved	7440-43-9	E421	0.00407 mg/L	0.004 mg/L	102	70.0	130	----
		Calcium, dissolved	7440-70-2	E421	ND mg/L	----	ND	70.0	130	----
		Cesium, dissolved	7440-46-2	E421	0.0102 mg/L	0.01 mg/L	102	70.0	130	----
		Chromium, dissolved	7440-47-3	E421	0.0409 mg/L	0.04 mg/L	102	70.0	130	----
		Cobalt, dissolved	7440-48-4	E421	0.0198 mg/L	0.02 mg/L	98.8	70.0	130	----
		Copper, dissolved	7440-50-8	E421	0.0196 mg/L	0.02 mg/L	97.9	70.0	130	----
		Iron, dissolved	7439-89-6	E421	1.99 mg/L	2 mg/L	99.4	70.0	130	----
		Lead, dissolved	7439-92-1	E421	0.0195 mg/L	0.02 mg/L	97.7	70.0	130	----
		Lithium, dissolved	7439-93-2	E421	0.101 mg/L	0.1 mg/L	101	70.0	130	----
		Magnesium, dissolved	7439-95-4	E421	ND mg/L	----	ND	70.0	130	----
		Manganese, dissolved	7439-96-5	E421	ND mg/L	----	ND	70.0	130	----
		Molybdenum, dissolved	7439-98-7	E421	0.0201 mg/L	0.02 mg/L	100	70.0	130	----
		Nickel, dissolved	7440-02-0	E421	0.0393 mg/L	0.04 mg/L	98.2	70.0	130	----
		Phosphorus, dissolved	7723-14-0	E421	11.4 mg/L	10 mg/L	114	70.0	130	----
		Potassium, dissolved	7440-09-7	E421	ND mg/L	----	ND	70.0	130	----
		Rubidium, dissolved	7440-17-7	E421	0.0204 mg/L	0.02 mg/L	102	70.0	130	----
		Selenium, dissolved	7782-49-2	E421	0.0410 mg/L	0.04 mg/L	102	70.0	130	----
		Silicon, dissolved	7440-21-3	E421	10.2 mg/L	10 mg/L	102	70.0	130	----
		Silver, dissolved	7440-22-4	E421	0.00295 mg/L	0.004 mg/L	73.8	70.0	130	----
		Sodium, dissolved	7440-23-5	E421	ND mg/L	----	ND	70.0	130	----
		Strontium, dissolved	7440-24-6	E421	ND mg/L	----	ND	70.0	130	----
		Sulfur, dissolved	7704-34-9	E421	ND mg/L	----	ND	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Dissolved Metals (QCLot: 1788299) - continued										
VA24D2094-002	Anonymous	Tellurium, dissolved	13494-80-9	E421	0.0403 mg/L	0.04 mg/L	101	70.0	130	----
		Thallium, dissolved	7440-28-0	E421	0.00362 mg/L	0.004 mg/L	90.6	70.0	130	----
		Thorium, dissolved	7440-29-1	E421	0.0177 mg/L	0.02 mg/L	88.5	70.0	130	----
		Tin, dissolved	7440-31-5	E421	0.0201 mg/L	0.02 mg/L	100	70.0	130	----
		Titanium, dissolved	7440-32-6	E421	0.0398 mg/L	0.04 mg/L	99.6	70.0	130	----
		Tungsten, dissolved	7440-33-7	E421	0.0192 mg/L	0.02 mg/L	96.0	70.0	130	----
		Uranium, dissolved	7440-61-1	E421	0.00378 mg/L	0.004 mg/L	94.4	70.0	130	----
		Vanadium, dissolved	7440-62-2	E421	0.103 mg/L	0.1 mg/L	103	70.0	130	----
		Zinc, dissolved	7440-66-6	E421	0.405 mg/L	0.4 mg/L	101	70.0	130	----
		Zirconium, dissolved	7440-67-7	E421	0.0445 mg/L	0.04 mg/L	111	70.0	130	----
Dissolved Metals (QCLot: 1795888)										
VA24D2094-006	Anonymous	Mercury, dissolved	7439-97-6	E509	0.0000976 mg/L	0 mg/L	97.6	70.0	130	----

CHAIN OF CUSTODY RECORD/ANALYSIS REQUEST

No. 23822 page 1 of 1

840 Howe St., 10th Floor
Vancouver, British Columbia, Canada V6Z 2M1
Telephone (604) 685-9381

Project Number: CA0033347.0492 Task 5020		Laboratory Name: ALS Environmental	
Short Title: CATALYST - WILDWOOD	WSP Contact: Jarod Devries	Address: 8081 Lougheed Hwy Bby	
WSP E-mail Address 1: Jarod.Devries@wsp.com	WSP E-mail Address 2: Andrew.Stevens@wsp.com	Telephone/Fax: 6042534188	Contact: Amber Springer

Office Name: Victoria

EQuIS Facility Code: _____
EQuIS upload: ☐

Sean.Sutherland@WSP.com

Turnaround Time: ☐ 24 hr ☐ 48 hr ☐ 72 hr ☒ Regular (5 Days)
Criteria: ☐ CSR ☐ CCME ☐ BC Water Quality ☐ Other

Note: Final Reports to be issued by e-mail

Quote No.:

Analyses Required

Sample Control Number (SCN)	Sample Location	Sa. #	Sample Depth (m)	Sample Matrix (over)	Date Sampled (D / M / Y)	Time Sampled (HH:MM)	Sample Type (over)	QAQC Code (over)	Related SCN (over)	Number of Containers	TSS / TDS	Total Alkalinity	Sulphate	TOC	Diss. Metals	Dioxins/Furans	Sulphide	chlorinated/non-chlorinated phenols	Chloride	RUSH (Select TAT above)	Remarks (over)
23822-01	PW-Composite			W6	26/11/24	11:35	GRAB			7	X	X	X	X	X	X	X				
23822-02	MWAH-3			W6		13:20				8	X	X	X	X	X	X		X			
23822-03	MW94-3			W6		14:10				1	X	X	X	X					X		
23822-04	MWAH-6L			W6		15:35				8	X	X	X	X	X	X		X			
23822-05	MW89-5			W6	27/11/24	09:00				7	X	X	X	X	X	X	X				
23822-06	MW93-2B			W6		10:15				6	X	X	X	X	X	X					
23822-07	MW94-19L			W6		12:05				6	X	X	X	X	X	X					
23822-08	MW94-113			W6		13:00		FDA	23822-09	6	X	X	X	X	X	X					
23822-09	MW94-113			W6		13:00		FD	23822-08	4	X	X	X	X	X						
23822-10	MW94-16B			W6		13:45				6	X	X	X	X	X	X					
-11																					
-12																					

Environmental Division
Vancouver
Work Order Reference
VA24D2162

Telephone : +1 604 253 4188

Sampler's Signature:	Relinquished by: Signature	Company: WSP	Date: 27/11/24	Time: 16:00	Received by: Signature / Company
Comments: ON ICE PACKS	Method of Shipment: AIR	Waybill No.:	Received for Lab by:	Date	Time
	Shipped by: Pacific Coastal	Shipment Condition: / Seal Intact:	Temp. (°C): 5,5,6 / Cooler opened by: SDM	Date: 27/11/24	Time: 9pm

WHITE: WSP Copy **YELLOW: Lab Copy** c'copy

ESED

WSP Canada Inc.
ATTN: Jarod Devries
3795 Carey Road, Second Floor
Victoria BC V8Z 6T8

Date Received: 28-NOV-24
Report Date: 20-FEB-25 12:27 (MT)
Version: FINAL REV. 2

Client Phone: 250-881-7372

Certificate of Analysis

Lab Work Order #: L2758265

Project P.O. #: NOT SUBMITTED
Job Reference: CA0033347.0492 TASK 5020
C of C Numbers:
Legal Site Desc:

Comments: Revision (2/20/2025): NATO TEQ Calculations added.

Amber Springer, B.Sc
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2758265-1	L2758265-2			
	Description	Water	Water			
	Sampled Date	25-NOV-24	25-NOV-24			
	Sampled Time	10:45	11:10			
	Client ID	23605-01	23605-02			
Grouping	**Analyte**					
WATER						
Dioxins and Furans	2,3,7,8-TCDD (pg/L)	<0.24 [U]	<0.21 [U]			
	1,2,3,7,8-PeCDD (pg/L)	<0.17 [U]	<0.30 [U]			
	1,2,3,4,7,8-HxCDD (pg/L)	<0.19 [U]	<0.32 [U]			
	1,2,3,6,7,8-HxCDD (pg/L)	<0.20 [U]	<0.33 [U]			
	1,2,3,7,8,9-HxCDD (pg/L)	<0.19 [U]	<0.32 [U]			
	1,2,3,4,6,7,8-HpCDD (pg/L)	0.49 J,R	0.48 J,R			
	OCDD (pg/L)	2.03 [J]	1.80 J,R			
	Total-TCDD (pg/L)	<0.24 [U]	0.53 [J]			
	Total TCDD # Homologues	0	1			
	Total-PeCDD (pg/L)	<0.17 [U]	<0.30 [U]			
	Total PeCDD # Homologues	0	0			
	Total-HxCDD (pg/L)	0.25 [J]	<0.33 [U]			
	Total HxCDD # Homologues	1	0			
	Total-HpCDD (pg/L)	<0.35 [U]	<0.42 [U]			
	Total HpCDD # Homologues	0	0			
	2,3,7,8-TCDF (pg/L)	<0.17 [U]	<0.23 [U]			
	1,2,3,7,8-PeCDF (pg/L)	0.41 J,R	0.38 J,R			
	2,3,4,7,8-PeCDF (pg/L)	<0.12 [U]	<0.13 [U]			
	1,2,3,4,7,8-HxCDF (pg/L)	<0.12 [U]	<0.12 [U]			
	1,2,3,6,7,8-HxCDF (pg/L)	0.18 J,R	<0.11 [U]			
	1,2,3,7,8,9-HxCDF (pg/L)	0.21 [J]	<0.15 [U]			
	2,3,4,6,7,8-HxCDF (pg/L)	0.23 [J]	<0.12 [U]			
	1,2,3,4,6,7,8-HpCDF (pg/L)	<0.17 [U]	<0.16 [U]			
	1,2,3,4,7,8,9-HpCDF (pg/L)	<0.22 [U]	0.24 J,R			
	OCDF (pg/L)	<0.48 [U]	<0.45 [U]			
	Total-TCDF (pg/L)	<0.17 [U]	<0.23 [U]			
	Total TCDF # Homologues	0	0			
	Total-PeCDF (pg/L)	<0.13 [U]	<0.14 [U]			
	Total PeCDF # Homologues	0	0			
	Total-HxCDF (pg/L)	0.44 [J]	<0.15 [U]			
	Total HxCDF # Homologues	2	0			
	Total-HpCDF (pg/L)	<0.22 [U]	<0.21 [U]			
	Total HpCDF # Homologues	0	0			
	Surrogate: 13C12-2,3,7,8-TCDD (%)	74.0	75.0			
	Surrogate: 13C12-1,2,3,7,8-PeCDD (%)	75.0	77.0			
	Surrogate: 13C12-1,2,3,4,7,8-HxCDD (%)	74.0	77.0			
	Surrogate: 13C12-1,2,3,6,7,8-HxCDD (%)	71.0	75.0			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2758265-1	L2758265-2			
	Description	Water	Water			
	Sampled Date	25-NOV-24	25-NOV-24			
	Sampled Time	10:45	11:10			
	Client ID	23605-01	23605-02			
Grouping	**Analyte**					
WATER						
Dioxins and Furans	Surrogate: 13C12-1,2,3,4,6,7,8-HpCDD (%)	61.0	64.0			
	Surrogate: 13C12-OCDD (%)	36.0	39.0			
	Surrogate: 13C12-2,3,7,8-TCDF (%)	74.0	73.0			
	Surrogate: 13C12-1,2,3,7,8-PeCDF (%)	73.0	75.0			
	Surrogate: 13C12-2,3,4,7,8-PeCDF (%)	75.0	75.0			
	Surrogate: 13C12-1,2,3,4,7,8-HxCDF (%)	76.0	81.0			
	Surrogate: 13C12-1,2,3,6,7,8-HxCDF (%)	80.0	84.0			
	Surrogate: 13C12-2,3,4,6,7,8-HxCDF (%)	79.0	83.0			
	Surrogate: 13C12-1,2,3,7,8,9-HxCDF (%)	77.0	80.0			
	Surrogate: 13C12-1,2,3,4,6,7,8-HpCDF (%)	67.0	70.0			
	Surrogate: 13C12-1,2,3,4,7,8,9-HpCDF (%)	68.0	73.0			
	Surrogate: 37Cl4-2,3,7,8-TCDD (Cleanup) (%)	70.0	68.0			
Toxic Equivalency	Lower Bound PCDD/F TEQ (WHO 2005) (pg/L)	0.0442	0.00			
	Mid Point PCDD/F TEQ (WHO 2005) (pg/L)	0.348	0.380			
	Upper Bound PCDD/F TEQ (WHO 2005) (pg/L)	0.616	0.740			
	Lower Bound PCDD/F TEQ (NATO) (pg/L)	0.0456	0.00			
	Mid Point PCDD/F TEQ (NATO) (pg/L)	0.327	0.327			
	Upper Bound PCDD/F TEQ (NATO) (pg/L)	0.565	0.625			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Method Blank	OCDF	J,R	L2758265-1, -2
Method Blank	1,2,3,4,6,7,8-HpCDD	[U]	L2758265-1, -2
Method Blank	1,2,3,4,6,7,8-HpCDF	[U]	L2758265-1, -2
Method Blank	1,2,3,4,7,8,9-HpCDF	[U]	L2758265-1, -2
Method Blank	1,2,3,4,7,8-HxCDD	[U]	L2758265-1, -2
Method Blank	1,2,3,4,7,8-HxCDF	[U]	L2758265-1, -2
Method Blank	1,2,3,6,7,8-HxCDD	[U]	L2758265-1, -2
Method Blank	1,2,3,6,7,8-HxCDF	[U]	L2758265-1, -2
Method Blank	1,2,3,7,8,9-HxCDD	[U]	L2758265-1, -2
Method Blank	1,2,3,7,8,9-HxCDF	[U]	L2758265-1, -2
Method Blank	1,2,3,7,8-PeCDD	[U]	L2758265-1, -2
Method Blank	1,2,3,7,8-PeCDF	[U]	L2758265-1, -2
Method Blank	2,3,4,6,7,8-HxCDF	[U]	L2758265-1, -2
Method Blank	2,3,4,7,8-PeCDF	[U]	L2758265-1, -2
Method Blank	2,3,7,8-TCDD	[U]	L2758265-1, -2
Method Blank	2,3,7,8-TCDF	[U]	L2758265-1, -2
Method Blank	OCDD	[U]	L2758265-1, -2
Method Blank	Total-HpCDD	[U]	L2758265-1, -2
Method Blank	Total-HpCDF	[U]	L2758265-1, -2
Method Blank	Total-HxCDD	[U]	L2758265-1, -2
Method Blank	Total-HxCDF	[U]	L2758265-1, -2
Method Blank	Total-PeCDD	[U]	L2758265-1, -2
Method Blank	Total-PeCDF	[U]	L2758265-1, -2
Method Blank	Total-TCDD	[U]	L2758265-1, -2
Method Blank	Total-TCDF	[U]	L2758265-1, -2

Qualifiers for Individual Parameters Listed:

Qualifier	Description
J,R	The analyte was detected below the calibrated range but above the EDL, and the ion abundance ratio(s) did not meet the acceptance criteria. Value is an estimated maximum.
[J]	The analyte was detected below the calibrated range but above the EDL.
[U]	The analyte was not detected above the EDL.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
DX-1613B-HRMS-BU	Water	Dioxins and Furans HR 1613B	USEPA 1613B

Samples are filtered if required. Solids are extracted by Soxhlet using toluene. The liquid portion is extracted by liquid/liquid extraction using dichloromethane. The extracts are prepared using column chromatography, reduced in volume and analyzed by isotope-dilution GC/HRMS

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
BU	ALS ENVIRONMENTAL - BURLINGTON, ONTARIO, CANADA

Chain of Custody Numbers:

Reference Information

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Client: WSP Canada Inc.
3795 Carey Road, Second Floor
Victoria BC V8Z 6T8
Contact: Jarod Devries

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
DX-1613B-HRMS-BU	**Water**							
Batch R5991297								
WG3791084-2 LCS								
2,3,7,8-TCDD			92.0		%		67-158	25-DEC-24
1,2,3,7,8-PeCDD			96.0		%		70-142	25-DEC-24
1,2,3,4,7,8-HxCDD			90.0		%		70-164	25-DEC-24
1,2,3,6,7,8-HxCDD			92.0		%		76-134	25-DEC-24
1,2,3,7,8,9-HxCDD			100.0		%		64-162	25-DEC-24
1,2,3,4,6,7,8-HpCDD			97.0		%		70-140	25-DEC-24
OCDD			87.0		%		78-144	25-DEC-24
2,3,7,8-TCDF			95.0		%		75-158	25-DEC-24
1,2,3,7,8-PeCDF			110.0		%		80-134	25-DEC-24
2,3,4,7,8-PeCDF			100.0		%		68-160	25-DEC-24
1,2,3,4,7,8-HxCDF			108.0		%		72-134	25-DEC-24
1,2,3,6,7,8-HxCDF			104.0		%		84-130	25-DEC-24
2,3,4,6,7,8-HxCDF			102.0		%		70-156	25-DEC-24
1,2,3,7,8,9-HxCDF			108.0		%		78-130	25-DEC-24
1,2,3,4,6,7,8-HpCDF			104.0		%		82-122	25-DEC-24
1,2,3,4,7,8,9-HpCDF			107.0		%		78-138	25-DEC-24
OCDF			124.0		%		63-170	25-DEC-24
WG3791084-1 MB								
2,3,7,8-TCDD			<0.25	[U]	pg/L		10	25-DEC-24
1,2,3,7,8-PeCDD			<0.24	[U]	pg/L		10	25-DEC-24
1,2,3,4,7,8-HxCDD			<0.32	[U]	pg/L		10	25-DEC-24
1,2,3,6,7,8-HxCDD			<0.32	[U]	pg/L		10	25-DEC-24
1,2,3,7,8,9-HxCDD			<0.31	[U]	pg/L		10	25-DEC-24
1,2,3,4,6,7,8-HpCDD			<0.33	[U]	pg/L		10	25-DEC-24
OCDD			<0.97	[U]	pg/L		20	25-DEC-24
2,3,7,8-TCDF			<0.22	[U]	pg/L		10	25-DEC-24
1,2,3,7,8-PeCDF			<0.24	[U]	pg/L		10	25-DEC-24
2,3,4,7,8-PeCDF			<0.20	[U]	pg/L		10	25-DEC-24
1,2,3,4,7,8-HxCDF			<0.20	[U]	pg/L		10	25-DEC-24
1,2,3,6,7,8-HxCDF			<0.20	[U]	pg/L		10	25-DEC-24
2,3,4,6,7,8-HxCDF			<0.19	[U]	pg/L		10	25-DEC-24
1,2,3,7,8,9-HxCDF			<0.24	[U]	pg/L		10	25-DEC-24
1,2,3,4,6,7,8-HpCDF			<0.20	[U]	pg/L		10	25-DEC-24
1,2,3,4,7,8,9-HpCDF			<0.26	[U]	pg/L		10	25-DEC-24

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
DX-1613B-HRMS-BU	**Water**							
Batch R5991297								
WG3791084-1 MB								
OCDF			0.66	J,R	pg/L		20	25-DEC-24
Total-TCDD			<0.25	[U]	pg/L		10	25-DEC-24
Total-PeCDD			<0.24	[U]	pg/L		10	25-DEC-24
Total-HxCDD			<0.32	[U]	pg/L		10	25-DEC-24
Total-HpCDD			<0.33	[U]	pg/L		10	25-DEC-24
Total-TCDF			<0.22	[U]	pg/L		10	25-DEC-24
Total-PeCDF			<0.24	[U]	pg/L		10	25-DEC-24
Total-HxCDF			<0.24	[U]	pg/L		10	25-DEC-24
Total-HpCDF			<0.26	[U]	pg/L		10	25-DEC-24
Surrogate: 13C12-2,3,7,8-TCDD			79.0		%		20-175	25-DEC-24
Surrogate: 13C12-1,2,3,7,8-PeCDD			83.0		%		21-227	25-DEC-24
Surrogate: 13C12-1,2,3,4,7,8-HxCDD			78.0		%		21-193	25-DEC-24
Surrogate: 13C12-1,2,3,6,7,8-HxCDD			76.0		%		25-163	25-DEC-24
Surrogate: 13C12-1,2,3,4,6,7,8-HpCDD			64.0		%		23-166	25-DEC-24
Surrogate: 13C12-OCDD			42.0		%		13-138	25-DEC-24
Surrogate: 13C12-2,3,7,8-TCDF			80.0		%		22-152	25-DEC-24
Surrogate: 13C12-1,2,3,7,8-PeCDF			80.0		%		24-185	25-DEC-24
Surrogate: 13C12-2,3,4,7,8-PeCDF			82.0		%		21-178	25-DEC-24
Surrogate: 13C12-1,2,3,4,7,8-HxCDF			80.0		%		26-152	25-DEC-24
Surrogate: 13C12-1,2,3,6,7,8-HxCDF			82.0		%		21-159	25-DEC-24
Surrogate: 13C12-2,3,4,6,7,8-HxCDF			84.0		%		17-205	25-DEC-24
Surrogate: 13C12-1,2,3,7,8,9-HxCDF			82.0		%		28-136	25-DEC-24
Surrogate: 13C12-1,2,3,4,6,7,8-HpCDF			70.0		%		21-158	25-DEC-24
Surrogate: 13C12-1,2,3,4,7,8,9-HpCDF			71.0		%		20-186	25-DEC-24
Surrogate: 37Cl4-2,3,7,8-TCDD (Cleanup)			69.0		%		31-191	25-DEC-24

Quality Control Report

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
J,R	The analyte was detected below the calibrated range but above the EDL, and the ion abundance ratio(s) did not meet the acceptance criteria. Value is an estimated maximum.
[U]	The analyte was not detected above the EDL.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

WSP Canada Inc.
ATTN: Jarod Devries
200-2920 Virtual Way
Vancouver BC V5M 0C4

Date Received: 02-DEC-24
Report Date: 20-FEB-25 12:26 (MT)
Version: FINAL REV. 2

Client Phone: 604-298-6623

Certificate of Analysis

Lab Work Order #: L2758281

Project P.O. #: NOT SUBMITTED
Job Reference: CA0033347.0492 TASK 5020
C of C Numbers:
Legal Site Desc:

Comments: Revision 2/20/2025: NATO TEQ Calculations added.

Amber Springer, B.Sc
Account Manager

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ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2758281-1	L2758281-2	L2758281-3	L2758281-4	L2758281-5
	Description	Water	Water	Water	Water	Water
	Sampled Date	26-NOV-24	26-NOV-24	26-NOV-24	27-NOV-24	27-NOV-24
	Sampled Time	11:35	13:20	15:35	09:00	10:15
	Client ID	23822-01	23822-02	23822-04	23822-05	23822-06
Grouping	**Analyte**					
WATER						
Dioxins and Furans	2,3,7,8-TCDD (pg/L)	<0.23 [U]	<0.17 [U]	<0.36 [U]	<0.38 [U]	<0.15 [U]
	1,2,3,7,8-PeCDD (pg/L)	<0.19 [U]	<0.29 [U]	3.1 J,R	1.33 [J]	<0.20 [U]
	1,2,3,4,7,8-HxCDD (pg/L)	<0.22 [U]	<0.19 [U]	<0.53 [U]	0.35 J,R	<0.13 [U]
	1,2,3,6,7,8-HxCDD (pg/L)	<0.23 [U]	<0.19 [U]	38.2	14.7	<0.13 [U]
	1,2,3,7,8,9-HxCDD (pg/L)	<0.23 [U]	<0.19 [U]	13.1	5.49 [J]	<0.13 [U]
	1,2,3,4,6,7,8-HpCDD (pg/L)	0.62 J,R	1.17 [J]	61.4	30.9	<0.23 [U]
	OCDD (pg/L)	1.83 [J]	3.73 [J]	310	112	1.59 [J]
	Total-TCDD (pg/L)	<0.23 [U]	0.42 [J]	16.5	13.2	<0.15 [U]
	Total TCDD # Homologues	0	1	5	4	0
	Total-PeCDD (pg/L)	<0.19 [U]	3.52 [J]	58.8	28.9	<0.20 [U]
	Total PeCDD # Homologues	0	1	3	4	0
	Total-HxCDD (pg/L)	<0.23 [U]	0.30 [J]	317	132	<0.13 [U]
	Total HxCDD # Homologues	0	1	4	5	0
	Total-HpCDD (pg/L)	<0.15 [U]	1.17 [J]	151	68.7	<0.23 [U]
	Total HpCDD # Homologues	0	1	2	2	0
	2,3,7,8-TCDF (pg/L)	<0.17 [U]	<0.23 [U]	0.59 [J]	<0.41 [U]	<0.17 [U]
	1,2,3,7,8-PeCDF (pg/L)	0.28 J,R	0.40 J,R	1.20 EMPC	0.54 [J]	0.37 [J]
	2,3,4,7,8-PeCDF (pg/L)	<0.15 [U]	<0.25 [U]	5.30 [J]	2.20 [J]	<0.13 [U]
	1,2,3,4,7,8-HxCDF (pg/L)	<0.21 [U]	<0.10 [U]	1.00 J,R	0.64 J,R	<0.079 [U]
	1,2,3,6,7,8-HxCDF (pg/L)	<0.19 [U]	<0.096 [U]	3.90 J,R	2.10 J,R	<0.077 [U]
	1,2,3,7,8,9-HxCDF (pg/L)	<0.25 [U]	<0.13 [U]	0.85 [J]	<0.36 [U]	<0.099 [U]
	2,3,4,6,7,8-HxCDF (pg/L)	<0.19 [U]	0.29 J,R	21.0	10.4	0.128 [J]
	1,2,3,4,6,7,8-HpCDF (pg/L)	<0.13 [U]	0.27 J,R	25.2	17.7	<0.14 [U]
	1,2,3,4,7,8,9-HpCDF (pg/L)	<0.16 [U]	<0.14 [U]	1.45 [J]	0.87 [J]	<0.17 [U]
	OCDF (pg/L)	<0.27 [U]	0.49 J,R	13.4 [J]	6.79 [J]	0.29 J,R
	Total-TCDF (pg/L)	<0.17 [U]	0.31 [J]	6.69 [J]	1.45 [J]	<0.17 [U]
	Total TCDF # Homologues	0	1	7	2	0
	Total-PeCDF (pg/L)	<0.16 [U]	<0.28 [U]	30.0	7.05 [J]	0.37 [J]
	Total PeCDF # Homologues	0	0	4	4	1
	Total-HxCDF (pg/L)	<0.25 [U]	0.72 [J]	115	58.3	0.291 [J]
	Total HxCDF # Homologues	0	1	5	5	2
	Total-HpCDF (pg/L)	<0.16 [U]	<0.14 [U]	69.3	43.2	<0.17 [U]
	Total HpCDF # Homologues	0	0	3	3	0
	Surrogate: 13C12-2,3,7,8-TCDD (%)	79.0	73.0	62.0	60.0	81.0
	Surrogate: 13C12-1,2,3,7,8-PeCDD (%)	75.0	66.0	54.0	56.0	76.0
	Surrogate: 13C12-1,2,3,4,7,8-HxCDD (%)	79.0	76.0	66.0	64.0	82.0
	Surrogate: 13C12-1,2,3,6,7,8-HxCDD (%)	79.0	72.0	61.0	63.0	80.0

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2758281-6	L2758281-7	L2758281-8		
	Description	Water	Water	Water		
	Sampled Date	27-NOV-24	27-NOV-24	27-NOV-24		
	Sampled Time	12:05	13:00	13:45		
	Client ID	23822-07	23822-08	23822-10		
Grouping	**Analyte**					
WATER						
Dioxins and Furans	2,3,7,8-TCDD (pg/L)	<0.24 [U]	<0.17 [U]	<0.19 [U]		
	1,2,3,7,8-PeCDD (pg/L)	0.46 [J,R]	<0.18 [U]	<0.16 [U]		
	1,2,3,4,7,8-HxCDD (pg/L)	<0.16 [U]	<0.28 [U]	<0.13 [U]		
	1,2,3,6,7,8-HxCDD (pg/L)	0.66 [J,R]	<0.27 [U]	<0.13 [U]		
	1,2,3,7,8,9-HxCDD (pg/L)	<0.16 [U]	<0.27 [U]	<0.13 [U]		
	1,2,3,4,6,7,8-HpCDD (pg/L)	1.00 [J,R]	<0.25 [U]	0.66 [J,R]		
	OCDD (pg/L)	6.00 [J]	1.94 [J]	2.10 [J,R]		
	Total-TCDD (pg/L)	0.31 [J]	<0.17 [U]	<0.19 [U]		
	Total TCDD # Homologues	1	0	0		
	Total-PeCDD (pg/L)	<0.28 [U]	<0.18 [U]	<0.16 [U]		
	Total PeCDD # Homologues	0	0	0		
	Total-HxCDD (pg/L)	4.12 [J]	<0.28 [U]	<0.13 [U]		
	Total HxCDD # Homologues	2	0	0		
	Total-HpCDD (pg/L)	<0.24 [U]	0.39 [J]	<0.15 [U]		
	Total HpCDD # Homologues	0	1	0		
	2,3,7,8-TCDF (pg/L)	<0.31 [U]	<0.16 [U]	<0.17 [U]		
	1,2,3,7,8-PeCDF (pg/L)	<0.24 [U]	<0.17 [U]	<0.12 [U]		
	2,3,4,7,8-PeCDF (pg/L)	<0.20 [U]	<0.17 [U]	<0.11 [U]		
	1,2,3,4,7,8-HxCDF (pg/L)	<0.24 [U]	<0.10 [U]	<0.13 [U]		
	1,2,3,6,7,8-HxCDF (pg/L)	<0.22 [U]	<0.096 [U]	<0.13 [U]		
	1,2,3,7,8,9-HxCDF (pg/L)	<0.31 [U]	<0.13 [U]	<0.16 [U]		
	2,3,4,6,7,8-HxCDF (pg/L)	<0.24 [U]	<0.10 [U]	<0.14 [U]		
	1,2,3,4,6,7,8-HpCDF (pg/L)	0.42 [J,R]	<0.14 [U]	<0.14 [U]		
	1,2,3,4,7,8,9-HpCDF (pg/L)	<0.20 [U]	<0.17 [U]	<0.17 [U]		
	OCDF (pg/L)	<0.36 [U]	<0.26 [U]	<0.22 [U]		
	Total-TCDF (pg/L)	<0.31 [U]	0.30 [J]	<0.17 [U]		
	Total TCDF # Homologues	0	1	0		
	Total-PeCDF (pg/L)	0.86 [J]	<0.17 [U]	<0.12 [U]		
	Total PeCDF # Homologues	1	0	0		
	Total-HxCDF (pg/L)	1.04 [J]	<0.13 [U]	<0.16 [U]		
	Total HxCDF # Homologues	1	0	0		
	Total-HpCDF (pg/L)	<0.20 [U]	<0.17 [U]	<0.17 [U]		
	Total HpCDF # Homologues	0	0	0		
	Surrogate: 13C12-2,3,7,8-TCDD (%)	66.0	76.0	74.0		
	Surrogate: 13C12-1,2,3,7,8-PeCDD (%)	63.0	71.0	72.0		
	Surrogate: 13C12-1,2,3,4,7,8-HxCDD (%)	76.0	83.0	76.0		
	Surrogate: 13C12-1,2,3,6,7,8-HxCDD (%)	72.0	76.0	72.0		

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2758281-1	L2758281-2	L2758281-3	L2758281-4	L2758281-5
	Description	Water	Water	Water	Water	Water
	Sampled Date	26-NOV-24	26-NOV-24	26-NOV-24	27-NOV-24	27-NOV-24
	Sampled Time	11:35	13:20	15:35	09:00	10:15
	Client ID	23822-01	23822-02	23822-04	23822-05	23822-06
Grouping	**Analyte**					
WATER						
Dioxins and Furans	Surrogate: 13C12-1,2,3,4,6,7,8-HpCDD (%)	78.0	73.0	60.0	61.0	80.0
	Surrogate: 13C12-OCDD (%)	76.0	69.0	51.0	56.0	75.0
	Surrogate: 13C12-2,3,7,8-TCDF (%)	73.0	69.0	54.0	56.0	75.0
	Surrogate: 13C12-1,2,3,7,8-PeCDF (%)	72.0	66.0	53.0	56.0	73.0
	Surrogate: 13C12-2,3,4,7,8-PeCDF (%)	75.0	64.0	53.0	56.0	74.0
	Surrogate: 13C12-1,2,3,4,7,8-HxCDF (%)	73.0	71.0	61.0	61.0	77.0
	Surrogate: 13C12-1,2,3,6,7,8-HxCDF (%)	75.0	74.0	59.0	60.0	75.0
	Surrogate: 13C12-2,3,4,6,7,8-HxCDF (%)	75.0	72.0	60.0	61.0	77.0
	Surrogate: 13C12-1,2,3,7,8,9-HxCDF (%)	74.0	71.0	58.0	59.0	76.0
	Surrogate: 13C12-1,2,3,4,6,7,8-HpCDF (%)	75.0	71.0	57.0	59.0	76.0
	Surrogate: 13C12-1,2,3,4,7,8,9-HpCDF (%)	75.0	70.0	59.0	60.0	78.0
	Surrogate: 37Cl4-2,3,7,8-TCDD (Cleanup) (%)	73.0	72.0	59.0	56.0	73.0
Toxic Equivalency	Lower Bound PCDD/F TEQ (WHO 2005) (pg/L)	0.000549	0.0128	9.94	5.60	0.0242
	Mid Point PCDD/F TEQ (WHO 2005) (pg/L)	0.334	0.381	13.8	6.13	0.262
	Upper Bound PCDD/F TEQ (WHO 2005) (pg/L)	0.652	0.706	14.0	6.36	0.500
	Lower Bound PCDD/F TEQ (NATO) (pg/L)	0.00183	0.0154	11.2	5.46	0.0326
	Mid Point PCDD/F TEQ (NATO) (pg/L)	0.308	0.345	13.5	6.00	0.234
	Upper Bound PCDD/F TEQ (NATO) (pg/L)	0.594	0.622	13.7	6.23	0.435

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2758281-6	L2758281-7	L2758281-8		
	Description	Water	Water	Water		
	Sampled Date	27-NOV-24	27-NOV-24	27-NOV-24		
	Sampled Time	12:05	13:00	13:45		
	Client ID	23822-07	23822-08	23822-10		
Grouping	**Analyte**					
WATER						
Dioxins and Furans	Surrogate: 13C12-1,2,3,4,6,7,8-HpCDD (%)	71.0	76.0	77.0		
	Surrogate: 13C12-OCDD (%)	63.0	69.0	77.0		
	Surrogate: 13C12-2,3,7,8-TCDF (%)	61.0	71.0	69.0		
	Surrogate: 13C12-1,2,3,7,8-PeCDF (%)	60.0	69.0	69.0		
	Surrogate: 13C12-2,3,4,7,8-PeCDF (%)	62.0	70.0	71.0		
	Surrogate: 13C12-1,2,3,4,7,8-HxCDF (%)	70.0	75.0	69.0		
	Surrogate: 13C12-1,2,3,6,7,8-HxCDF (%)	70.0	75.0	69.0		
	Surrogate: 13C12-2,3,4,6,7,8-HxCDF (%)	71.0	77.0	71.0		
	Surrogate: 13C12-1,2,3,7,8,9-HxCDF (%)	69.0	74.0	71.0		
	Surrogate: 13C12-1,2,3,4,6,7,8-HpCDF (%)	67.0	73.0	73.0		
	Surrogate: 13C12-1,2,3,4,7,8,9-HpCDF (%)	66.0	74.0	73.0		
	Surrogate: 37Cl4-2,3,7,8-TCDD (Cleanup) (%)	60.0	74.0	68.0		
Toxic Equivalency	Lower Bound PCDD/F TEQ (WHO 2005) (pg/L)	0.00180	0.000582	0.00		
	Mid Point PCDD/F TEQ (WHO 2005) (pg/L)	0.779	0.277	0.258		
	Upper Bound PCDD/F TEQ (WHO 2005) (pg/L)	1.02	0.553	0.509		
	Lower Bound PCDD/F TEQ (NATO) (pg/L)	0.00600	0.00194	0.00		
	Mid Point PCDD/F TEQ (NATO) (pg/L)	0.575	0.252	0.232		
	Upper Bound PCDD/F TEQ (NATO) (pg/L)	0.835	0.502	0.455		

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Method Blank	1,2,3,4,6,7,8-HpCDF	J,R	L2758281-1, -2, -3, -4, -5, -6, -7, -8
Method Blank	1,2,3,7,8-PeCDF	J,R	L2758281-1, -2, -3, -4, -5, -6, -7, -8
Method Blank	OCDD	J,R	L2758281-1, -2, -3, -4, -5, -6, -7, -8
Method Blank	OCDD	J,R	L2758281-1, -2, -3, -4, -5, -6, -7, -8
Method Blank	1,2,3,7,8-PeCDF	[J]	L2758281-1, -2, -3, -4, -5, -6, -7, -8
Method Blank	Total-PeCDF	[J]	L2758281-1, -2, -3, -4, -5, -6, -7, -8
Method Blank	Total-TCDF	[J]	L2758281-1, -2, -3, -4, -5, -6, -7, -8
Method Blank	1,2,3,4,6,7,8-HpCDD	[U]	L2758281-1, -2, -3, -4, -5, -6, -7, -8
Method Blank	1,2,3,4,6,7,8-HpCDD	[U]	L2758281-1, -2, -3, -4, -5, -6, -7, -8
Method Blank	1,2,3,4,6,7,8-HpCDF	[U]	L2758281-1, -2, -3, -4, -5, -6, -7, -8
Method Blank	1,2,3,4,7,8,9-HpCDF	[U]	L2758281-1, -2, -3, -4, -5, -6, -7, -8
Method Blank	1,2,3,4,7,8,9-HpCDF	[U]	L2758281-1, -2, -3, -4, -5, -6, -7, -8
Method Blank	1,2,3,4,7,8-HxCDD	[U]	L2758281-1, -2, -3, -4, -5, -6, -7, -8
Method Blank	1,2,3,4,7,8-HxCDD	[U]	L2758281-1, -2, -3, -4, -5, -6, -7, -8
Method Blank	1,2,3,4,7,8-HxCDF	[U]	L2758281-1, -2, -3, -4, -5, -6, -7, -8
Method Blank	1,2,3,4,7,8-HxCDF	[U]	L2758281-1, -2, -3, -4, -5, -6, -7, -8
Method Blank	1,2,3,6,7,8-HxCDD	[U]	L2758281-1, -2, -3, -4, -5, -6, -7, -8
Method Blank	1,2,3,6,7,8-HxCDD	[U]	L2758281-1, -2, -3, -4, -5, -6, -7, -8
Method Blank	1,2,3,6,7,8-HxCDF	[U]	L2758281-1, -2, -3, -4, -5, -6, -7, -8
Method Blank	1,2,3,6,7,8-HxCDF	[U]	L2758281-1, -2, -3, -4, -5, -6, -7, -8
Method Blank	1,2,3,7,8,9-HxCDD	[U]	L2758281-1, -2, -3, -4, -5, -6, -7, -8
Method Blank	1,2,3,7,8,9-HxCDD	[U]	L2758281-1, -2, -3, -4, -5, -6, -7, -8
Method Blank	1,2,3,7,8,9-HxCDF	[U]	L2758281-1, -2, -3, -4, -5, -6, -7, -8
Method Blank	1,2,3,7,8,9-HxCDF	[U]	L2758281-1, -2, -3, -4, -5, -6, -7, -8
Method Blank	1,2,3,7,8-PeCDD	[U]	L2758281-1, -2, -3, -4, -5, -6, -7, -8
Method Blank	1,2,3,7,8-PeCDD	[U]	L2758281-1, -2, -3, -4, -5, -6, -7, -8
Method Blank	2,3,4,6,7,8-HxCDF	[U]	L2758281-1, -2, -3, -4, -5, -6, -7, -8
Method Blank	2,3,4,6,7,8-HxCDF	[U]	L2758281-1, -2, -3, -4, -5, -6, -7, -8
Method Blank	2,3,4,7,8-PeCDF	[U]	L2758281-1, -2, -3, -4, -5, -6, -7, -8
Method Blank	2,3,4,7,8-PeCDF	[U]	L2758281-1, -2, -3, -4, -5, -6, -7, -8
Method Blank	2,3,7,8-TCDD	[U]	L2758281-1, -2, -3, -4, -5, -6, -7, -8
Method Blank	2,3,7,8-TCDD	[U]	L2758281-1, -2, -3, -4, -5, -6, -7, -8
Method Blank	2,3,7,8-TCDF	[U]	L2758281-1, -2, -3, -4, -5, -6, -7, -8
Method Blank	2,3,7,8-TCDF	[U]	L2758281-1, -2, -3, -4, -5, -6, -7, -8
Method Blank	OCDF	[U]	L2758281-1, -2, -3, -4, -5, -6, -7, -8
Method Blank	OCDF	[U]	L2758281-1, -2, -3, -4, -5, -6, -7, -8
Method Blank	Total-HpCDD	[U]	L2758281-1, -2, -3, -4, -5, -6, -7, -8
Method Blank	Total-HpCDD	[U]	L2758281-1, -2, -3, -4, -5, -6, -7, -8
Method Blank	Total-HpCDF	[U]	L2758281-1, -2, -3, -4, -5, -6, -7, -8
Method Blank	Total-HpCDF	[U]	L2758281-1, -2, -3, -4, -5, -6, -7, -8
Method Blank	Total-HxCDD	[U]	L2758281-1, -2, -3, -4, -5, -6, -7, -8
Method Blank	Total-HxCDD	[U]	L2758281-1, -2, -3, -4, -5, -6, -7, -8
Method Blank	Total-HxCDF	[U]	L2758281-1, -2, -3, -4, -5, -6, -7, -8
Method Blank	Total-HxCDF	[U]	L2758281-1, -2, -3, -4, -5, -6, -7, -8
Method Blank	Total-PeCDD	[U]	L2758281-1, -2, -3, -4, -5, -6, -7, -8
Method Blank	Total-PeCDD	[U]	L2758281-1, -2, -3, -4, -5, -6, -7, -8
Method Blank	Total-PeCDF	[U]	L2758281-1, -2, -3, -4, -5, -6, -7, -8
Method Blank	Total-TCDD	[U]	L2758281-1, -2, -3, -4, -5, -6, -7, -8
Method Blank	Total-TCDD	[U]	L2758281-1, -2, -3, -4, -5, -6, -7, -8
Method Blank	Total-TCDF	[U]	L2758281-1, -2, -3, -4, -5, -6, -7, -8

Qualifiers for Individual Parameters Listed:

Qualifier	Description

Reference Information

EMPC	Estimated Maximum Possible Concentration. Parameter detected but didn't meet all criteria for positive identification.
J,R	The analyte was detected below the calibrated range but above the EDL, and the ion abundance ratio(s) did not meet the acceptance criteria. Value is an estimated maximum.
[J]	The analyte was detected below the calibrated range but above the EDL.
[U]	The analyte was not detected above the EDL.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
DX-1613B-HRMS-BU	Water	Dioxins and Furans HR 1613B	USEPA 1613B

Samples are filtered if required. Solids are extracted by Soxhlet using toluene. The liquid portion is extracted by liquid/liquid extraction using dichloromethane. The extracts are prepared using column chromatography, reduced in volume and analyzed by isotope-dilution GC/HRMS

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
BU	ALS ENVIRONMENTAL - BURLINGTON, ONTARIO, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Client: WSP Canada Inc.
200-2920 Virtual Way
Vancouver BC V5M 0C4
Contact: Jarod Devries

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
DX-1613B-HRMS-BU	**Water**							
Batch R5991416								
WG3791202-2 LCS								
2,3,7,8-TCDD			90.0		%		67-158	30-DEC-24
1,2,3,7,8-PeCDD			101.0		%		70-142	30-DEC-24
1,2,3,4,7,8-HxCDD			91.0		%		70-164	30-DEC-24
1,2,3,6,7,8-HxCDD			87.0		%		76-134	30-DEC-24
1,2,3,7,8,9-HxCDD			90.0		%		64-162	30-DEC-24
1,2,3,4,6,7,8-HpCDD			97.0		%		70-140	30-DEC-24
OCDD			89.0		%		78-144	30-DEC-24
2,3,7,8-TCDF			99.0		%		75-158	30-DEC-24
1,2,3,7,8-PeCDF			107.0		%		80-134	30-DEC-24
2,3,4,7,8-PeCDF			99.0		%		68-160	30-DEC-24
1,2,3,4,7,8-HxCDF			103.0		%		72-134	30-DEC-24
1,2,3,6,7,8-HxCDF			102.0		%		84-130	30-DEC-24
2,3,4,6,7,8-HxCDF			101.0		%		70-156	30-DEC-24
1,2,3,7,8,9-HxCDF			107.0		%		78-130	30-DEC-24
1,2,3,4,6,7,8-HpCDF			107.0		%		82-122	30-DEC-24
1,2,3,4,7,8,9-HpCDF			104.0		%		78-138	30-DEC-24
OCDF			99.0		%		63-170	30-DEC-24
WG3791202-1 MB								
2,3,7,8-TCDD			<0.19	[U]	pg/L		10	30-DEC-24
1,2,3,7,8-PeCDD			<0.21	[U]	pg/L		10	30-DEC-24
1,2,3,4,7,8-HxCDD			<0.19	[U]	pg/L		10	30-DEC-24
1,2,3,6,7,8-HxCDD			<0.19	[U]	pg/L		10	30-DEC-24
1,2,3,7,8,9-HxCDD			<0.19	[U]	pg/L		10	30-DEC-24
1,2,3,4,6,7,8-HpCDD			<0.21	[U]	pg/L		10	30-DEC-24
OCDD			1.10	J,R	pg/L		20	30-DEC-24
2,3,7,8-TCDF			<0.18	[U]	pg/L		10	30-DEC-24
1,2,3,7,8-PeCDF			0.27	J,R	pg/L		10	30-DEC-24
2,3,4,7,8-PeCDF			<0.16	[U]	pg/L		10	30-DEC-24
1,2,3,4,7,8-HxCDF			<0.12	[U]	pg/L		10	30-DEC-24
1,2,3,6,7,8-HxCDF			<0.11	[U]	pg/L		10	30-DEC-24
2,3,4,6,7,8-HxCDF			<0.12	[U]	pg/L		10	30-DEC-24
1,2,3,7,8,9-HxCDF			<0.16	[U]	pg/L		10	30-DEC-24
1,2,3,4,6,7,8-HpCDF			0.16	J,R	pg/L		10	30-DEC-24
1,2,3,4,7,8,9-HpCDF			<0.18	[U]	pg/L		10	30-DEC-24

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
DX-1613B-HRMS-BU	**Water**							
Batch R5991416								
WG3791202-1 MB								
OCDF			<0.21	[U]	pg/L		20	30-DEC-24
Total-TCDD			<0.19	[U]	pg/L		10	30-DEC-24
Total-PeCDD			<0.21	[U]	pg/L		10	30-DEC-24
Total-HxCDD			<0.19	[U]	pg/L		10	30-DEC-24
Total-HpCDD			<0.21	[U]	pg/L		10	30-DEC-24
Total-TCDF			<0.18	[U]	pg/L		10	30-DEC-24
Total-PeCDF			<0.17	[U]	pg/L		10	30-DEC-24
Total-HxCDF			<0.16	[U]	pg/L		10	30-DEC-24
Total-HpCDF			<0.18	[U]	pg/L		10	30-DEC-24
Surrogate: 13C12-2,3,7,8-TCDD			69.0		%		20-175	30-DEC-24
Surrogate: 13C12-1,2,3,7,8-PeCDD			65.0		%		21-227	30-DEC-24
Surrogate: 13C12-1,2,3,4,7,8-HxCDD			78.0		%		21-193	30-DEC-24
Surrogate: 13C12-1,2,3,6,7,8-HxCDD			75.0		%		25-163	30-DEC-24
Surrogate: 13C12-1,2,3,4,6,7,8-HpCDD			76.0		%		23-166	30-DEC-24
Surrogate: 13C12-OCDD			71.0		%		13-138	30-DEC-24
Surrogate: 13C12-2,3,7,8-TCDF			64.0		%		22-152	30-DEC-24
Surrogate: 13C12-1,2,3,7,8-PeCDF			62.0		%		24-185	30-DEC-24
Surrogate: 13C12-2,3,4,7,8-PeCDF			64.0		%		21-178	30-DEC-24
Surrogate: 13C12-1,2,3,4,7,8-HxCDF			72.0		%		26-152	30-DEC-24
Surrogate: 13C12-1,2,3,6,7,8-HxCDF			73.0		%		21-159	30-DEC-24
Surrogate: 13C12-2,3,4,6,7,8-HxCDF			74.0		%		17-205	30-DEC-24
Surrogate: 13C12-1,2,3,7,8,9-HxCDF			72.0		%		28-136	30-DEC-24
Surrogate: 13C12-1,2,3,4,6,7,8-HpCDF			70.0		%		21-158	30-DEC-24
Surrogate: 13C12-1,2,3,4,7,8,9-HpCDF			73.0		%		20-186	30-DEC-24
Surrogate: 37Cl4-2,3,7,8-TCDD (Cleanup)			63.0		%		31-191	30-DEC-24
WG3791202-4 MB								
2,3,7,8-TCDD			<0.25	[U]	pg/L		10	30-DEC-24
1,2,3,7,8-PeCDD			<0.19	[U]	pg/L		10	30-DEC-24
1,2,3,4,7,8-HxCDD			<0.15	[U]	pg/L		10	30-DEC-24
1,2,3,6,7,8-HxCDD			<0.15	[U]	pg/L		10	30-DEC-24
1,2,3,7,8,9-HxCDD			<0.15	[U]	pg/L		10	30-DEC-24
1,2,3,4,6,7,8-HpCDD			<0.23	[U]	pg/L		10	30-DEC-24
OCDD			1.20	J,R	pg/L		20	30-DEC-24
2,3,7,8-TCDF			<0.15	[U]	pg/L		10	30-DEC-24

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
DX-1613B-HRMS-BU	**Water**							
Batch R5991416								
WG3791202-4 MB								
1,2,3,7,8-PeCDF			0.43	[J]	pg/L		10	30-DEC-24
2,3,4,7,8-PeCDF			<0.16	[U]	pg/L		10	30-DEC-24
1,2,3,4,7,8-HxCDF			<0.12	[U]	pg/L		10	30-DEC-24
1,2,3,6,7,8-HxCDF			<0.11	[U]	pg/L		10	30-DEC-24
2,3,4,6,7,8-HxCDF			<0.12	[U]	pg/L		10	30-DEC-24
1,2,3,7,8,9-HxCDF			<0.15	[U]	pg/L		10	30-DEC-24
1,2,3,4,6,7,8-HpCDF			<0.12	[U]	pg/L		10	30-DEC-24
1,2,3,4,7,8,9-HpCDF			<0.15	[U]	pg/L		10	30-DEC-24
OCDF			<0.24	[U]	pg/L		20	30-DEC-24
Total-TCDD			<0.25	[U]	pg/L		10	30-DEC-24
Total-PeCDD			<0.19	[U]	pg/L		10	30-DEC-24
Total-HxCDD			<0.15	[U]	pg/L		10	30-DEC-24
Total-HpCDD			<0.23	[U]	pg/L		10	30-DEC-24
Total-TCDF			0.21	[J]	pg/L		10	30-DEC-24
Total-PeCDF			0.43	[J]	pg/L		10	30-DEC-24
Total-HxCDF			<0.15	[U]	pg/L		10	30-DEC-24
Total-HpCDF			<0.15	[U]	pg/L		10	30-DEC-24
Surrogate: 13C12-2,3,7,8-TCDD			75.0		%		20-175	30-DEC-24
Surrogate: 13C12-1,2,3,7,8-PeCDD			73.0		%		21-227	30-DEC-24
Surrogate: 13C12-1,2,3,4,7,8-HxCDD			83.0		%		21-193	30-DEC-24
Surrogate: 13C12-1,2,3,6,7,8-HxCDD			77.0		%		25-163	30-DEC-24
Surrogate: 13C12-1,2,3,4,6,7,8-HpCDD			77.0		%		23-166	30-DEC-24
Surrogate: 13C12-OCDD			72.0		%		13-138	30-DEC-24
Surrogate: 13C12-2,3,7,8-TCDF			68.0		%		22-152	30-DEC-24
Surrogate: 13C12-1,2,3,7,8-PeCDF			70.0		%		24-185	30-DEC-24
Surrogate: 13C12-2,3,4,7,8-PeCDF			72.0		%		21-178	30-DEC-24
Surrogate: 13C12-1,2,3,4,7,8-HxCDF			74.0		%		26-152	30-DEC-24
Surrogate: 13C12-1,2,3,6,7,8-HxCDF			75.0		%		21-159	30-DEC-24
Surrogate: 13C12-2,3,4,6,7,8-HxCDF			77.0		%		17-205	30-DEC-24
Surrogate: 13C12-1,2,3,7,8,9-HxCDF			74.0		%		28-136	30-DEC-24
Surrogate: 13C12-1,2,3,4,6,7,8-HpCDF			75.0		%		21-158	30-DEC-24
Surrogate: 13C12-1,2,3,4,7,8,9-HpCDF			74.0		%		20-186	30-DEC-24
Surrogate: 37Cl4-2,3,7,8-TCDD (Cleanup)			69.0		%		31-191	30-DEC-24

Quality Control Report

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
J,R	The analyte was detected below the calibrated range but above the EDL, and the ion abundance ratio(s) did not meet the acceptance criteria. Value is an estimated maximum.
[J]	The analyte was detected below the calibrated range but above the EDL.
[U]	The analyte was not detected above the EDL.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

APPENDIX F

Field Duplicate Results

Quality Assurance and Quality Control (QA/QC)

WSP's quality assurance/quality control (QA/QC) program was followed to produce interpretable, meaningful, and reproducible sampling and analytical data. Standard industry field procedures were used during the monitoring program to help achieve reproducibility. This involved using QA/QC measures in both the collection (field program) and analysis (laboratory) of samples, as described below.

Quality Assurance – Sample Collection

The quality assurance (QA) measures used in the collection, preservation and shipment of samples included the following management controls:

- Sampling methods were consistent with established WSP protocols, industry standards, and provincial/federal requirements.
- Field notes were recorded during the investigation. Each sample was assigned a unique sample identification number recorded in the field notes, along with the date and time of sample collection, the sample matrix, and the requested analyses.
- Dedicated sampling equipment (tubing and foot valves) and clean disposable Nitrile™ gloves were used at each sampling location to prevent cross-contamination. Non-dedicated sampling equipment (e.g., water level meters) was decontaminated between sampling locations. Sampling equipment in contact with groundwater was washed with a laboratory-grade detergent (e.g., phosphate-free Liquinox) and thoroughly rinsed with deionized water.
- Chain-of-Custody procedures were used for the shipment of samples to the laboratories; samples included in a shipment were identified on a WSP Chain-of-Custody form, with one copy retained by WSP personnel, after sign-off.
- Samples were stored in coolers and chilled with ice prior to submission and during transport to the laboratory.

Quality Control – Field Investigation

The quality control (QC) measures established for the field program included the following technical aspects:

- Submission of field duplicate samples (i.e., paired sample analyses). A field duplicate sample is a second sample of a certain media (e.g., soil or water) from the same location that is submitted to the analytical laboratory under a separate label such that the laboratory has no prior knowledge that it is a duplicate. The duplicate target frequency was 10% duplicates for samples analyzed.
    - For groundwater samples, duplicate samples were collected by alternately directing the outlet tubing between the two water sampling containers.
- Water samples were chilled on ice in coolers which were submitted to the laboratory depot under chain of custody procedures. Sample temperature was assessed at the laboratory depot upon arrival to document that the samples were chilled.

Quality Control – Data Interpretation

The quality control (QC) measures established for interpretation of the chemistry results included the following technical aspects:

- Standard WSP data quality checks were completed to verify that electronic and manual data transfers (e.g., compilation of data into tables) were complete and that the potential for errors was minimized.
- The relative percent difference (RPD) between paired sample results was used to assess duplicate sample data. The RPD is a measure of the variability between two outcomes from the same procedure or process and is calculated by:

$$RPD\ (\%) = absolute\left[\frac{(X_1 - X_2)}{average(X_1, X_2)}\right] x100$$

  where X_1 is the original sample result and X_2 is the paired analysis result.

- Where the concentration of a given parameter is less than five times the reporting detection limit (RDL), the laboratory results are considered to be less precise and the RPD is not calculated. For parameters with concentrations less than five times the RDL, the difference factor (DF) between paired analyses results is calculated by:

$$DF = \frac{(X_1 - X_2)}{RDL}$$

  where X_1 is the original sample result and X_2 is the paired analysis result.

In 2023, the BC Ministry of Environment updated the British Columbia Laboratory Manual which contains recommended Data Quality Objectives (DQOs) for laboratories duplicate RPDs (BC ENV 2023). It is recognized that these DQOs are intended for laboratory duplicates and do not include provisions for additional variability in field duplicates. However, these DQOs are considered a conservative screen for assessing the quality of field duplicates. The DQOs applied to this investigation are as follows:

- **Groundwater:** Analytical duplicates should exhibit RPDs less than 30% for organics, and 20% for metals and other inorganic parameters.
- For parameters with concentrations less than five times the RDL, the difference factor should be less than 2.

If the DQO was exceeded, further investigation of the data quality was required. Data not meeting the DQOs, if encountered, were examined on a case-by-case basis.

Laboratory Analysis

The laboratory utilized for this investigation had achieved proficiency certification by the Canadian Association for Laboratory Accreditation (CALA) for the analyses conducted. ALS Environmental performed the chemical analysis of samples collected at the Site by WSP in 2024. ALS is certified by CALA for the analytical methods used for this program.

ALS conducted internal quality control (QC) checks and reported the results to WSP. These QC checks were used to assess the reliability, accuracy, and reproducibility of the data. Reports from the laboratory were reviewed internally prior to submission to WSP. If internal QA/QC problems were encountered, the

field samples and internal QA/QC samples were re-analyzed. Data quality issues identified by the laboratory were communicated to WSP at the time of data delivery.

Copies of the analytical reports and the corresponding Chain-of-Custody forms are presented in Appendix E.

TABLE F-1
Quality Assurance / Quality Control on Laboratory Results
General Parameters

Monitoring Well		94-1/3	94-1/3					Spring S1	Spring S1				
Flow Zone		38	38	Method Detection Limit	Mean	Relative Percent Difference	Difference Factor (DF)	38	38	Method Detection Limit	Mean	Relative Percent Difference	Difference Factor (DF)
Sample Date		27-Nov-2024	27-Nov-2024					26-Jul-2023	26-Jul-2023				
Sample No.		23822-08	23822-09					23603-01	23603-03				
QAQC Sample No.		23822-09	23822-08					23603-03	23603-01				
Duplicate		FDA	FD					FDA	FD				
Physical + TOC	**Units**												
Alkalinity-Total ($CaCO_3$)	mg/L	79	79.1	1.0	79.05	0.1%	n/a	85	82.1	1.0	83.6	3.5%	n/a
Hardness ($CaCO_3$)	mg/L	83	81.6	0.6	82.3	1.7%	n/a	-	-	0.6	-	-	-
Total Suspended Solids (TSS)	mg/L	10	10.4	3.0	10.2	n/a	0.13	<3.0	4.4	3.0	NC	NC	n/a
Total Dissolved Solids (TDS)	mg/L	150	150	13	150	0.0%	n/a	176	194	20	185.0	9.7%	n/a
Total Organic Carbon (TOC)	mg/L	<0.50	0.52	0.5	NC	NC	NC	0.97	1.15	0.5	1.1	n/a	0.36
Anions and Nutrients													
Chloride	mg/L	-	-	0.5	-	-	-	31.1	-	0.50	-	-	-
Sulfate	mg/L	9.6	9.74	0.3	9.67	1.4%	n/a	20.9	21.1	0.30	21.0	1.0%	n/a

Notes:
Mean = average of two values.
Relative percent difference = the difference between two values divided by the mean of the two values.
Relative percent difference (RPD) is calculated only when the mean conc. is greater than or equal to 5x the detection limit.
Difference factor = absolute difference between two values divided by the method detection limit.
Difference factor is calculated only when the mean concentration is less than five times the detection limit.
Where detection limits vary between parent and duplicate samples, the highest detection limit is reported.
NC = not calculated; n/a = not applicable
Bold - indicates RPD greater than 20% or DF greater than 2, exceeding WSP's internal QA/QC target.

Quality Assurance / Quality Control on Laboratory Results
Dissolved Metal Parameters

Monitoring Well		94-1/3	94-1/3				
Flow Zone		38	38	Method Detection Limit	Mean	Relative Percent Difference	Difference Factor (DF)
Sample Date		27-Nov-2024	27-Nov-2024				
Sample No.		23822-08	23822-09				
QC Target Sample No.		23822-09	23822-08				
Duplicate		FDA	FD				
Dissolved Metals	**Units**						
Aluminum	mg/L	0.0011	<0.0010	0.001	NC	NC	NC
Antimony	mg/L	<0.00010	<0.00010	0.0001	NC	NC	NC
Arsenic	mg/L	0.00028	0.00029	0.0001	0.000285	n/a	0.1
Barium	mg/L	0.00533	0.00525	0.0001	0.00529	1.5%	n/a
Beryllium	mg/L	<0.000100	<0.000100	0.0001	NC	NC	NC
Bismuth	mg/L	<0.000050	<0.000050	0.00005	NC	NC	NC
Boron	mg/L	0.01	<0.010	0.01	NC	NC	NC
Cadmium	mg/L	<0.0000050	<0.0000050	0.000005	NC	NC	NC
Calcium	mg/L	21	21	0.05	21	0.0%	n/a
Cesium	mg/L	<0.000010	<0.000010	0.00001	NC	NC	NC
Chromium	mg/L	<0.00050	<0.00050	0.0005	NC	NC	NC
Cobalt	mg/L	<0.00010	<0.00010	0.0001	NC	NC	NC
Copper	mg/L	<0.00020	<0.00020	0.0002	NC	NC	NC
Iron	mg/L	<0.010	<0.010	0.01	NC	NC	NC
Lead	mg/L	<0.000050	<0.000050	0.00005	NC	NC	NC
Lithium	mg/L	0.0022	0.0022	0.001	0.0022	n/a	0.0
Magnesium	mg/L	7.42	7.08	0.005	7.25	4.7%	n/a
Manganese	mg/L	0.00012	<0.00010	0.0001	NC	NC	NC
Mercury	mg/L	<0.0000050	<0.0000050	0.000005	NC	NC	NC
Molybdenum	mg/L	0.000894	0.000867	0.00005	0.0008805	3.1%	n/a
Nickel	mg/L	<0.00050	<0.00050	0.0005	NC	NC	NC
Phosphorus	mg/L	<0.050	<0.050	0.05	NC	NC	NC
Potassium	mg/L	2.32	2.32	0.05	2.32	0.0%	n/a
Rubidium	mg/L	0.00025	0.00029	0.0002	0.00027	n/a	0.2
Selenium	mg/L	0.000104	0.000095	0.00005	0.0000995	n/a	0.18
Silicon	mg/L	15.7	15.9	0.05	15.8	1.3%	n/a
Silver	mg/L	<0.000010	<0.000010	0.00001	NC	NC	NC
Sodium	mg/L	15.9	15.8	0.05	15.85	0.6%	n/a
Strontium	mg/L	0.131	0.128	0.0002	0.1295	2.3%	n/a
Sulphur	mg/L	3.34	3.3	0.5	3.32	1.2%	n/a
Tellurium	mg/L	<0.00020	<0.00020	0.0002	NC	NC	NC
Thallium	mg/L	<0.000010	<0.000010	0.00001	NC	NC	NC
Thorium	mg/L	<0.00010	<0.00010	0.0001	NC	NC	NC
Tin	mg/L	<0.00010	<0.00010	0.0001	NC	NC	NC
Titanium	mg/L	<0.00030	<0.00030	0.0003	NC	NC	NC
Tungsten	mg/L	<0.00010	<0.00010	0.0001	NC	NC	NC
Uranium	mg/L	0.000108	0.00011	0.00001	0.000109	1.8%	n/a
Vanadium	mg/L	0.0062	0.00621	0.0005	0.006205	0.2%	n/a
Zinc	mg/L	<0.0010	<0.0010	0.001	NC	NC	NC
Zirconium	mg/L	<0.00020	<0.00020	0.0002	NC	NC	NC

Notes:
Mean = average of two values.
Relative percent difference = the difference between two values divided by the mean of the two values.
Relative percent difference (RPD) is calculated only when the mean conc. is greater than or equal to 5x the detection limit.
Difference factor = absolute difference between two values divided by the method detection limit.
Difference factor is calculated only when the mean concentration is less than five times the detection limit.
Where detection limits vary between parent and duplicate samples, the highest detection limit is reported.
NC = not calculated; n/a = not applicable
Bold - indicates RPD greater than 20% or DF greater than 2, exceeding WSP's internal QA/QC target.

TABLE F-3
Quality Assurance / Quality Control on Laboratory Results
Dioxins and Furans

Location:		Spring S1	Spring S1				
Flow Zone:		38	38	Method Detection Limit	Mean	Relative Percent Difference	Difference Factor (DF)
Date Sampled:		06-Sep-24	06-Sep-2024				
Sample Control Number:		23603-01	23603-03				
Ref. Sample No.:		23603-03	23603-01				
Duplicate Sample Type:		FDA	FD				
Dioxins	**Units**						
2,3,7,8-TCDD	pg/L	<0.41	<0.38	0.38	NC	NC	NC
Total-TCDD	pg/L	<0.41	<0.38	0.38	NC	NC	NC
1,2,3,7,8-PeCDD	pg/L	<0.53	<0.44	0.44	NC	NC	NC
Total-PeCDD	pg/L	<0.53	<0.44	0.44	NC	NC	NC
1,2,3,4,7,8-HxCDD	pg/L	<0.38	<0.36	0.36	NC	NC	NC
1,2,3,6,7,8-HxCDD	pg/L	<0.39	<0.37	0.37	NC	NC	NC
1,2,3,7,8,9-HxCDD	pg/L	<0.37	<0.35	0.35	NC	NC	NC
Total-HxCDD	pg/L	<0.39	0.64	0.37	NC	NC	NC
1,2,3,4,6,7,8-HpCDD	pg/L	0.9	1.1	0.5	1.015	n/a	0.34
Total-HpCDD	pg/L	<0.50	<0.72	0.5	NC	NC	NC
OCDD	pg/L	4.2	3.1	0.88	3.65	n/a	1.25
Furans							
2,3,7,8-TCDF	pg/L	<0.54	<0.56	0.54	NC	NC	NC
Total-TCDF	pg/L	<0.54	<0.56	0.54	NC	NC	NC
1,2,3,7,8-PeCDF	pg/L	1.27	0.45	0.44	0.86	n/a	1.86
2,3,4,7,8-PeCDF	pg/L	<0.59	<0.36	0.36	NC	NC	NC
Total-PeCDF	pg/L	1.27	<0.44	0.44	NC	NC	NC
1,2,3,4,7,8-HxCDF	pg/L	<0.23	<0.24	0.23	NC	NC	NC
1,2,3,6,7,8-HxCDF	pg/L	<0.22	0.24	0.22	NC	NC	NC
1,2,3,7,8,9-HxCDF	pg/L	<0.29	<0.31	0.29	NC	NC	NC
2,3,4,6,7,8-HxCDF	pg/L	0.36	<0.23	0.23	NC	NC	NC
Total-HxCDF	pg/L	<0.29	<0.31	0.29	NC	NC	NC
1,2,3,4,6,7,8-HpCDF	pg/L	1.16	0.38	0.27	0.77	n/a	2.89
1,2,3,4,7,8,9-HpCDF	pg/L	<0.45	<0.37	0.37	NC	NC	NC
Total-HpCDF	pg/L	1.2	<0.37	0.37	NC	NC	NC
OCDF	pg/L	1.0	<1.0	0.64	NC	NC	NC
Total PCDD/PCDF TEQ (using NATO I-TEF's)							
TEQs (ND=1/2DL) [pg/L]	pg/L	0.734	0.578	0	0.656	n/a	n/a
TEQs (ND=DL) [pg/L]	pg/L	1.34	1.09	0	1.215	n/a	n/a
TEQs (ND=0) [pg/L]	pg/L	0.0793	0	0	0.03965	n/a	n/a
Total PCDD/PCDF TEQ (using WHO 2005 TEF's) **							
TEQs (ND=1/2DL) [pg/L]	pg/L	0.778	0.64	0	0.709	n/a	n/a
TEQs (ND=DL) [pg/L]	pg/L	1.46	1.23	0	1.345	n/a	n/a
TEQs (ND=0) [pg/L]	pg/L	0.051	0	0	0.0255	n/a	n/a

Notes:
Mean = average of two values.
Relative percent difference = the difference between two values divided by the mean of the two values.
Relative percent difference (RPD) is calculated only when the mean conc. is greater than or equal to 5x the detection limit.
Difference factor = absolute difference between two values divided by the method detection limit.
Difference factor is calculated only when the mean concentration is less than five times the detection limit.
TEQ = Toxicity Equivalence.
NC = not calculated; n/a = not applicable
Bold - indicates RPD greater than 20% or DF greater than 2, exceeding WSP's internal QA/QC target.

APPENDIX G

Design and Operating Plan, 2021

REPORT

Wildwood Landfill, Powell River

Design and Operating Plan 2021

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Catalyst Paper

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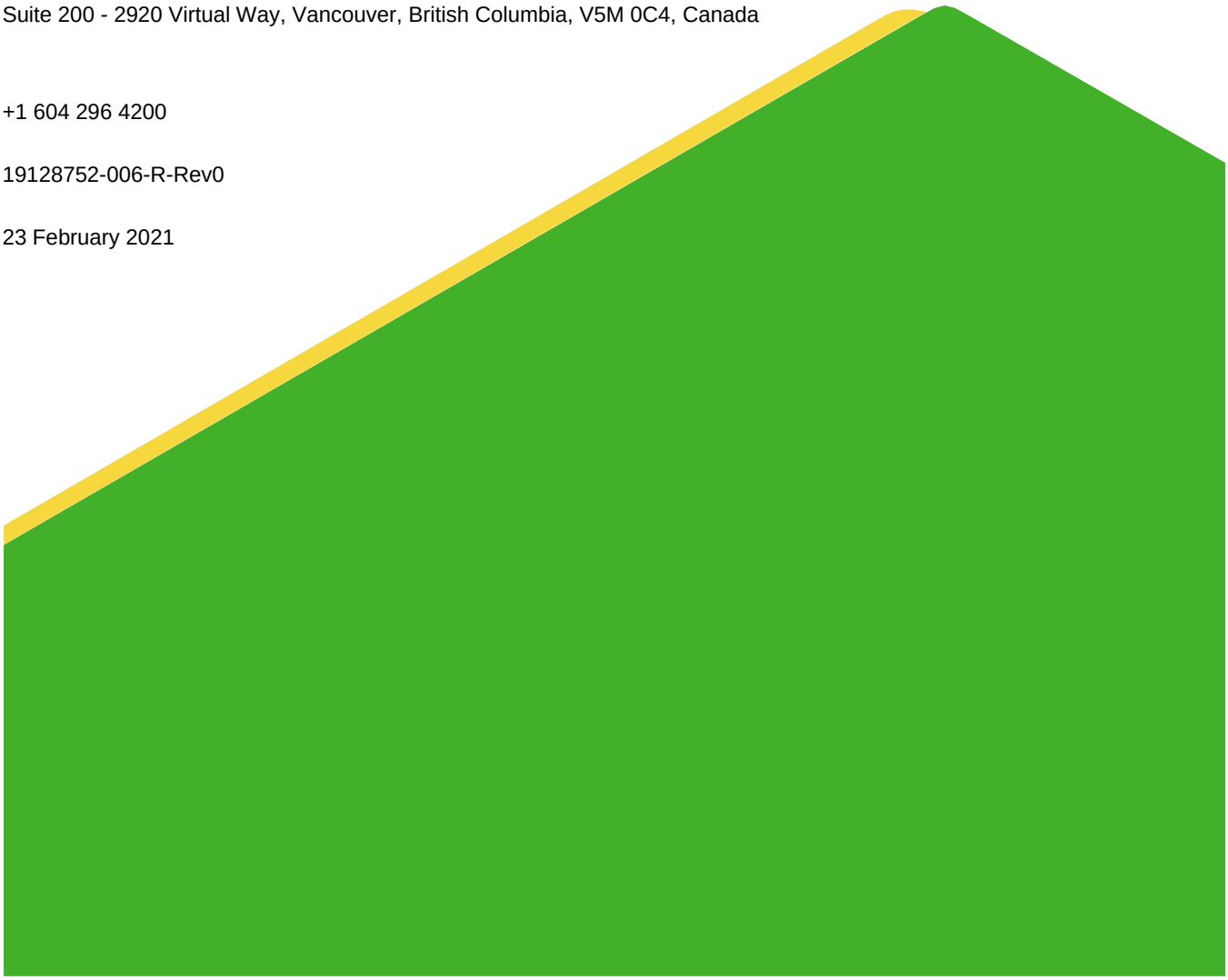
23 February 2021



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APPENDIX B
Waste Disposal Rates

APPENDIX C
Landfill Expansion Design Drawings

1.0 INTRODUCTION

1.1 Preface

This document provides a Design and Operating Plan (the Plan) for Catalyst Paper's (Catalyst's) Wildwood Landfill in Powell River, BC. The purpose of this Plan is to outline the general manner in which the landfill will operate. This Plan is specific to the placement of ash and spent bed sand generated from Power Boiler 19 and minor amounts of waste asbestos and miscellaneous mill waste generated from Catalyst's Powell River mill site. These ash, spent bed sand, asbestos and miscellaneous mill wastes will have a gradation, density, composition, and strength similar to those currently generated. Changes to the ash or spent bed sand that could affect its gradation, density, composition, and strength, or to the transportation and water addition methods, in a manner that would affect the safety or structural integrity of the landfill will require an update of this Plan. This Plan assumes that no other types of materials will be placed in the landfill.

The previous version of the Design and Operating Plan was dated 26 November 2012. The present Plan is an update of, and supersedes, the 2012 Design and Operating Plan.

In this Plan:

- The former Wildwood Landfill that was closed in 1995 is referred to as the "Phase 1 landfill";
- The smaller landfill at the northeast corner of the Phase 1 landfill that is currently operating is referred to as the "mini-landfill";
- The vertical expansion of the closed Phase 1 landfill to the south and west of the mini-landfill is referred to as the "landfill expansion";
- The operating mini-landfill and the landfill expansion are collectively referred to as the "Landfill";
- The ash material generated from the boiler is referred to as "ash" or "flyash";
- The sand that is brought to the Landfill from the boiler is referred to as "spent bed sand"; and
- "Fresh ash" refers to the ash slurry that, when placed in the Landfill, will harden in place.

The location of the Landfill is shown in Figure 1. This Plan will be reviewed annually and revisions to the Plan will be included in the relevant Annual Report for the Landfill.

1.2 Background

The Landfill is located in the Wildwood community area of the City of Powell River, BC. (Figure 1). The lands surrounding the Landfill are owned by Catalyst. A 30 m high bedrock knob is present on the west side of the Landfill. The Landfill occupies an area of approximately 6 hectares, with one part located on top of the low-permeability asphalt cap of the Phase 1 landfill and the other part consisting of the mini-landfill. Site preparation for the landfill expansion commenced in the spring of 2012 and the Landfill expansion was constructed in the spring and summer of 2013.

The mini-landfill is located to the northeast of the Phase 1 landfill, and has been accepting waste since 27 August 1996, after the Phase 1 landfill was closed. The mini-landfill has a footprint area of approximately 2 hectares, is lined with a high-density polyethylene (HDPE) geomembrane and soil-bentonite composite liner, and has provisions for leachate collection and leak detection.

The Landfill is permitted under the Environmental Management Act (Permit PR-4565 last amended 19 March 2015) to receive flyash, spent bed sand, miscellaneous mill waste, and waste asbestos. A copy of the permit is provided in Appendix A. Power Boiler 19 was built in 1996 to 1997 and upgraded in 2011.

The technical supporting document for the development of this Plan is Golder Associates Ltd.'s (Golder's) Environmental Assessment Report, Wildwood Landfill Expansion, Powell River, BC (dated 26 July 2007, Project No. 06-1411-080/9000).

The approximate extent of the Landfill and the mini-landfill is shown in Figure 2. The actual elevations of the Landfill are continually changing due to active filling.

1.3 Landfill Setting and Design

The legal description of the property within which the Landfill is located is "Part of Block 55, DL 450, Plan 8096 and Part of Block 48, DL 1901A, Plan 8096, Group 1, New Westminster District," based on Permit PR-4565. The centroid of the Landfill will be located at approximately latitude 49° 53' 0", longitude 124° 33' 26", and UTM co-ordinates 388150E, 5526750N (zone 10).

The Landfill is located in a bedrock valley naturally filled with sand and gravel deposits. The area on which the Landfill has been developed is the mini-landfill and the closed Phase 1 landfill. This surface slopes gently downward to the southeast, from an elevation of approximately 137.5 m to an elevation of about 131.5 m at the southeast edge of the Phase 1 landfill. The northwest edge of the Phase 1 landfill appears to represent a saddle point in the surface topography, with the ground surface sloping downwards to the west and southwest at some distance northwest of the Phase 1 landfill. The topography of the site is shown in Figure 2.

The mini-landfill consists of a 2-hectare area lined with a HDPE geomembrane and soil-bentonite composite liner. It has provisions for leachate collection and leak detection, and has a leak detection sump consisting of drain gravel overlying 200 mm diameter leak detection pipes located at its southeast corner.

The outer limits of waste of the Landfill lies within the footprint of the Phase 1 landfill and the mini-landfill. The majority of the Landfill is constructed on top of the low-permeability asphalt cap of the Phase 1 landfill. The asphalt cap was inferred to be approximately 72 mm thick, and to have an existing hydraulic conductivity on the order of 4×10^{-10} cm/s. The Phase 1 landfill has six groundwater recovery wells that were installed along the southern edge of the Phase 1 landfill in 1995 and 1999, to intercept groundwater down-gradient of the Phase 1 landfill. The locations of these recovery wells are shown in Figure 5. The collected groundwater is conveyed via an existing leachate conveyance pipeline to Catalyst's mill site effluent treatment plant, where it is treated along with the mill's wastewater prior to discharge.

2.0 OPERATIONS

2.1 Landfill Materials

Permit PR-4565 allows flyash, spent bed sand, waste asbestos, and miscellaneous mill waste generated from Catalyst's Powell River mill site to be placed in the Landfill. Table 1 summarizes the annual airspace consumption rates for 2015 by Emery & Rae Land Surveying Ltd. and since 2016 by Polaris Land Surveying Inc. The airspace consumption rate includes final cover that was installed.

Also provided is the waste volumes provided by Catalyst as determined from the number of truck loads recorded on driver log sheets. Appendix B provides Catalyst Paper's historic breakdown of waste volumes and should be read considering that the power boiler operation was increased to nearly 100% capacity on 1 December 2011. Disposal of spent bed sand between 2015 and 2019 varied between 1,728 m^3 in 2017 to 4,018 m^3 in 2019.

Table 1: Airspace Consumption

Year	Survey Period	Airspace Consumed (m^3) – Survey	Waste Disposed (m^3) – Catalyst Records
2015	6 January 2015 to 12 January 2016	21,545	17,831
2016	12 January 2016 to 4 January 2017	15,150	19,962
2017	4 January 2017 to 3 January 2018	21,920	17,835
2018	3 January 2018 to 7 January 2019	19,425	18,673
2019	7 January 2019 to 29 January 2020	19,580	19,620
Average 2015 to 2019		**19,524**	**18,784**

For the purpose of projecting landfill capacity, an annual waste disposal rate of 20,000 m^3/year has been assumed.

2.2 Access and Traffic

Traffic to the Landfill generally consists of trucks hauling waste from Catalyst's Powell River mill site to the Landfill. The estimated travel distance is about 2.5 km from the mill via Highway 101. There is a motorized gate with a card lock to control access. This gate remains closed until an electronic key temporarily opens the gate. Based on current ash production rates in the mill and current truck capacities, approximately 10 truckloads per day are required for ash disposal.

2.3 Site Development, Landfilling Method, and Cover

2.3.1 Filling Plan

Currently, Catalyst places most of the ash in the landfill expansion and most of the spent bed sand in the mini-landfill. The highest point in the mini-landfill is currently at about elevation 146 to 147 m and the lowest point of the waste platform of the Landfill is currently at about elevation 135 m.

The ash arrives as a slurry in concrete mixer trucks. After placement and if left undisturbed, the ash hardens to a state similar to that of a stiff soil.

The spent bed sand has little to no fines (silt or clay-sized particles), but has a high pH of about 11.2. The spent bed sand may contain gravel particles (which may be clinker formed in the furnace).

Provided most of the hardened ash is not disturbed, there is no need for intermediate cover over the ash or spent bed sand. In areas where ash is loosened by truck traffic, dust can be controlled by watering.

The Landfill will be filled in two stages:

1) The first stage of filling would be filling within the mini-landfill and the landfill expansion area to the contours shown on Figure 3. This figure shows the final contours of the Landfill on completion of filling except in the current truck wash area. These contours provide for roughly 285,000 m^3 of airspace from January 2020 until these contours are achieved.

    - Three years prior to completion of filling to the contours on Figure 3 (in about 2029), preparations should be made to relocate the truck wash area.
    - Two years prior to completion of filling to the contours on Figure 3 (in about 2030), the truck wash should be relocated. A potential new area of the truck wash would be the current paved area to the east of the present location.
    - One year prior to completion of filling to the contours on Figure 3 (in about 2031) the liner within the current truck wash area should be installed. This new liner should connect to the liner of the mini-landfill and the liner of the landfill expansion and should ensure that all areas where waste will be discharged are lined and have a leachate collection system.

2) The second stage will involve filling in the area of the newly installed liner, currently occupied by the truck wash area. Figure 4 shows the final contours of the Landfill at closure (including the final cover thickness).

Operational equipment will generally consist of trucks delivering ash to the Landfill, as well as excavators and/or loaders associated with grooming the Landfill and burying waste. Cranes may also be required periodically to place concrete blocks. Other vehicles could include pickup trucks, and various mill or contract dump trucks.

2.3.2 Disposal of Ash

The recommended placement of ash is as follows:

1) The ash is placed into hardening beds constructed on the surface of the Landfill. The hardening beds consist of a perimeter berm to enclose a space into which the slurry ash is poured to allow to harden. The hardening bed can be any size or shape, but rectangular beds 20 m width and similar to greater length appear to be a convenient size.

3) Spent bed sand shall be used to build the hardening bed perimeter berms to contain the ash slurry. The sand may be placed in one lift and should be nominally compacted. Berm heights of approximately 1.2 m to 1.5 m are preferred. Berm crest widths of 0.6 m or greater are recommended. The berms should have a

uniform elevation around the entire berm. Hardening beds bordering the outside face of the Landfill should ensure that spent bed sand is used to construct the entire perimeter berm. This would provide for positive internal drainage of leachate, which enhances the geotechnical stability of the waste.

4) Once the ash slurry reaches within 50 to 100 mm below the lowest point of the perimeter berm, disposal of ash slurry into the hardening bed should stop and the ash allowed to harden.

5) Once the ash has hardened, another hardening bed can be constructed on top.

Once the ash has hardened, it should not be disturbed. Any disturbance of the hardened ash that is necessary for operation of the landfill should be minimized.

If necessary to reduce dust generation, roads constructed on ash will be lined with a layer of mill felt covered with clean crushed gravel to minimize contamination of trucks' running gear with waste ash and dust generation.

An area adjacent to the leachate pumphouse is currently being used as a sump to collect surface runoff from the perimeter drainage ditch and wash water from the truck wash facility.

Once the elevation of the crest of the landfill (the flatter top portion of the Landfill that will have finished elevations of 150 m to 155 m) has reached within 2 m of the design final contours, the final hardening bed should be constructed and finished.

Then a capping fill, consisting of 75 mm minus mineral soil having at least 35% of material passing the 0.074 mm sieve size, shall be placed over the ash beds and spent bed sand berms to the underside of the final cover system. The capping fill shall be placed in maximum 300 mm thick lifts, with each lift compacted to a minimum of 95% of standard Proctor maximum dry density. The minimum thickness of this capping fill shall be 200 mm. This layer of silty soil will reduce infiltration into the Landfill via the spent bed sand, thereby maintaining the geotechnical stability of the waste. Consideration may be given to using ash (either as a formed slurry or from an on-site excavation) as capping fill provided that it can be compacted to the indicated specifications and the fill is covered with final cover material as soon as possible to minimize dust.

2.3.3 Disposal of Spent Bed Sand

The disposal of spent bed sand shall be as follows:

1) The first priority is for the spent bed sand to be used to build the perimeter berms for the ash hardening beds. The perimeter berms can be up to 5 m wide at the berm crest. The sand should be continuous around the entire perimeter berm of each hardening bed.

2) Excess sand may be placed as a monofill. A monofill is a single area for the exclusive disposal of a particular waste; in this case spent bed sand. Currently, spent bed sand has been placed as a monofill in the northeast corner of the mini-landfill. The thickness of spent bed sand in the monofill is only limited by the final cover surface of the Landfill.

The spent bed sand shall not be placed as a thin layer over a wide area (greater than about 200 m^2). Such a thin sand layer placed over a wide area may be susceptible to liquefaction in the event of an earthquake and may result in lateral movement of the waste and possible discharge off of the lined area.

Utilization alternatives to disposal of the sand in the Landfill are currently being investigated.

2.3.4 Disposal of Miscellaneous Mill Waste and Waste Asbestos

Miscellaneous mill waste, loose excavated flyash, and sediment removed from the truck wash shall be placed in layers in the interior of the mini-landfill and the landfill expansion, and at least 30 m from the outer edge of the Landfill final slopes. This setback is recommended for slope stability reasons. Within 30 days of its placement, the miscellaneous waste shall be covered with at least 0.3 m thickness of suitable material.

Asbestos waste shall be placed in accordance with the Hazardous Waste Regulation. Asbestos shall be sealed in double bags (i.e., packed in a 0.15 mm thick plastic bag, placed within another 0.15 mm thick plastic bag) prior to disposal, and be kept double-bagged during its transportation to the Landfill. Upon its disposal, the double-bagged asbestos shall be covered with at least 0.5 m of suitable material. Asbestos shall be placed at least 30 m from the outer edge of the Landfill final slopes.

2.3.5 Estimated Elevations of Waste with Time

Since the Landfill is located on the sloping final cover surface of the Phase 1 landfill, filling of the Landfill will be according to waste thickness, not to specific elevations. However, for the purpose of addressing the permit requirements, Table 2 provides the approximate elevations at 5-year intervals, assuming a rate of waste filling of 20,000 m^3/year.

Table 2: Estimated Landfill Elevations at 5-year Intervals

Approximate Year	Approximate elevation of waste
2020	135 m
2025	140 m
2030	150 m
2035	155 m

2.3.6 Truck Wash

The truck wash is a facility to wash dirt from haul trucks prior to entering the public road system. The existing truck wash is currently located to the south of the mini-landfill, within the area for the landfill expansion. Although it is paved, it is not lined with a geomembrane. In preparation for stage 2 filling, the truck wash is to be relocated in about 2029-2030.

The truck wash, regardless of its location, will discharge wash water into the mini-landfill or other leachate containment areas within the Landfill. Overflow from the truck wash is piped to the active pond via a HDPE pipe. Truck wash water should not be discharged directly to the leachate conveyance pipeline, without first entering a settling area, otherwise the risk of plugging of the leachate conveyance pipeline is increased. Sediment will be periodically removed by Catalyst and taken to the active waste filling area. This sediment shall be placed not closer than 30 m from the outer edge of the Landfill final slopes.

2.3.7 Leachate Management

Leachate in the mini-landfill is currently collected in a sump and is pumped into the existing leachate conveyance pipeline to the mill. There is also a pipe for leak detection from the mini-landfill.

As shown on issued for construction drawings of the landfill expansion (see Appendix C), the landfill expansion is constructed on top of the asphalt of the Phase 1 landfill. Below the geomembrane of the landfill expansion but on top of the asphalt of the Phase 1 closure, is a system of perforated pipes. If there is a leak in the geomembrane that causes leachate flow to these pipes, the pipes will collect the leachate. New facilities will be required to be constructed to convey this leachate to the existing leachate conveyance pipeline.

A nominal 1.5 mm thick HDPE geomembrane has been installed for the landfill expansion. The above-liner leachate collection system in the landfill expansion consists of a combination of Multi-Flow drainage media and perforated plastic pipes surrounded with drain rock encapsulated with a heavy geotextile, all installed in a 0.3 m thick sand layer. The Multi-Flow media were intended to assist with managing leachate when the leachate collection layer had not yet been covered with ash, and leachate inflows to the system are at their predicted highest rate. The Multi-Flow media were not intended to serve as a long-term medium for leachate collection.

The leachate collected by the leachate collection system of the landfill expansion is directed to a 150 mm diameter non-perforated DR32.5 HDPE above-liner drain pipe that is connected to the existing 200 mm diameter leachate conveyance pipeline. Leachate that runs off the landfill surface before final cover is placed as surface leachate will be collected by a perimeter leachate collection ditch as illustrated on Figure 6. The final cover material within the leachate ditch should only be placed at the time waste placement is complete and the Landfill is being closed (otherwise the leachate ditch will be blocked).

If, due to storm events, the leachate conveyance pipeline is unable to handle the flow, a 600 mm diameter non-perforated HDPE leachate runoff pipe will discharge surface leachate (leachate that runs off the surface of the landfill expansion) into the Active Pond located southeast of the landfill expansion. The Active Pond is a pond for temporary storage of leachate that is lined with 2.5 mm nominal thickness smooth HDPE geomembrane. The Active Pond has a lined plan area to the top of the berm of approximately 4,080 m^2 and a storage capacity (below 0.6 m freeboard) of approximately 4,680 m^3. The pond is drained via a 200 mm diameter non-perforated DR32.5 HDPE pipe with a valve, to the existing 200 mm diameter leachate conveyance pipeline. The leachate conveyance pipeline had a flow capacity to the mill of 35 litres per second as tested by Catalyst in November 2008. The location of the Active Pond is shown in Figures 2 to 5.

The manner of Catalyst's waste filling will require attention to stormwater runoff from the top of the ash; this runoff is considered to be leachate. If the ash is placed completely level, there will be less control as to the runoff's flow path than if the ash is provided with a grade. Thus, Catalyst will monitor the surface drainage pattern on the ash surface, and will provide flow channels, erosion protection, or both as necessary, to direct runoff towards the south corner of the landfill expansion, where there will be a pipe leading to the Active Pond.

The leachate has a high mineral content and is susceptible to the formation of solids (precipitate) in the pipelines under certain conditions. The introduction of air (oxygen) into the leachate appears to be a factor that leads to solids formation. The formation of solids has resulted in blockage, near the wye with the leachate conveyance pipeline, of the 200 mm diameter discharge from the pipe at the Active Pond (now cleaned and free-flowing) and of the 150 mm diameter above-liner drain pipe (currently still plugged). Periodic cleaning of these pipes may be required to maintain flow.

2.3.8 Site Management and Administration

Overall and day-to-day Landfill operations are Catalyst's responsibility. However, Catalyst may hire a contractor to carry out certain management or consulting activities, or to do physical work associated with the Landfill's day to-day operations.

2.3.9 Operational Inspections

Catalyst will carry out periodic inspections of the Landfill for the following:

- Compliance with the permit and this Plan;
- Conditions of Landfill works;
- Evidence of erosion or excessive dust;
- Evidence of excessive ponding or unusual Landfill settlement;
- Evidence of environmental impact on adjacent properties based on visual inspection;
- Condition of the Active Pond;
- Absence of any liquid in the below-liner drainage system of the landfill expansion and the leak detection sump of the mini-landfill. If there is liquid, Catalyst will test the liquid for pH and conductivity to assess whether the liquid is leachate or fresh water; and
- Adequacy of safety measures.

Catalyst will carry out the above inspections at least quarterly, or at a higher frequency if required (e.g., if inspections indicate any concerns regarding the above issues). A written site inspection report shall be prepared after each inspection.

If a deficiency is identified during the operational inspections, corrective measures should be undertaken to address the deficiency. In particular, the following should be carried out as soon as practical:

- Repairing any areas with excessive erosion or slumping;
- Repairing any damage to the Active Pond liner; and
- Revegetating or assessing any areas where vegetation will not grow on the final cover after hydroseeding.

2.3.10 Annual Report

An Annual Report summarizing the Landfill activities over the past year will be prepared and submitted to the BC Ministry of Environment and Climate Change Strategy (ENV) by 30 April of the following year. This report shall include the following:

- Remaining design capacity and estimated closure date of the Landfill;

- Efforts made in waste reduction and alternate disposal;
- Measures to minimize leachate generation, their effectiveness, and any proposed measures;
- Evaluation of slope stability and settlement monitoring;
- Evaluation of air quality, PM10 and PM2.5, in the adjacent community of Wildwood;
- Any material changes to the Design and Operating Plan, or the associated procedures;
- Revisions to the estimated closure and post-closure costs;
- A review and interpretation of the monitoring data obtained during the previous calendar year, with recommendations for changes to the monitoring program or additional measures for environmental protection;
- Types and volumes of refuse discharged; and
- Details of proposed dustfall monitoring program for the coming year.

3.0 ENVIRONMENTAL PROTECTION

3.1 Control of Leachate Generation and Migration

The Landfill has the following environmental protection features to protect the groundwater from Landfill leachate:

- Mini-landfill – existing HDPE geomembrane and soil-bentonite composite liner, a leachate collection system, and a leak detection sump. Leachate is pumped from the mini-landfill into the leachate conveyance pipeline to the mill for treatment; and
- Landfill expansion – a 1.5 mm (60 mil) thick HDPE geomembrane liner, a gravity leachate collection system, and a below-liner drainage system. A final cover system will provide a physical barrier to the waste, and will reduce dust and erosion.

Due to impacts from the Phase 1 landfill, groundwater recovery wells have been installed downgradient of the Phase 1 landfill. If leachate from the landfill expansion were to escape, these groundwater recovery wells could collect this groundwater.

3.2 Surface Water Management

Clean surface water is diverted away from the Landfill by a perimeter drainage course around the Landfill. Barren soil surfaces will be vegetated as soon as practical after final cover has been installed in the area. In addition, sediment that accumulates in the ditches will be removed after major storm events, if the accumulation will impair effectiveness of the ditches.

3.3 Dust Management

Ash that is highly disturbed (such that it is effectively a loose soil) is a source of dust, and will be covered by fresh ash. If this is not possible, gravel or a heavy cloth, or both if necessary, will be used to cover the material. Catalyst may also use a heavy fabric on the running surface of ash to reduce dust generation.

Water, or other effective dust control measures, will be applied to the waste, if necessary, to control dust. If excessive dust is generated, one or more the following actions will be undertaken:

- Applying water or other effective dust suppression measures as appropriate;
- Checking that road cover on the ash is in good repair; or
- Covering disturbed ash with fresh ash.

3.4 Environmental Assessment Report

An Environmental Assessment Report was submitted to the ENV on 19 December 2019 and subsequent Environmental Assessment Reports will be submitted every five years thereafter for the life of the Landfill. This report shall include the following:

- A review of all monitoring data since the start of waste placement in the landfill expansion. This review shall include groundwater, leachate, dust, particulate, surface water, settlement, and slope stability aspects;
- A comparison of the monitoring data to baseline data;
- An evaluation of the overall impact of the Landfill on the receiving environments; and
- Recommendations for changes to the monitoring program.

4.0 MONITORING

This section summarizes the monitoring program developed based on the requirements outlined in the amended Permit PR-4565 dated 19 March 2015. The purpose of the monitoring program is to monitor for impacts or potential impacts of the Landfill on its receiving environments. In particular, the monitoring program is to enable Catalyst to demonstrate that the Landfill meets the performance criteria of the permit.

4.1 Discharge Monitoring

The scope of discharge monitoring will consist of the following:

- Leachate monitoring – Representative leachate samples will be collected from the mini-landfill sump and the landfill expansion, and will be analyzed for pH, specific conductivity, and biochemical oxygen demand on a semi-annual basis, and for dioxins and furans on an annual basis; and
- Discharge quantities – The types and volumes of refuse discharged to the Landfill will be recorded by Catalyst.

4.2 Monitoring of Receiving Environments

The scope of monitoring to be carried out related to the receiving environments will consist of the following:

- Groundwater sampling and analytical testing of selected monitoring wells (up-gradient monitoring well 93-2B, and down-gradient monitoring wells 89-5, AH-3, AH-6L, 94-1/3, 94-16B, and 94-19L);
- Composite sampling from the active recovery well(s);
- Surface water sampling at Spring S1 and Spring S2;
- Sampling for field indicator parameters ("snap-shot sampling") at selected down-gradient monitoring wells (94-16, 94-17, 94-18, and 94-19); and
- Dustfall monitoring at four on-site sampling locations and particulate matter monitoring (PM10) at one off-site sampling locations.

Figure 5 shows the monitoring locations near the Landfill.

4.3 Monitoring Parameters and Frequency

Table 3 summarizes the recommended groundwater and surface water monitoring schedule and parameters. The following summarizes some of the parameter headings in Table 3:

- General parameters (GP) – total suspended solids (TSS), total dissolved solids (TDS), total alkalinity, hardness, bromide, chloride, fluoride, ammonia, nitrate, nitrite, sulphate, and total organic carbon (TOC)[1];
- Chlorinated and non-chlorinated phenolics (CP) – laboratory suite;
- Total metals (T.Met) or dissolved metals (D.Met) – groundwater from monitoring wells will be sampled for the laboratory suite of dissolved metals, while surface water from Spring S1 and Spring S2 will be analyzed for the laboratory suite of total metals. The dissolved metals samples should be field-filtered, with preservatives added in the field as per the laboratory's instruction. The detection limits should meet aquatic life and drinking water standards of the Contaminated Site Regulation;
- Dioxins and furans (D&F) – laboratory suite;
- Sulphide (S);
- Polychlorinated biphenols (PCBs) – laboratory suite; and
- "Snap-shot" field indicator parameters – pH, specific conductivity, alkalinity, sulphate, dissolved oxygen, temperature, and redox. These "snap-shot" parameters will be carried out annually (in the dry season) at up-gradient monitoring well 93-2B, and down-gradient monitoring wells 94-16 (11 m, 38 m, regional and bedrock flow zones), 94-17 (regional and bedrock flow zones), 94-18 (38 m and regional flow zones), and 94-19 (38 m, regional and bedrock flow zones).

[1] Sampling for bromide, chloride, fluoride, ammonia, nitrate and nitrite are not required by the Landfill permit.

Table 3: Summary of Groundwater Monitoring Program

Sample Location	Dry Weather Monitoring Event (August)	Wet Weather Monitoring Event (November/December)
MW 93-2B (upgradient)	GP	GP, D. MET, D&F
MW 89-5	GP	GP, D. MET, D&F, S
MW AH-3	GP	GP, CP, D. MET, D&F
MW AH-6L	GP	GP, CP, D. MET, D&F
MW 94-1/3	GP	GP, D. MET, D&F
MW 94-16B	GP	GP, D. MET, D&F
MW94-19L	GP	GP, D. MET, D&F
PW-Composite (includes PW95-1, PW95-8, PW95-9, PW99-2, PW99-4 and PW99-5)	GP	GP, D. MET, D&F, S
Springs S1	GP, D&F	GP, T. MET, D&F
Spring S2	GP, D&F	GP, T.MET, D&F

Notes:

Prior to sampling any groundwater monitoring well, the water level in the well will be measured, the well will be purged, and field parameters (Specific Conductance (Electrical Conductivity at 25ºC), pH, Oxidation-Reduction Potential (ORP), and dissolved oxygen) will be obtained.

Table 4 summarizes the currently recommended monitoring program for dustfall and particulate to comply with the permit. The dustfall monitoring results will be posted on the company's web page within 30 calendar days of the end of each month.

Sampling of particulate matter with a mean aerodynamic diameter less than 10 microns (PM10) is conducted at James Thomson School. Continuous particulate instruments were updated in January 2019 from Tapered Element Oscillating Microbalance (TEOM) units to a singular Teledyne API T640, which monitors both PM2.5 and PM10. A PM2.5 Tapered Element Oscillating Microbalance (TEOM) unit remains operational at Wildwood School for co-location monitoring at ENV's request.

Table 4: Currently Recommended Scope of Dustfall and Particulate Matter Monitoring program

Location	Dustfall	Particulate Matter
Site 1 (on-site)	Monthly	-
Site 2 (on-site)	Monthly	-
Site 3 (on-site)	Monthly	-
Site 4 (on-site)	Monthly	-
Wildwood School (off-site)	-	24-Hour PM_{10}

Note: Monthly dustfall monitoring is carried out in July, August and September

It is recommended that the dustfall monitoring program be discontinued, and instead focus on continuing the PM10 particulate monitoring at James Thomson School. This change would require an amendment to the permit.

Field review of surface water diversions, final cover, and overall Landfill stability will be carried out annually by a qualified professional engineer registered in BC.

4.4 Slope Stability and Settlement Monitoring

The following monitoring program shall be carried out to assess slope stability and settlement of the Landfill:

- Surface settlement monuments that have been established at the locations shown in Figure 5 shall be surveyed for elevation and location. These are metal pins driven into the ground or permanent marks on the pavement that are surveyed annually in January for elevation and location;
- Vertical 50 mm diameter slope inclinometer casings were installed not closer than 500 mm from the HDPE geomembrane liner in about 2013 at the locations shown in Figure 5. The elevation of the top of casing can be surveyed to measure settlement. The casing would need to be extended as the landfill surface rises; and
- On an annual basis for the Annual Report, the data on the elevations and locations of the surface settlement monuments are transmitted to Catalyst, which then forwards it to Golder for interpretation.

5.0 CONTINGENCY PLANS AND PROCEDURES

5.1 General

A site safety plan and procedure has been developed by Catalyst and is reviewed periodically (at a minimum annually) to ensure that safety issues associated with Landfill operations (e.g., ash stability) are identified and properly addressed. This plan is available at Catalyst's offices at its Powell River mill. Catalyst indicates that the operations procedure Catalyst Maintenance Job Safety Analysis, re: Power Boiler Ash Handling details the filling, off-loading and cleaning of ash trucks.

The mill has an Emergency Response Plan and procedures in place that provide guidance on how to handle various situations that could arise at the Landfill. Emergency situations include the following:

- Effects due to earthquakes, including slope stability, settlement, or discharges to groundwater or surface water;
- Detection of leachate in groundwater monitoring wells or surface water;
- Excessive dust;
- Injuries to workers or users of the facility;
- Unauthorized dumping of prohibited waste at the site; and
- Detection of high leachate level in the sump of the mini-landfill.

From time to time, these contingency plans may be modified or expanded. The Site Manager will ensure that the plans are kept current and available, and that site staff understand, and are trained in, their responsibilities.

5.2 Early Closure

If the Landfill needs to be closed before it reaches the planned closure design grades, the following actions will be undertaken:

1) A topographic survey of the Landfill will be obtained;

2) A qualified engineer will be retained to develop a revised closure plan (including new closure contours), as well as to review and, if necessary, revise the final cover design; and

3) After consultation with the ENV, the revised closure plan will be implemented.

Catalyst has recorded a financial obligation on its books, consistent with the relevant provisions of the current Canadian Generally Accepted Accounting Principles (GAAP), to provide for Landfill closure.

5.3 Contingencies for Slope Stability and Settlement

If monitoring indicates slope stability movements or settlements that are indicative of the potential for sudden downslope mass movement of waste, this information would be shared with the ENV and an approved plan of action would be developed. Based on the circumstances, actions may include the following:

- Installation of slope inclinometers in the appropriate toe area of the Landfill to assess the depth of downslope movement. Additional surface movement monitoring locations may also be established and surveyed;
- Interpretation of information from slope inclinometers by a geotechnical engineer. If it is the geotechnical engineer's opinion that remedial measures are necessary, then these remedial measures will be implemented. Potential remedial measures could include a supporting earthen berm at the Landfill toe, flattening of Landfill slopes, or a reduction of water levels in the Landfill by enhanced drainage (e.g., drainage trenches or horizontal drainage pipes); and
- Development of corrective measures that return the Landfill to a stable condition.

5.4 Contingencies for Environmental Protection

If there is a failure of the environmental protection systems, the contingency actions outlined in the following sections will be carried out, depending on the type of failure.

5.4.1 Discharge to Groundwater

If there is a discharge of leachate to the groundwater, as indicated by test results from the monitoring wells, the following contingency actions will be undertaken:

1) Notifying the Regional Manager, Environmental Protection, ENV;

2) Increasing monitoring frequency of the existing groundwater and surface water monitoring points (i.e., those forming part of the regular monitoring plan described in this Plan) to quarterly, until such a time as a qualified professional is of the opinion that the groundwater and surface water monitoring frequency can be reduced; and

3) Installing additional groundwater recovery wells at the direction of a qualified professional, if the increased groundwater and surface water monitoring indicates that discharges of leachate constituents above the Contaminated Sites Regulation standards are occurring off the Landfill property.

5.4.2 Discharge to Surface Water

If there is visual evidence of a leachate discharge to surface water (i.e., water flowing to Powell River and/or Powell Lake), the following contingency actions will be undertaken:

1) Repairing the breach in the surface water protection systems as soon as possible;

2) Notifying the Regional Manager, Environmental Protection, ENV, as soon as possible; and

3) Immediately determining whether the off-site leachate flow is as surface water, or seeps into the ground to the groundwater:

    a) If the leachate seeps into the ground, then the location of seepage into the ground shall be determined and compared with hydrogeological information to assess which monitoring wells could be affected and whether this leachate could be captured by the existing groundwater recovery wells. A round of sampling and testing of the monitoring wells may be necessary. If the leachate discharge is unlikely to be captured by the existing groundwater recovery wells, then a program of increased sampling and testing of groundwater and/or surface water downstream of the discharge shall be developed and implemented by a qualified professional and the risks presented by the leachate discharge assessed; or

    b) If the leachate flows as surface water off the site, surface water at the property line or immediately upstream of the discharge into Powell River shall be immediately sampled. The sample of surface water shall be tested for pH, conductivity, temperature, alkalinity, major anions, and metals scan. A sufficiently large sample (40 litre) should also be tested for toxicity to rainbow trout (96-hour LC50 test).

5.4.3 Dust

If excessive dust is generated, one or more of the following actions shall be undertaken:

1) Applying water or other effective dust suppression measures, such as cloth, as appropriate;

2) Checking that road cover on the ash is in good repair; or

3) Covering disturbed ash with fresh ash that will harden.

5.4.4 Injuries

In the event of an injury to a mill worker or others at the Landfill, standard mill procedures will be followed. These procedures are available on the mill's electronic information system or from the main security gate.

5.4.5 Unauthorized Dumping

Unauthorized dumping is unlikely to occur due to the motorized gate with a card lock at the entrance to the Landfill. However, if unauthorized dumping or other solid waste management issues occur, the mill's operating procedures will be followed. These procedures are available on the mill's electronic information system or from the main security gate.

5.4.6 High Leachate Level

If high leachate levels are measured in the mini-landfill sump, the pump should be checked to ensure that it is operating. If the pump is not operating, it should be repaired or replaced.

The landfill expansion has a leachate collection system consisting of a network of drainage media and perforated pipes that drain leachate to the existing leachate conveyance pipeline by gravity. In the unlikely event that this system is no longer functional, a qualified professional should be contacted for advice.

6.0 CLOSURE PLAN

This section provides a closure plan for the Landfill.

6.1 Final Landfill

Figure 4 provides a topographical plan of the Landfill at closure. It is anticipated that, upon closure at site capacity, the Landfill will have the following (all quantities and timelines are approximate):

- Total Landfill airspace volume – 670,000 m^3
- Total plan area (landfill expansion liner plus mini-landfill liner) – 5.8 hectares
- Total waste volume (excluding 0.60 m thickness of final cover) – 635,000 m^3
- Volume filled to January 2020 (from Polaris Land Surveying) – 316,500 m^3
- Total airspace volume available as of 29 January 2020 – 354,000 m^3
- Total waste volume available as of 29 January 2020 – 321,000 m^3
- Year of anticipated Landfill closure – early 2036;
- Area that has received final cover as of January 2020 – approximately 4,000 m^2; and
- Elevation of the highest point of Landfill final cover at closure – 155 m.

6.2 Cover Design

Progressive closure of the Landfill will be carried out. Currently, approximately 4,000 m^2 of final cover has been installed, all on the east side of the north slope and the north side of the east slope.

The final cover shall consist of the following layers (from top to bottom):

- 150 mm thickness of soil that is suitable for supporting the growth of grass. The surface of this soil layer will be hydroseeded as soon as possible after its placement; and
- 450 mm thickness of cover soil having a hydraulic conductivity of 1.2×10^{-4} cm/s or less.

It should be noted that if intact and impermeable solidified ash underlies the final cover on a slope, and there is an extended period of heavy precipitation, there is the risk that the final cover will move downslope. If this occurs, the slope should be remediated by installing drainage (e.g., Multi-Flow, perforated pipe with a gravel and geotextile surround, or other drainage media) prior to re-installing the final cover.

Landfill final slopes will be between 3% and 33%, and will have surface water drainage works that are designed to allow runoff meeting applicable water quality criteria to flow in a controlled manner to the perimeter ditches.

6.3 Post-closure Use of Property

There are presently no plans for the post-closure use of the property. However, a plan for post-closure use of the property will be submitted to the ENV at least one year before closure.

6.4 Closure/Post-closure Funding

Catalyst has recorded a financial obligation on its books, consistent with the relevant provisions of the current Canadian GAAP, and with Catalyst's past practice with respect to such obligations, to reflect future closure and other regulatory requirements related to the Landfill. Canadian GAAP requires that the obligation be established on a net present value basis, and be accrued over the time estimated to the obligation becoming due. Catalyst's balance of the accrued obligation as of 30 November 2020 is $769,773.

Golder estimates that the capital cost to close the Landfill is approximately $2.5 million in 2020 dollars. Table 5 provides a summary of the estimated cost to close the Landfill as of 2020. The cost of final cover in areas that have already received final cover is not included in Table 5. It should be noted that the cost of final cover is highly dependent on the availability and cost of locally available materials, and the uncertainty regarding this cost is high.

Table 5: Estimated Landfill Closure Costs

Component	Quantity	Unit Cost	Estimated Cost
Mobilization, decommission truck wash, and fixed costs	Lump sum		$240,000
Final cover	54,000 m^2	$30/$m^2$	$1,620,000
Surface water works	1,250 m	$100/m	$125,000
Leachate Collection	Lump sum		$95,000
Contingency	20%		$400,000
TOTAL ESTIMATED COST			**$2.5 million**

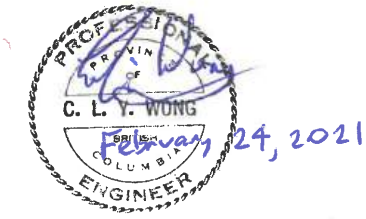
If the Canadian GAAP applicable to the Landfill post-closure cost changes, then it is acknowledged that Catalyst will conform to any of such changes, and will amend the recording of the obligation accordingly.

7.0 CLOSING COMMENTS

This Design and Operating Plan was prepared by Golder Associates Ltd. in a manner consistent with that level of care and skill ordinarily exercised by members of the engineering and geoscience professions currently practicing under similar conditions for active industrial landfills in British Columbia, subject to the time limits and physical constraints applicable to this report. No warranty, expressed or implied, is made.

This Plan is predicated on the environmental assessment completed by Golder (Report No. 06-1411-106/9000, dated 26 July 2007). If any of the conditions or assumptions stated in this Plan or in the environmental assessment changes, Golder should be requested to assess the implications on the design, operations, and closure of the Landfill.

Golder Associates Ltd.



Colin L.Y. Wong, PEng
Principal

Jillian Sacré, PGeo
Principal, Senior Hydrogeologist

CW/JS/asd

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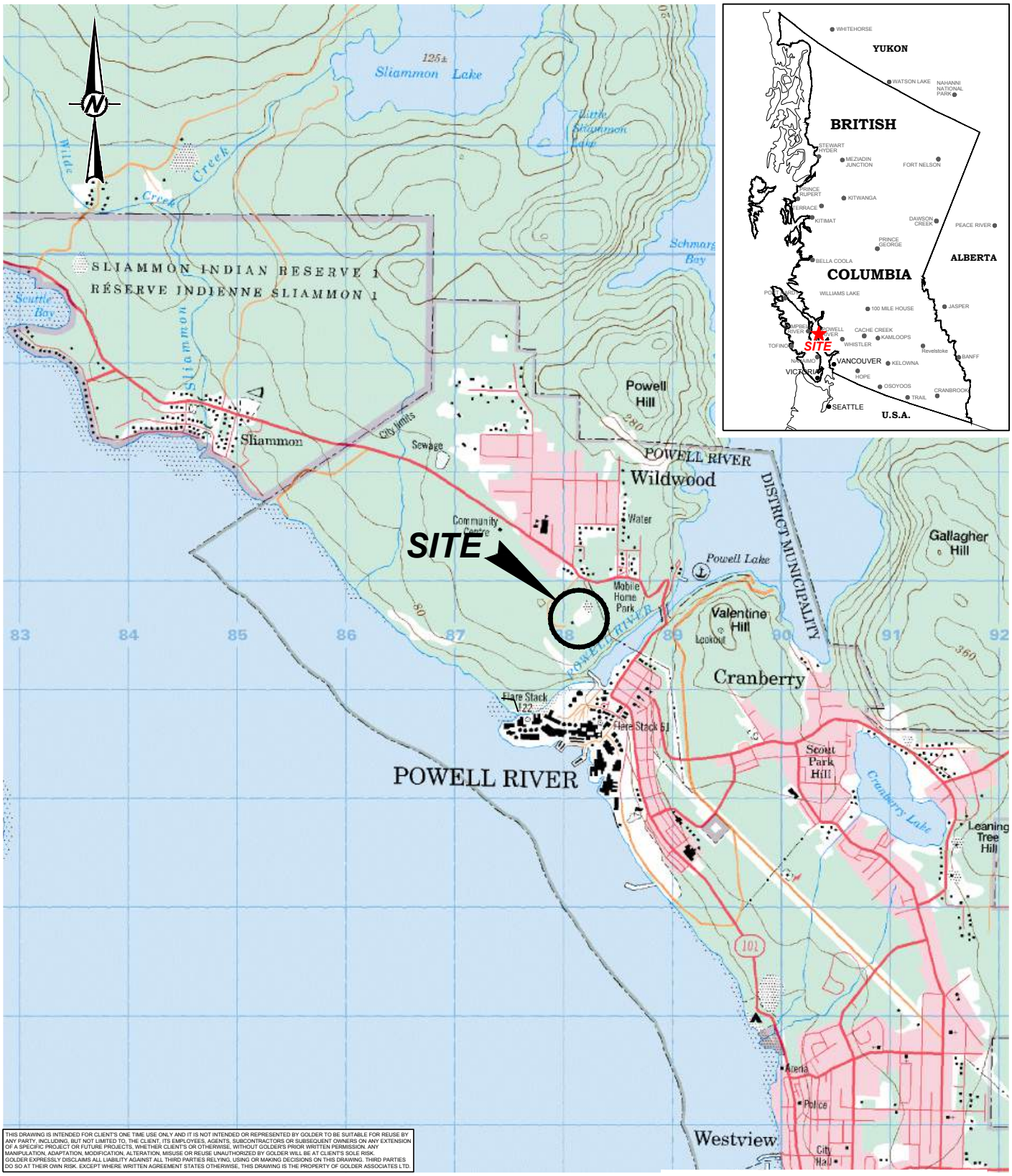
https://golderassociates.sharepoint.com/sites/113944/project files/6 deliverables/issued to client_for wp/19128752-006-r-rev0/19128752-006-r-rev0-d&o plan 2020-23feb_21.docx



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0 1,000 2,000
1:50,000 METRES

REFERENCE
BASE MAP FROM ETOPO, 1:50,000 NTS MAP 092F15, EDITION 3, UTM ZONE 10.

CLIENT
CATALYST PAPER COMPANY

PROJECT
WILDWOOD LANDFILL
POWELL RIVER, B.C.

CONSULTANT
GOLDER

YYYY-MM-DD	2021-02-12
DESIGNED	CLYW
PREPARED	GB
REVIEWED	JPS
APPROVED	CLYW

TITLE
KEY PLAN

PROJECT NO.	PHASE/DOC.	REV.	FIGURE
19128752	9000/006	0	1

Last Edited By: gbettoschi Date: 2021-02-12 Time:2:14:56 PM | Printed By: GBettoschi Date: 2021-02-16 Time:2:51:02 PM
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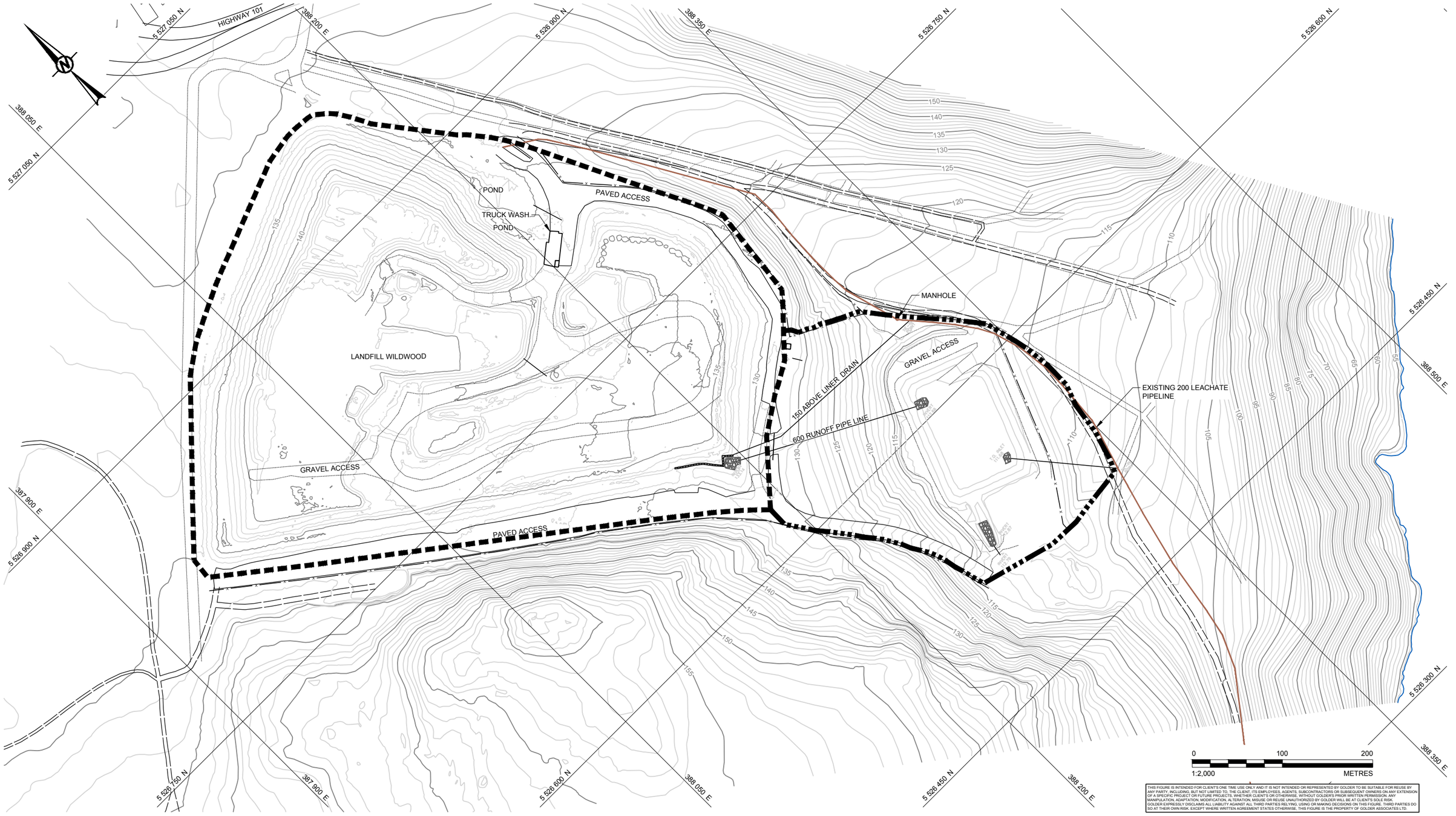

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LEGEND

- 150 — EXISTING TOPOGRAPHY (5 m MAJOR AND 1 m MINOR CONTOURS)
- FENCE
- RIVER
- EXISTING 200 LEACHATE PIPE
- APPROXIMATE 2020 TOPOGRAPHY FOOTPRINT
- APPROXIMATE 2013 TOPOGRAPHY FOOTPRINT

NOTES

1. COORDINATES ARE IN UTM NAD83, ZONE 10.
2. BASE SITE TOPOGRAPHY FROM JULY 31, 2012 SURVEY (SEE REFERENCE 1).
5. ACTIVE POND TOPOGRAPHY FROM OCTOBER 2013 SURVEY (SEE REFERENCE 2).

REFERENCES

1. EMERY & RAE LAND SURVEYING LTD.,
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2. TOPOGRAPHIC SURVEY RECEIVED FROM CATALYST PAPER COMPANY.
DATE RECEIVED: NOVEMBER 12, 2020
FILE NAME: 0946-10-2020_UTM_2020-11-12_CLIENT.dwg.
3. EMERY & RAE, FILE: 7-183 AS BUILT SITE PLAN OCTOBER-2013 FOR CLIENT.dwg, DATED NOVEMBER 4, 2013. ORIGINAL SCALE 1:1000.

CLIENT
CATALYST PAPER COMPANY

CONSULTANT
GOLDER

YYYY-MM-DD	2021-02-12
DESIGNED	CLYW
PREPARED	GB
REVIEWED	JPS
APPROVED	CLYW

PROJECT
WILDWOOD LANDFILL
POWELL RIVER, B.C.

TITLE
SITE PLAN

PROJECT NO.	PHASE/DOC.	REV.	FIGURE
19128752	9000/006	0	2

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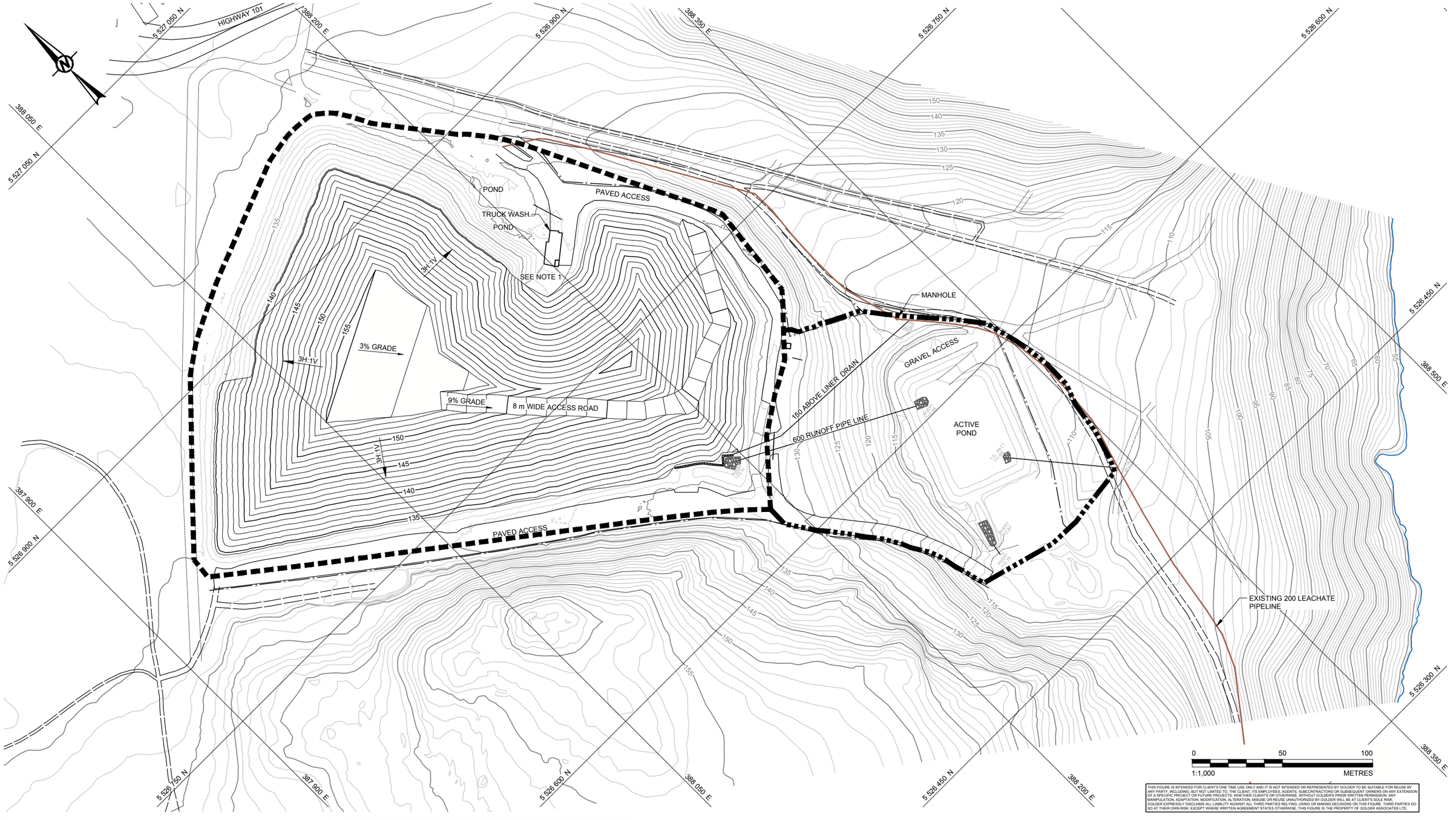

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LEGEND

- 150 — EXISTING TOPOGRAPHY (5 m MAJOR AND 1 m MINOR CONTOURS)
- 150 — DESIGN CONTOURS (5 m MAJOR AND 1 m MINOR CONTOURS)
- FENCE
- RIVER
- EXISTING 200 LEACHATE PIPE
- APPROXIMATE 2020 TOPOGRAPHY FOOTPRINT
- APPROXIMATE 2013 TOPOGRAPHY FOOTPRINT

NOTES

1. DO NOT FILL BEYOND THIS TOE LINE SO THAT THE FUTURE LINER THAT WILL BE INSTALLED FOR THE TRUCK WASH AREA CAN BE JOINED TO THE EXISTING LINER OF THE 2013 LANDFILL EXPANSION
2. COORDINATES ARE IN UTM NAD83, ZONE 10.
3. ROAD LOCATIONS ARE APPROXIMATE.
4. BASE SITE TOPOGRAPHY FROM JULY 31, 2012 SURVEY (SEE REFERENCE 1).
5. ACTIVE POND TOPOGRAPHY FROM OCTOBER 2013 SURVEY (SEE REFERENCE 2).

REFERENCES

1. EMERY & RAE LAND SURVEYING LTD., FILE NAME: 7-160 JULY 31-2012 SITE TOPO.dwg, DATED: JULY 31, 2012.
2. EMERY & RAE, FILE: 7-183 AS BUILT SITE PLAN OCTOBER-2013 FOR CLIENT.dwg, DATED NOVEMBER 4, 2013. ORIGINAL SCALE 1:1000.

CLIENT
CATALYST PAPER COMPANY

CONSULTANT
GOLDER

YYYY-MM-DD	2021-02-12
DESIGNED	CLYW
PREPARED	GB
REVIEWED	JPS
APPROVED	CLYW

PROJECT
WILDWOOD LANDFILL
POWELL RIVER, B.C.

TITLE
STAGE 1 CLOSURE CONTOURS

PROJECT NO.	PHASE/DOC.	REV.	FIGURE
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LEGEND

- 150 — EXISTING TOPOGRAPHY (5 m MAJOR AND 1 m MINOR CONTOURS)
- 150 — DESIGN CONTOURS (5 m MAJOR AND 1 m MINOR CONTOURS)
- FENCE
- RIVER
- EXISTING 200 LEACHATE PIPE
- APPROXIMATE 2020 TOPOGRAPHY FOOTPRINT
- APPROXIMATE 2013 TOPOGRAPHY FOOTPRINT

NOTES

1. COORDINATES ARE IN UTM NAD83, ZONE 10.
2. ROAD LOCATIONS ARE APPROXIMATE.
3. BASE SITE TOPOGRAPHY FROM JULY 31, 2012 SURVEY (SEE REFERENCE 1).
4. ACTIVE POND TOPOGRAPHY FROM OCTOBER 2013 SURVEY (SEE REFERENCE 2).

REFERENCES

1. EMERY & RAE LAND SURVEYING LTD., FILE NAME: 7-160 JULY 31-2012 SITE TOPO.dwg, DATED: JULY 31, 2012.
2. EMERY & RAE, FILE: 7-183 AS BUILT SITE PLAN OCTOBER-2013 FOR CLIENT.dwg, DATED NOVEMBER 4, 2013. ORIGINAL SCALE 1:1000.

CLIENT
CATALYST PAPER COMPANY

CONSULTANT
GOLDER

YYYY-MM-DD	2021-02-12
DESIGNED	CLYW
PREPARED	GB
REVIEWED	JPS
APPROVED	CLYW

PROJECT
WILDWOOD LANDFILL
POWELL RIVER, B.C.

TITLE
STAGE 2 ULTIMATE CLOSURE CONTOURS

PROJECT NO.	PHASE/DOC.	REV.	FIGURE
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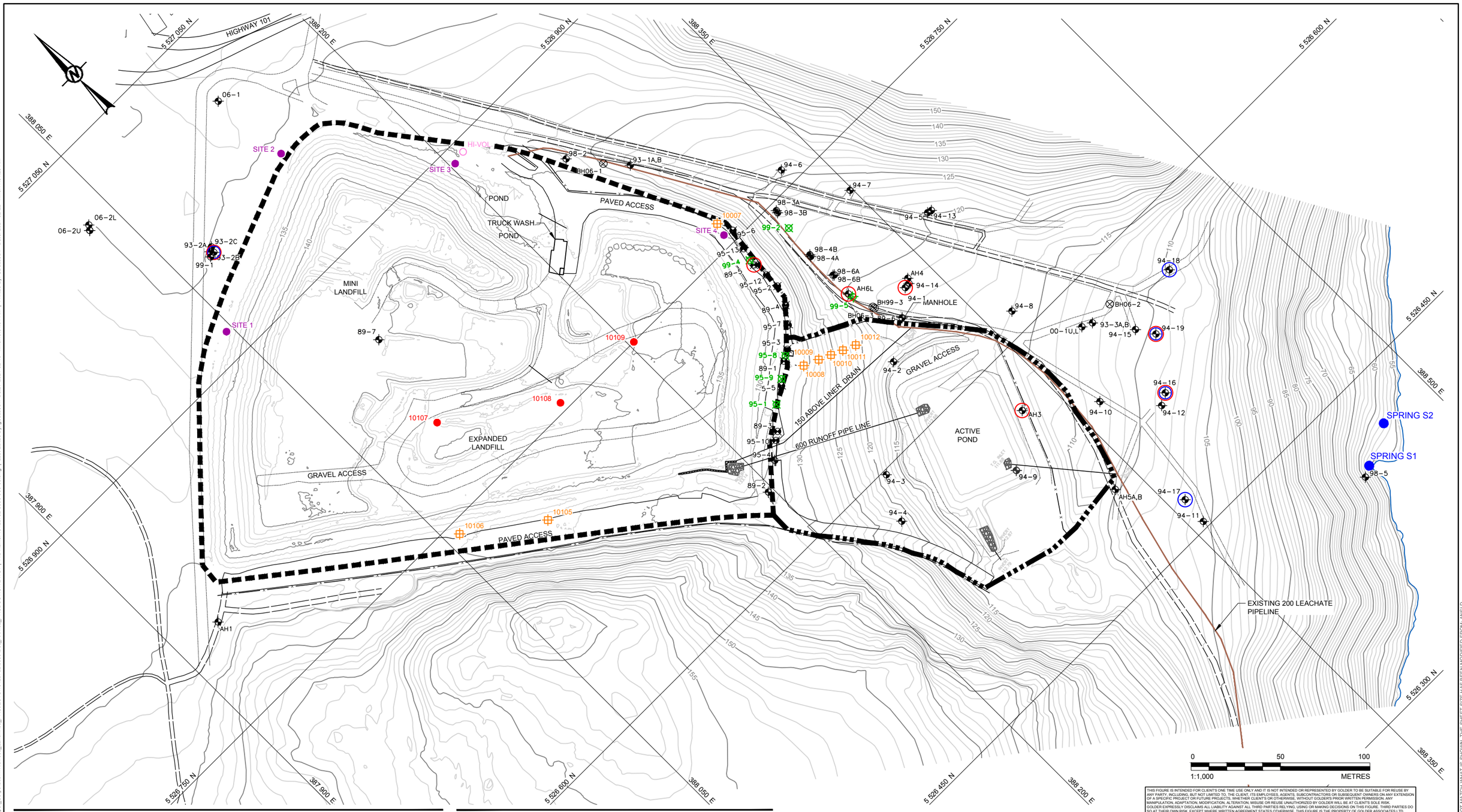

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LEGEND

- GROUNDWATER MONITORING WELL
- GROUNDWATER SAMPLING LOCATION
- "SNAP SHOT" GROUNDWATER SAMPLING LOCATION
- RECOVERY WELL
- SURFACE WATER SAMPLING LOCATION
- INCLINOMETER MONITORING STATION
- DUSTFALL MONITORING LOCATIONS
- HI-VOL PM_{10} SAMPLING LOCATION
- SETTLEMENT MONUMENT STATIONS
- EXISTING TOPOGRAPHY (5 m MAJOR AND 1 m MINOR CONTOURS)
- FENCE
- RIVER
- EXISTING 200 LEACHATE PIPE
- APPROXIMATE 2020 TOPOGRAPHY FOOTPRINT
- APPROXIMATE 2013 TOPOGRAPHY FOOTPRINT

NOTES

1. COORDINATES ARE IN UTM NAD83, ZONE 10.
2. ROAD LOCATIONS ARE APPROXIMATE.
3. BASE SITE TOPOGRAPHY FROM JULY 31, 2012 SURVEY (SEE REFERENCE 1).
4. ACTIVE POND TOPOGRAPHY FROM OCTOBER 2013 SURVEY (SEE REFERENCE 2).
5. MAIN LANDFILL TOPOGRAPHY FROM JANUARY 2016 SURVEY (SEE REFERENCE 3).

REFERENCES

1. EMERY & RAE LAND SURVEYING LTD., FILE NAME: 7-160 JULY 31-2012 SITE TOPO.dwg, DATED: JULY 31, 2012.
2. EMERY & RAE, FILE: 7-183 AS BUILT SITE PLAN OCTOBER-2013 FOR CLIENT.dwg, DATED NOVEMBER 4, 2013. ORIGINAL SCALE 1:1000.
3. EMERY & RAE LAND SURVEYING LTD., FILE NAME: 7-197-5 January-2016 FOR CLIENT.dwg, RECEIVED: FEBRUARY 22, 2016.

CLIENT
CATALYST PAPER COMPANY

CONSULTANT
GOLDER

YYYY-MM-DD	2021-02-12
DESIGNED	CLYW
PREPARED	GB
REVIEWED	JPS
APPROVED	CLYW

PROJECT
WILDWOOD LANDFILL
POWELL RIVER, B.C.

TITLE
MONITORING LOCATIONS

PROJECT NO.	PHASE/DOC.	REV.	FIGURE
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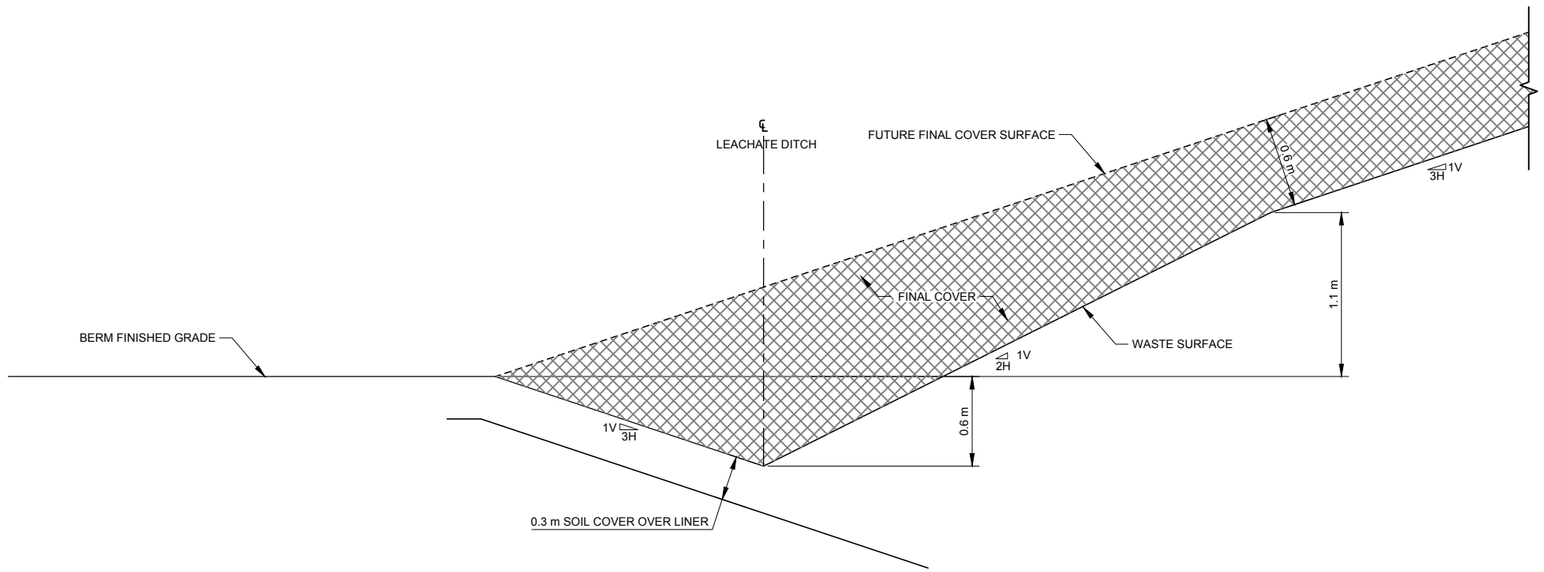

PERIMETER LEACHATE DITCH
SCALE 1:20 m

LEGEND

FINAL COVER

NOTES

1. ALL DIMENSIONS IN METERS UNLESS OTHERWISE NOTED.
2. LEACHATE DITCH SHALL REMAIN IN OPERATION UNTIL THERE IS NO RISK OF LEACHATE RUNNING OFF SLOPE. THEN FINAL COVER MATERIAL CAN BE USED TO FILL-IN LEACHATE DITCH.
3. AFTER FINAL COVER IS PLACED, CULVERTS OR DRAINAGE SWALES WITH EROSION PROTECTION MAY BE REQUIRED ACROSS THE BERM FINISHED SURFACE AT POINTS OF CONCENTRATED RUNOFF.

0 1 2
1:20 METRES

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CLIENT
CATALYST PAPER COMPANY

CONSULTANT
GOLDER

YYYY-MM-DD	2021-02-12
DESIGNED	CLYW
PREPARED	GB
REVIEWED	JPS
APPROVED	CLYW

PROJECT
WILDWOOD LANDFILL
POWELL RIVER, B.C.

TITLE
PERIMETER LEACHATE DITCH

PROJECT NO.	PHASE/DOC.	REV.	FIGURE
19128752	9000/006	0	6

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APPENDIX A

Permit PR-4565 – 2015

March 19, 2015

Tracking Number: 337672
Authorization Number: 4565

REGISTERED MAIL

Catalyst Paper Corporation and Catalyst Pulp Operations Limited doing business as Catalyst Paper, General Partnership
2nd Floor
3600 Lysander Lane
Richmond BC V7B 1C3

Dear Permittee:

Enclosed is Amended Permit 4565 issued under the provisions of the *Environmental Management Act*. Your attention is respectfully directed to the terms and conditions outlined in the permit. An annual fee will be determined according to the Permit Fees Regulation.

This permit 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 permittee. This permit is issued pursuant to the provisions of the *Environmental Management Act* to ensure compliance with Section 120(3) of that statute, which makes it an offence to discharge waste, from a prescribed industry or activity, without proper authorization. It is also the responsibility of the permittee 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.

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.

Ministry of Environment
Environmental Protection Division
Suite 200,10470 - 152 Street
Surrey, BC V3R 0Y3
Coast Region
Telephone: (604) 582-5200
Facsimile: (604) 584-9751

Administration of this permit will be carried out by staff from the Coast Region. Plans, data and reports pertinent to the permit are to be submitted to the Regional Director, Environmental Protection, at Ministry of Environment, Regional Operations, Coast Region, Suite 200,10470 - 152 Street, Surrey, BC V3R 0Y3.

Yours truly,

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

Enclosure

cc: Environment Canada

Sarah Barkowski, Catalyst Paper, General Partnership
5775 Ash Avenue, Powell River, BC V8A 4R3

MINISTRY OF ENVIRONMENT

PERMIT

4565

Under the Provisions of the Environmental Management Act

Catalyst Paper Corporation and Catalyst Pulp Operations Limited doing business as Catalyst Paper, General Partnership

2nd Floor
3600 Lysander Lane
Richmond BC V7B 1C3

is authorized to discharge refuse to the ground from a pulp and paper mill located at 5775 Ash Avenue, Powell River, British Columbia, subject to the terms and conditions listed below. Contravention of any of these conditions is a violation of the *Environmental Management Act* and may lead to prosecution.

This Permit supersedes and amends all previous versions of Permit 4565 issued under Part 2, Section 14 of the *Environmental Management Act*.

1. AUTHORIZED DISCHARGES

1.1 This section applies to the discharge of **REFUSE FROM A PULP AND PAPER MILL**. The site reference number for this discharge is E208453.

1.1.1 The maximum authorized rate of discharge is 25,000 m^3/year (uncompacted volume). The total volume of refuse discharged to the landfill must not exceed 620,000 m^3 (uncompacted volume).

1.1.2 The components of the refuse which may be discharged are restricted to:

Flyash
Spent bed sand
Waste asbestos
Miscellaneous mill waste, subject to Section 2.9, to a maximum of 3000 m^3/year (uncompacted volume)

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Date amended: March 19, 2015
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1.1.3 The authorized works are a landfill operation including a 6.1 ha landfill with a 1.5 mm high density polyethylene liner, a leachate management system consisting of a leak detection system, leachate collection system, leachate pond, pumping and conveyance system, surface water diversion ditches, surface water infiltration pit, truck wash facility, and related appurtenances approximately located as shown on Site Plan A.

1.1.4 The authorized works must be complete and in operation while discharging.

1.1.5 The location of the facilities from which the discharge originates is L3088 (PID 015-890-333), L7212 (PID 004-781-821), L7213 (PID 004-781-856), L6071, Water L 6174, L6237A, L5922, L5923, L5924, L4071, L4072, L3437 (PID 015-875-121), L3090 (PID 015-890-325), L3091(PID 015-890-317), Lot A2, Ref. Plan 490, DL 3091 (PID 015-890-309), Part of Block 43 (PID 002-554-682), Block 44 (PID 010-264-469), and Block 46 (PID 002-560-194) of DL 450, Plan 8096, New Westminster District.

The location of the point of discharge is Part of Block 55, DL 450, Plan 8096 (PID 010-237-321) and Part of Block 48, DL 1901A, Plan 8096 (PID 010-267-361), Group 1, New Westminster District.

2. GENERAL REQUIREMENTS

2.1 Maintenance of Works and 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 permittee including, but not limited to, unauthorized fires arising from spontaneous combustion or other causes, or detection of leachate on the property, the permittee 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.

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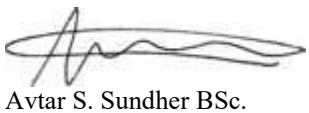

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2.2 **Maintenance of Contiguous Point - Part of Block 55 and Block 48 with Block 43**

The permittee must ensure that Part of Block 55, DL 450 (PID 010-267-361),Plan 8096, Group 1, NWD, and Block 48, DL19O1A, Plan 8096, Group 1, NWD remain contiguous with Block 43, DL 450, Plan 8096, NWD. The permittee must notify the Regional Director, Environmental Protection in writing at least 90 days prior to any subdivision of Part of Block 55, DL 450 (PID 010-267-361), Plan 8096, Group 1, NWD or Block 48, DL19O1A, Plan 8096, Group 1, NWD or Block 43, DL 450, Plan 8096, NWD.

2.3 **Bypasses**

Any bypass of the authorized works is prohibited unless the approval of the Director is obtained and confirmed in writing.

2.4 **Process Modifications**

The Director must be notified prior to implementing changes to any process that may adversely affect the quality and/or quantity of the discharge. Despite notification under this section, permitted levels must not be exceeded.

2.5 **Site Security**

The permittee must maintain an inner and an outer perimeter fence and secure access to the landfill authorized in Section 1.1 during the active life of the landfill. A sign, acceptable to the Director, including the name and contact information of the owner/operator must be posted at the entrance of the landfill.

2.6 **Buffer Zone**

The permittee must maintain a minimum 50 metre buffer zone between the perimeter of the discharge area and the closest property boundary.

2.7 **Inspections**

Once each calendar quarter, the permittee must inspect the area between the landfill and the inner perimeter fence, determine the extent of any noted problem, and notify the Regional Director, Environmental Protection of any evidence of potential environmental impact on adjacent properties. Records of inspections must be kept available on-site.

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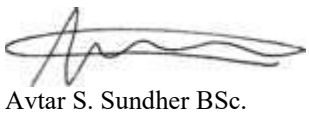

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2.8 Waste Reduction and Alternate Disposal

The Ministry of Environment has adopted a policy to reduce, recycle and reuse solid wastes. The permittee is encouraged to segregate for recycling and reuse, where possible, materials destined for disposal at this site.

The permittee must, on an ongoing basis, explore options for the use of flyash and spent bed sand as products, in order to reduce or eliminate the need for landfilling of those materials. Details of the efforts made must be included in the Annual Report required in Section 3.7.

2.9 Miscellaneous Mill Waste

The miscellaneous mill waste authorized for discharge in Section 1.1.2 is restricted to dirt contaminated wood chips/hog fuel, dirt contaminated pulp/paper, road sweepings, asphalt and concrete rubble from minor demolition/construction projects, elemental sulphur, spent activated carbon, lime, lime mud and lime dregs, effluent treatment solids, boiler feedwater treatment resins, and fibreglass. The discharge of any other types of miscellaneous mill wastes must be approved by the Director.

2.10 Refuse Deposition and Prohibitions

All refuse must be placed in a manner determined by a qualified professional registered in British Columbia and as specified in the Design and Operating Plan required in Section 2.15. Refuse must be discharged in lifts not exceeding 3 metres in height. Each lift must cover all of the available disposal area prior to the commencement of the next lift. Miscellaneous mill waste as defined in Section 2.9 must be discharged in layers, compacted to the smallest practical volume (where applicable), and covered with a minimum of 0.3 metres of suitable cover material at least once every thirty days.

The overall profile from the outer edge of the landfill must not exceed a maximum side slope of 1:3 (vertical:horizontal) at any time. The final side slopes of the landfill cover must not exceed a slope of 1:3 (vertical:horizontal). The working face must be confined to the smallest practical area. The permittee must take all necessary actions to minimize dust from the landfill, including but not limited to, more frequent application of cover material.

Waste asbestos authorized for discharge in section 1.1.2 must be managed in accordance with the Hazardous Waste Regulation.

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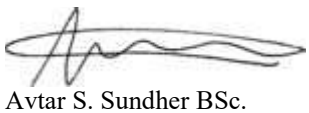

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The discharge of the following waste is prohibited:

- Wood waste contaminated with wood preserving chemicals, or wastes that contain chemicals that penetrate the high density polyethylene liner.
- Hazardous waste, other than waste asbestos, as defined in the Hazardous Waste Regulation.

2.11 Leachate Management

The permittee must, to the satisfaction of the Director, take measures to minimize leachate generation, including but not limited to, providing effective surface water diversion and optimizing the amount of water used in producing the flyash slurry. Measures taken, their effectiveness and any proposed measures must be detailed in the Annual Report required in Section 3.7.

The leachate detection and collection works must be maintained in accordance with an approach designed by a qualified professional registered in British Columbia.

The leachate containment pond (active pond) must be lined to prevent infiltration of leachate into groundwater. A minimum level of 1.0 metres of freeboard must be maintained in the leachate containment pond to prevent overflow from the pond to the environment. Freeboard is defined as the difference in elevation between the contained liquid level and the top of the berm structure at its lowest point.

2.12 Slope Stability and Settlement

The permittee must retain a qualified professional registered in British Columbia to design a slope stability and settlement monitoring program, to the satisfaction of the Director, for the landfill authorized in Section 1.1. Areas of primary focus must include, but are not limited to:

- Slope stability of the south-east slope of the Phase 1 portion of the landfill.
- Settlement across the base of the Phase 2 portion of the landfill.

The details of the monitoring program must be included in the Design and Operating Plan required in Section 2.15. Monitoring results must form part of the Annual Report required in Section 3.7.

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2.13 Fugitive Particulate Emission

The permittee must control fugitive particulate emissions generated from the property. Should the Director have reasonable grounds to believe that fugitive particulate emissions cause pollution outside the property boundary; the permittee must undertake additional measures and/or curtail operations to control the emissions.

2.14 Ambient Air Quality

The permittee must evaluate ambient air quality (PM10 and PM2.5) in the adjacent community of Wildwood with respect to the applicable criteria on a continual basis. The Regional Director, Environmental Protection, must be notified if the data indicates deterioration of the ambient air quality. A summary of the evaluation must form part of the Annual Report required in Section 3.7.

2.15 Design and Operating Plan

The permittee must operate the landfill authorized in Section 1.1 in accordance with a design and operating plan certified by a qualified professional registered in British Columbia and acceptable to the Director. The plan must include, but is not limited to, information regarding:

- a fill plan 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,
- a contingency to close the landfill, including funding, prior to the design capacity being achieved should early closure be required for any reason,
- estimated elevations at 5 year intervals,
- cell size, progressive closure and intermediate and final cover details including types of materials used,
- details of how refuse will be managed/discharged,
- surface water diversion measures,
- measures to minimize leachate generation,
- leachate detection/collection maintenance details,
- operational hours, internal road network and truck wash facility,
- measures to prevent dust,
- contingencies to address slope stability issues and settlement issues should monitoring indicate slope movement or settling,

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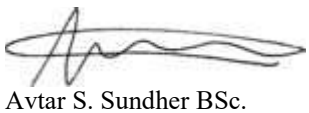

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- contingencies to address environmental protection issues, including leachate management, settlement and slope stability, in the event of an earthquake or any other emergency, and
- estimated closure/post-closure costs and details of how the closure/post-closure funds will be accrued.

The permittee must review the plan on an annual basis to determine if changes are required. Any revisions to the plan, certified by a qualified professional registered in British Columbia, must be submitted to the Regional Director, Environmental Protection, as part of the Annual Report required in Section 3.7.

2.16 Environmental Assessment Report

In addition to the annual report specified in Section 3.5, the permittee must submit an Environmental Assessment Report of the landfill authorized in Section 1.1 (acceptable to the Director) by December 31, 2019 and every five years thereafter for the life of the landfill. Terms of reference for each update must be submitted to the Regional Director, Environmental Protection at least 6 months prior to the due date. The Environmental Assessment Report must include, but is not limited to:

1. a review of all monitoring data collected since the date that discharge to the expanded landfill commenced (in the area outside of the existing mini-landfill),

2. a comparison to baseline data which is established, by a qualified professional registered in British Columbia, as being representative of conditions prior to the date when discharge to the expanded landfill commenced,

3. an evaluation of the overall impact on the receiving environment as a result of the expanded landfill operation, and

4. an evaluation of the effectiveness of the monitoring program.

Data for this assessment must include, but is not limited to, monitoring data from groundwater wells, recovery wells, surface water, leachate, dustfall canisters, and ambient monitoring stations as well as slope stability and settlement measurements.

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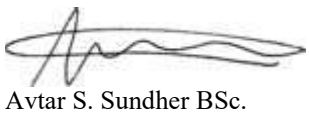

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The Environmental Assessment Report and subsequent updates must be conducted by a qualified professional registered in British Columbia. Actions recommended as a result of these updates must be incorporated into the Design and Operating Plan required in Section 2.15.

If any Environmental Assessment Report, or any other information, indicates that there is an adverse impact on the receiving environment, the Director may at his/her discretion require that the permittee immediately cease the discharge authorized in Section 1.1.1 and close the landfill in accordance with the Closure Plan required in Section 2.18.

2.17 Completed Areas of the Landfill

The permittee must apply final cover to any area of the landfill which will not receive any further refuse. The design, method, and frequency of application of final cover must be determined by a qualified professional registered in British Columbia and be acceptable to the Director.

2.18 Closure Plan

The permittee must submit a closure plan for the landfill authorized in Section 1.1 at least 6 months prior to the closure of the landfill to the Director for approval. The plan must be prepared by a qualified professional registered in British Columbia and include information regarding:

- estimated total waste volume and the closure date,
- 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, drainage layers details and information on topsoil, vegetative cover and erosion prevention controls,
- proposed end use of the property after closure,
- a post-closure monitoring program for groundwater, surface water, erosion and settlement 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.

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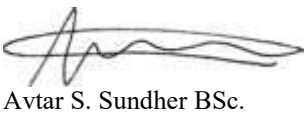

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2.19 Closure/Post-Closure Funding

The permittee must record a financial obligation on its books, consistent with relevant provisions of the current Canadian Generally Accepted Accounting Principles ("GAAP"), to reflect future closure and other regulatory requirements related to the landfill. The estimated cost of meeting these requirements, and how this cost is determined, must be included in the Design and Operating Plan required in Section 2.15.

The estimated cost of future closure, post closure and other regulatory requirements must be reviewed annually and reflected appropriately in the accrued obligation in the permittee's books. The outcome of this annual review must be reported to the Regional Director, Environmental Protection, as part of the Annual Report required in Section 3.7.

2.20 Site Decommissioning

In accordance with the *Environmental Management Act* and its regulations, the permittee must submit a site profile to the Regional Director, Environmental Protection, not less than 10 days prior to decommissioning the landfill authorized in Section1.1.

2.21 Legal Survey

Upon closure of the landfill, the permittee must register a covenant or other legal notification (acceptable to the Director) that the property described in Section 1.1.5 was used for the purpose of refuse disposal as a charge against the title of the property. The Regional Director, Environmental Protection, must be notified of the covenant or legal notification.

3. MONITORING AND REPORTING REQUIREMENTS

3.1 Discharge Monitoring

3.1.1 Leachate Monitoring

The permittee must obtain representative grab samples of the leachate collected in the mini-landfill sump and from the expanded landfill and have the samples analyzed for the following parameters:

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Parameter	Frequency
pH	Semi-annually
Specific Conductivity	Semi-annually
Biochemical Oxygen Demand	Semi-annually
Dioxins & Furans	Annually

The leakage detection/collection system must be monitored semi-annually for the presence of flow. If any groundwater is collected by the leakage detection/collection system, the collected groundwater must also be analyzed for the same parameters and on the same frequency as listed above.

Proper care must be taken in sampling, storing and transporting the samples to adequately control temperature and avoid contamination, breakage, etc.

3.1.2 Discharge Quantities

The permittee must record the types and volumes (uncompacted cubic metres) of refuse discharged to the landfill (excluding cover material).

3.2 Receiving Environment Monitoring

3.2.1 Dustfall Monitoring

In order to determine compliance with Section 2.13, the permittee must conduct an annual dustfall monitoring program, acceptable to the Director. The program must include a minimum of 4 dustfall sampling locations and one PM10 sampling location that take into consideration the horizontal and vertical aspects of the landfill.

3.2.2 Groundwater Monitoring

The permittee must maintain at least six groundwater monitoring wells and at least six groundwater recovery wells. The water collected in the groundwater pumping wells must be directed to the effluent treatment system. The exact design and location of the groundwater monitoring and groundwater recovery wells must be designed by a qualified professional registered in British Columbia and be acceptable to the Director.

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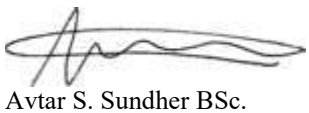

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3.2.3 **Analysis**

For the groundwater monitoring wells specified in Section 3.2.2, the permittee must obtain grab samples for each of the wells and other monitoring sites and analyze the samples for the following contaminants at the specified frequencies.

The abbreviations used in this section are described in Section 3.2.4.

Sample Location	Dry Weather (July / August)	Wet Weather (November / December)
93-2b	GP	GP, D.MET, D&F
89-5	GP	GP, D.MET, D&F, S
AH-3	GP	GP, CP*, D.MET, D&F
AH-6L	GP	GP, CP*, D.MET, D&F
94-1/3	GP	GP, D.MET, D&F
94-19L	GP	GP, D.MET, D&F
94-16B	GP	GP, D.MET, D&F
PW-COMP	GP	GP, D.MET, D&F, S
SPRING-S1	GP, D&F	GP, D&F, T.MET
SPRING-S2	GP, D&F	GP, D&F, T.MET

* If, it appears that the concentration of this contaminant is increasing significantly, based on data collected; the Director may amend the permit to add additional sampling locations.

Sample Location	Dry Weather (July / August)	Wet Weather (November / December)
Snapshot * Monitoring	Field Indicator Parameters	N/A
All Ground-water Wells	Manual Water Levels	Manual Water Levels

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Sample Location	Monthly Monitoring
All Active Recovery Wells	Flow, pH, Conductivity

* Snapshot Monitoring Wells: upgradient well 93-2B and downgradient wells 94-16 (11m, 38 m, regional and bedrock flow zones), 94-17 (regional and bedrock flow zones), 94-18 (38 m and regional flow zones), 94-19 (38 m, regional and bedrock flow zones)

3.2.4 Abbreviations - Analysis

GP (General Parameters)	total suspended solids, total dissolved solids, alkalinity, sulphate and total organic carbon
CP	chlorinated / non- chlorinated phenols
T.MET	total metals
D.MET	dissolved metals
D&F	dioxins and furans
S	sulphide
Field Indicator parameters	pH, specific conductivity, alkalinity, sulphate (lab test), dissolved oxygen, temperature and redox

3.3 Polychlorinated Biphenyls (PCBs) Monitoring

PCB monitoring is no longer required, however, if new information regarding the presence of PCBs comes to the attention of the Director, the permit may be amended to require resumption of PCB monitoring.

3.4 Monitoring at the Mill Filterhouse

Sampling and monitoring at the Mill Filterhouse location is no longer required, however, if new information regarding the quality of the water at the Mill Filterhouse comes to the attention of the Director, the permit may be amended to require resumption of sampling and monitoring at that location.

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3.5 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 www.env.gov.bc.ca/epd/wamr/labsys/lab_meth_manual.html.

3.6 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/epd/wamr/labsys/lab_meth_manual.html.

3.7 Reporting

An annual report must be prepared by the permittee and submitted to the Regional Director, Environmental Protection, by April 30 of the following year. The report must include, but is not limited to the following items:

1. remaining design capacity of the landfill (uncompacted cubic metres) and an estimation of closure date at the current rate of disposal,
2. efforts made in waste reduction and alternate disposal as required in Section 2.8,
3. measures taken to minimize leachate generation, their effectiveness and any proposed measures as required in Section 2.11,
4. an evaluation of slope stability and settlement monitoring as required in Section 2.12,
5. an evaluation of air quality (PM10 and PM2.5) in the adjacent community of Wildwood as required in Section 2.14,
6. any changes to the design and operating plan as required in Section 2.15,
7. estimated costs of closure and post-closure activities as required in Section 2.19,
8. monitoring data as required in Section 3.1.1,

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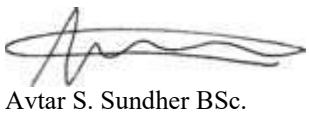

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9. types and volumes (uncompacted cubic metres) of refuse discharged as required in Section 3.1.2,
10. details of the proposed dustfall monitoring program for the coming year.

The following information must be posted on the company web page at the specified frequencies:

1. Ambient Monitoring Data Graphs and Hivol Monitoring Results – within 30 calendar days of the end of each month;
2. Dustfall Monitoring Results – within 30 calendar days following receipt of the data; and
3. Groundwater Update Report, Annual Report (Section 3.5) – within 30 calendar days of receipt of the report.

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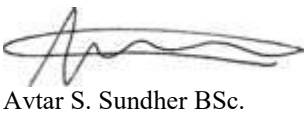

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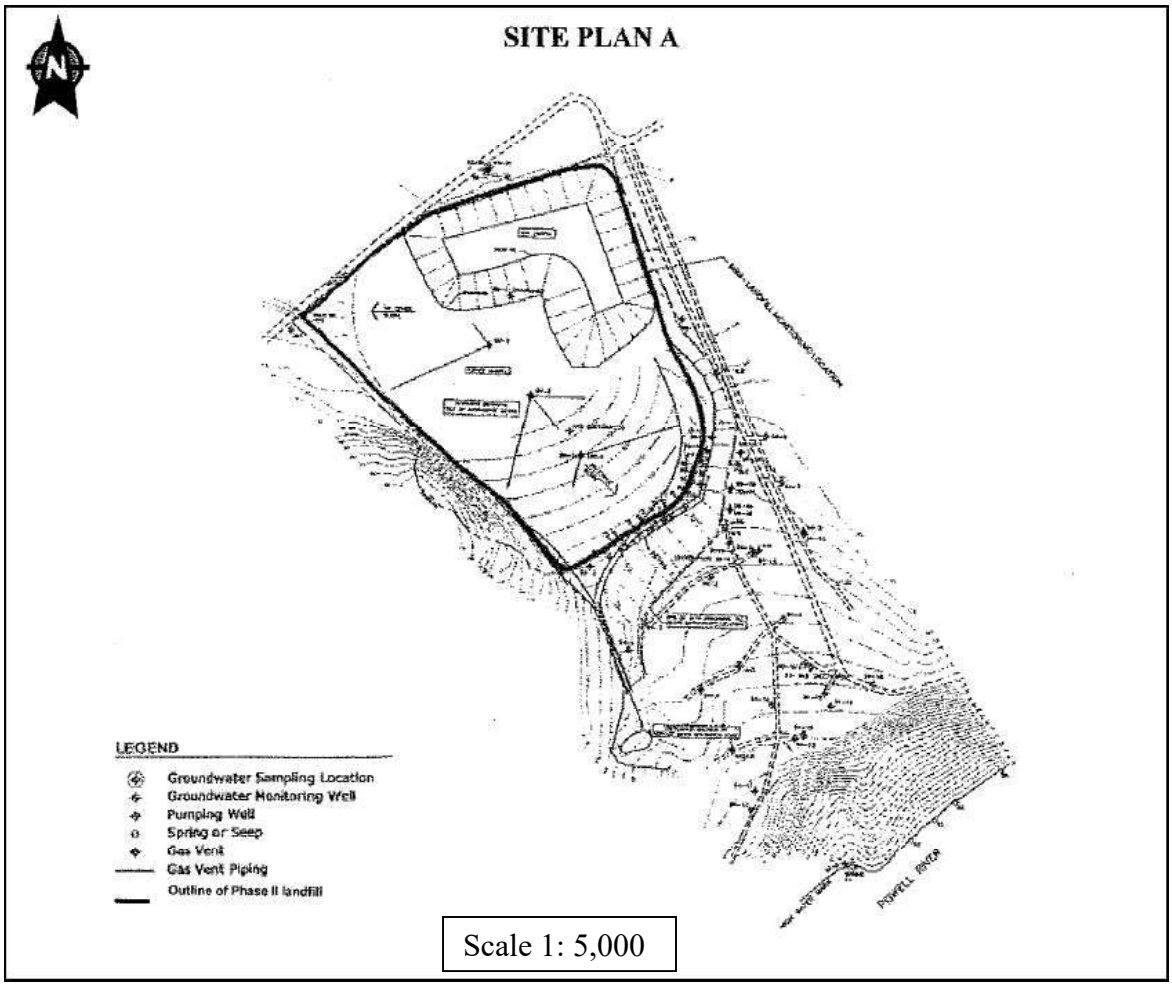
SITE PLAN A



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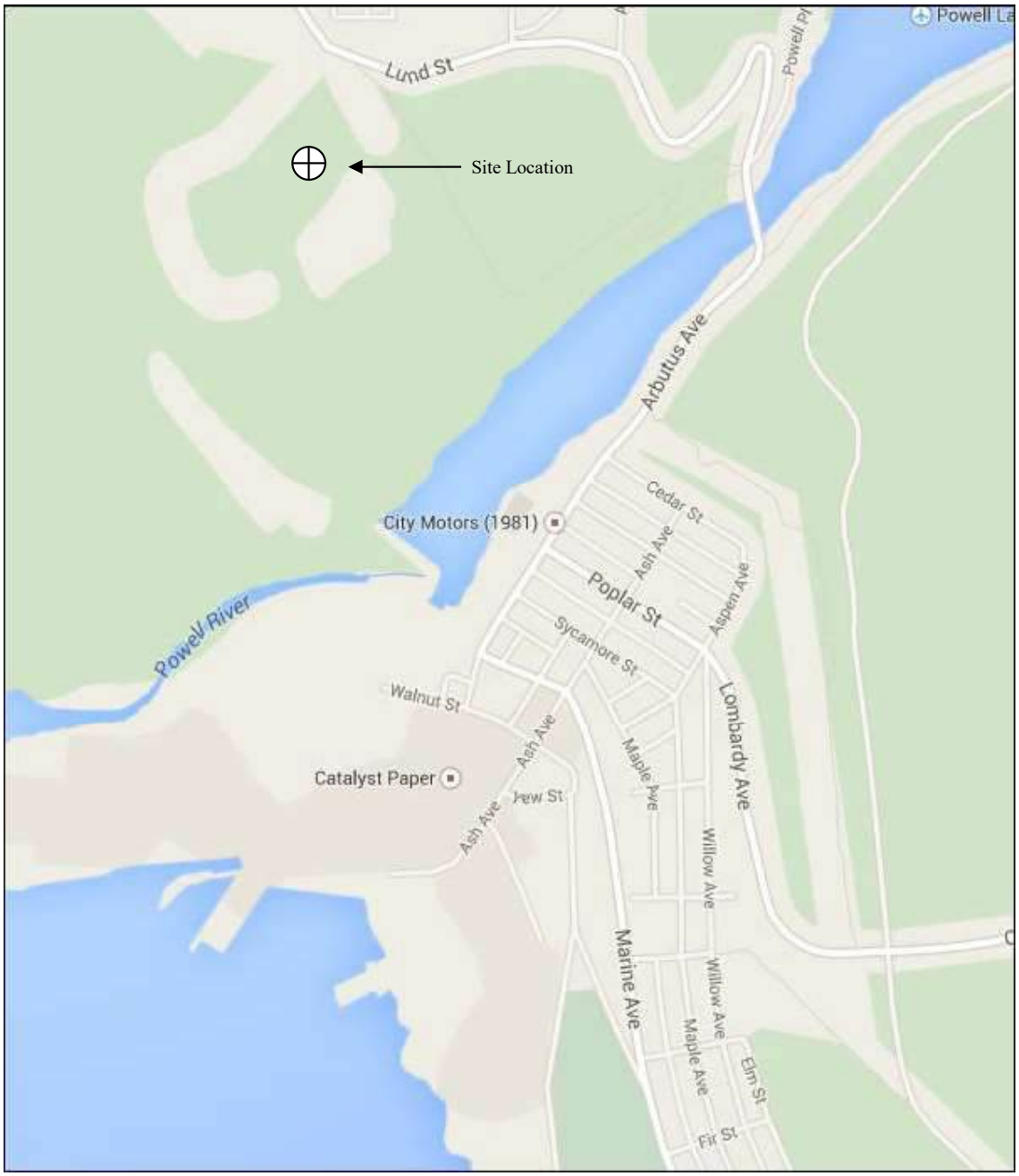
LOCATION MAP



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Date issued: December 7, 1976
Date amended: March 19, 2015
(most recent)

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

APPENDIX B

Waste Disposal Rates

Table B-1: Historical Refuse Types and Quantities Discharged to the Mini-Landfill

Year	Fly Ash (m^3)	Misc. (m^3)	Asbestos (m^3)	Total (m^3)	Cumulative Total (m^3)	Miscellaneous Category Comments
1996	10,433	2,714.9	0	13,148	13,148	2,325 m^3 dregs
1997	9,974	3131	0	13,105	26,253	2,666 m^3 dregs, 405 m^3 PB 19, 46 m^3 Cont. chips, 11 m^3 lime, 3 m^3 vent dust
1998	6,792	6,346.9	0	13,139	39,392	2,890 m^3 bottom ash, 2,876 m^3 dregs, 543 m^3 No. 1 SP from 1997 stockpile, 23 m^3 sand/carbon from No. 1 S.P., 10 m^3 sulfur, 3 m^3 lime, 1m^3 PB 19 sewer cleaning, 1 m^3 activated carbon
1999	1,277	3,306	0	13,151	52,543	2,857 m^3 dregs, 362 m^3 bed sand, 87 m^3 lime from Kraft shut
2000	2	2,934	0	2,936	55,479	2,799 m^3 lime/dregs, 68 m^3 bed sand, 20 m^3 lime from recaust, 12 m^3 lime bricks, 12 m^3 black liquor contaminated cement blocks, 12 m^3 sand/gravel/hog, 9 m^3 lime from bioreactor inlet, 2 m^3 gravel
2001	0	3,344	0	3,344	58,823	3,342 m^3 lime/dregs, 2 m^3 lime from precip
2002	24	108	0	132	58,955	46 m^3 contaminated soil, 32 m^3 lime dregs, 23 m^3 chips/hog/rocks, 7 m^3 demolition debris
2003	63	20	0	83	59,038	12 m^3 asphalt/gravel mix, 8 m^3 wood/gravel mix
2004	315	82	0	397	59,435	63 m^3 bed sand, 12 m^3 contaminated pulp, 5 m^3 biosolids, 2 m^3 activated carbon
2005	196	80	0	276	59,711	24 m^3 cement, 12 m^3 bed sand, 11 m^3 contaminated pulp, 10 m^3 ion exchange resin, 10 m^3 boiler debris, 9 m^3 sand blast sand, 2 m^3 insulation, 1.6 m^3 secondary sludge
2006	6,601	1,043	66	7,710	67,421	689 m^3 contaminated hogfuel, 328 m^3 concrete and demolition debris, 14 m^3 cover sand, 12 m^3 road sweepings
2007	13,644	13	64	13,721	81,142	12 m^3 concrete rubble, 1 m^3 spent activated alumina
2008	14,548	1130	103	15,781	96,923	226 m^3 pulp, sludge, sand, gravel, ash from mill outage, 307 m^3 lime dregs, 364 m^3 lime mud, 226 m^3 soil and rubble, 8 m^3 sludge
2009	12,952	9	48	13,009	109,933	8 m^3 bed sand, 1 m^3 spent activated carbon
2010	11,505	92	40	11,637	121,570	91.7 m^3 calcined lime
2011	12,775	2,438	112	15,325	136,895	1800 m^3 concrete/dirt from lime kiln demo, 434 m^3 reject sand, 134 m^3 accepts sand, 55 m^3 lime kiln brick, 16 m^3 lime dregs
2012	17,013	1,783	40	18,836	155,731	1673 m^3 reject sand, 96 m^3 rock and dirt, 14 m^3 accepts sand
2013*	16,933	2,698	9	19,640	175,371	2,698 m^3 bed sand
2014	15,956	2,092	9	18,057	193,428	48 m^3 pulp, sludge, sand, gravel, ash from mill outage, 1 m^3 section of penstock pipe, 2,027 m^3 sand, 16 m^3 contaminated hog
2015	15,794	2,035	2	17,831	211,259	1,784 m^3 sand, 248 m^3 minor demolition debris, 3 m^3 section of penstock pipe
2016	17,250	2,435	277	19,962	231,221	2,339 m^3 sand, 96 m^3 clinkers
2017	16,075	1,728	32	17,835	249,056	1,728 m^3 sand
2018	15,223	3,426	24	18,673	267,729	3,362 m^3 sand, 64 m^3 minor demolition debris and knots
2019	15,570	4,018	32	19,620	287,349	4,018 m^3 sand

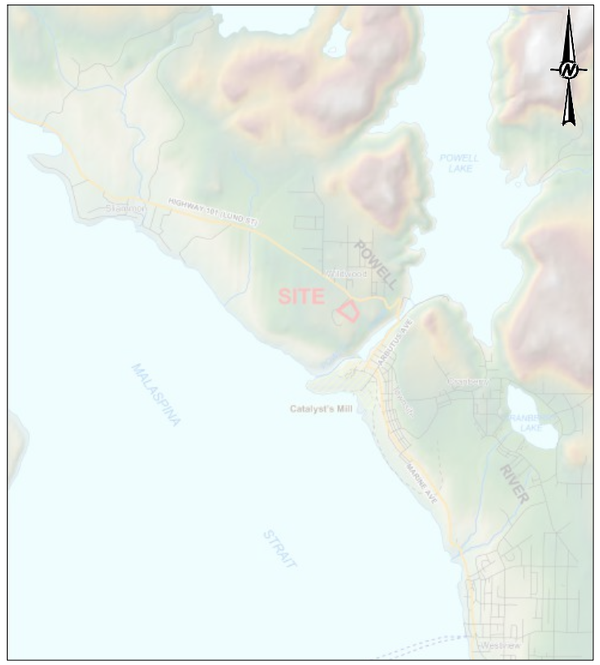
*Note: From October 2013 onwards waste is discharged into the Mini-landfill and the Phase 2 Landfill

APPENDIX C

Landfill Expansion Design Drawings

WILDWOOD LANDFILL EXPANSION
CATALYST PAPER CORPORATION (CER 11-1205)
POWELL RIVER, B.C.

DRAWING INDEX		
DRAWING No.	DRAWING TITLE	REVISION
A1-1-692-013	SHEET INDEX	0
A1-1-692-014	GENERAL ARRANGEMENT PLAN	0
A1-1-692-015	DEMOLITION PLAN	0
A1-1-692-016	NORTHWEST FILL GRADING PLAN	0
A1-1-692-017	PERIMETER BERM DESIGN PLAN	0
A1-1-692-018	ASPHALT PAVING PLAN	0
A1-1-692-019	BELOW-LINER DRAINAGE LAYOUT PLAN	0
A1-1-692-020	EXTENT OF GEOMEMBRANE PLAN	0
A1-1-692-021	ABOVE-LINER DRAINAGE LAYOUT PLAN	0
A1-1-692-022	ABOVE-LINER PIPELINE PLAN - PROFILE	0
A1-1-692-023	RUNOFF PIPELINE PLAN - PROFILE	0
A1-1-692-024	ACTIVE POND DESIGN PLAN	0
A1-1-692-025	ACTIVE POND OUTLET PIPELINE PLAN - PROFILE	0
A1-1-692-026	TYPICAL PERIMETER BERM DETAILS	0
A1-1-692-027	RUNOFF PIPE INLET AND OUTLET DETAILS	0
A1-1-692-028	TYPICAL POND CROSS-SECTIONS	0
A1-1-692-029	ACTIVE POND SPILLWAY CROSS-SECTIONS	0
A1-1-692-030	PERIMETER BERM SPILLWAY CROSS-SECTIONS	0
A1-1-692-031	TYPICAL DETAILS - LINER	0
A1-1-692-032	TYPICAL DETAILS - DRAINAGE PIPES	0
A1-1-692-033	TYPICAL SECTIONS - BURIED PIPELINES	0
A1-1-692-034	TYPICAL DETAILS - MINI-LANDFILL LINER TIE-IN DRAINS	0
A1-1-692-035	TYPICAL DETAILS - VALVES	0
A1-1-692-036	TYPICAL DETAILS - EXTENSION OF EXISTING MONITORING WELLS	0



KEY PLAN
SCALE IN METERS
0 1,000 2,000 3,000m
SCALE IN METERS

ISSUED FOR CONSTRUCTION

Golder Associates

NO.	DATE	REVISION	DR.	CH.	AP.
0	31DEC12	ISSUED FOR CONSTRUCTION	LCR		
C	25MAY12	ISSUED FOR TENDER	MSH		
B	11MAY12	ISSUED FOR CLIENT APPROVAL	MSH		
A	16APR12	ISSUED FOR CLIENT REVIEW	MSH		

WILDWOOD LANDFILL EXPANSION
SHEET INDEX

SCALE: AS SHOWN
DRAWN: MSH
CHECKED: CLYW
APPROVED:
APPROVED:
DATE: 31DEC12

Catalyst — Powell River Division

R.E.S. No. | W. O. No. | FILE No. 11-1447-0080/5100
SPEC. No. | STA. No.
THIRD ANGLE PROJECTION
DWG. No. A1-1-692-013
REV. 0

DWG. NO.	REFERENCE	DWG. NO.	REFERENCE	DWG. NO.	REFERENCE
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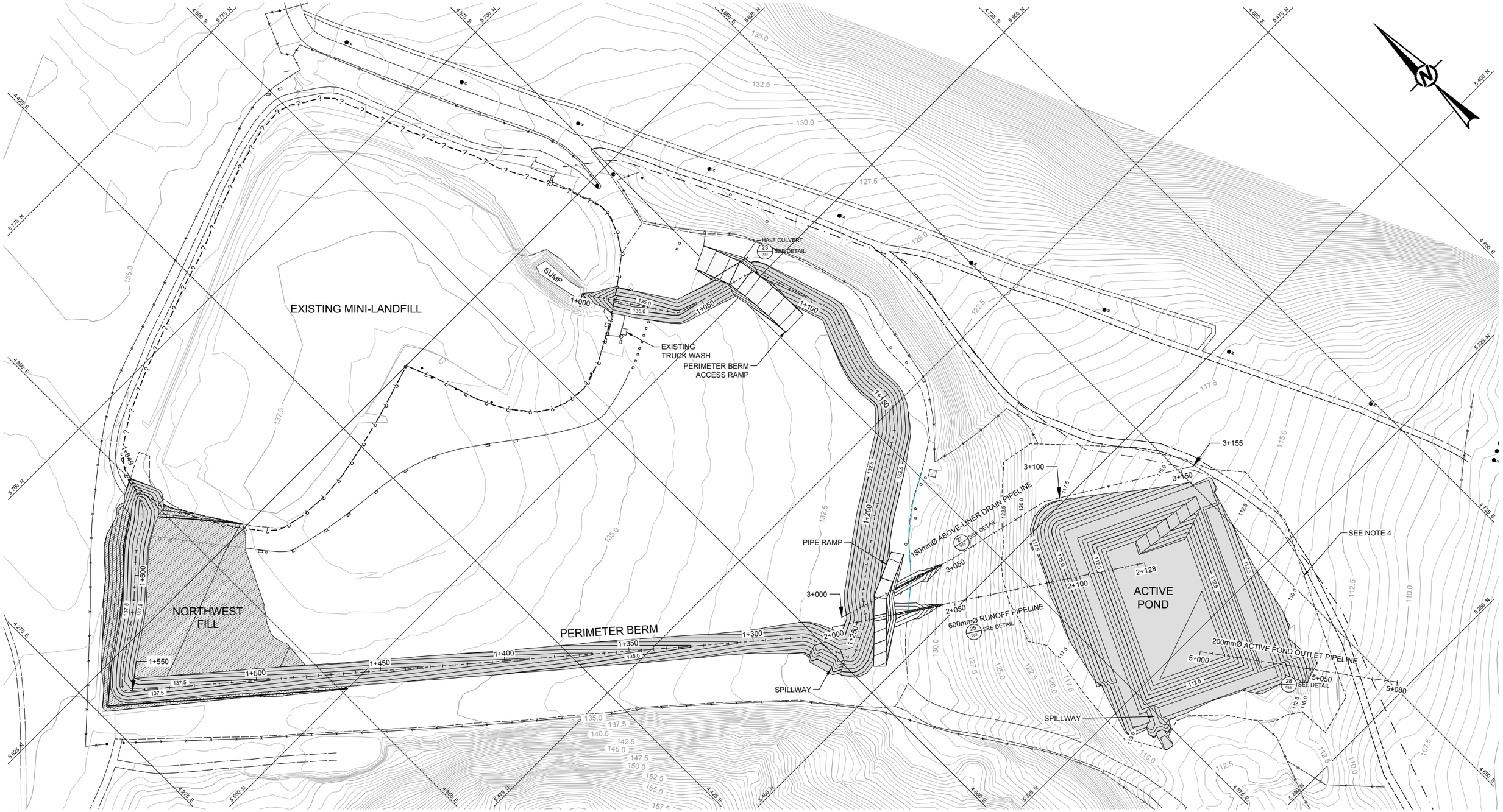
ACAD No. N:\Bur-Graphics\Projects\2011\1447\11-1447-0080\Drafting\5100\Figures\A1-1-692-013.dwg



LEGEND

- EXISTING MINOR CONTOUR
- EXISTING MAJOR CONTOUR
- EXISTING LEACHATE PIPELINE
- EXISTING FENCE
- PROPOSED MINOR CONTOUR
- PROPOSED MAJOR CONTOUR
- APPROXIMATE LOCATION OF INFERRED MINI-LANDFILL CREST
- VALVE

NOTES

1. ALL DIMENSIONS AND ELEVATIONS ARE IN METRES, UNLESS NOTED OTHERWISE.
2. CONTOURS OF THE MINI-LANDFILL PROVIDED BY CATALYST PAPER CORPORATION ARE IN MILL GRID CO-ORDINATE SYSTEM. THESE CONTOURS WERE TRANSLATED TO THE UTM CO-ORDINATE SYSTEM SO THAT THEY COULD BE COMBINED WITH THE 2006 SURVEY PLAN OF THE EXPANSION AREA (IN UTM CO-ORDINATES) TO CREATE THIS PLAN.
3. PIPE DIAMETERS ARE NOMINAL.
4. CONTOURS OF THE ACTIVE POND AREA WERE SURVEYED BY EMERY & RAE LAND SURVEYING LTD. ON MAY 17, 2012.

REFERENCES

1. CO-ORDINATE SYSTEM IS IN CATALYST'S MILL GRID. SURVEY CONTROL WAS PROVIDED BY EMERY & RAE LAND SURVEYING LTD. ON MARCH 23, 2012. CONVERSION BETWEEN UTM AND CATALYST'S MILL GRIDS HAS AN ACCURACY OF APPROXIMATELY ±0.1m.
2. EMERY & RAE LAND SURVEYING LTD., CAD FILE: 7-123_JAN3-08_MODEL.dwg, PROVIDED BY CATALYST PAPER CORPORATION ON JANUARY 14, 2008.
3. EMERY & RAE LAND SURVEYING LTD., CAD FILE: 7-144 Leachate Line Location.dwg, PROVIDED BY CATALYST PAPER CORPORATION ON MARCH 1, 2012.
4. EAGLE MAPPING LTD., PROJECT: 06-130, 1:1000 TOPOGRAPHICAL PLAN, AERIAL PHOTOGRAPH FLOWN ON SEPTEMBER 5, 2006.
5. AGRA EARTH & ENVIRONMENTAL LTD., DRAWING: VE-50514-200 ML-4, DATED: MAY 7, 1996.
6. EMERY & RAE LAND SURVEYING LTD., FILE: 7-155 ACTIVE POND TOPO MAY 17-2012.asc, PROVIDED BY CATALYST PAPER CORPORATION ON MAY 23, 2012.
7. EMERY & RAE LAND SURVEYING LTD., FILE: 7-164 MILL.ASC AND 7-164 UTM.ASC, DATED: NOVEMBER 6, 2012.

ISSUED FOR CONSTRUCTION

SCALE IN METERS: 0, 15, 30, 45m

Golder Associates

DWG. NO.	REFERENCE	DWG. NO.	REFERENCE	DWG. NO.	REFERENCE
###	###				

NO.	DATE	REVISION	DR.	CH.	AP.
0	31DEC12	ISSUED FOR CONSTRUCTION	LCR		
C	25MAY12	ISSUED FOR TENDER	MSH		
B	11MAY12	ISSUED FOR CLIENT APPROVAL	MSH		
A	16APR12	ISSUED FOR CLIENT REVIEW	MSH		

WILDWOOD LANDFILL EXPANSION

GENERAL ARRANGEMENT PLAN

Catalyst — Powell River Division

R.E.S. No. | W. O. No. | FILE No. 11-1447-0080/5100

SCALE: AS SHOWN | SPEC. No. | STA. No.

DRAWN: LCR | THIRD ANGLE PROJECTION | DWG. No. | REV.

CHECKED: CLYW | APPROVED: | APPROVED: | DATE: 31DEC12 | A1-1-692-014 | 0

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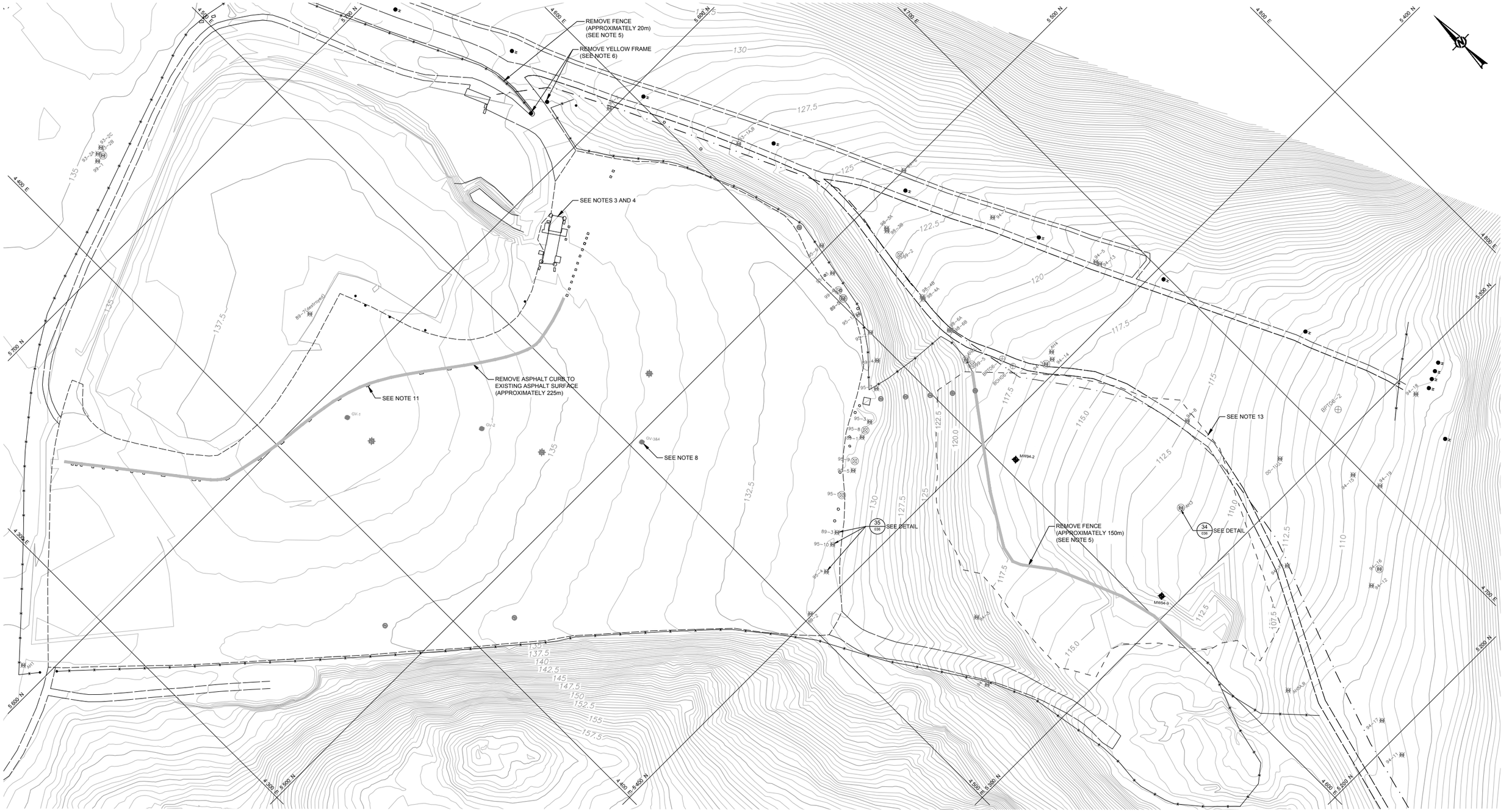

REFERENCES

1. CO-ORDINATE SYSTEM IS IN CATALYST'S MILL GRID. SURVEY CONTROL WAS PROVIDED BY EMERY & RAE LAND SURVEYING LTD. ON MARCH 23, 2012. CONVERSION BETWEEN UTM AND CATALYST'S MILL GRIDS HAS AN ACCURACY OF APPROXIMATELY ±0.1m.
2. EAGLE MAPPING LTD., PROJECT: 06-130, 1:1000 TOPOGRAPHICAL PLAN, AERIAL PHOTOGRAPH FLOWN ON SEPTEMBER 5, 2006.
3. AGRA EARTH & ENVIRONMENTAL LTD., DRAWING: VE-50514-200 ML-4, DATED: MAY 7, 1996.
4. EMERY & RAE LAND SURVEYING LTD., CAD FILE: 7-144 Leachate Line Location.dwg, PROVIDED BY CATALYST PAPER CORPORATION ON MARCH 1, 2012.
5. EMERY & RAE LAND SURVEYING LTD., FILE: 7-155 ACTIVE POND TOPO MAY 17-2012.asc, PROVIDED BY CATALYST PAPER CORPORATION ON MAY 23, 2012.

NOTES

1. ALL DIMENSIONS AND ELEVATIONS ARE IN METRES, UNLESS OTHERWISE NOTED.
2. CONTOURS OF THE MINI-LANDFILL PROVIDED BY CATALYST PAPER CORPORATION ARE IN A MILL GRID CO-ORDINATE SYSTEM. THESE CONTOURS WERE TRANSLATED TO THE UTM CO-ORDINATE SYSTEM SO THAT THEY COULD BE COMBINED WITH THE 2006 SURVEY PLAN OF THE EXPANSION AREA (IN UTM CO-ORDINATES) TO CREATE THIS PLAN.
3. DISCONNECT SERVICES AND DE-ENERGIZE POWER PRIOR TO EXISTING TRUCK WASH DEMOLITION.
4. EXISTING TRUCK WASH DEMOLITION: REMOVE SCAFFOLDING, ABOVE-GROUND PIPING, LIGHT POLES, CONCRETE CURB ON SOUTH SIDE, ABOVE-GROUND PIPING, AND CONCRETE BLOCK PUMPHOUSE AND CONTENTS.
5. FENCING THAT HAS BEEN REMOVED MAY BE REUSED IF IN GOOD CONDITION AND IF APPROVED IN WRITING BY THE OWNER.
6. YELLOW FRAME THAT HAS BEEN REMOVED MAY BE REUSED FOR THE NEW TRUCK WASH.
7. ALL OTHER ITEMS THAT ARE TO BE REMOVED SHALL BE DISPOSED OFF-SITE.
8. CUT OFF GAS VENTS GV-1, GV-2, GV-3 AND GV-4, 50mm ABOVE ASPHALT SURFACE. REMOVE SHARP EDGES AND BURRS. FILL WITH CLEAR GRAVEL. THEN COVER WITH HEAVY GEOTEXTILE.
9. DECOMMISSION MONITORING WELLS MW94-2 AND MW94-9 IN ACCORDANCE WITH BC GROUNDWATER PROTECTION REGULATION.
10. DO NOT DAMAGE EXISTING ASPHALT OR CONCRETE OVER LANDFILL.
11. LOCK-BLOCKS TO BE REMOVED BY THE CONTRACTOR.
12. ALL MONITORING WELL LOCATIONS ARE APPROXIMATE.
13. CONTOURS OF ACTIVE POND AREA WERE SURVEYED BY EMERY & RAE LAND SURVEYING LTD. ON MAY 17, 2012.

LEGEND

- EXISTING MINOR CONTOUR
- EXISTING MAJOR CONTOUR
- EXISTING LEACHATE PIPELINE
- EXISTING FENCE
- DEMOLITION
- GROUNDWATER WELL
- "SNAP-SHOT" GROUNDWATER WELL
- PUMPING WELL
- GAS VENT
- SETTLEMENT MONITORING POINT (SURFACE)
- SLOPE INCLINOMETER CASING
- MONITORING WELL TO BE DECOMMISSIONED (SEE NOTE 9)

ISSUED FOR CONSTRUCTION

0 15 30 45
SCALE IN METERS

Golder Associates

DWG. NO.	REFERENCE	DWG. NO.	REFERENCE	DWG. NO.	REFERENCE
###	###				

NO.	DATE	REVISION	DR.	CH.	AP.
0	31DEC12	ISSUED FOR CONSTRUCTION	LCR		
C	25MAY12	ISSUED FOR TENDER	MSH		
B	11MAY12	ISSUED FOR CLIENT APPROVAL	MSH		
A	16APR12	ISSUED FOR CLIENT REVIEW	MSH		

WILDWOOD LANDFILL EXPANSION
DEMOLITION PLAN

Catalyst — Powell River Division

R.E.S. No. | W. O. No. | FILE No. 11-1447-0080/5100
SPEC. No. | STA. No.
SCALE: AS SHOWN | DRAWN: LCR | CHECKED: CLYW | APPROVED: | APPROVED:
THIRD ANGLE PROJECTION
DATE: 31DEC12
DWG. No. A1-1-692-015 | REV. 0

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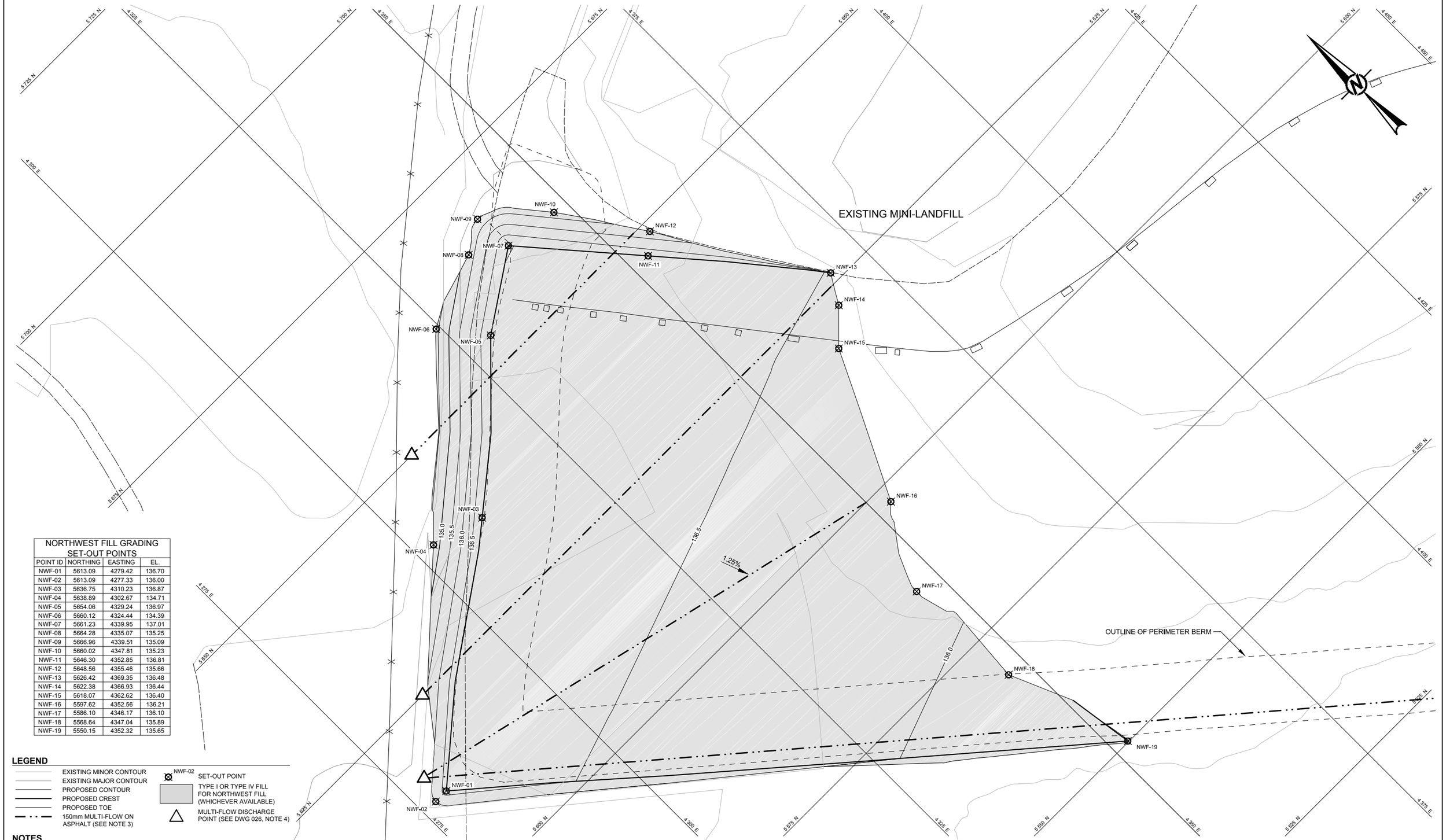


NORTHWEST FILL GRADING SET-OUT POINTS			
POINT ID	NORTHING	EASTING	EL.
NWF-01	5613.09	4279.42	136.70
NWF-02	5613.09	4277.33	136.00
NWF-03	5636.75	4310.23	136.87
NWF-04	5638.89	4302.67	134.71
NWF-05	5654.06	4329.24	136.97
NWF-06	5660.12	4324.44	134.39
NWF-07	5661.23	4339.95	137.01
NWF-08	5664.28	4335.07	135.25
NWF-09	5666.96	4339.51	135.09
NWF-10	5660.02	4347.81	135.23
NWF-11	5646.30	4352.85	136.81
NWF-12	5648.56	4355.46	135.66
NWF-13	5626.42	4369.35	136.48
NWF-14	5622.38	4366.93	136.44
NWF-15	5618.07	4362.62	136.40
NWF-16	5597.62	4352.56	136.21
NWF-17	5586.10	4346.17	136.10
NWF-18	5568.64	4347.04	135.89
NWF-19	5550.15	4352.32	135.65

LEGEND

- EXISTING MINOR CONTOUR
- EXISTING MAJOR CONTOUR
- PROPOSED CONTOUR
- PROPOSED CREST
- PROPOSED TOE
- 150mm MULTI-FLOW ON ASPHALT (SEE NOTE 3)
- NWF-02 — SET-OUT POINT
- TYPE I OR TYPE IV FILL FOR NORTHWEST FILL (WHICHEVER AVAILABLE)
- MULTI-FLOW DISCHARGE POINT (SEE DWG 026, NOTE 4)

NOTES

1. ALL DIMENSIONS AND ELEVATIONS ARE IN METRES, UNLESS NOTED OTHERWISE.
2. CONTOURS OF THE MINI-LANDFILL PROVIDED BY CATALYST PAPER CORPORATION ARE IN MILL GRID CO-ORDINATE SYSTEM. THESE CONTOURS WERE TRANSLATED TO THE UTM CO-ORDINATE SYSTEM SO THAT THEY COULD BE COMBINED WITH THE 2006 SURVEY PLAN OF THE EXPANSION AREA (IN UTM CO-ORDINATES) TO CREATE THIS PLAN.
3. MULTI-FLOW SHALL BE INSTALLED HORIZONTALLY. SEE DRAWING 032 FOR DETAILS.

REFERENCES

1. CO-ORDINATE SYSTEM IS IN CATALYST'S MILL GRID. SURVEY CONTROL WAS PROVIDED BY EMERY & RAE LAND SURVEYING LTD. ON MARCH 23, 2012. CONVERSION BETWEEN UTM AND CATALYST'S MILL GRIDS HAS AN ACCURACY OF APPROXIMATELY ±0.1m.
2. EMERY & RAE LAND SURVEYING LTD., CAD FILE: 7-123_JAN3-08_MODEL.dwg, PROVIDED BY CATALYST PAPER CORPORATION ON JANUARY 14, 2008.
3. EAGLE MAPPING LTD., PROJECT: 06-130, 1:1000 TOPOGRAPHICAL PLAN, AERIAL PHOTOGRAPH FLOWN ON SEPTEMBER 5, 2006.
4. AGRA EARTH & ENVIRONMENTAL LTD., DRAWING: VE-50514-200 ML-4, DATED: MAY 7, 1996.

ISSUED FOR CONSTRUCTION

0 5 10 15m
1:250

Golder Associates

DWG. NO.	REFERENCE	DWG. NO.	REFERENCE	DWG. NO.	REFERENCE
###	###				

NO.	DATE	REVISION	DR.	CH.	AP.
0	31DEC12	ISSUED FOR CONSTRUCTION	LCR		
C	25MAY12	ISSUED FOR TENDER	MSH		
B	11MAY12	ISSUED FOR CLIENT APPROVAL	MSH		
A	16APR12	ISSUED FOR CLIENT REVIEW	MSH		

WILDWOOD LANDFILL EXPANSION
NORTHWEST FILL GRADING PLAN

Catalyst — Powell River Division

R.E.S. No.	W. O. No.	FILE No.	11-1447-0080/5100
SCALE: AS SHOWN	SPEC. No.	STA. No.	
DRAWN: MSH	THIRD ANGLE PROJECTION	DWG. No.	REV.
CHECKED: CLYW	APPROVED:	APPROVED:	A1-1-692-016 / 0
DATE: 31DEC12			

ACAD No. N:\Bur-Graphics\Projects\2011\1447\11-1447-0080\Drafting\5100\Figures\A1-1-692-016.dwg

EXISTING MINI-LANDFILL

NORTHWEST FILL

SUMP

HALF CULVERT

PERIMETER BERM ACCESS RAMP

PERIMETER BERM CENTRELINE

PLACE MIN. 300mm THICKNESS OF TYPE I FILL OVER ASPHALT AND NORTHWEST FILL

SEE NOTE 5

SEE NOTE 3

150mm Ø ABOVE-LINER DRAIN PIPELINE

600mm Ø RUNOFF PIPELINE

RIPE RAMP

SPILLWAY

PB-CL-01 PB-CL-02 PB-CL-03 PB-CL-04 PB-CL-05 PB-CL-06 PB-CL-07 PB-CL-08 PB-CL-09 PB-CL-10 PB-CL-11 PB-CL-12 PB-CL-13 PB-CL-14 PB-CL-15 PB-CL-16 PB-CL-17 PB-CL-18

STA 1+106 STA 1+302

LEGEND

- EXISTING MINOR CONTOUR
- EXISTING MAJOR CONTOUR
- EXISTING LEACHATE PIPELINE
- EXISTING FENCE
- PROPOSED MINOR CONTOUR
- PROPOSED MAJOR CONTOUR
- PROPOSED TOE
- LIMIT OF TYPE I FILL
- GROUNDWATER WELL
- "SNAP-SHOT" GROUNDWATER WELL
- PUMPING WELL
- PB-CL-01 PERIMETER BERM SET-OUT POINT
- BERM HEIGHT AT 1.5m FROM EXISTING GROUND/ASPHALT OR NORTHWEST FILL SURFACE ON HIGH SIDE (**)
- BERM CREST AT EL. 134.40m

NOTES

1. ALL DIMENSIONS AND ELEVATIONS ARE IN METRES, UNLESS NOTED OTHERWISE.
2. CONTOURS OF THE MINI-LANDFILL PROVIDED BY CATALYST PAPER CORPORATION ARE IN MILL GRID CO-ORDINATE SYSTEM. THESE CONTOURS WERE TRANSLATED TO THE UTM COORDINATE SYSTEM SO THAT THEY COULD BE COMBINED WITH THE 2006 SURVEY PLAN OF THE EXPANSION AREA (IN UTM CO-ORDINATES) TO CREATE THIS PLAN.
3. PLACE 150mm THICK BY 2000mm WIDE PAD OF FINE TORPEDO GRAVEL ACROSS FILL AT THE LOWEST PART OF ASPHALT FOR DRAINAGE PURPOSES, PRIOR TO FILLING WITH TYPE IV FILL.
4. PIPE DIAMETERS ARE NOMINAL.
5. CONTOURS OF ACTIVE POND AREA WERE SURVEYED BY EMERY & RAE LAND SURVEYING LTD. ON MAY 17, 2012.

REFERENCES

1. CO-ORDINATE SYSTEM IS IN CATALYST'S MILL GRID. SURVEY CONTROL WAS PROVIDED BY EMERY& RAE LAND SURVEYING LTD. ON MARCH 23, 2012. CONVERSION BETWEEN UTM AND CATALYST'S MILL GRIDS HAS AN ACCURACY OF APPROXIMATELY ±0.1m.
2. EMERY & RAE LAND SURVEYING LTD., CAD FILE: 7-123_JAN3-08_MODEL.dwg, PROVIDED BY CATALYST PAPER CORPORATION ON JANUARY 14, 2008.
3. EMERY & RAE LAND SURVEYING LTD., CAD FILE: 7-144 Leachate Line Location.dwg, PROVIDED BY CATALYST PAPER CORPORATION ON MARCH 1, 2012.
4. EAGLE MAPPING LTD., PROJECT: 06-130, 1:1000 TOPOGRAPHICAL PLAN, AERIAL PHOTOGRAPH FLOWN ON SEPTEMBER 5, 2006.
5. AGRA EARTH & ENVIRONMENTAL LTD., DRAWING: VE-50514-200 ML-4, DATED: MAY 7, 1996.
6. EMERY & RAE LAND SURVEYING LTD., FILE: 7-155 ACTIVE POND TOPO MAY 17-2012.asc, PROVIDED BY CATALYST PAPER CORPORATION ON MAY 23, 2012.

PERIMETER BERM CENTRELINE SET-OUT POINTS

ID NAME	EASTING	NORTHING
PB-CL-01	4530.89	5595.40
PB-CL-02	4552.73	5562.56
PB-CL-03	4586.48	5553.23
PB-CL-04	4597.63	5519.51
PB-CL-05	4588.21	5494.07
PB-CL-06	4589.68	5478.22
PB-CL-07	4580.70	5467.83
PB-CL-08	4551.20	5449.46
PB-CL-09	4524.77	5430.18
PB-CL-10	4519.19	5422.32
PB-CL-11	4503.96	5414.91
PB-CL-12	4497.43	5434.23
PB-CL-13	4287.58	5613.36
PB-CL-14	4294.82	5620.08
PB-CL-15	4314.51	5633.61
PB-CL-16	4333.32	5650.84
PB-CL-17	4345.47	5657.93
PB-CL-18	4353.34	5679.60

**ELEVATIONS DETERMINED BY CONFIGURATION

ISSUED FOR CONSTRUCTION

SCALE IN METERS 0 10 20 30m

Golder Associates

NO.	DATE	REVISION	DR.	CH.	AP.
0	31DEC12	ISSUED FOR CONSTRUCTION	LCR		
C	25MAY12	ISSUED FOR TENDER	MSH		
B	11MAY12	ISSUED FOR CLIENT APPROVAL	MSH		
A	16APR12	ISSUED FOR CLIENT REVIEW	MSH		

WILDWOOD LANDFILL EXPANSION
PERIMETER BERM DESIGN PLAN

Catalyst — Powell River Division

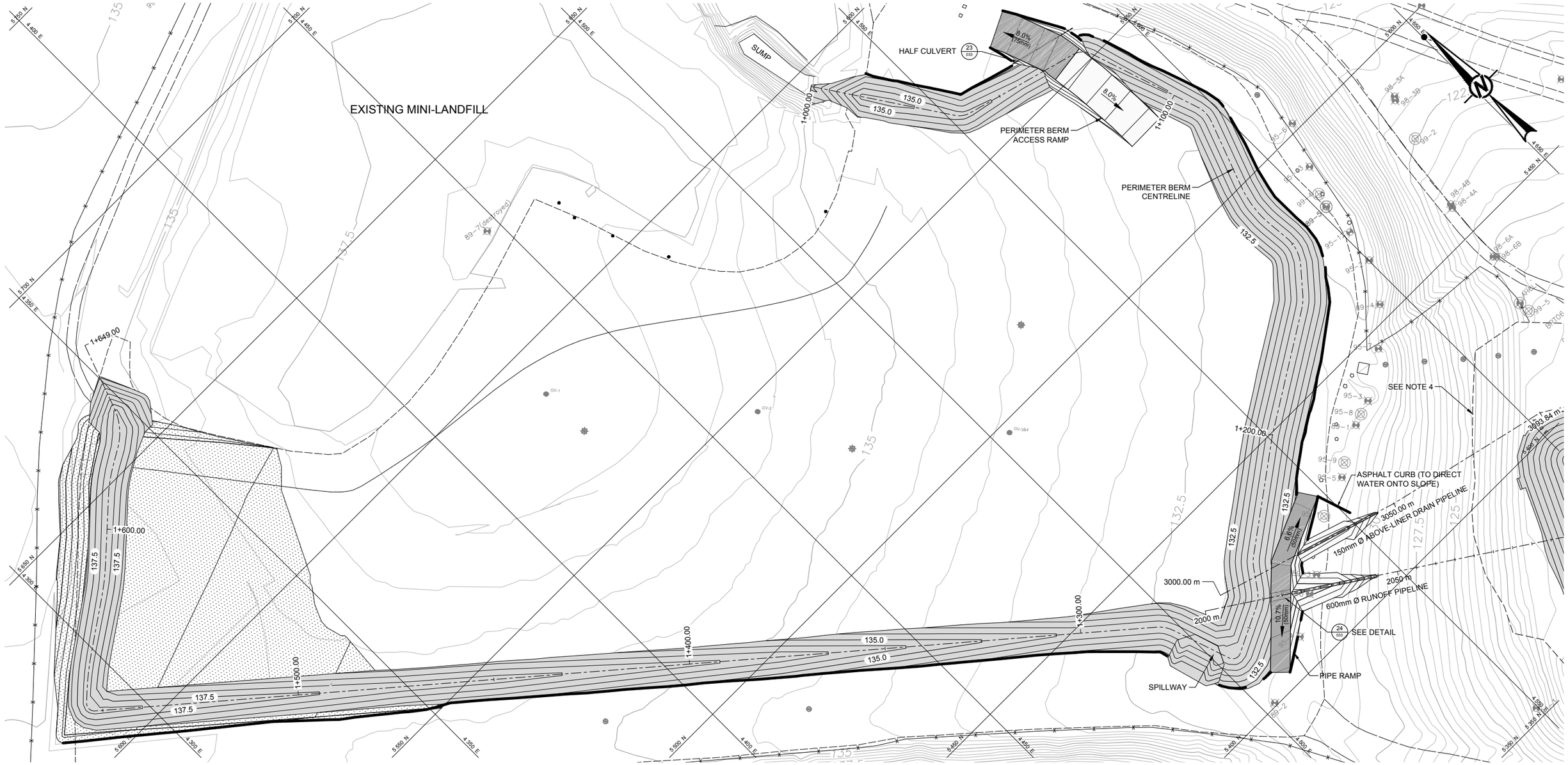
R.E.S. No. | W. O. No. | FILE No. 11-1447-0080/5100

SCALE: AS SHOWN | SPEC. No. | STA. No.

THIRD ANGLE PROJECTION | DRAWN: MSH | DWG. No. | REV.

CHECKED: CLYW | APPROVED: | APPROVED: | DATE: 31DEC12 | A1-1-692-017 | 0

ACAD No. D:\N\Bur-Graphics\Projects\2011\1447\11-1447-0080\Drafting\5100\Figures\A1-1-692-017.dwg



LEGEND

- EXISTING MINOR CONTOUR
- EXISTING MAJOR CONTOUR
- EXISTING LEACHATE PIPELINE
- EXISTING FENCE
- PROPOSED MINOR CONTOUR
- PROPOSED MAJOR CONTOUR
- PROPOSED TOE
- PROPOSED ASPHALT CURB
- ASPHALT CONCRETE PAVEMENT (THICKNESS)
- GROUNDWATER WELL
- "SNAP-SHOT" GROUNDWATER WELL
- PUMPING WELL

NOTES

1. ALL DIMENSIONS AND ELEVATIONS ARE IN METRES, UNLESS NOTED OTHERWISE.
2. CONTOURS OF THE MINI-LANDFILL PROVIDED BY CATALYST PAPER CORPORATION ARE IN MILL GRID CO-ORDINATE SYSTEM. THESE CONTOURS WERE TRANSLATED TO THE UTM CO-ORDINATE SYSTEM SO THAT THEY COULD BE COMBINED WITH THE 2006 SURVEY PLAN OF THE EXPANSION AREA (IN UTM CO-ORDINATES) TO CREATE THIS PLAN.
3. PIPE DIAMETERS ARE NOMINAL.
4. CONTOURS OF THE ACTIVE POND AREA WERE SURVEYED BY EMERY & RAE LAND SURVEYING LTD. ON MAY 17, 2012.

REFERENCES

1. CO-ORDINATE SYSTEM IS IN CATALYST'S MILL GRID. SURVEY CONTROL WAS PROVIDED BY EMERY& RAE LAND SURVEYING LTD. ON MARCH 23, 2012. CONVERSION BETWEEN UTM AND CATALYST'S MILL GRIDS HAS AN ACCURACY OF APPROXIMATELY ±0.1m.
2. EMERY & RAE LAND SURVEYING LTD., CAD FILE: 7-123_JAN3-08_MODEL.dwg, PROVIDED BY CATALYST PAPER CORPORATION ON JANUARY 14, 2008.
3. EMERY & RAE LAND SURVEYING LTD., CAD FILE: 7-144 Leachate Line Location.dwg, PROVIDED BY CATALYST PAPER CORPORATION ON MARCH 1, 2012.
4. EAGLE MAPPING LTD., PROJECT: 06-130, 1:1000 TOPOGRAPHICAL PLAN, AERIAL PHOTOGRAPH FLOWN ON SEPTEMBER 5, 2006.
5. AGRA EARTH & ENVIRONMENTAL LTD., DRAWING: VE-50514-200 ML-4, DATED: MAY 7, 1996.
6. EMERY & RAE LAND SURVEYING LTD., FILE: 7-155 ACTIVE POND TOPO MAY 17-2012.asc, PROVIDED BY CATALYST PAPER CORPORATION ON MAY 23, 2012.

ISSUED FOR CONSTRUCTION

SCALE IN METERS 0 10 20 30m

Golder Associates

NO.	DATE	REVISION	DR.	CH.	AP.
0	31DEC12	ISSUED FOR CONSTRUCTION	LCR		
B	25MAY12	ISSUED FOR TENDER	DT		
A	11MAY12	ISSUED FOR CLIENT APPROVAL	DT		

WILDWOOD LANDFILL EXPANSION

ASPHALT PAVING PLAN

Catalyst — Powell River Division

R.E.S. No. | W. O. No. 11-1447-0080/5100 | FILE No.

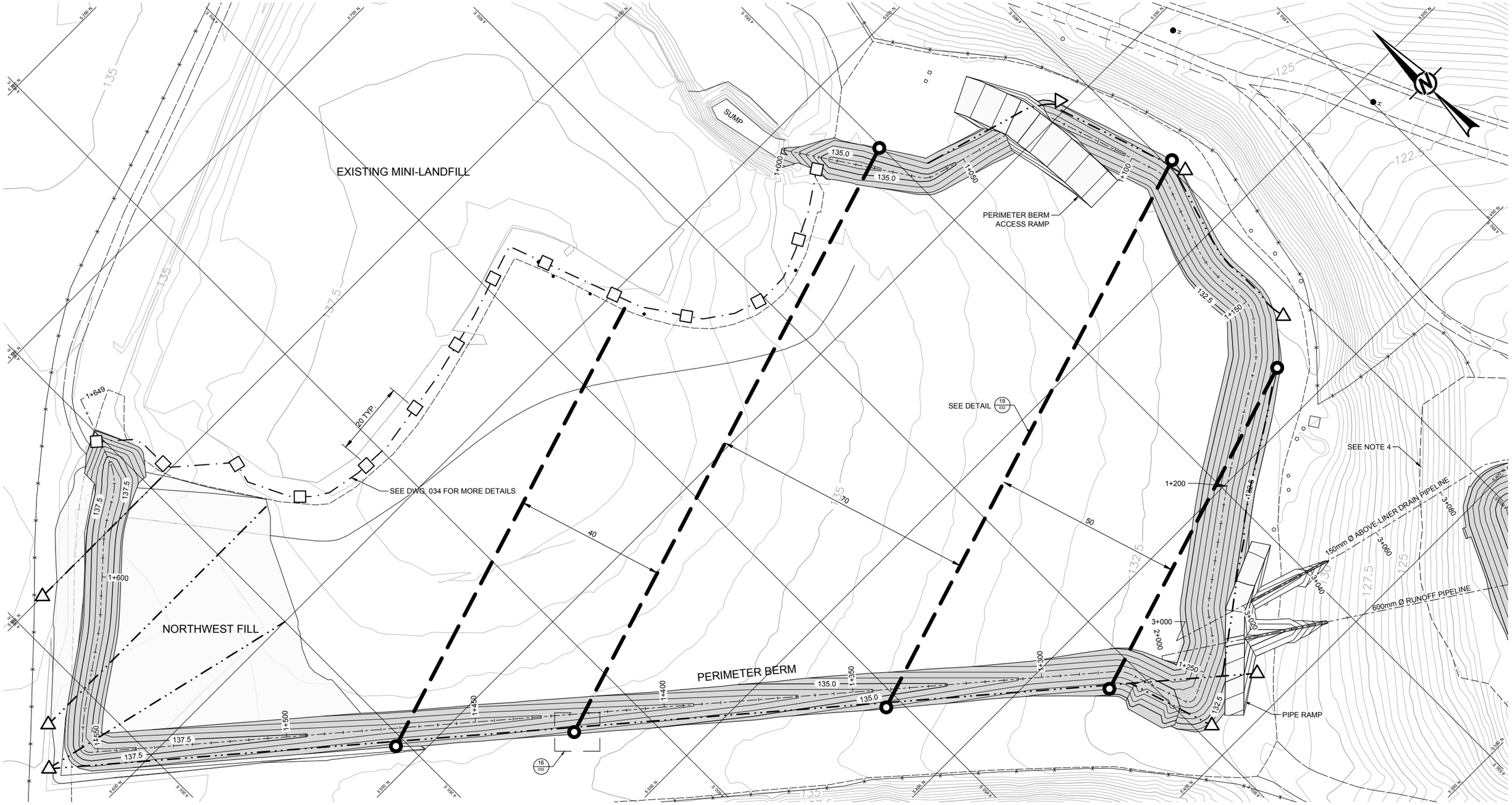
SCALE: AS SHOWN | SPEC. No. | STA. No.

THIRD ANGLE PROJECTION

DRAWN: DT | DWG. No. A1-1-692-018 | REV. 0

CHECKED: CLYW | APPROVED: | APPROVED: | DATE: 31DEC12

ACAD No. D:\N:\Bur-Graphics\Projects\2011\1447-0080\Drafting\5100\Figures\A1-1-692-018.dwg



NOTES

1. ALL DIMENSIONS AND ELEVATIONS ARE IN METRES, UNLESS NOTED OTHERWISE.
2. CONTOURS OF THE MINI-LANDFILL PROVIDED BY CATALYST PAPER CORPORATION ARE IN MILL GRID CO-ORDINATE SYSTEM. THESE CONTOURS WERE TRANSLATED TO THE UTM CO-ORDINATE SYSTEM SO THAT THEY COULD BE COMBINED WITH THE 2006 SURVEY PLAN OF THE EXPANSION AREA (IN UTM CO-ORDINATES) TO CREATE THIS PLAN.
3. PIPE DIAMETERS ARE NOMINAL.
4. CONTOURS OF THE ACTIVE POND AREA WERE SURVEYED BY EMERY & RAE LAND SURVEYING LTD. ON MAY 17, 2012.

REFERENCES

1. CO-ORDINATE SYSTEM IS IN CATALYST'S MILL GRID. SURVEY CONTROL WAS PROVIDED BY EMERY & RAE LAND SURVEYING LTD. ON MARCH 23, 2012. CONVERSION BETWEEN UTM AND CATALYST'S MILL GRIDS HAS AN ACCURACY OF APPROXIMATELY ±0.1m.
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3. EMERY & RAE LAND SURVEYING LTD., CAD FILE: 7-144 Leachate Line Location.dwg, PROVIDED BY CATALYST PAPER CORPORATION ON MARCH 1, 2012.
4. EAGLE MAPPING LTD., PROJECT: 06-130, 1:1000 TOPOGRAPHICAL PLAN, AERIAL PHOTOGRAPH FLOWN ON SEPTEMBER 5, 2006.
5. AGRA EARTH & ENVIRONMENTAL LTD., DRAWING: VE-50514-200 ML-4, DATED: MAY 7, 1996.
6. EMERY & RAE LAND SURVEYING LTD., FILE: 7-155 ACTIVE POND TOPO MAY 17-2012.asc, PROVIDED BY CATALYST PAPER CORPORATION ON MAY 23, 2012.

LEGEND

- EXISTING MINOR CONTOUR
- EXISTING MAJOR CONTOUR
- EXISTING LEACHATE PIPELINE
- EXISTING FENCE
- PROPOSED MINOR CONTOUR
- PROPOSED MAJOR CONTOUR
- PROPOSED TOE
- 100mm Ø PERFORATED PVC PIPE (SCHEDULE 40)
- MINI-LANDFILL LINER TIE-IN DRAIN
- 150mm MULTI-FLOW ON ASPHALT
- MULTI-FLOW DISCHARGE POINT (SEE DWG. 026, NOTE 4)
- EDGE INTERFACE DRAIN
- CLEAN-OUT

ISSUED FOR CONSTRUCTION

0 10 20 30m
1:500

Golder Associates

NO.	DATE	REVISION	DR.	CH.	AP.
0	31DEC12	ISSUED FOR CONSTRUCTION	LCR		
C	25MAY12	ISSUED FOR TENDER	MSH		
B	11MAY12	ISSUED FOR CLIENT APPROVAL	MSH		
A	16APR12	ISSUED FOR CLIENT REVIEW	MSH		

DWG. NO. | REFERENCE | DWG. NO. | REFERENCE | DWG. NO. | REFERENCE

WILDWOOD LANDFILL EXPANSION
BELOW-LINER DRAINAGE LAYOUT PLAN

Catalyst — Powell River Division

R.E.S. No. | W. O. No. | FILE No. 11-1447-0080/5100
SCALE: AS SHOWN | SPEC. No. | STA. No.
DRAWN: MSH
CHECKED: CLYW | APPROVED: | APPROVED:
THIRD ANGLE PROJECTION
DATE: 31DEC12
DWG. No. A1-1-692-019 | REV. 0

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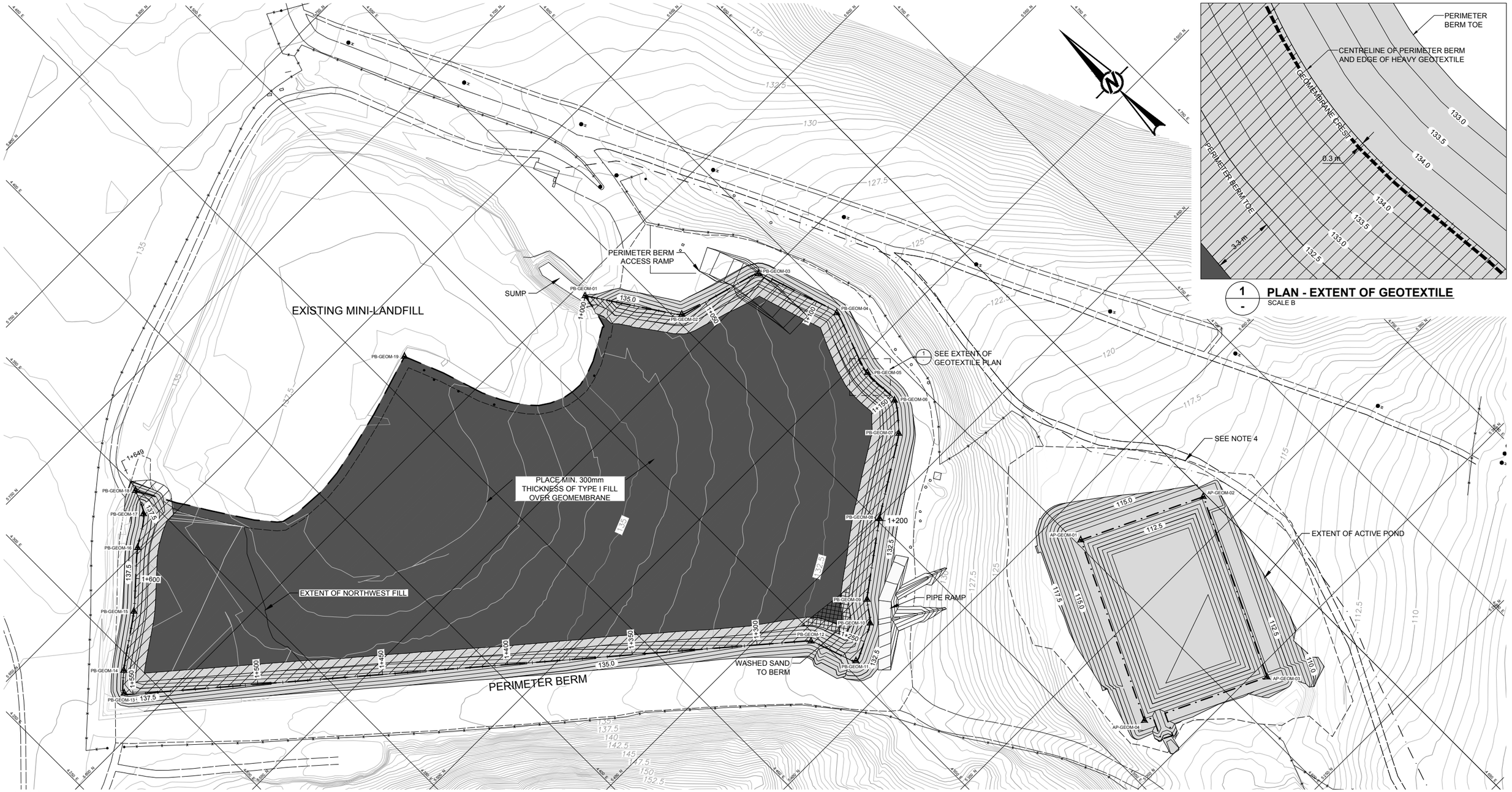

1 - **PLAN - EXTENT OF GEOTEXTILE**
SCALE B

PLAN
SCALE A

LEGEND

- EXISTING MINOR CONTOUR
- EXISTING MAJOR CONTOUR
- EXISTING LEACHATE PIPELINE
- EXISTING FENCE
- CREST OF GEOMEMBRANE (LANDFILL EXPANSION AREA)
- CREST OF GEOMEMBRANE (ACTIVE POND)
- PROPOSED MINOR CONTOUR
- PROPOSED MAJOR CONTOUR
- TYPE I FILL
- 300mm THICK WASHED SAND
- TYPE III FILL
- EXTENT OF HEAVY GEOTEXTILE
- SET-OUT POINT

NOTES

1. ALL DIMENSIONS AND ELEVATIONS ARE IN METRES, UNLESS OTHERWISE NOTED.
2. CONTOURS OF THE MINI-LANDFILL PROVIDED BY CATALYST PAPER CORPORATION ARE IN MILL GRID CO-ORDINATE SYSTEM. THESE CONTOURS WERE TRANSLATED TO THE UTM CO-ORDINATE SYSTEM SO THAT THEY COULD BE COMBINED WITH THE 2006 SURVEY PLAN OF THE EXPANSION AREA (IN UTM CO-ORDINATES) TO CREATE THIS PLAN.
3. MAINTAIN AT LEAST 1.0m OF CONTINUOUSLY EXPOSED GEOMEMBRANE AT THE CREST OF GEOMEMBRANE UNTIL LEAK LOCATION SURVEY IS COMPLETED.
4. CONTOURS OF THE ACTIVE POND AREA WERE SURVEYED BY EMERY & RAE LAND SURVEYING LTD. ON MAY 17, 2012.

REFERENCES

1. CO-ORDINATE SYSTEM IS IN CATALYST'S MILL GRID. SURVEY CONTROL WAS PROVIDED BY EMERY & RAE LAND SURVEYING LTD. ON MARCH 23, 2012. CONVERSION BETWEEN UTM AND CATALYST'S MILL GRIDS HAS AN ACCURACY OF APPROXIMATELY ±0.1m.
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3. EMERY & RAE LAND SURVEYING LTD., CAD FILE: 7-144 Leachate Line Location.dwg, PROVIDED BY CATALYST PAPER CORPORATION ON MARCH 1, 2012.
4. EAGLE MAPPING LTD., PROJECT: 06-130, 1:1000 TOPOGRAPHICAL PLAN, AERIAL PHOTOGRAPH FLOWN ON SEPTEMBER 5, 2006.
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6. EMERY & RAE LAND SURVEYING LTD., FILE: 7-155 ACTIVE POND TOPO MAY 17-2012.asc, PROVIDED BY CATALYST PAPER CORPORATION ON MAY 23, 2012.

LANDFILL EXPANSION AREA CREST OF GEOMEMBRANE SET-OUT POINTS

POINT ID	NORTHING	EASTING	POINT ID	NORTHING	EASTING
PB-GEOM-01	5595.40	4530.89	PB-GEOM-11	5415.87	4504.36
PB-GEOM-02	5562.85	4552.94	PB-GEOM-12	5434.06	4497.18
PB-GEOM-03	5552.68	4585.95	PB-GEOM-13	5613.38	4288.61
PB-GEOM-04	5519.52	4597.15	PB-GEOM-14	5619.94	4294.93
PB-GEOM-05	5493.97	4588.96	PB-GEOM-15	5633.72	4314.42
PB-GEOM-06	5478.51	4588.77	PB-GEOM-16	5650.67	4333.44
PB-GEOM-07	5467.93	4580.61	PB-GEOM-17	5658.59	4344.68
PB-GEOM-08	5449.46	4551.20	PB-GEOM-18	5667.41	4348.91
PB-GEOM-09	5430.05	4524.83	PB-GEOM-19	5629.26	4462.79
PB-GEOM-10	5422.53	4519.01			

FILL TYPES	
TYPE I	CLEAN SAND
TYPE II	20mm MINUS CRUSHED ROAD BASE
TYPE III	75mm MINUS SAND AND GRAVEL
TYPE IV	STRUCTURAL FILL

ISSUED FOR CONSTRUCTION

SCALE A: 0, 15, 30, 45m
SCALE B: 0, 2, 4, 6m

Golder Associates

NO.	DATE	REVISION	DR.	CH.	AP.
0	31DEC12	ISSUED FOR CONSTRUCTION	LCR		
C	29MAY12	ISSUED FOR TENDER	MSH		
B	11MAY12	ISSUED FOR CLIENT APPROVAL	MSH		
A	16APR12	ISSUED FOR CLIENT REVIEW	MSH		

DWG. NO.	REFERENCE
###	###

WILDWOOD LANDFILL EXPANSION
EXTENT OF GEOMEMBRANE PLAN

Catalyst — Powell River Division

R.E.S. No. | W. O. No. | FILE No. 11-1447-0080/5100
SCALE: AS SHOWN | SPEC. No. | STA. No.
THIRD ANGLE PROJECTION
DRAWN: MSH
CHECKED: CLYW | APPROVED: | APPROVED:
DATE: 31DEC12
DWG. No. A1-1-692-020 | REV. 0

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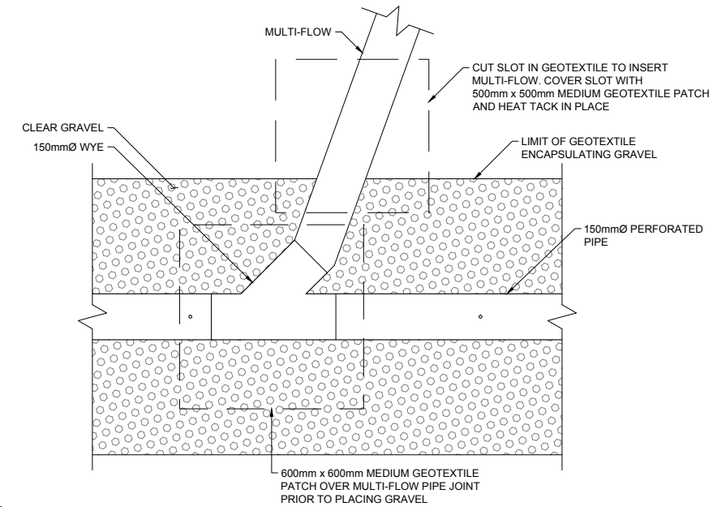

2 / - PLAN - ABOVE-LINER MULTI-FLOW TO PERFORATED PIPE CONNECTION
NOT TO SCALE - SCHEMATIC ONLY

LEGEND

- EXISTING MINOR CONTOUR
- EXISTING MAJOR CONTOUR
- EXISTING LEACHATE PIPELINE
- EXISTING FENCE
- 100mmØ HDPE PERFORATED LEACHATE PIPELINE (DR17)
- 150mmØ HDPE PERFORATED LEACHATE PIPELINE (DR17)
- 150mm MULTI-FLOW
- AREA COVERED WITH GEONET/GEOTEXTILE
- 150mm HDPE BLIND FLANGE (DR17)

NOTES

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2. CONTOURS OF THE MINI-LANDFILL PROVIDED BY CATALYST PAPER CORPORATION ARE IN MILL GRID CO-ORDINATE SYSTEM. THESE CONTOURS WERE TRANSLATED TO THE UTM CO-ORDINATE SYSTEM SO THAT THEY COULD BE COMBINED WITH THE 2006 SURVEY PLAN OF THE EXPANSION AREA (IN UTM CO-ORDINATES) TO CREATE THIS PLAN.
3. PIPE DIAMETERS ARE NOMINAL.
4. SPACING IS CENTRE-TO-CENTRE BETWEEN PIPES, AND CENTRE-TO-CENTRE BETWEEN MULTI-FLOW DRAINAGE MEDIA.
5. MULTI-FLOW SHALL BE INSTALLED HORIZONTALLY. SEE DWG 032 FOR DETAILS.
6. CONTOURS OF THE ACTIVE POND AREA WERE SURVEYED BY EMERY & RAE LAND SURVEYING LTD. ON MAY 17, 2012.

REFERENCES

1. CO-ORDINATE SYSTEM IS IN CATALYST'S MILL GRID. SURVEY CONTROL WAS PROVIDED BY EMERY & RAE LAND SURVEYING LTD. ON MARCH 23, 2012. CONVERSION BETWEEN UTM AND CATALYST'S MILL GRIDS HAS AN ACCURACY OF APPROXIMATELY ±0.1m.
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5. AGRA EARTH & ENVIRONMENTAL LTD., DRAWING: VE-50514-200 ML-4, DATED: MAY 7, 1996.
6. EMERY & RAE LAND SURVEYING LTD., FILE: 7-155 ACTIVE POND TOPO MAY 17-2012.asc, PROVIDED BY CATALYST PAPER CORPORATION ON MAY 23, 2012.

ISSUED FOR CONSTRUCTION

SCALE IN METERS: 0, 15, 30, 45m

Golder Associates

NO.	DATE	REVISION	DR.	CH.	AP.
0	31DEC12	ISSUED FOR CONSTRUCTION	LCR		
C	25MAY12	ISSUED FOR TENDER	MSH		
B	11MAY12	ISSUED FOR CLIENT APPROVAL	MSH		
A	16APR12	ISSUED FOR CLIENT REVIEW	MSH		

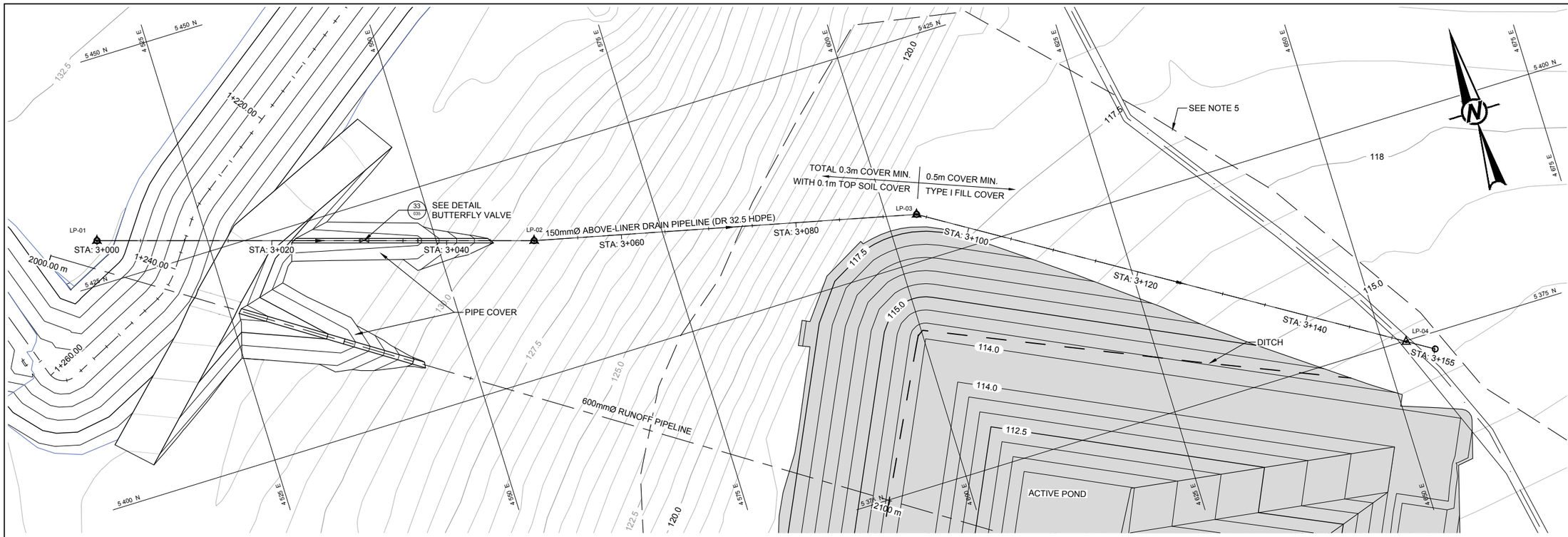
DWG. NO. / REFERENCE: ### / ###

WILDWOOD LANDFILL EXPANSION
ABOVE-LINER DRAINAGE LAYOUT PLAN

Catalyst — Powell River Division

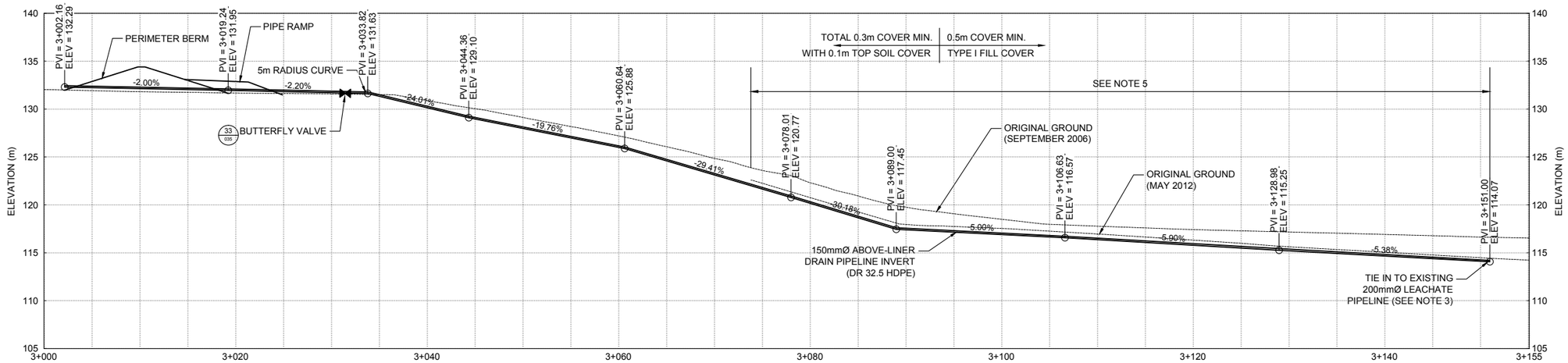
R.E.S. No. | W. O. No. | FILE No. 11-1447-0080/5100
SCALE: AS SHOWN | SPEC. No. | STA. No.
DRAWN: MSH
CHECKED: CLYW | APPROVED: | APPROVED:
DATE: 31DEC12
THIRD ANGLE PROJECTION
DWG. No. A1-1-692-021 | REV. 0

ACAD No. N:\Bur-Graphics\Projects\2011\1447\11-1447-0080\Drafting\5100\Figures\A1-1-692-021.dwg



PLAN
SCALE AS SHOWN

LEACHATE PIPELINE SET-OUT POINTS		
POINT ID	NORTHING	EASTING
LP-01	5429.95	4512.92
LP-02	5415.25	4560.71
LP-03	5405.26	4603.39
LP-04	5374.88	4652.62



PROFILE
SCALE AS SHOWN

LEGEND

- EXISTING MINOR CONTOUR
- EXISTING MAJOR CONTOUR
- PROPOSED MINOR CONTOUR
- PROPOSED MAJOR CONTOUR
- EXISTING LEACHATE PIPELINE

NOTES

1. ALL DIMENSIONS AND ELEVATIONS ARE IN METRES, UNLESS NOTED OTHERWISE.
2. CONTOURS OF THE MINI-LANDFILL PROVIDED BY CATALYST PAPER CORPORATION ARE IN MILL GRID CO-ORDINATE SYSTEM. THESE CONTOURS WERE TRANSLATED TO THE UTM CO-ORDINATE SYSTEM SO THAT THEY COULD BE COMBINED WITH THE 2006 SURVEY PLAN OF THE EXPANSION AREA (IN UTM CO-ORDINATES) TO CREATE THIS PLAN.
3. ELEVATION OF THE TIE-IN TO THE EXISTING LEACHATE PIPELINE TO BE CONFIRMED AT THE SITE BY THE CONTRACTOR BEFORE THE ABOVE-LINER DRAIN PIPELINE IS CONNECTED.
4. PIPE DIAMETERS ARE NOMINAL.
5. CONTOURS OF THE ACTIVE POND AREA WERE SURVEYED BY EMERY & RAE LAND SURVEYING LTD. ON MAY 17, 2012.

REFERENCES

1. CO-ORDINATE SYSTEM IS IN CATALYST'S MILL GRID. SURVEY CONTROL WAS PROVIDED BY EMERY & RAE LAND SURVEYING LTD. ON MARCH 23, 2012. CONVERSION BETWEEN UTM AND CATALYST'S MILL GRIDS HAS AN ACCURACY OF APPROXIMATELY ±0.1m.
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ISSUED FOR CONSTRUCTION

Golder Associates

NO.	DATE	REVISION	DR.	CH.	AP.
0	31DEC'12	ISSUED FOR CONSTRUCTION	LCR		
C	25MAY'12	ISSUED FOR TENDER	MSH		
B	11MAY'12	ISSUED FOR CLIENT APPROVAL	MSH		
A	16APR'12	ISSUED FOR CLIENT REVIEW	MSH		

DWG. NO. | REFERENCE | DWG. NO. | REFERENCE | DWG. NO. | REFERENCE

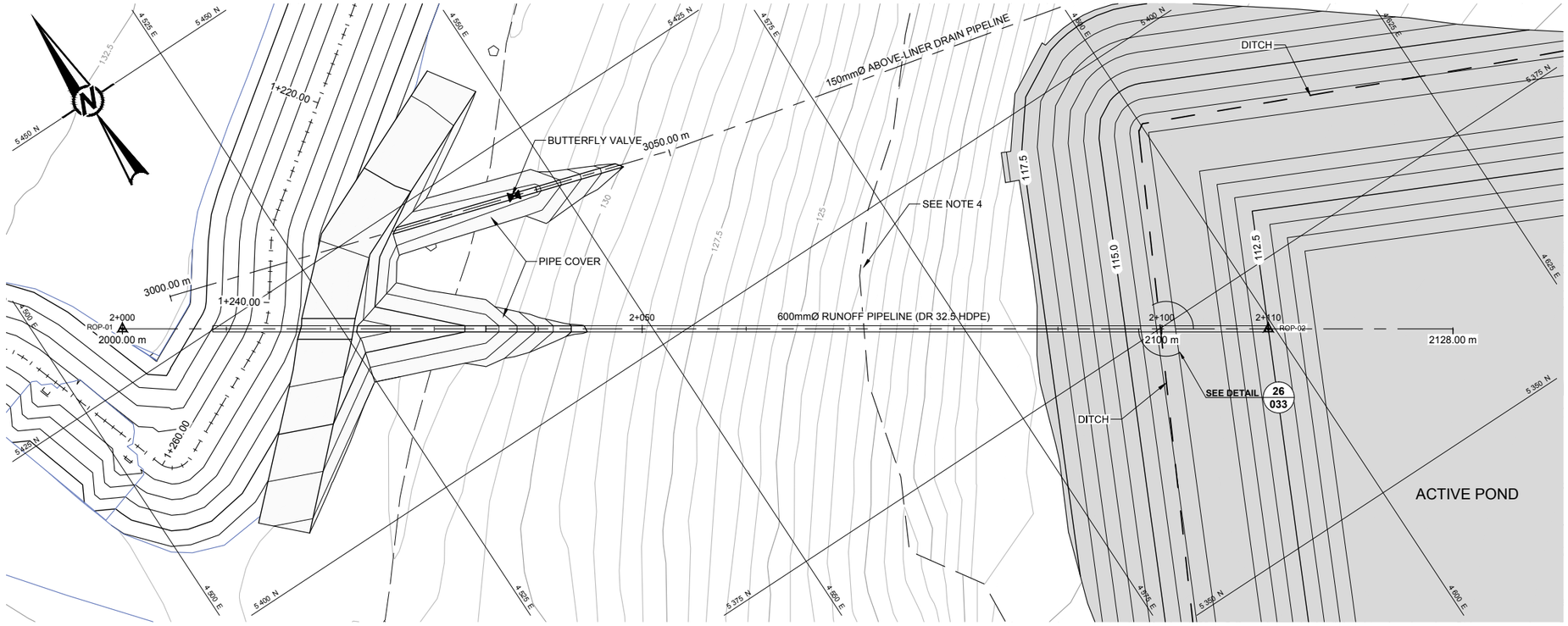
WILDWOOD LANDFILL EXPANSION
ABOVE-LINER PIPELINE PLAN – PROFILE

Catalyst — Powell River Division

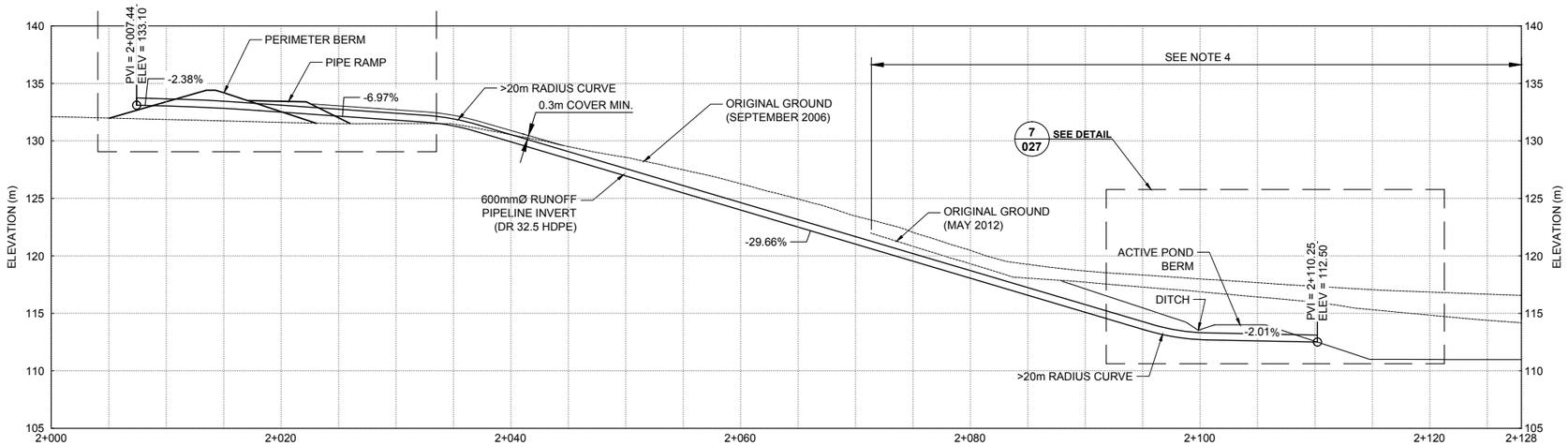
DRAWN: MSH | SCALE: AS SHOWN | CHECKED: CLYW | APPROVED: | APPROVED: | DATE: 31DEC'12

R.E.S. No. | W. O. No. | FILE No. 11-1447-0080/5100 | SPEC. No. | STA. No. | THIRD ANGLE PROJECTION | DWG. No. A1-1-692-022 | REV. 0

ACAD No. N:\Bur-Graphics\Projects\2011\1447\11-1447-0080\Drafting\5100\Figures\A1-1-692-022.dwg



PLAN
SCALE AS SHOWN



PROFILE
SCALE AS SHOWN

LEGEND

- EXISTING MINOR CONTOUR
- EXISTING MAJOR CONTOUR
- PROPOSED MINOR CONTOUR
- PROPOSED MAJOR CONTOUR

NOTES

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RUNOFF PIPELINE SET-OUT POINTS		
POINT ID	NORTHING	EASTING
ROP-01	5429.85	4507.36
ROP-02	5369.24	4599.45

ISSUED FOR CONSTRUCTION

Golder Associates

NO.	DATE	REVISION	DR.	CH.	AP.
0	31DEC12	ISSUED FOR CONSTRUCTION	LCR		
C	25MAY12	ISSUED FOR TENDER	MSH		
B	11MAY12	ISSUED FOR CLIENT APPROVAL	MSH		
A	16APR12	ISSUED FOR CLIENT REVIEW	MSH		

WILDWOOD LANDFILL EXPANSION
RUNOFF PIPELINE PLAN – PROFILE

Catalyst — Powell River Division

R.E.S. No. | W. O. No. 11-1447-0080/5100 | FILE No.
SCALE: AS SHOWN | SPEC. No. | STA. No.
DRAWN: MSH | THIRD ANGLE PROJECTION | DWG. No. A1-1-692-023 | REV. 0
CHECKED: CLYW | APPROVED: | APPROVED: | DATE: 31DEC12

DWG. NO.	REFERENCE	DWG. NO.	REFERENCE	DWG. NO.	REFERENCE
###	###				

ACAD No. N:\Bur-Graphics\Projects\2011\1447\11-1447-0080\Drafting\5100\Figures\A1-1-692-023.dwg

ACTIVE POND GEOMEMBRANE SET-OUT POINTS			
POINT ID	NORTHING	EASTING	EL.
AP-001	5385.56	4602.26	114.00
AP-002	5363.79	4647.83	114.00
AP-003	5363.36	4648.73	114.00
AP-004	5296.12	4615.49	114.00
AP-005	5295.69	4616.40	114.00
AP-006	5317.89	4569.93	114.00
AP-007	5316.60	4572.63	114.00
AP-008	5317.31	4574.63	113.50
AP-009	5316.44	4576.44	113.50
AP-010	5314.44	4577.15	114.00
AP-011	5310.52	4575.27	114.00
AP-012	5309.81	4573.27	113.50
AP-013	5310.67	4571.47	113.50
AP-014	5312.67	4570.76	114.00
AP-015	5373.56	4606.50	111.00
AP-016	5368.11	4617.63	110.96
AP-017	5363.44	4615.00	110.91
AP-018	5354.79	4632.85	110.79
AP-019	5311.18	4610.21	110.50
AP-020	5322.89	4583.74	110.80

LEGEND

- EXISTING MINOR CONTOUR
- EXISTING MAJOR CONTOUR
- PROPOSED MINOR CONTOUR
- PROPOSED MAJOR CONTOUR
- PROPOSED CREST
- PROPOSED TOE
- PROPOSED DITCH
- EXISTING LEACHATE PIPELINE
- EXISTING FENCE
- GROUNDWATER SAMPLING LOCATION
- MONITORING WELL TO BE DECOMMISSIONED

NOTES

1. ALL DIMENSIONS AND ELEVATIONS ARE IN METRES, UNLESS NOTED OTHERWISE.
2. CONTOURS OF THE MINI-LANDFILL PROVIDED BY CATALYST PAPER CORPORATION ARE IN MILL GRID CO-ORDINATE SYSTEM. THESE CONTOURS WERE TRANSLATED TO THE UTM CO-ORDINATE SYSTEM SO THAT THEY COULD BE COMBINED WITH THE 2006 SURVEY PLAN OF THE EXPANSION AREA (IN UTM CO-ORDINATES) TO CREATE THIS PLAN.
3. PIPE DIAMETERS ARE NOMINAL.
4. MONITORING WELL LOCATIONS ARE APPROXIMATE.
5. CONTOURS OF THE ACTIVE POND AREA WERE SURVEYED BY EMERY & RAE LAND SURVEYING LTD. ON MAY 17, 2012.

REFERENCES

1. CO-ORDINATE SYSTEM IS IN CATALYST'S MILL GRID. SURVEY CONTROL WAS PROVIDED BY EMERY & RAE LAND SURVEYING LTD. ON MARCH 23, 2012. CONVERSION BETWEEN UTM AND CATALYST'S MILL GRIDS HAS AN ACCURACY OF APPROXIMATELY ±0.1m.
2. EMERY & RAE LAND SURVEYING LTD., CAD FILE: 7-123_JAN3-08_MODEL.dwg, PROVIDED BY CATALYST PAPER CORPORATION ON JANUARY 14, 2008.
3. EMERY & RAE LAND SURVEYING LTD., CAD FILE: 7-144 Leachate Line Location.dwg, PROVIDED BY CATALYST PAPER CORPORATION ON MARCH 1, 2012.
4. EAGLE MAPPING LTD., PROJECT: 06-130, 1:1000 TOPOGRAPHICAL PLAN, AERIAL PHOTOGRAPH FLOWN ON SEPTEMBER 5, 2006.
5. AGRA EARTH & ENVIRONMENTAL LTD., DRAWING: VE-50514-200 ML-4, DATED: MAY 7, 1996.
6. EMERY & RAE LAND SURVEYING LTD., FILE: 7-155 ACTIVE POND TOPO MAY 17-2012.asc, PROVIDED BY CATALYST PAPER CORPORATION ON MAY 23, 2012.

ISSUED FOR CONSTRUCTION

SCALE IN METERS 0 5 10 15m

Golder Associates

NO.	DATE	REVISION	DR.	CH.	AP.
0	31DEC12	ISSUED FOR CONSTRUCTION	LCR		
C	18OCT12	ISSUED FOR TENDER(STAKE-OUT PURPOSE ONLY)	LCR		
B	11MAY12	ISSUED FOR CLIENT APPROVAL	MSH		
A	16APR12	ISSUED FOR CLIENT REVIEW	MSH		

WILDWOOD LANDFILL EXPANSION

ACTIVE POND DESIGN PLAN

Catalyst — Powell River Division

R.E.S. No. | W. O. No. | FILE No. 11-1447-0080/5100

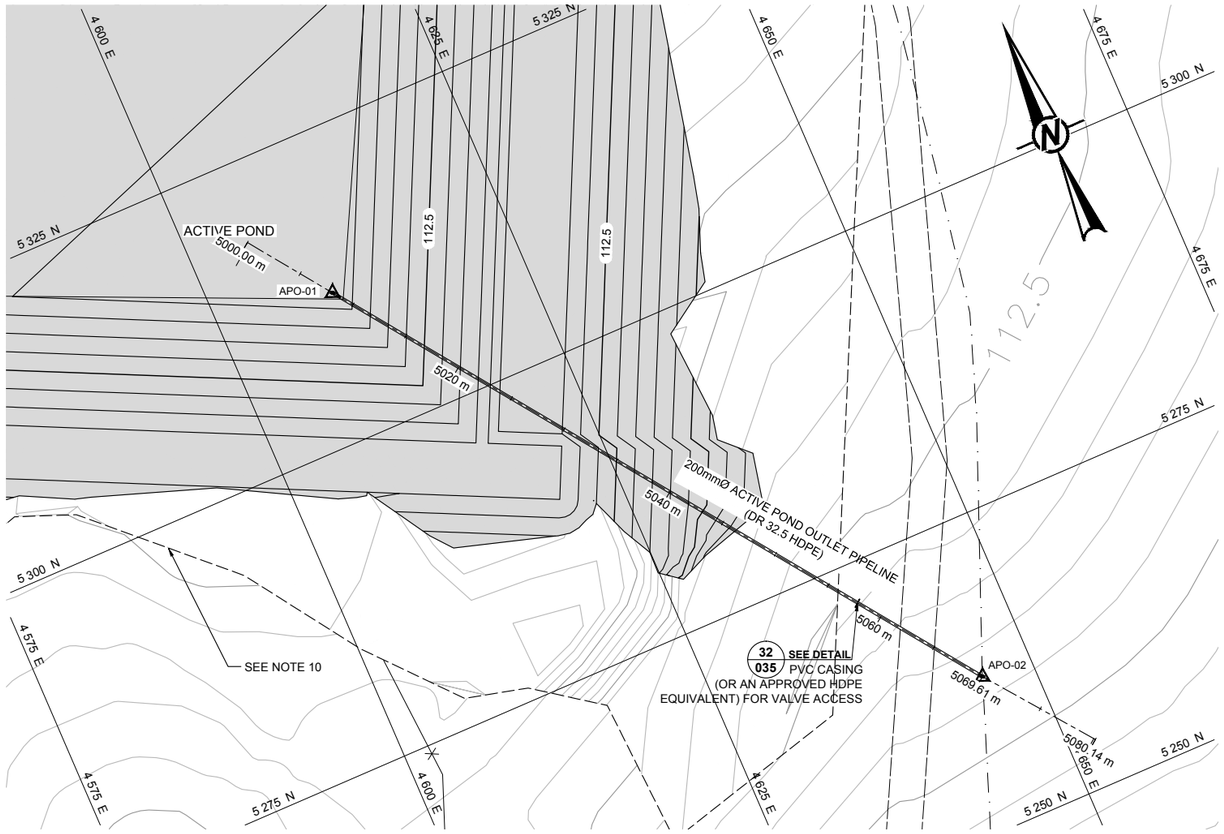
SCALE: AS SHOWN | SPEC. No. | STA. No.

THIRD ANGLE PROJECTION

DRAWN: MSH | DWG. No. | REV.

CHECKED: CLYW | APPROVED: | APPROVED: | DATE: 31DEC12 | A1-1-692-024 | 0

ACAD No.N:\Bur-Graphics\Projects\2011\1447\11-1447-0080\Drafting\5100\Figures\A1-1-692-024.dwg



PLAN
SCALE A

ACTIVE POND OUTLET PIPELINE SET-OUT POINTS		
POINT ID	NORTHING	EASTING
APO-01	5311.99	4609.62
APO-02	5262.23	4645.84

LEGEND

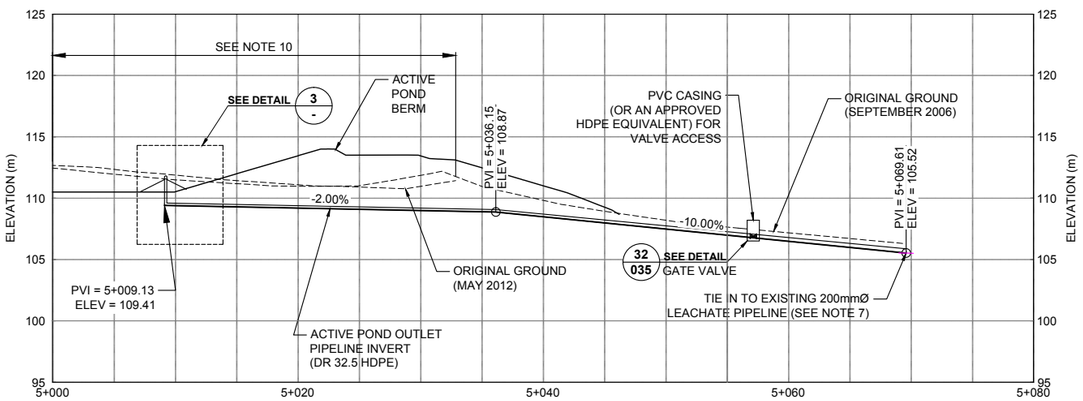
- EXISTING MINOR CONTOUR
- EXISTING MAJOR CONTOUR
- EXISTING LEACHATE PIPELINE
- PROPOSED MINOR CONTOUR
- PROPOSED MAJOR CONTOUR

NOTES

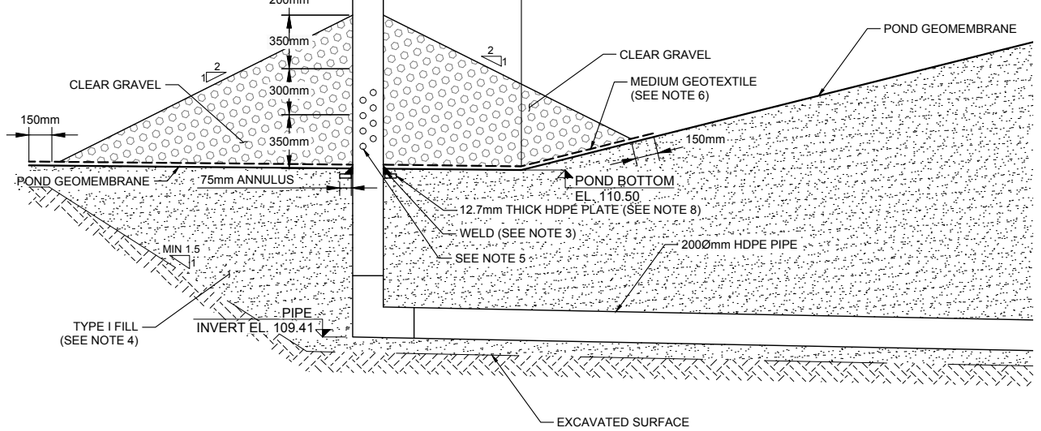
1. ALL DIMENSIONS AND ELEVATIONS ARE IN METRES, UNLESS OTHERWISE NOTED.
2. CONTOURS OF THE MINI-LANDFILL PROVIDED BY CATALYST PAPER CORPORATION ARE IN MILL GRID CO-ORDINATE SYSTEM. THESE CONTOURS WERE TRANSLATED TO THE UTM CO-ORDINATE SYSTEM SO THAT THEY COULD BE COMBINED WITH THE 2006 SURVEY PLAN OF THE EXPANSION AREA (IN UTM CO-ORDINATES) TO CREATE THIS PLAN.
3. PIPE PENETRATION BOOT SHALL CONSIST OF A 12.7mm THICK ANNULUS PLATE WELDED TO THE PIPE AND MAIN POND GEOMEMBRANE SHEET.
4. TYPE I FILL FOR 200mm DIAMETER PIPE PENETRATION SHALL BE PLACED IN 150mm THICK LIFTS AND COMPACTED TO 100% OF STANDARD PROCTOR MAXIMUM DRY DENSITY.
5. DRILL 12 COLUMNS OF FOUR 12.7mm DIAMETER HOLES AT 100mm SPACING. STAGGER HOLE LOCATIONS SUCH THAT HOLE ON ONE SIDE OF PIPE IS 50mm ABOVE OTHER SIDE. THE BOTTOM MOST HOLE SHALL BE 25mm ABOVE POND GEOMEMBRANE ELEVATION.
6. GEOTEXTILE ON POND GEOMEMBRANE SHALL BE ONE PIECE WITH A HOLE CUT IN THE CENTRE FOR THE 200mm DIAMETER PIPE.
7. ELEVATION OF TIE-IN TO THE EXISTING LEACHATE PIPELINE TO BE CONFIRMED AT THE SITE BY THE CONTRACTOR BEFORE THE ACTIVE POND OUTLET PIPELINE IS CONNECTED.
8. BEVEL THE OUTSIDE EDGE OF HDPE PLATE AT 30 DEGREES. PLACE HDPE ANNULUS PLATE IN FIRM CONTACT WITH TYPE I FILL. THEN WELD THE PLATE TO PIPE.
9. PIPE DIAMETERS ARE NOMINAL.
10. CONTOURS OF THE ACTIVE POND AREA WERE SURVEYED BY EMERY & RAE LAND SURVEYING LTD. ON MAY 17, 2012.

REFERENCES

1. CO-ORDINATE SYSTEM IS IN CATALYST'S MILL GRID. SURVEY CONTROL WAS PROVIDED BY EMERY & RAE LAND SURVEYING LTD. ON MARCH 23, 2012. CONVERSION BETWEEN UTM AND CATALYST'S MILL GRIDS HAS AN ACCURACY OF APPROXIMATELY ±0.1m.
2. EMERY & RAE LAND SURVEYING LTD., CAD FILE: 7-123_JAN3-08_MODEL.dwg, PROVIDED BY CATALYST PAPER CORPORATION ON JANUARY 14, 2008.
3. EMERY & RAE LAND SURVEYING LTD., CAD FILE: 7-144 Leachate Line Location.dwg, PROVIDED BY CATALYST PAPER CORPORATION ON MARCH 1, 2012.
4. EAGLE MAPPING LTD., PROJECT: 06-130, 1:1000 TOPOGRAPHICAL PLAN, AERIAL PHOTOGRAPH FLOWN ON SEPTEMBER 5, 2006.
5. AGRA EARTH & ENVIRONMENTAL LTD., DRAWING: VE-50514-200 ML-4, DATED: MAY 7, 1996.
6. EMERY & RAE LAND SURVEYING LTD., FILE: 7-155 ACTIVE POND TOPO MAY 17-2012.asc, PROVIDED BY CATALYST PAPER CORPORATION ON MAY 23, 2012.



PROFILE
SCALE A



3 - DETAIL - ACTIVE POND OUTLET
SCALE B

FILL TYPES	
TYPE I	CLEAN SAND
TYPE II	20mm MINUS CRUSHED ROAD BASE
TYPE III	75mm MINUS SAND AND GRAVEL
TYPE IV	STRUCTURAL FILL

0 5 10 15m
SCALE A IN METRES

0 400 800 1,200mm
SCALE B IN MILLIMETRES

ISSUED FOR CONSTRUCTION

Golder Associates

NO.	DATE	REVISION	DR.	CH.	AP.
0	31DEC12	ISSUED FOR CONSTRUCTION	LCR		
C	25MAY12	ISSUED FOR TENDER	MSH		
B	11MAY12	ISSUED FOR CLIENT APPROVAL	MSH		
A	16APR12	ISSUED FOR CLIENT REVIEW	MSH		

WILDWOOD LANDFILL EXPANSION
ACTIVE POND OUTLET PIPELINE PLAN – PROFILE

Catalyst — Powell River Division

R.E.S. No. | W. O. No. | FILE No. 11-1447-0080/5100 | SPEC. No. | STA. No.

SCALE: AS SHOWN | DRAWN: MSH | CHECKED: CLYW | APPROVED: | APPROVED:

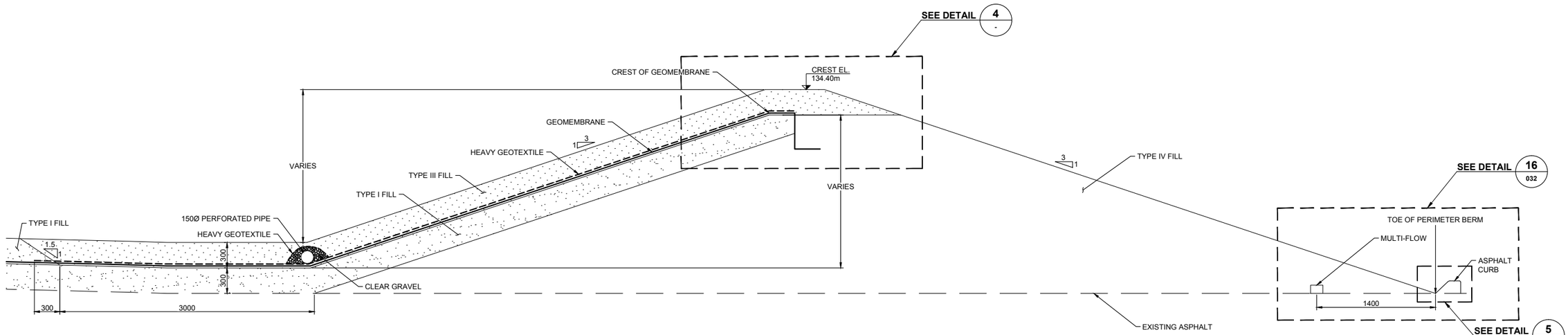
THIRD ANGLE PROJECTION

DATE: 31DEC12

DWG. No. A1-1-692-025 | REV. 0

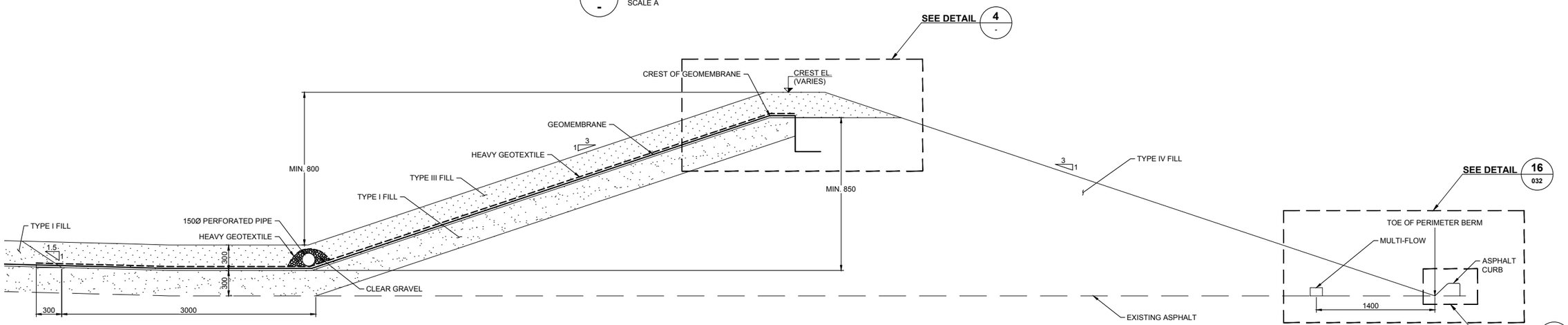
DWG. NO.	REFERENCE	DWG. NO.	REFERENCE	DWG. NO.	REFERENCE
###	###				

ACAD No. N:\Bur-Graphics\Projects\2011\1447\11-1447-0080\Drafting\5100\Figures\A1-1-692-025.dwg



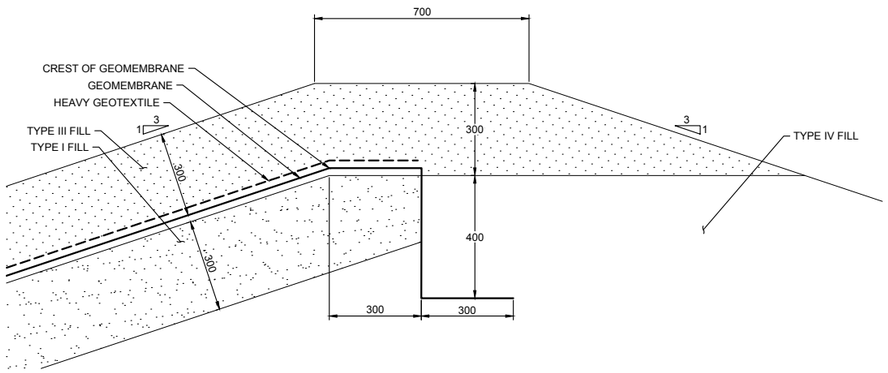
A - TYPICAL CROSS-SECTION - ELEVATION-CONTROLLED BERM

SCALE A



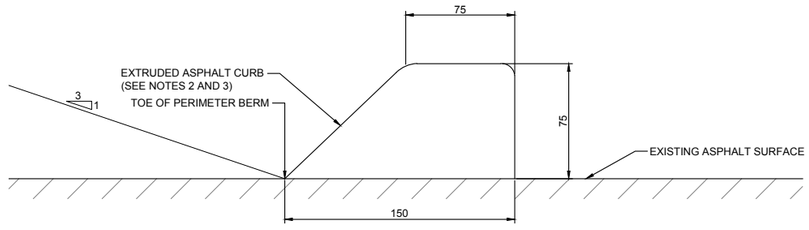
B - TYPICAL CROSS-SECTION - HEIGHT-CONTROLLED BERM

SCALE A



4 - TYPICAL DETAIL - GEOMEMBRANE ANCHOR TRENCH

SCALE B



5 - TYPICAL DETAIL - EXTRUDED ASPHALT CURB

NOT TO SCALE - SCHEMATIC ONLY

ISSUED FOR CONSTRUCTION

NOTES

1. ALL DIMENSIONS ARE IN MILLIMETRES, UNLESS OTHERWISE NOTED.
2. PREPARE SURFACE FOR EXTRUDED ASPHALT CURB BY CLEANING SURFACE OF ALL DIRT AND LOOSE MATERIALS IN ACCORDANCE WITH MMCD SECTION 32 01 11. APPLY AN ASPHALT TACK COAT TO CLEANED SURFACE THAT MEETS MMCD SECTION 32 12 13.1.
3. ASPHALT CONCRETE FOR EXTRUDED ASPHALT CURB SHALL CONFORM WITH MMCD SECTION 31 12 16.
4. LEAVE 200mm WIDE GAP IN ASPHALT CURB WHERE MULTI-FLOW DISCHARGES OUT OF THE BERM.
5. PIPE DIAMETERS ARE NOMINAL.

FILL TYPES	
TYPE I	CLEAN SAND
TYPE II	20mm MINUS CRUSHED ROAD BASE
TYPE III	75mm MINUS SAND AND GRAVEL
TYPE IV	STRUCTURAL FILL

0 500 1,000 1,500mm
SCALE A
0 200 400 600mm
SCALE B

Golder Associates

DWG. NO.	REFERENCE	DWG. NO.	REFERENCE	DWG. NO.	REFERENCE
###	###				

NO.	DATE	REVISION	DR.	CH.	AP.
0	31DEC12	ISSUED FOR CONSTRUCTION	LCR		
C	25MAY12	ISSUED FOR TENDER	MSH		
B	11MAY12	ISSUED FOR CLIENT APPROVAL	MSH		
A	16APR12	ISSUED FOR CLIENT REVIEW	MSH		

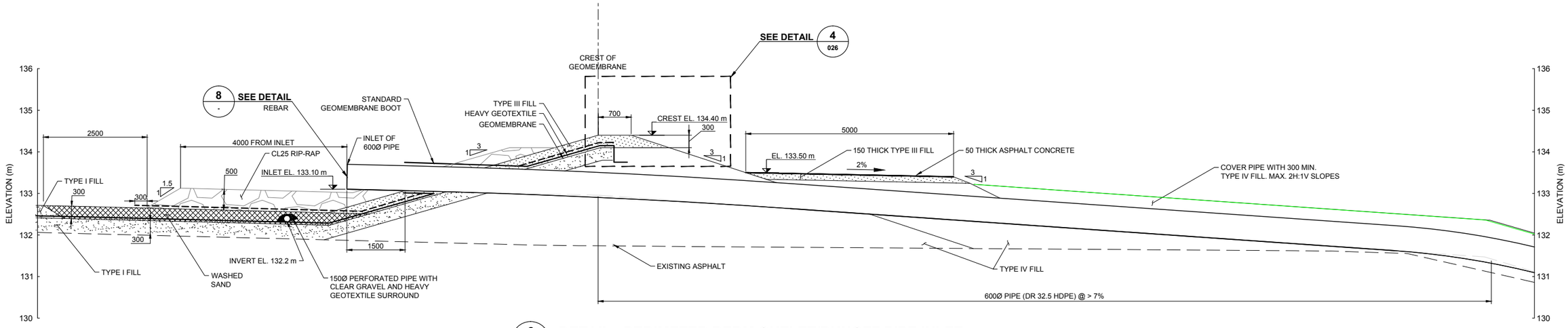
WILDWOOD LANDFILL EXPANSION
TYPICAL PERIMETER BERM DETAILS

SCALE: AS SHOWN
DRAWN: MSH
CHECKED: CLYW
APPROVED:
APPROVED:

Catalyst — Powell River Division

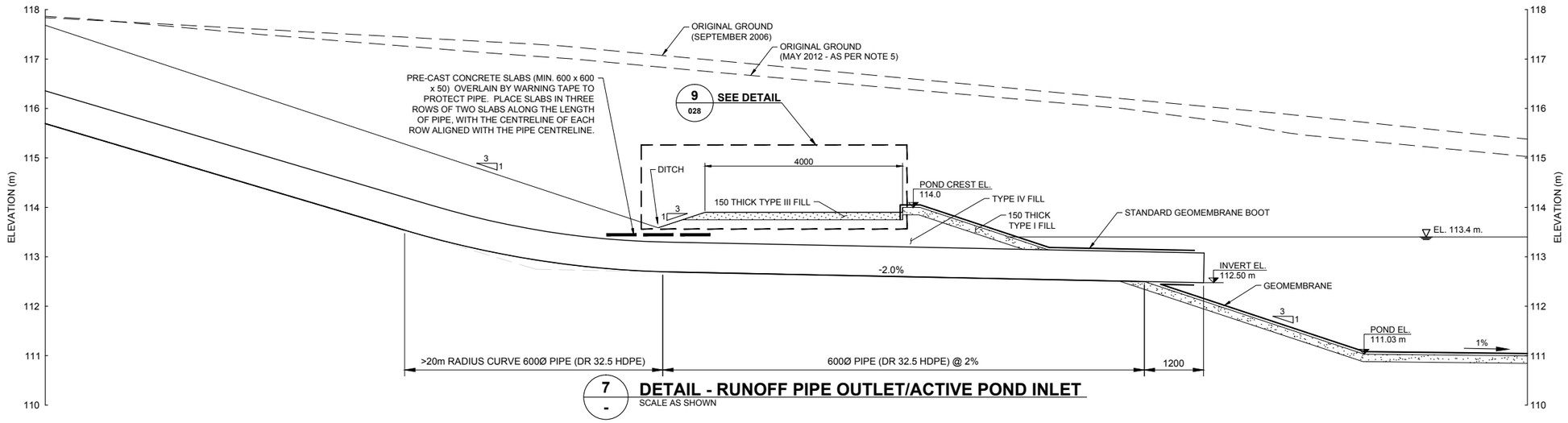
R.E.S. No.
W. O. No.
FILE No. 11-1447-0080/5100
SPEC. No.
STA. No.
THIRD ANGLE PROJECTION
DWG. No. A1-1-692-026
REV: 0
DATE: 31DEC12

ACAD No. N:\Bur-Graphics\Projects\2011\1447\11-1447-0080\Drafting\5100\Figures\A1-1-692-026.dwg



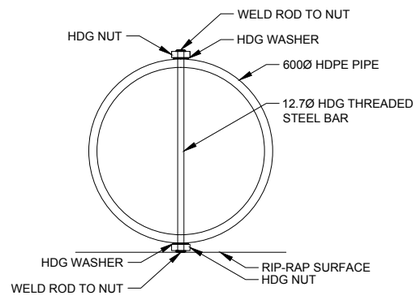
6 - DETAIL - PERIMETER BERM OUTLET/RUNOFF PIPE INLET

SCALE AS SHOWN



7 - DETAIL - RUNOFF PIPE OUTLET/ACTIVE POND INLET

SCALE AS SHOWN



8 - DETAIL - REBAR AT 600Ø PIPE INLET

NOT TO SCALE - SCHEMATIC ONLY

NOTES

1. ALL DIMENSIONS ARE IN MILLIMETRES, UNLESS OTHERWISE NOTED.
2. PIPE DIAMETERS ARE NOMINAL.
3. HDG - HOT DIPPED GALVANIZED.
4. REBAR SHALL BE DRILLED 150mm FROM THE INLET OF 600 ø PIPE.
5. CONTOURS OF THE ACTIVE POND AREA WERE SURVEYED BY EMERY & RAE LAND SURVEYING LTD. ON MAY 17, 2012.

REFERENCES

1. EMERY & RAE LAND SURVEYING LTD., CAD FILE: 7-123_JAN3-08_MODEL.dwg, PROVIDED BY CATALYST PAPER CORPORATION ON JANUARY 14, 2008.
2. EAGLE MAPPING LTD., PROJECT: 06-130, 1:1000 TOPOGRAPHICAL PLAN, AERIAL PHOTOGRAPH FLOWN ON SEPTEMBER 5, 2006.
3. AGRA EARTH & ENVIRONMENTAL LTD., DRAWING: VE-50514-200 ML-4, DATED: MAY 7, 1996.
4. EMERY & RAE LAND SURVEYING LTD., FILE: 7-155 ACTIVE POND TOPO MAY 17-2012.asc, PROVIDED BY CATALYST PAPER CORPORATION ON MAY 23, 2012.

FILL TYPES	
TYPE I	CLEAN SAND
TYPE II	20mm MINUS CRUSHED ROAD BASE
TYPE III	75mm MINUS SAND AND GRAVEL
TYPE IV	STRUCTURAL FILL

ISSUED FOR CONSTRUCTION

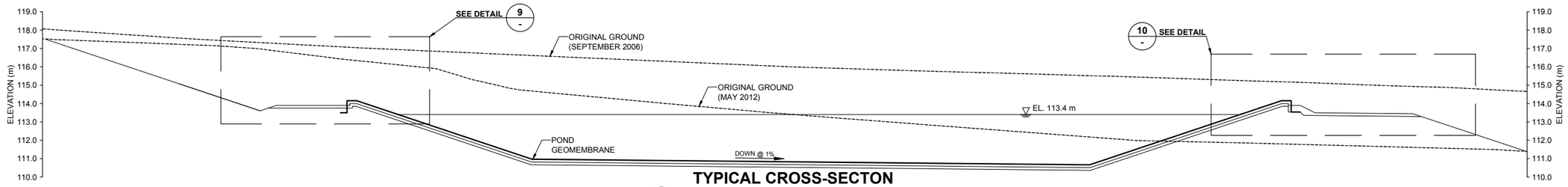
NO.	DATE	REVISION	DR.	CH.	AP.
0	31DEC12	ISSUED FOR CONSTRUCTION	LCR		
C	25MAY12	ISSUED FOR TENDER	MSH		
B	11MAY12	ISSUED FOR CLIENT APPROVAL	MSH		
A	16APR12	ISSUED FOR CLIENT REVIEW	MSH		

WILDWOOD LANDFILL EXPANSION
RUNOFF PIPE INLET AND OUTLET DETAILS

Catalyst — Powell River Division

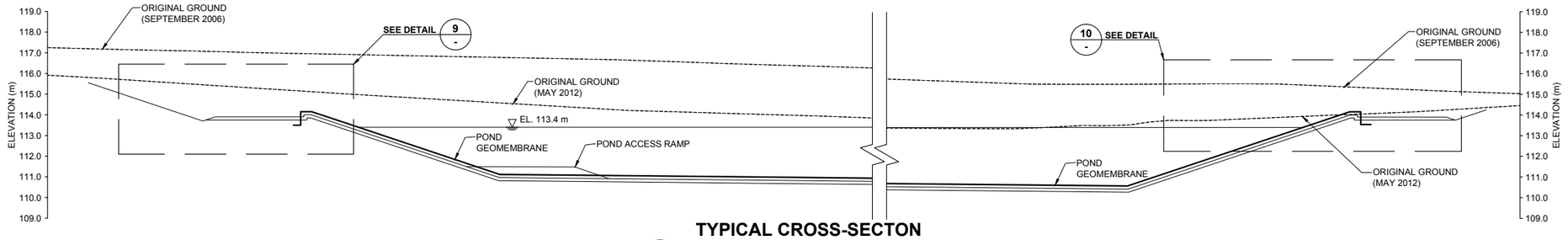
R.E.S. No. | W. O. No. | FILE No. 11-1447-0080/5100
SPEC. No. | STA. No.
SCALE: AS SHOWN
DRAWN: MSH
CHECKED: CLYW | APPROVED: | APPROVED:
DATE: 31DEC12
THIRD ANGLE PROJECTION
DWG. No. A1-1-692-027
REV. 0

ACAD No. N:\Bur-Graphics\Projects\2011\1447\11-1447-0080\Drafting\5100\Figures\A1-1-692-027.dwg



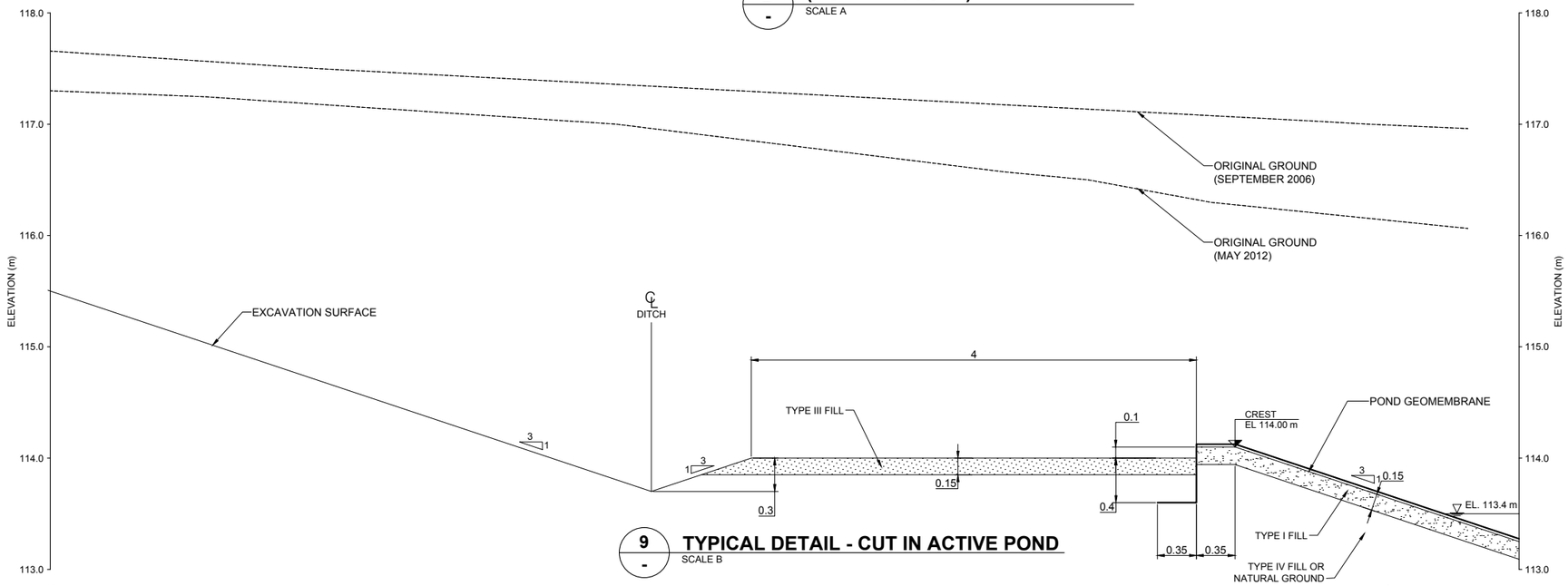
C - TYPICAL CROSS-SECTON (EAST - WEST) - ACTIVE POND

SCALE A



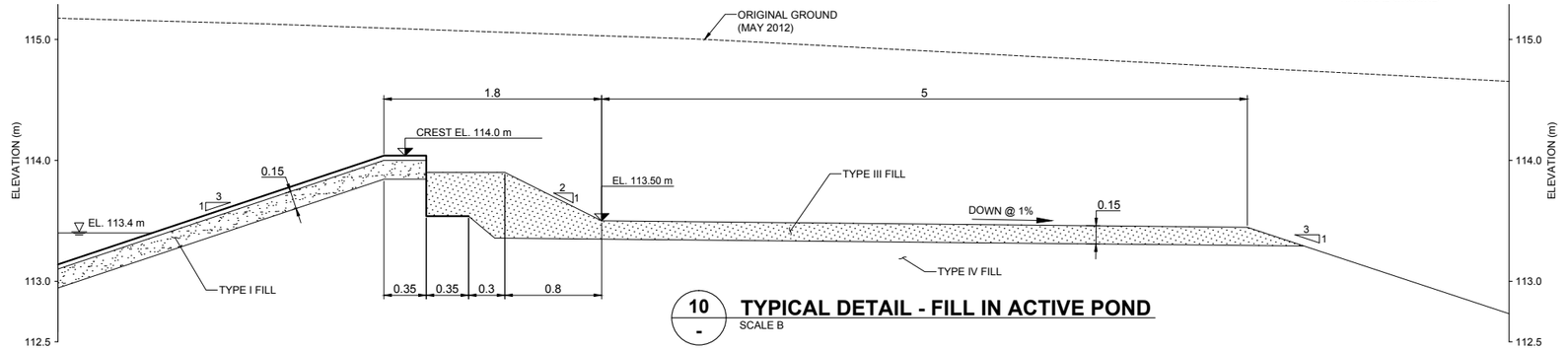
D - TYPICAL CROSS-SECTON (NORTH - SOUTH) - ACTIVE POND

SCALE A



9 - TYPICAL DETAIL - CUT IN ACTIVE POND

SCALE B



10 - TYPICAL DETAIL - FILL IN ACTIVE POND

SCALE B

FILL TYPES	
TYPE I	CLEAN SAND
TYPE II	20mm MINUS CRUSHED ROAD BASE
TYPE III	75mm MINUS SAND AND GRAVEL
TYPE IV	STRUCTURAL FILL

NOTE

1. ALL DIMENSIONS ARE IN METRES, UNLESS OTHERWISE NOTED.

ISSUED FOR CONSTRUCTION

SCALE A: 0, 2.5, 5, 7.5m

SCALE B: 0, 500, 1,000, 1,500mm

Golder Associates

NO.	DATE	REVISION	DR.	CH.	AP.
0	31DEC12	ISSUED FOR CONSTRUCTION	LCR		
C	18OCT12	ISSUED FOR TENDER(STAKE-OUT PURPOSE ONLY)	LCR		
B	11MAY12	ISSUED FOR CLIENT APPROVAL	MSH		
A	16APR12	ISSUED FOR CLIENT REVIEW	MSH		

WILDWOOD LANDFILL EXPANSION

TYPICAL POND CROSS-SECTIONS

Catalyst — Powell River Division

R.E.S. No. | W. O. No. | FILE No. 11-1447-0080/5100

SCALE: AS SHOWN | DRAWN: MSH | CHECKED: CLYW | APPROVED: | APPROVED:

THIRD ANGLE PROJECTION | SPEC. No. | STA. No.

DATE: 31DEC12 | DWG. No. A1-1-692-028 | REV. 0

DWG. NO.	REFERENCE	DWG. NO.	REFERENCE	DWG. NO.	REFERENCE
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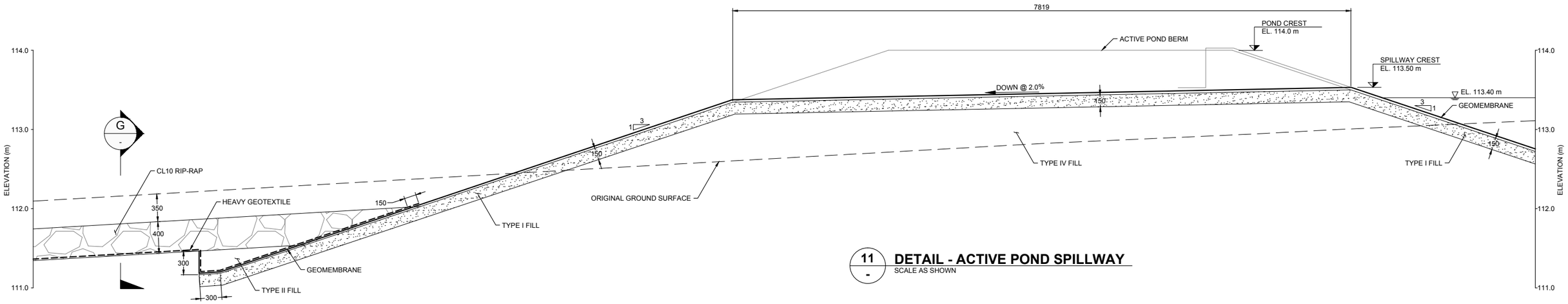
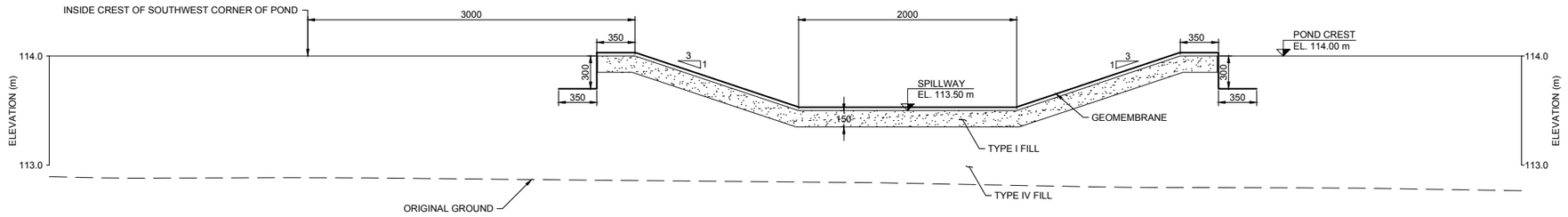
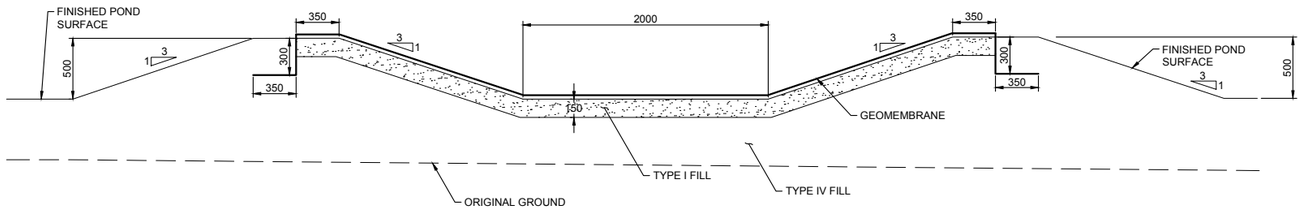
ACAD No. N:\Bur-Graphics\Projects\2011\1447\11-1447-0080\Drafting\5100\Figures\A1-1-692-028.dwg



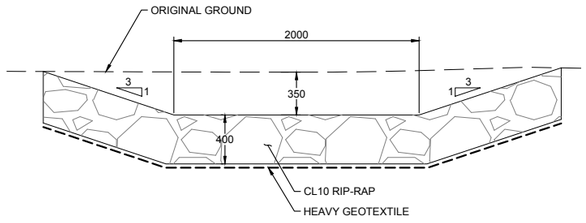
11 - DETAIL - ACTIVE POND SPILLWAY
SCALE AS SHOWN



E - TYPICAL CROSS-SECTION - SPILLWAY ON TOP OF ACTIVE POND
SCALE AS SHOWN



F - TYPICAL CROSS-SECTION - SPILLWAY ON DOWNSTREAM SLOPE OF ACTIVE POND
SCALE AS SHOWN



G - TYPICAL CROSS-SECTION - SPILLWAY CHANNEL
SCALE AS SHOWN

FILL TYPES	
TYPE I	CLEAN SAND
TYPE II	20mm MINUS CRUSHED ROAD BASE
TYPE III	75mm MINUS SAND AND GRAVEL
TYPE IV	STRUCTURAL FILL

NOTE

1. ALL DIMENSIONS ARE IN MILLIMETRES, UNLESS OTHERWISE NOTED.

ISSUED FOR CONSTRUCTION

Golder Associates

NO.	DATE	REVISION	DR.	CH.	AP.
0	31DEC12	ISSUED FOR CONSTRUCTION	LCR		
C	25MAY12	ISSUED FOR TENDER	MSH		
B	11MAY12	ISSUED FOR CLIENT APPROVAL	MSH		
A	16APR12	ISSUED FOR CLIENT REVIEW	MSH		

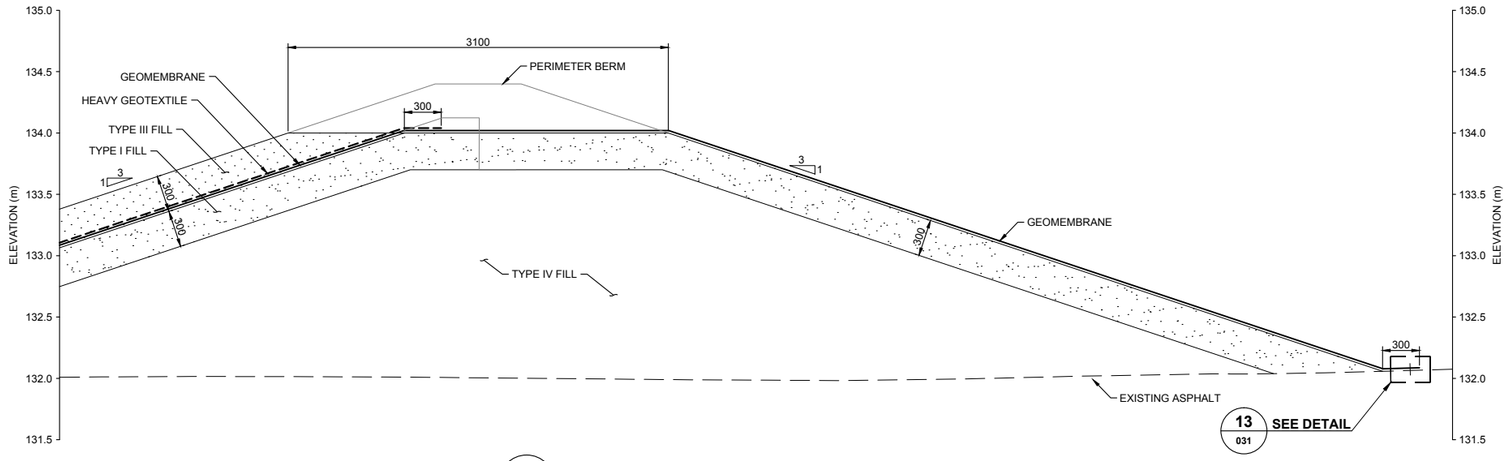
WILDWOOD LANDFILL EXPANSION
ACTIVE POND SPILLWAY CROSS-SECTIONS

Catalyst — Powell River Division

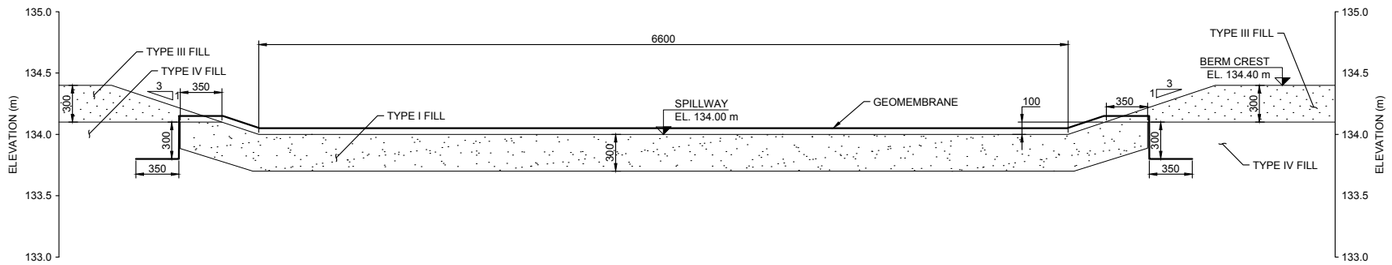
R.E.S. No. | W. O. No. | FILE No. 11-1447-0080/5100
SCALE: AS SHOWN | SPEC. No. | STA. No.
DRAWN: MSH | THIRD ANGLE PROJECTION | DWG. No. A1-1-692-029 | REV. 0
CHECKED: CLYW | APPROVED: | APPROVED: | DATE: 31DEC12

DWG. NO. | REFERENCE | DWG. NO. | REFERENCE | DWG. NO. | REFERENCE

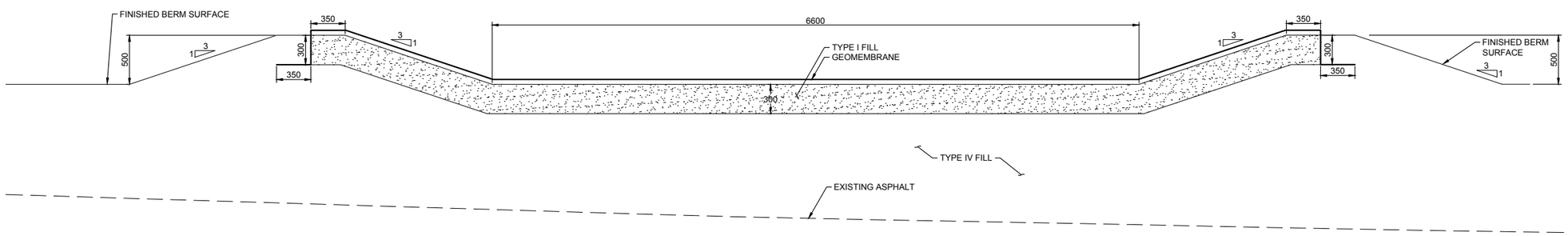
ACAD No: N:\Bur-Graphics\Projects\2011\1447\11-1447-0080\Drafting\5100\Figures\A1-1-692-029.dwg



12 / - **DETAIL - PERIMETER BERM SPILLWAY**
SCALE AS SHOWN



H / - **TYPICAL CROSS-SECTION - SPILLWAY ON TOP OF PERIMETER BERM**
SCALE AS SHOWN



I / - **TYPICAL CROSS-SECTION - SPILLWAY ON DOWNSTREAM SLOPE OF PERIMETER BERM**
SCALE AS SHOWN

FILL TYPES	
TYPE I	CLEAN SAND
TYPE II	20mm MINUS CRUSHED ROAD BASE
TYPE III	75mm MINUS SAND AND GRAVEL
TYPE IV	STRUCTURAL FILL

NOTE

1. ALL DIMENSIONS ARE IN MILLIMETRES, UNLESS OTHERWISE NOTED.

ISSUED FOR CONSTRUCTION

Golder Associates

NO.	DATE	REVISION	DR.	CH.	AP.
0	31DEC12	ISSUED FOR CONSTRUCTION	LCR		
B	29MAY12	ISSUED FOR TENDER	MSH		
A	11MAY12	ISSUED FOR CLIENT APPROVAL	MSH		

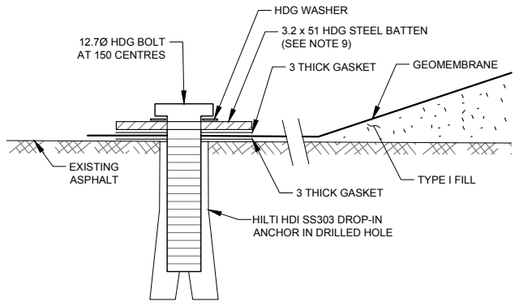
WILDWOOD LANDFILL EXPANSION
PERIMETER BERM SPILLWAY CROSS-SECTIONS

Catalyst — Powell River Division

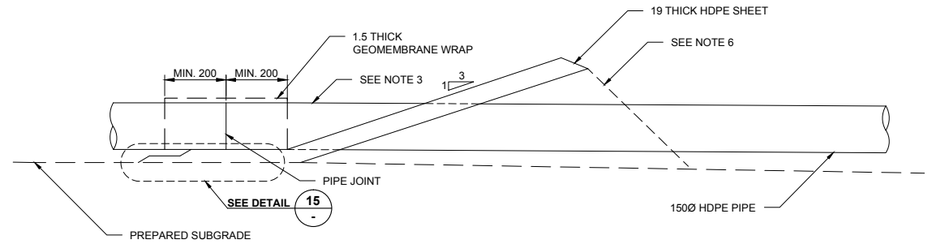
R.E.S. No. | W. O. No. | FILE No. 11-1447-0080/5100
SCALE: AS SHOWN | SPEC. No. | STA. No.
DRAWN: MSH | THIRD ANGLE PROJECTION | DWG. No. A1-1-692-030 | REV. 0
CHECKED: CLYW | APPROVED: | APPROVED: | DATE: 31DEC12

DWG. NO. | REFERENCE | DWG. NO. | REFERENCE | DWG. NO. | REFERENCE
|

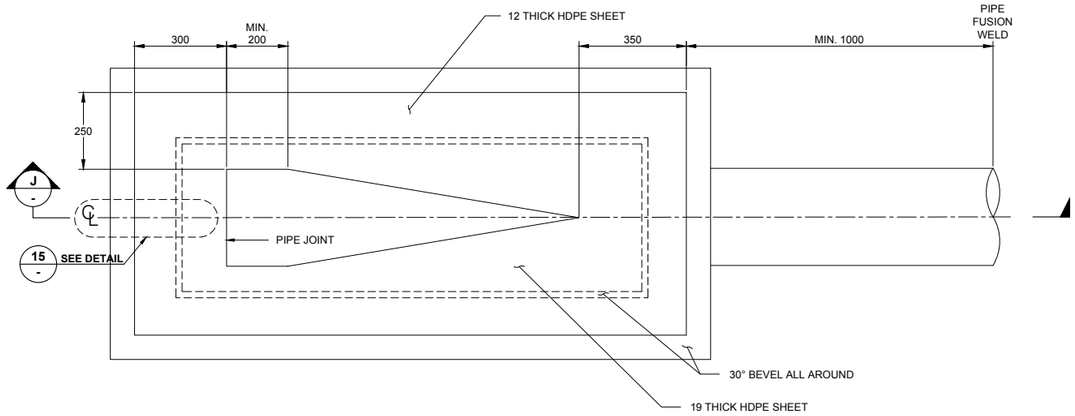
ACAD No. N:\Bur-Graphics\Projects\2011\1447\11-1447-0080\Drafting\5100\Figures\A1-1-692-030.dwg



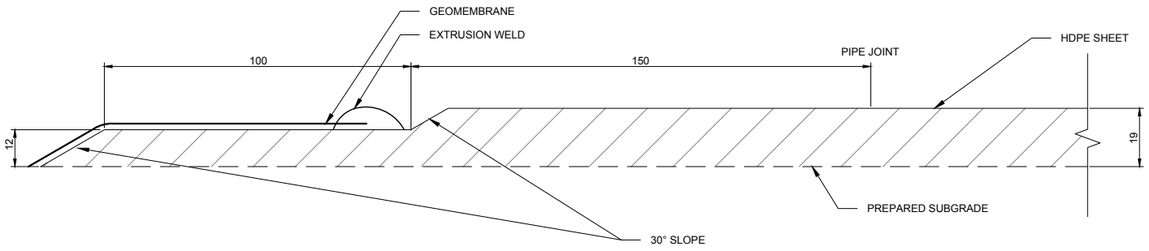
13 / - TYPICAL DETAIL - GEOMEMBRANE ANCHOR TO ASPHALT
NOT TO SCALE



J / - SECTION - 150Ø PIPE PENETRATION BOOT
NOT TO SCALE



14 / - PLAN - 150Ø PIPE PENETRATION BOOT
SCALE A



15 / - TYPICAL DETAIL - EXTRUSION WELD BETWEEN HDPE SHEETS
SCALE B

FILL TYPES	
TYPE I	CLEAN SAND
TYPE II	20mm MINUS CRUSHED ROAD BASE
TYPE III	75mm MINUS SAND AND GRAVEL
TYPE IV	STRUCTURAL FILL

NOTES

1. ALL DIMENSIONS ARE IN MILLIMETRES, UNLESS OTHERWISE NOTED.
2. HDPE SHEETS SHALL BE 19mm THICK. BEVEL FINISHED EDGE AT 30 DEGREES.
3. HDPE PIPE ON RIGHT SIDE OF JOINT SHALL BE FABRICATED INTEGRAL WITH THE 19mm THICK HDPE SHEET. PIPE ENDS SHALL BE MACHINED READY FOR FUSION WELDING. JOINT SHALL BE EXTRUSION WELDED, EXCEPT AT THE VERY BOTTOM. JOINT SHALL BE COVERED WITH 1.5mm THICK HDPE GEOMEMBRANE IN CONTACT WITH HDPE PIPE AND EXTENDING MINIMUM 200mm BEYOND JOINT.
4. FOR ALL HDPE-SHEET-TO-HDPE-PIPE WELDS, USE HOT AIR GUN FOR INITIAL SEAL. THEN USE EXTRUSION WELDER FOR MAIN WELD.
5. WELD TOP SIDE AND UNDERSIDE AT ALL JOINTS.
6. FILL VOIDS UNDER INCLINED HDPE SHEET WITH LOW SLUMP 10 MPa CONCRETE, HAND PACKED INTO CORNERS AND UNDER ENTIRE HDPE SHEET.
7. PIPE DIAMETERS ARE NOMINAL.
8. HDG - HOT DIPPED GALVANIZED.
9. LEAVE 25mm GAP IN BATTENS NEAR SOUTH END TO ALLOW DRAINAGE.

ISSUED FOR CONSTRUCTION

SCALE A: 0, 200, 400, 600mm
SCALE B: 0, 20, 40, 60mm

Golder Associates

NO.	DATE	REVISION	DR.	CH.	AP.
0	31DEC12	ISSUED FOR CONSTRUCTION	LCR		
C	25MAY12	ISSUED FOR TENDER	MSH		
B	11MAY12	ISSUED FOR CLIENT APPROVAL	MSH		
A	16APR12	ISSUED FOR CLIENT REVIEW	MSH		

WILDWOOD LANDFILL EXPANSION

TYPICAL DETAILS – LINER

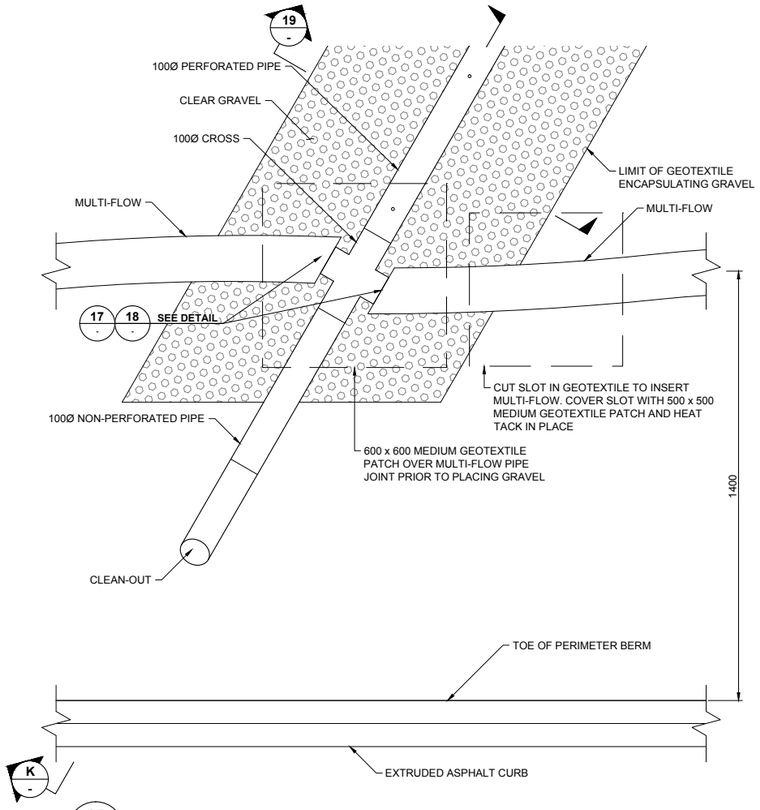
SCALE: AS SHOWN
DRAWN: MSH
CHECKED: CLYW
APPROVED:
APPROVED:
DATE: 31DEC12

Catalyst — Powell River Division

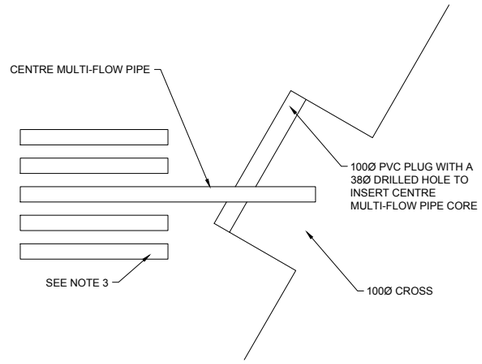
R.E.S. No.
W. O. No.
FILE No. 11-1447-0080/5100
SPEC. No.
STA. No.
THIRD ANGLE PROJECTION
DWG. No. A1-1-692-031
REV. 0

DWG. NO.	REFERENCE	DWG. NO.	REFERENCE	DWG. NO.	REFERENCE
###	###				

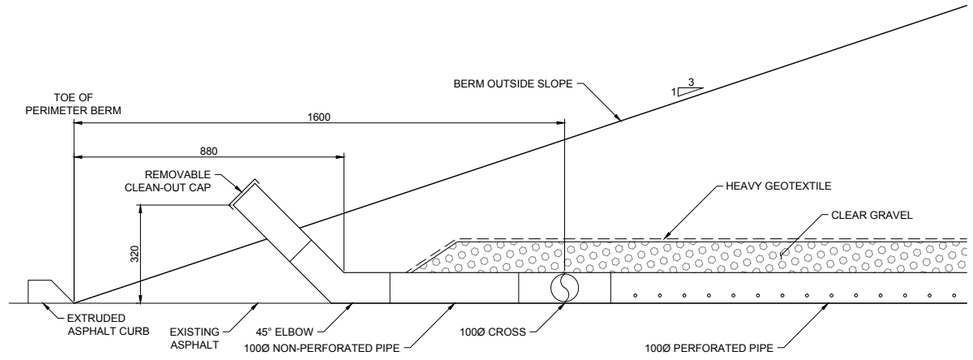
ACAD No:\\Bur-Graphics\Projects\2011\1447\11-1447-0080\Drafting\5100\Figures\A1-1-692-031.dwg



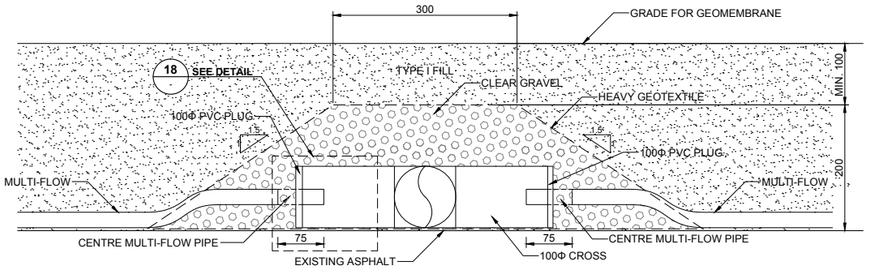
16 - TYPICAL PLAN - BELOW-LINER DRAINAGE PIPE NEAR CURB
SCALE A



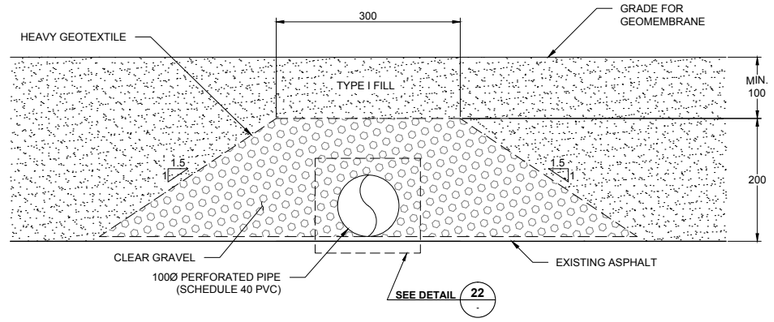
18 - TYPICAL DETAIL (PLAN) - MULTI-FLOW TO 100Ø CROSS
NOT TO SCALE - SCHEMATIC ONLY



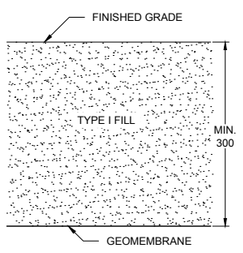
K - TYPICAL CROSS-SECTION - 100Ø BELOW-LINER PERFORATED DRAINAGE PIPE
SCALE A



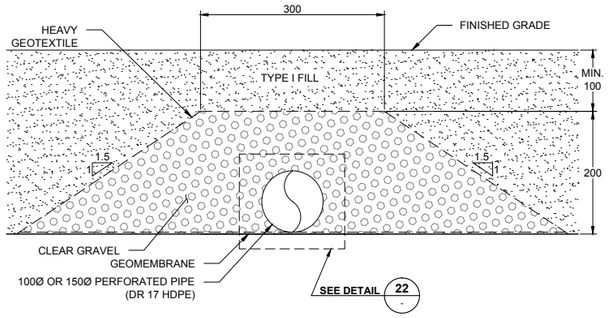
17 - TYPICAL DETAIL (SIDE) - MULTI-FLOW TO 100Ø CROSS
SCALE B

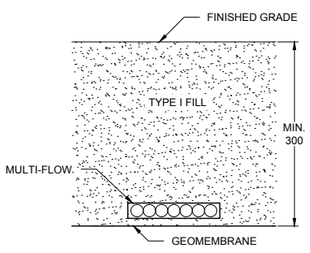


19 - TYPICAL DETAIL - BELOW-LINER LEACHATE PIPE
SCALE B



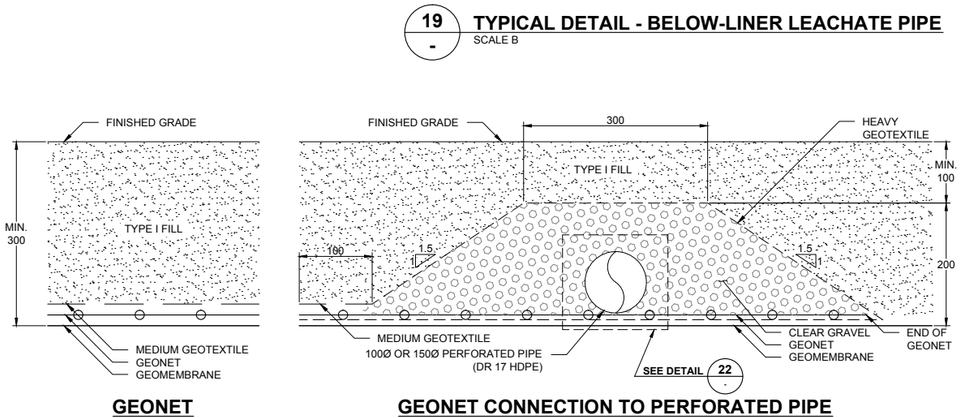
FILL MATERIAL





MULTI-FLOW

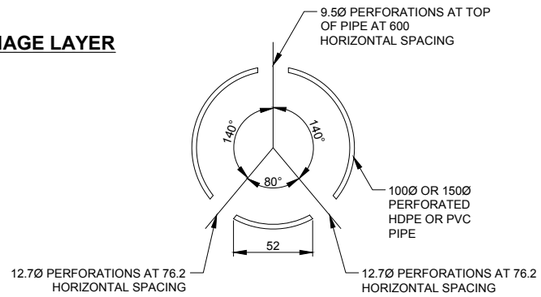
20 - TYPICAL DETAILS - ABOVE-LINER DRAINAGE LAYER
SCALE B



GEONET

GEONET CONNECTION TO PERFORATED PIPE

21 - TYPICAL DETAILS - ABOVE-LINER GEONET/GEOTEXTILE
SCALE B



22 - TYPICAL DETAIL - PERFORATED PIPE
NOT TO SCALE - SCHEMATIC ONLY

NOTES

1. ALL DIMENSIONS ARE IN MILLIMETRES, UNLESS OTHERWISE NOTED.
2. ALL PIPE DIAMETERS ARE NOMINAL.
3. CUT MULTI-FLOW SO THAT CENTRE MULTI-FLOW PIPE EXTENDS 75mm BEYOND OTHER PIPES. COVER OTHER FOUR PIPE ENDS WITH MEDIUM GEOTEXTILE PATCH.

ISSUED FOR CONSTRUCTION

SCALE A: 0 200 400 600mm
SCALE B: 0 100 200 300mm

Golder Associates

NO.	DATE	REVISION	DR.	CH.	AP.
0	31DEC12	ISSUED FOR CONSTRUCTION	LCR		
C	29MAY12	ISSUED FOR TENDER	MSH		
B	11MAY12	ISSUED FOR CLIENT APPROVAL	MSH		
A	16APR12	ISSUED FOR CLIENT REVIEW	MSH		

WILDWOOD LANDFILL EXPANSION
TYPICAL DETAILS – DRAINAGE PIPES

Catalyst — Powell River Division

R.E.S. No. | W. O. No. | FILE No. 11-1447-0080/5100
SCALE: AS SHOWN | SPEC. No. | STA. No.
DRAWN: MSH | THIRD ANGLE PROJECTION | DWG. No. | REV.
CHECKED: CLYW | APPROVED: | APPROVED: | DATE: 31DEC12 | A1-1-692-032 | 0

DWG. NO.	REFERENCE
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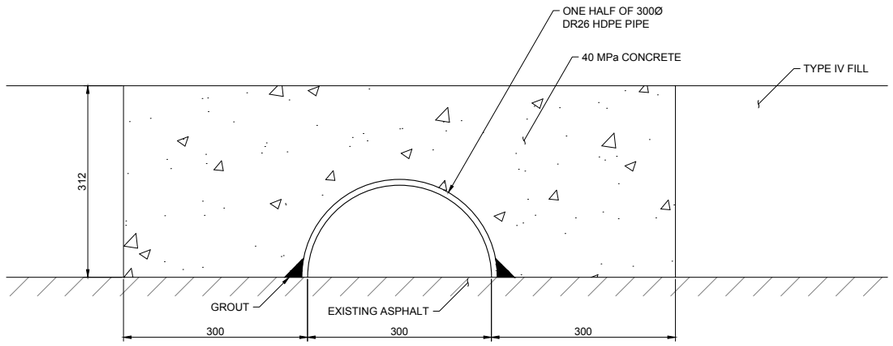
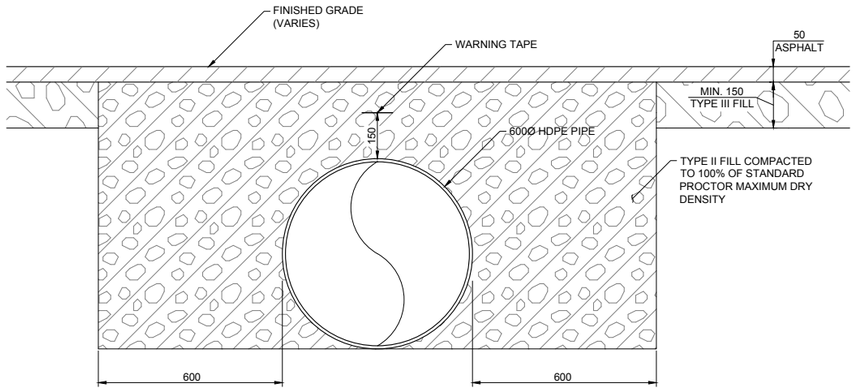
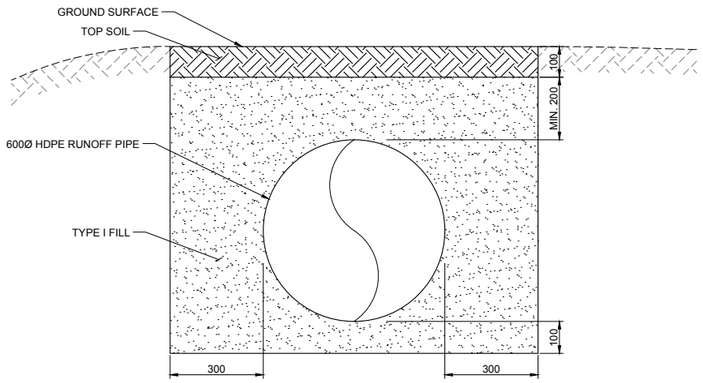
ACAD No. N:\Bur-Graphics\Projects\2011\1447\11-1447-0080\Drafting\5100\Figures\A1-1-692-032.dwg



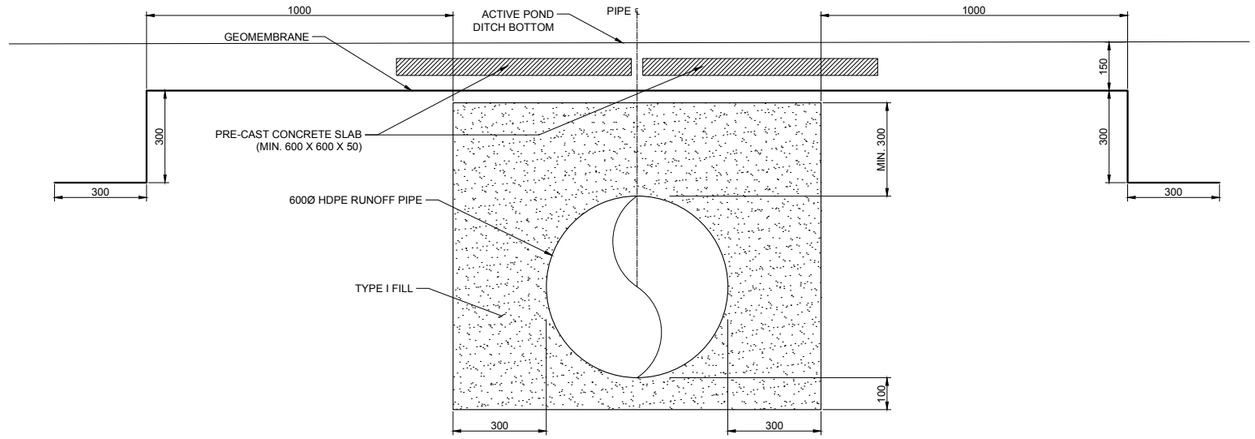
23 - TYPICAL DETAIL - HALF CULVERT (SEE NOTES 3 TO 5)
SCALE B



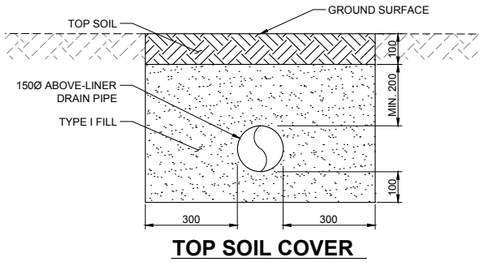
24 - TYPICAL DETAIL - 600Ø RUNOFF PIPELINE UNDER ASPHALT
SCALE A



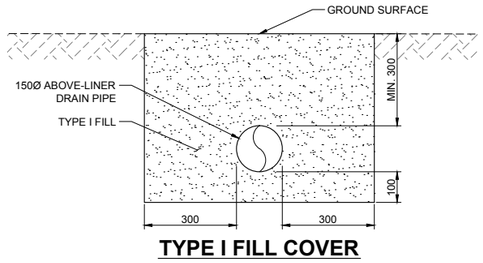
25 - TYPICAL DETAIL - 600Ø RUNOFF PIPE TRENCH
SCALE A



26 - TYPICAL DETAIL - 600Ø RUNOFF PIPE TRENCH UNDER ACTIVE POND DITCH
SCALE A

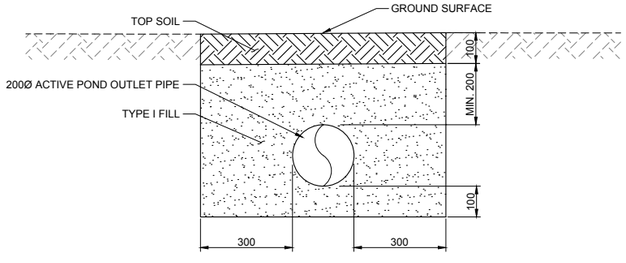


TOP SOIL COVER



TYPE I FILL COVER

27 - TYPICAL DETAILS - 150Ø ABOVE-LINER DRAIN PIPE TRENCH
SCALE A



28 - TYPICAL DETAIL - 200Ø ACTIVE POND OUTLET PIPE TRENCH
SCALE A

NOTES

1. ALL DIMENSIONS ARE IN MILLIMETRES, UNLESS OTHERWISE NOTED.
2. PIPE DIAMETERS ARE NOMINAL.
3. COVER HDPE HALF-PIPE JOINTS WITH POLYETHYLENE SHEET TAPED IN PLACE PRIOR TO POURING CONCRETE.
4. PRIOR TO POURING CONCRETE, HAND PACK ZERO-SLUMP CEMENT GROUT ALONG THE INTERFACE OF HDPE PIPE AND ASPHALT SURFACE TO PREVENT INGRESS OF CONCRETE INTO HALF-PIPE.
5. CONCRETE TO MEET MMCD SECTION 03 30 53 AND CLAUSE 2.1.5.1 OF MMCD SECTION 03 30 20.
6. TOP SOIL TO BE OBTAINED FROM CATALYST STOCKPILE.

FILL TYPES	
TYPE I	CLEAN SAND
TYPE II	20mm MINUS CRUSHED ROAD BASE
TYPE III	75mm MINUS SAND AND GRAVEL
TYPE IV	STRUCTURAL FILL

ISSUED FOR CONSTRUCTION

SCALE A: 0, 200, 400, 600mm
SCALE B: 0, 100, 200, 300mm

Golder Associates

DWG. NO.	REFERENCE	DWG. NO.	REFERENCE	DWG. NO.	REFERENCE	NO.	DATE	REVISION	DR.	CH.	AP.
###	###					0	31DEC12	ISSUED FOR CONSTRUCTION	LCR		
						C	25MAY12	ISSUED FOR TENDER	MSH		
						B	11MAY12	ISSUED FOR CLIENT APPROVAL	MSH		
						A	16APR12	ISSUED FOR CLIENT REVIEW	MSH		

WILDWOOD LANDFILL EXPANSION

TYPICAL SECTIONS – BURIED PIPELINES

SCALE: AS SHOWN
DRAWN: MSH
CHECKED: CLYW
APPROVED:
APPROVED:
DATE: 31DEC12

Catalyst — Powell River Division

R.E.S. No.
W. O. No.
FILE No. 11-1447-0080/5100
SPEC. No.
STA. No.
THIRD ANGLE PROJECTION
DWG. No. A1-1-692-033
REV. 0

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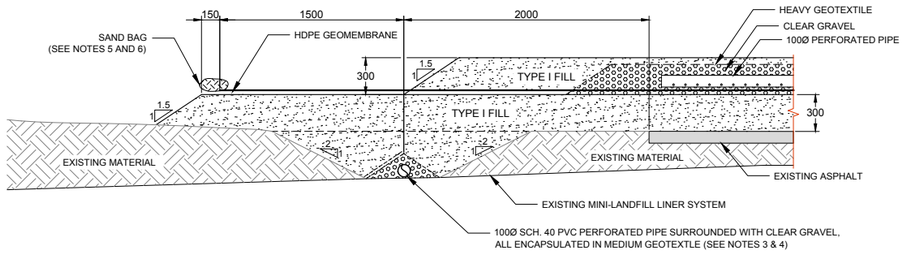
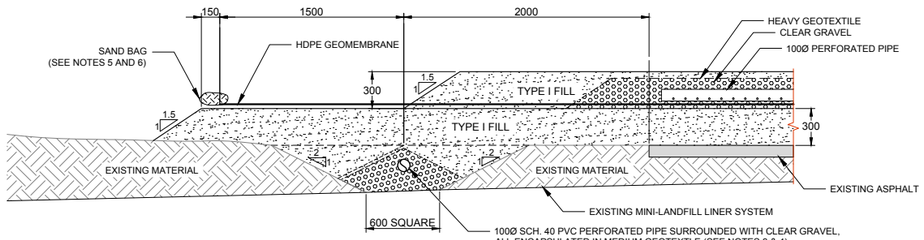
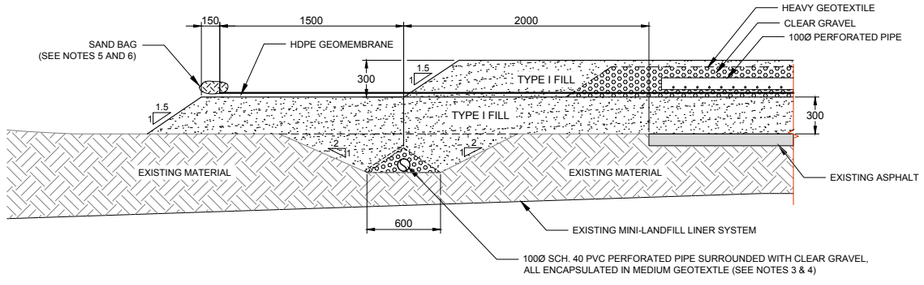


29 - TYPICAL DETAIL - MINI-LANDFILL LINER TIE-IN (SHALLOW)



30 - TYPICAL DETAIL - MINI-LANDFILL LINER TIE-IN (SUMP)

FILL TYPES	
TYPE I	CLEAN SAND
TYPE II	20mm MINUS CRUSHED ROAD BASE
TYPE III	75mm MINUS SAND AND GRAVEL
TYPE IV	STRUCTURAL FILL



31 - TYPICAL DETAIL - MINI-LANDFILL LINER TIE-IN (DEEP)

NOTES

1. ALL DIMENSIONS ARE IN MILLIMETRES, UNLESS OTHERWISE NOTED.
2. LOCATION AND ELEVATION OF EXISTING MINI-LANDFILL LINING SYSTEM MAY VARY FROM THAT SHOWN. DO NOT DAMAGE EXISTING MINI-LANDFILL LINING SYSTEM. CAREFULLY HAND-DIG, IF NECESSARY, TO VERIFY THE LOCATION OF THE MINI-LANDFILL LINING SYSTEM.
3. VERY CAREFULLY EXPOSE AND CLEAN EXISTING GEOTEXTILE SURFACE, SUCH THAT WATER CAN FREELY DRAIN THROUGH THE GEOTEXTILE INTO THE GEONET. REPAIR ANY RIPS OR HOLES IN THE GEOTEXTILE WITH MIN. 300 g/sq.m NON-WOVEN NEEDLE-PUNCHED GEOTEXTILE PATCHES EXTENDING 150mm BEYOND RIPS OR HOLES. GEOTEXTILE THAT ENCAPSULATES PIPE AND CLEAR GRAVEL SHALL BE IN DIRECT CONTACT WITH CLEANED GEOTEXTILE OF THE MINI-LANDFILL LINING SYSTEM SUCH THAT WATER CAN FREELY DRAIN.
4. GRADE OF 100mm DIAMETER PERFORATED PIPE SHALL BE SUCH THAT THERE IS A POSITIVE GRADE TOWARDS AN EDGE INTERFACE DRAIN.
5. PLACE MIN. 12kg SAND BAGS AT 2.0m CENTRE-TO-CENTRE SPACING AT THE EDGE OF GEOMEMBRANE.
6. AFTER COMPLETION OF CONSTRUCTION, CATALYST SHALL CARRY OUT INITIAL POURING OF ASH TO AT LEAST 2.0m THICKNESS, DIRECTLY ON EXPOSED GEOMEMBRANE AND SAND BAGS, AS WELL AS TO 3.0m AWAY FROM THE EDGE OF THE GEOMEMBRANE, AND ALLOW THE ASH TO HARDEN. THE CONTRACTOR SHALL ENSURE THAT THE GEOMEMBRANE IS CLEAN PRIOR TO CATALYST PLACING ASH.
7. PIPE DIAMETERS ARE NOMINAL.

ISSUED FOR CONSTRUCTION

0 500 1,000 1,500mm
SCALE IN MILLIMETRES

Golder Associates

DWG. NO.	REFERENCE	DWG. NO.	REFERENCE	DWG. NO.	REFERENCE
###	###				

NO.	DATE	REVISION	DR.	CH.	AP.
0	31DEC12	ISSUED FOR CONSTRUCTION	LCR		
C	29MAY12	ISSUED FOR TENDER	MSH		
B	11MAY12	ISSUED FOR CLIENT APPROVAL	MSH		
A	16APR12	ISSUED FOR CLIENT REVIEW	MSH		

WILDWOOD LANDFILL EXPANSION

TYPICAL DETAILS – MINI-LANDFILL LINER TIE-IN DRAINS

Catalyst — Powell River Division

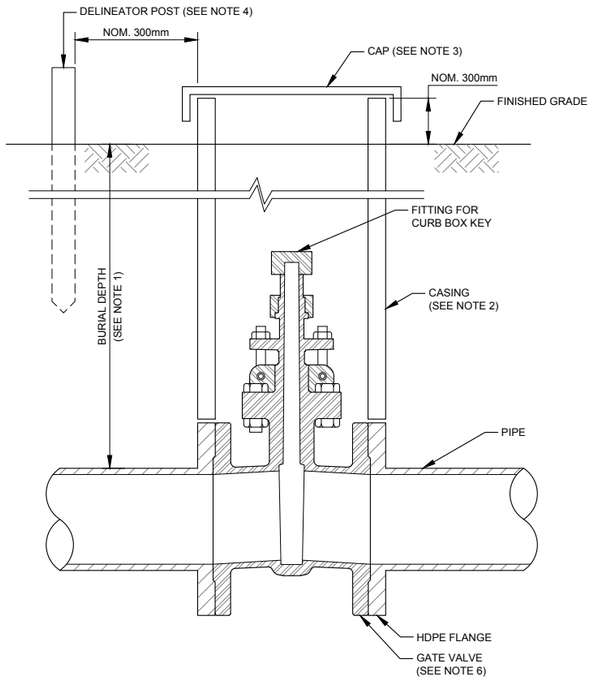
R.E.S. No. | W. O. No. | FILE No. 11-1447-0080/5100

SCALE: AS SHOWN | DRAWN: MSH | CHECKED: CLYW | APPROVED: | APPROVED: | DATE: 31DEC12

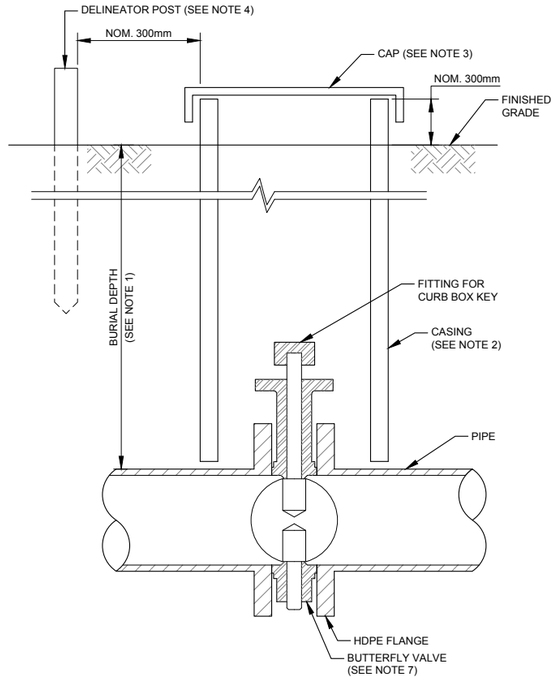
THIRD ANGLE PROJECTION

SPEC. No. | STA. No. | DWG. No. A1-1-692-034 | REV. 0

ACAD No. N:\Bur-Graphics\Projects\2011\1447\11-1447-0080\Drafting\5100\Figures\A1-1-692-034.dwg



32 - DETAIL - 200mmØ GATE VALVE
NOT TO SCALE - SCHEMATIC ONLY



33 - DETAIL - 150mmØ BUTTERFLY VALVE
NOT TO SCALE - SCHEMATIC ONLY

NOTES

1. BURIAL DEPTH SHALL BE MIN. 500mm.
2. CASING SHALL BE DR35 (OR THICKER) PVC PIPE OF A DIAMETER THAT ALLOWS THE VERTICAL PVC CASING TO REST ON THE PIPE FLANGES.
3. CAP SHALL BE SCHEDULE 40. PROVIDE SAW-CUT SLOT ON ONE SIDE OF CAP.
4. DELINEATOR POST SHALL MEET BC MINISTRY OF TRANSPORTATION'S SPECIFICATION FOR PERFORATED SQUARE STEEL TUBING DELINEATOR POST (MOT DRAWING SP635-3.10.2). FACE REFLECTOR TOWARDS NEAREST ROAD.
5. VALVE STEM SHALL BE EQUIPPED TO ACCEPT KEY FOR OPENING/CLOSING VALVE. INSTALL VALVE IN FULLY OPEN POSITION. PROVIDE ONE MATCHING VALVE KEY TO THE OWNER.
6. 200mm DIAMETER VALVE SHALL BE ALOYCO CLASS 150 STAINLESS STEEL GATE VALVE WITH FLANGED, OR SIMILAR APPROVED BY THE CONSULTANT. PROVIDE NEOPRENE GASKET BETWEEN FLANGES OF PIPE AND VALVE.
7. 150mm DIAMETER VALVE SHALL BE KITZ CLASS 150 STAINLESS STEEL BUTTERFLY VALVE, WAFER STYLE, GEAR OPERATED, OR SIMILAR APPROVED BY THE CONSULTANT. PROVIDE GASKET BETWEEN FLANGES OF PIPE AND VALVE AS RECOMMENDED BY THE MANUFACTURER.
8. PIPE DIAMETERS ARE NOMINAL.

ISSUED FOR CONSTRUCTION

Golder Associates

DWG. NO.	REFERENCE	DWG. NO.	REFERENCE	DWG. NO.	REFERENCE	NO.	DATE	REVISION	DR.	CH.	AP.	NO.	DATE	REVISION	DR.	CH.	AP.	NO.	DATE	REVISION	DR.	CH.	AP.
																		0	31DEC12	ISSUED FOR CONSTRUCTION	LCR		
																		C	25MAY12	ISSUED FOR TENDER	MSH		
																		B	11MAY12	ISSUED FOR CLIENT APPROVAL	MSH		
###	###																	A	16APR12	ISSUED FOR CLIENT REVIEW	MSH		

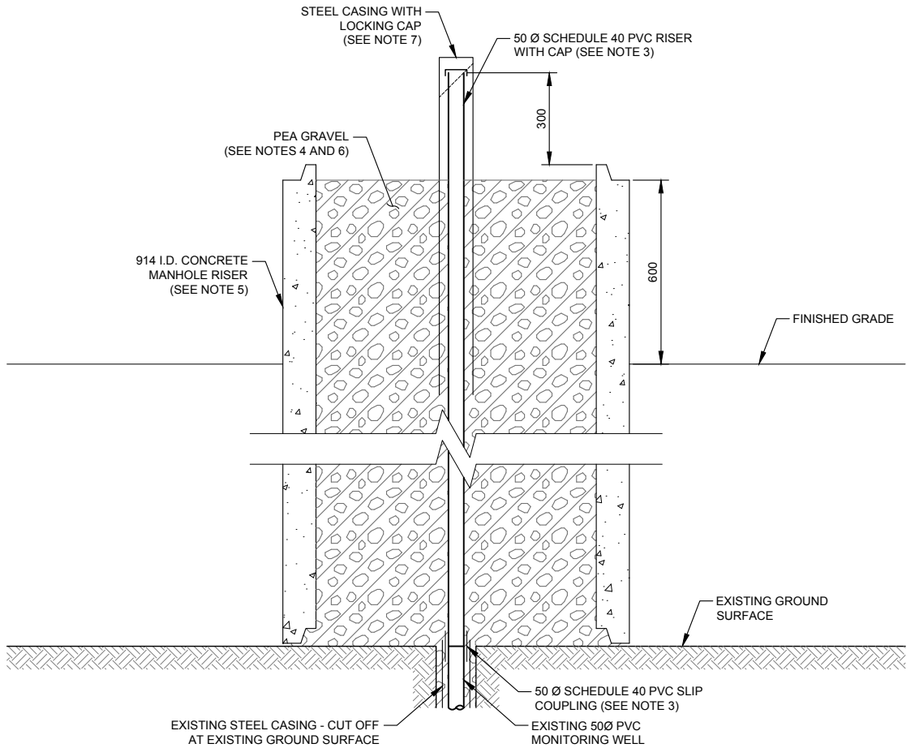
WILDWOOD LANDFILL EXPANSION
TYPICAL DETAILS – VALVES

SCALE: AS SHOWN
DRAWN: MSH
CHECKED: CLYW
APPROVED:
APPROVED:
DATE: 31DEC12

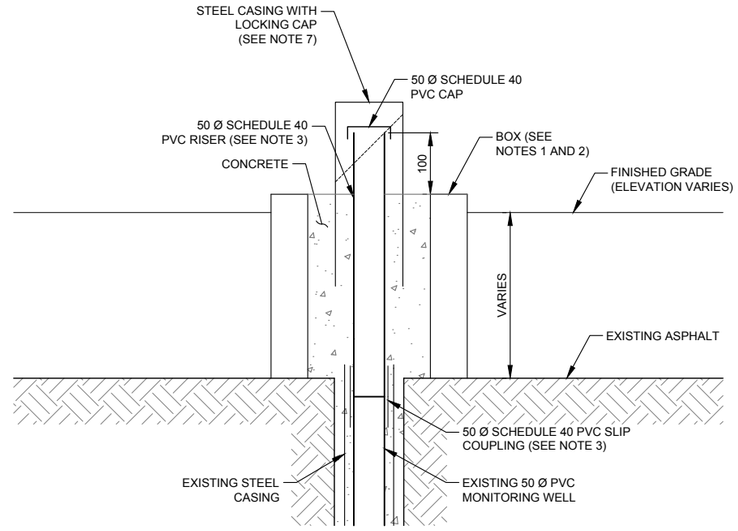
Catalyst — Powell River Division

R.E.S. No.
W. O. No.
FILE No. 11-1447-0080/5100
SPEC. No.
STA. No.
THIRD ANGLE PROJECTION
DWG. No. A1-1-692-035
REV. 0

ACAD No. N:\Bur-Graphics\Projects\2011\1447\11-1447-0080\Drafting\5100\Figures\A1-1-692-035.dwg



34 - DETAIL - MONITORING WELL EXTENSION (AH3)
NOT TO SCALE - SCHEMATIC ONLY



35 - TYPICAL DETAIL - MONITORING WELL EXTENSION (OTHER WELLS)
NOT TO SCALE - SCHEMATIC ONLY

NOTES

1. BOX SHALL BE LANGLEY CONCRETE TYPE #37 WATER METER BOX RISERS OR AN APPROVED EQUIVALENT. USE AS MANY RISERS AS REQUIRED TO BE AT OR ABOVE FINISHED GRADE.
2. BOXES SHALL BE VERTICAL AND CENTRED AROUND 50 Ø PVC MONITORING WELL PIPE. SHIM AS REQUIRED.
3. INSTALLATION OF PVC COUPLING AND PIPE RISER SHALL BE UNDERTAKEN BY A QUALIFIED WELL DRILLER. DO NOT USE EXCESSIVE PRIMER OR CEMENT, OR ALLOW THESE SUBSTANCES TO ENTER THE WELL.
4. PEA GRAVEL BACKFILL SHALL NOT BE PLACED UNTIL AT LEAST 21 DAYS AFTER ADJACENT FINISHED GRADE IS COMPLETE.
5. MANHOLE RISER SHALL BE VERTICAL AND CENTRED AROUND 50 Ø PVC MONITORING WELL PIPE.
6. PROVIDE A SAFETY BARRIER IN THE INTERIM.
7. INSTALL A STEEL CASING, EMBEDDED INTO THE PEA GRAVEL AT LEAST 800mm, WITH A LOCKABLE HINGED CAP (E.G., AS SUPPLIED BY MUD BAY DRILLING LTD.).
8. ALL DIMENSIONS ARE IN MILLIMETRES, UNLESS NOTED OTHERWISE.
9. PIPE DIAMETERS ARE NOMINAL.

ISSUED FOR CONSTRUCTION

Golder Associates

DWG. NO.	REFERENCE	DWG. NO.	REFERENCE	DWG. NO.	REFERENCE
###	###				

NO.	DATE	REVISION	DR.	CH.	AP.
0	31DEC12	ISSUED FOR CONSTRUCTION	LCR		
B	29MAY12	ISSUED FOR TENDER	MSH		
A	11MAY12	ISSUED FOR CLIENT APPROVAL	MSH		

WILDWOOD LANDFILL EXPANSION

TYPICAL DETAILS – EXTENSION OF EXISTING MONITORING WELLS

Catalyst — Powell River Division

R.E.S. No. | W. O. No. | FILE No. 11-1447-0080/5100

SCALE: AS SHOWN | SPEC. No. | STA. No.

THIRD ANGLE PROJECTION

DRAWN: MSH | CHECKED: CLYW | APPROVED: | APPROVED: | DATE: 31DEC12

DWG. No. A1-1-692-036 | REV: 0

ACAD No: N:\Bur-Graphics\Projects\2011\1447\11-1447-0080\Drafting\5100\Figures\A1-1-692-036.dwg

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