GOLDER
MEMBER OF WSP

REPORT

2021 Monitoring Report

Westside Landfill, West Kelowna, BC

Submitted to:

Regional District of Central Okanagan

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Table of Contents

TABLES *(IN TEXT)*

PHOTOGRAPHS and FIGURES *(IN TEXT)*

FIGURES *(ATTACHED)*

APPENDICES

APPENDIX A
Westside Landfill Operational Certificate Letter

APPENDIX B
Tabulated Results (2021 Groundwater and Soil Gas Monitoring Results and Groundwater Elevations)

APPENDIX C
CARO Laboratory Certificate of Analysis (COA) Reports

APPENDIX D
Quality Assurance / Quality Control (QA/QC) Results

1.0 INTRODUCTION

Golder Associates Ltd. (Golder) was retained by the Regional District of Central Okanagan (RDCO) to provide support services for the 2021 annual monitoring program at the Westside Landfill (the Site), located in West Kelowna, BC (Figure 1). Westside Landfill was operated as a municipal solid waste landfill under Operational Certificate (OC) PR#12217 (Appendix A) issued by British Columbia Ministry of Environment and Climate Change Strategy (ENV[1]). Westside Landfill ceased receiving waste in 2010 and was partially covered. A Closure Plan was developed by Golder in 2015 and was accepted by the ENV in September 2017 (ENV letter provided in Appendix A). Golder has been provided with record drawings for the closure works, which included earthworks, drainage works and the placement of topsoil, all of which were completed in 2018 under the supervision of Urban System Ltd. (USL); the USL record drawings were provided in the 2018 Annual Report (Golder 2019). The Site was seeded and fertilized during the first week of November 2018, with a final completion date of 7 November 2018.

Landfill Monitoring Program

The current landfill monitoring program was carried out as initially outlined in OC PR#12217 following recommendations outlined in the Updated Landfill Monitoring Program (Golder 2014b) and the Closure Plan (Golder 2015). The recommendations for changes to the monitoring and inspection plan outlined in the 2015 Closure Plan were formally accepted by ENV in September 2017. An Updated Landfill Monitoring Program (LMP) report was prepared to 1) reflect the landfill gas monitoring wells installed since the 2014 Updated LMP, 2) update the LMP to reflect the vapour wells decommissioned in 2018 and provide recommendations for replacement of the decommissioned vapour wells, and 3) review the required monitoring and sampling requirements following closure activities of the Westside Landfill (Golder 2020). The Updated LMP report was submitted to ENV in 2020 as part of an amendment application for OC PR#12217 (Golder 2020), currently under review by ENV. Modifications to the landfill gas vapour probe network and groundwater sampling program since 2015 and are discussed in Section 4.0.

The annual monitoring program includes groundwater sampling and analysis, groundwater elevation monitoring, landfill gas monitoring, and preparation of an annual landfill inspection. Similar to previous years, RDCO staff completed the groundwater sampling, groundwater elevation and landfill gas monitoring components of the program in 2021. Golder reviewed results from each landfill gas monitoring event within 24 hours of data collection, as outlined in the Landfill Gas Management Plan (Golder 2013a) and the Closure Plan (Golder 2015) and completed an inspection of the Site in November of 2021. This report summarizes the results of these inspection and monitoring activities and provides recommendations for adjustments to the monitoring program.

[1] ENV is referenced herein in this report, including references to previous nomenclature of Ministry of Environment (MoE)

2.0 APPLICABLE REGULATORY FRAMEWORK

The Westside Landfill was initially permitted under PR#12217 in 1997. With the acceptance of the Closure Plan (Golder 2015) by the ENV in September 2017 (Appendix A), the monitoring and inspection requirements outlined in that document became effective. As outlined in the Closure Plan, monitoring results are used as part of the assessment of effectiveness of closure works at Westside Landfill, in particular the use of an evapotranspiration cover at this Site. Periodic (annually, at present) inspections by a qualified professional are also part of this assessment of the effectiveness of closure works. If assessment of monitoring data and inspections suggest potential adverse impacts to the environment or risks to human health, then additional works or mitigation measures may be required.

In British Columbia, environmental matters pertaining to contaminated sites generally fall under the jurisdiction of the Ministry of Environment & Climate Change Strategy (ENV), pursuant to the *Environmental Management Act* (EMA, SBC 2003, Chapter 53 assented to 23 October 2003, current to 1 February 2021; BC ENV 1996). The key regulation under the EMA that relates to the assessment and remediation of contaminated sites is the Contaminated Sites Regulation (CSR; BC Reg. 375/96, O.C. 1480/96 and M271/2004, as updated [includes amendments up to BC Reg. 179/2021, updated to 7 July 2021]).

An additional regulation applicable to environmental investigations is the BC Groundwater Protection Regulation (BC Reg. 39/2016, O.C. 113/2016, including amendments up to BC Reg 75/2021, 11 March 2021). This regulation establishes standards to protect groundwater supplies by requiring wells, including environmental boreholes, test pits and monitoring wells, to be adequately constructed, maintained and, at the end of their service, adequately deactivated and ultimately closed. Additional regulations and guidance specific to landfills include Landfill Criteria for Municipal Solid Waste, Second Edition (2016) and the Landfill Gas Management Regulation (current to 8 February 2022).

2.1 BC CSR Water Standards

The CSR provides Generic Numerical Water Standards for the assessment of groundwater quality (CSR Schedule 3.2). The groundwater quality standards are divided into four categories that include standards for the protection of aquatic life (AW), irrigation water (IW), livestock watering (LW), and drinking water (DW). BC ENV *Protocol 21 for Contaminated Sites: Water Use Determination* (ENV 2017) provides guidance for determining applicable groundwater uses at a site, which in turn affect the groundwater standards. The discussion below presents an evaluation of the groundwater uses that apply when determining the numerical standards for groundwater at the Site based on guidance in Protocol 21.

Drinking Water

According to Protocol 21, current and future groundwater use as potential drinking water should be assessed where an aquifer underlies a site. As outlined in Section 3.0, two aquifers underlie the Site. In addition, there are two former registered wells on the Site and numerous registered wells located within 500 m of the Site. Therefore, the CSR DW standards are applied to evaluate groundwater quality for this monitoring program.

The Stage 8 CSR Amendments restricted the application of the water standards for iron and manganese to sites with specific Schedule 2 activities (ENV 2013). As none of the specific Schedule 2 activities listed in the Stage 8 Amendments are occurring on the Site, the CSR standards for iron and manganese in drinking water do not apply to the Site.

Aquatic Life

Shannon Lake is located approximately 300 m to the east/northeast of the Site; however, previous investigations have ruled out Shannon Lake as a receptor of groundwater from the Site (Golder 2015). As such, the CSR AW standards have not been applied.

Irrigation and Livestock Watering

Based on Protocol 21, irrigation water and livestock watering standards are considered applicable at sites where an aquifer underlies the site and the site is i) used for agricultural purposes, ii) located within a provincial Agricultural Land Reserve (ALR) or iii) if "irrigation or livestock watering wells or surface water intakes are present within a distance of 500 m from the outer extent of a groundwater contamination source". The Site is not used for agricultural activities and is not located within the ALR. Based on surrounding land use, provincial water well and water license records, points of diversion, and agricultural land reserve mapping, and in consideration of the groundwater flow direction across the Site, no groundwater wells or surface water intakes were identified for the purpose of livestock watering or irrigation within 100 m upgradient (north-northwest) of the Site and 500 m downgradient (south-southeast) of the Site. Therefore, the CSR IW and LW standards were not considered applicable to groundwater at the Site.

2.2 Regional Background Groundwater Concentrations

ENV Protocol 9 for Contaminated Sites: *Establishing Local Background Concentrations in Groundwater* which establishes regional background concentrations for select inorganic substances in groundwater for four regions in BC (ENV 2021). Under Protocol 9, groundwater that contains a substance at concentrations above the applicable generic numerical CSR water standard at a site, but below the local background concentration for that substance, would not be considered contaminated under Section 11(3) of the CSR with respect to that substance.

The boundaries of each of the four regions outlined in Protocol 9 are available in iMapBC. Based on these boundaries, a portion of the Site is located within Thompson Okanagan Region and as such, the background concentrations for the Thompson Okanagan Region are considered applicable to the groundwater quality at BH-3, BH-4, and BH-5. The remaining monitoring wells, BH-1, BH-2, BH-7, and MW99-2 are located just outside the boundary to the north of the mapped Thompson Okanagan Region. As such, analytical groundwater results discussed in this report are compared to the CSR DW standards and analytical results from BH-3, BH-4, and BH-5 were also compared to the background concentrations established in Table 1 of Protocol 9, where applicable.

For cobalt, the local background concentration estimate for cobalt in the Thompson-Okanagan Region in Protocol 9 was applied as well as the interim background value for the province (ENV 2021).

3.0 HYDROLOGY AND HYDROGEOLOGY

The regional direction of groundwater flow is inferred to be towards the south to southeast based on available information and previous reports (Figure 2).

Surface ponding consisting of two small transient surface water bodies located along the northwest side of the landfill was first observed during Site visits conducted in early 2013. The surface ponding, referred to as North and South Ponds in Golder's *2013 Annual Operations and Monitoring Report* (Golder 2014a), was monitored in

2013 and 2015 for possible changes in groundwater conditions or surface water inflow. The results suggested that the surface water was not being impacted with leachate from the landfill. The surface water appeared to be collecting in an excavated area from groundwater seepage located on the west side of the landfill. Golder believes that the ponds appeared primarily as a result of flow from groundwater seepage into the excavation. Remedial works were proposed in the Closure Plan (Golder 2015) and undertaken in 2018. This area was observed during the Site inspection in November 2021, as discussed in Section 5.1.

According to the ENV's BC Water Resources Atlas, two aquifers underlie the Site:

- **Aquifer No. 0301** is a sand and gravel aquifer with domestic water uses. It is classified as having a moderate demand, productivity, and vulnerability. It is also locally known as the Shannon Lake Aquifer. The aquifer mapping presented in iMapBC indicates that this aquifer is only present on the southern portion of the landfill.
- **Aquifer No. 0305** is a bedrock aquifer with domestic water uses. It is classified as having a moderate demand and vulnerability, and low productivity. The aquifer mapping presented in iMapBC indicates that this aquifer is present underlying the entire landfill.

According to ENV's BC Water Resource Atlas, several wells are present in Aquifers No. 0301 and No. 0305. The majority of the wells are completed in Aquifer 301 and are located east and south of the Site. The wells are reportedly used for private domestic, commercial, and industrial purposes. Generally, the depth to groundwater ranged between 2.1 m to 4.6 m below ground surface (mbgs).

Two registered wells are located within and/or immediately adjacent to the Site (Well Tag Number [WTN] 61675 and 56228.

According to the detailed well report, WTN 61675 corresponds to BH-6 in Golder borehole records. It is located along the western boundary and within the landfill. It was reportedly constructed in 1994 for commercial and industrial use. This well was drilled to a total depth of 12.2 mbgs and terminated in bedrock.

WTN 56228 (known as Dobbin's Well) was located immediately adjacent and outside of the landfill footprint, along the northwestern boundary (Figure 2). It was reportedly constructed in 1986 for private domestic use, terminated in bedrock at a total depth of 54.7 mbgs. The well was disconnected in 2006 due to a pipeline rupture and is no longer accessible. It is inferred that Dobbin's Well is installed within Aquifer 0305.

4.0 METHODS

4.1 Site Inspection

The Westside Landfill is inspected annually by a qualified professional as part of the monitoring program. During the inspection, the Westside Landfill is visually evaluated for potential issues such as erosion, differential settlement, slope failure, the condition of the vegetation on the cover, and safety concerns.

4.2 Groundwater Monitoring

The groundwater sampling program for the Westside Landfill was carried out by RDCO staff in May and November 2021, and depth to groundwater was measured by RDCO staff in January, February, March, April, May, August, November, and December 2021. The monitoring well locations used for water quality and level monitoring are shown on Figure 3.

Groundwater samples collected from the monitoring wells during the 2021 monitoring program were submitted to CARO Analytical Services of Kelowna, BC (CARO) for chemical analyses. As outlined in the Closure Plan (Golder 2015) and the groundwater monitoring requirements based on the ENV OC, the groundwater samples collected from monitoring wells BH-1, BH-2, BH-3, BH-4, BH-5, BH-7, and MW99-2 were analyzed for the following parameters: pH, conductivity, total dissolved solids (TDS), hardness, alkalinity, chloride, sulphate, ammonia nitrogen, nitrate nitrogen and dissolved metals. In addition to the aforementioned parameters the groundwater sample collected from BH-1 in May 2021 was analyzed for biological oxygen demand (BOD), chemical oxygen demand (COD), volatile organic compounds (VOCs), extractable petroleum hydrocarbons (EPH), polycyclic aromatic hydrocarbons (PAHs), and aromatic hydrocarbons (including benzene, toluene, ethylbenzene, and xylenes [BTEX]).

In the Closure Plan (Golder 2015), a well formerly used for background monitoring (Dobbin's Well) was destroyed. MW99-2 was monitored for one year to assess whether it would be suitable to serve as a background monitoring well, subject to ENV approval, and based on the 2016 assessment, MW99-2 has been included in the groundwater quality monitoring program (Golder 2017).

4.3 Landfill Gas Monitoring

A landfill gas management plan (LGMP) was developed in consultation with ENV (Golder 2013). Modifications to refine and extend the program were proposed in the Closure Plan (Golder 2015), most of which have been put into action since they are consistent with the program outlined in the LGMP. Additional vapour wells (VP15-01, VP15-02 and VP15-03) were installed in 2015, with two of these (VP15-01 and VP15-02) located near the edge of the area of filling along the eastern boundary to serve as additional "step-out wells" to the existing VP07-02, to better assess methane levels near the property boundary. VP15-03 was located near BH102 to provide additional information on landfill gas composition variation with depth. In 2018, seven vapour wells that were located north of the Site boundary on the north side were removed as part of earthworks being completed on the off-Site property; the wells removed included VP07-11, VP07-12, VP07-13, VP07-17, VP07-18, VP07-19, and VP07-20.

The recommendations included in the LGMP (Golder 2013) and the Closure Plan (Golder 2015) were put into effect as of May 2013. Landfill gas measurements have been measured by RDCO staff since 2016. The results of the monitoring events are submitted to Golder for review and assessment within 24 hours, to better meet the timelines for further action, if needed. In the LGMP (Golder 2013), action levels were set relative to the location of vapour wells, which were classified as *Inside-Boundary* for vapour wells within the landfill boundary that are no closer than 5 m to the landfill boundary, *Near-Boundary* for vapour wells, which are within the landfill boundary and are within 5 m of the landfill boundary, and *Outside-Boundary* for vapour wells that are outside of the landfill boundary. The action level for *Inside-Boundary* vapour wells is 25% Lower Explosive Limit (LEL), while the action level for the *Near-Boundary* and *Outside-Boundary* vapour wells is 10% LEL. The prescribed action in the case of exceedances at a vapour well is to check the instrument calibration and resample if there was a calibration issue. In cases where there is an associated "step-out" vapour well, which is a vapour well located further from the

landfill in a direction approximately perpendicular to the closest landfill boundary, then readings are measured at the step-out well and compared with the associated action level for that monitor. If the step-out readings are less than the associated action level, then no additional action is required. If there is no associated step-out monitor or if level in the step-out monitor exceed the associated action level, then ENV needs to be notified and an action plan developed.

The 2021 landfill gas monitoring program was conducted by RDCO staff. Complete monitoring events were completed in January, February, March, April, May, August, November, and December 2021, and partial sampling events in key locations were completed in June, July, September, and October 2021. The vapour monitoring locations are shown on Figure 3.

4.4 Groundwater Elevation Data

Groundwater depths were measured in January, February, March, April, May, August, November, and December 2021 from MW99-2, MW99-3 and MW99-4, and in May and November 2021 from BH-1, BH-2, BH-3, BH-4, BH-5, and BH-7.

A survey of the vapour and groundwater monitoring locations and elevations was completed by AllTerra Land Surveying Ltd. in January 2015. The elevations of the top of the monitoring wells are used to calculate groundwater elevations from the measured depth to groundwater. The information from this survey was used to adjust historical groundwater elevation data and was incorporated into the assessment of groundwater elevations and flow directions presented in the 2015 Monitoring Report (Golder 2015b), subsequent reports and this (current) report.

4.5 Quality Assurance / Quality Control (QA/QC)

A Quality Assurance/Quality Control (QA/QC) program was developed and implemented for the purpose of obtaining sampling and analytical data that were interpretable, meaningful, and reproducible. This involved using QA/QC measures in both the collection (field) and analysis (laboratory) of samples. A summary of the QA/QC procedures established for the field program and the QA/QC measures implemented by the analytical laboratory is provided in Appendix D.

5.0 RESULTS

The 2021 Site inspection, groundwater quality, landfill gas monitoring, and groundwater level results are discussed in the following sections.

5.1 Site Inspection

The 2021 Site inspection was conducted on 22 November 2021 by Mackenzie Scherer of Golder. No issues of immediate concern were identified during the 2021 Site inspection; however, several integrity issues were noted, including:

- Damage to the fencing by fallen tree along the western property boundary was observed (similar to the observation from the 2020 Site inspection) (Photo 1).
- Numerous holes cut into the fencing, primarily along the western and southern property boundaries.
- Damage to the electrical component of the fencing.

We understand from the RDCO that these integrity issues have been captured in a previous compliance report. Additionally, it is noted that following completion of the update to OC PR#12217, which is currently in pending, the requirement for fencing surrounding the perimeter of the landfill will no longer be required.

At the time of the Site inspection, the entirety of the landfill was covered in vegetation that did not appear to be stressed with only localized sections of bare earth showing (Photo 2). No visual evidence of erosion, differential settlement, or slope failure were observed. The two surface water bodies previously located in the northwest portion of the Site, referred to as North and South Ponds in Golder's *2013 Annual Operations and Monitoring Report* (Golder 2014a), did not contain water during the 2021 Site inspection. No indications of vehicular traffic or storage of equipment were observed on the landfill. While conducting the Site inspection, four deer were observed grazing on the western slope of the landfill. Additionally, burrows were observed in various locations across the landfill (Photo 3); however, no rodents or burrowing animals were directly observed.

Photo 1: Damaged perimeter fencing along western property boundary due to fallen tree, facing northeast.

Photo 2: Westside Landfill vegetation cover, facing south.

Photo 3: Animal burrow on Westside Landfill.

5.2 Groundwater Quality

RDCO staff collected groundwater samples in May and November 2021 and submitted the samples to CARO for analysis of the parameters outlined in Section 4.2. The analytical results were provided to Golder by RDCO for the preparation of this report. The groundwater analytical results were compiled and compared to the applicable regulatory criteria as described in Section 2.0. The tabulated analytical results are provided in Tables B-1 and B-2 in Appendix B, while the Certificate of Analysis (COA) reports from CARO are provided in Appendix C.

5.2.1 Groundwater Monitoring Results Relative to BC CSR DW Standards

The groundwater analytical results for dissolved metals, chloride, and nitrate (as N) from May 2021 and November 2021 are provided in Figure 4 and Figure 5, respectively.

To facilitate interpretation, the results are presented for wells located hydraulically upgradient of the landfill, within the landfill footprint, hydraulically downgradient within 50 m of the Site boundary, and hydraulically downgradient more than 50 m from the Site boundary. Parameter concentrations that exceed the applicable CSR DW standard are depicted with solid squares, while parameters concentrations that are below the applicable CSR DW standard are depicted with outlined circles and parameter concentrations with no applicable CSR DW standard are depicted with outlined triangles. The analytes are arranged in ascending order of concentration (approximately) to make interpretation of the figures easier. The concentrations of the parameters included in Figures 4 and 5 vary over a wide range, hence a logarithmic scale is used. For a number of the parameters, the results were reported to be at or below the laboratory reporting limits, which results in the data being plotted effectively as a single point (mercury, for example). Note that in cases where a result was below the laboratory reporting limit, the result was plotted as being equal to the laboratory reporting limit. There is a large variation in manganese and iron values, which is likely due to the fact that they are both much more soluble under reducing conditions than under oxidizing conditions.

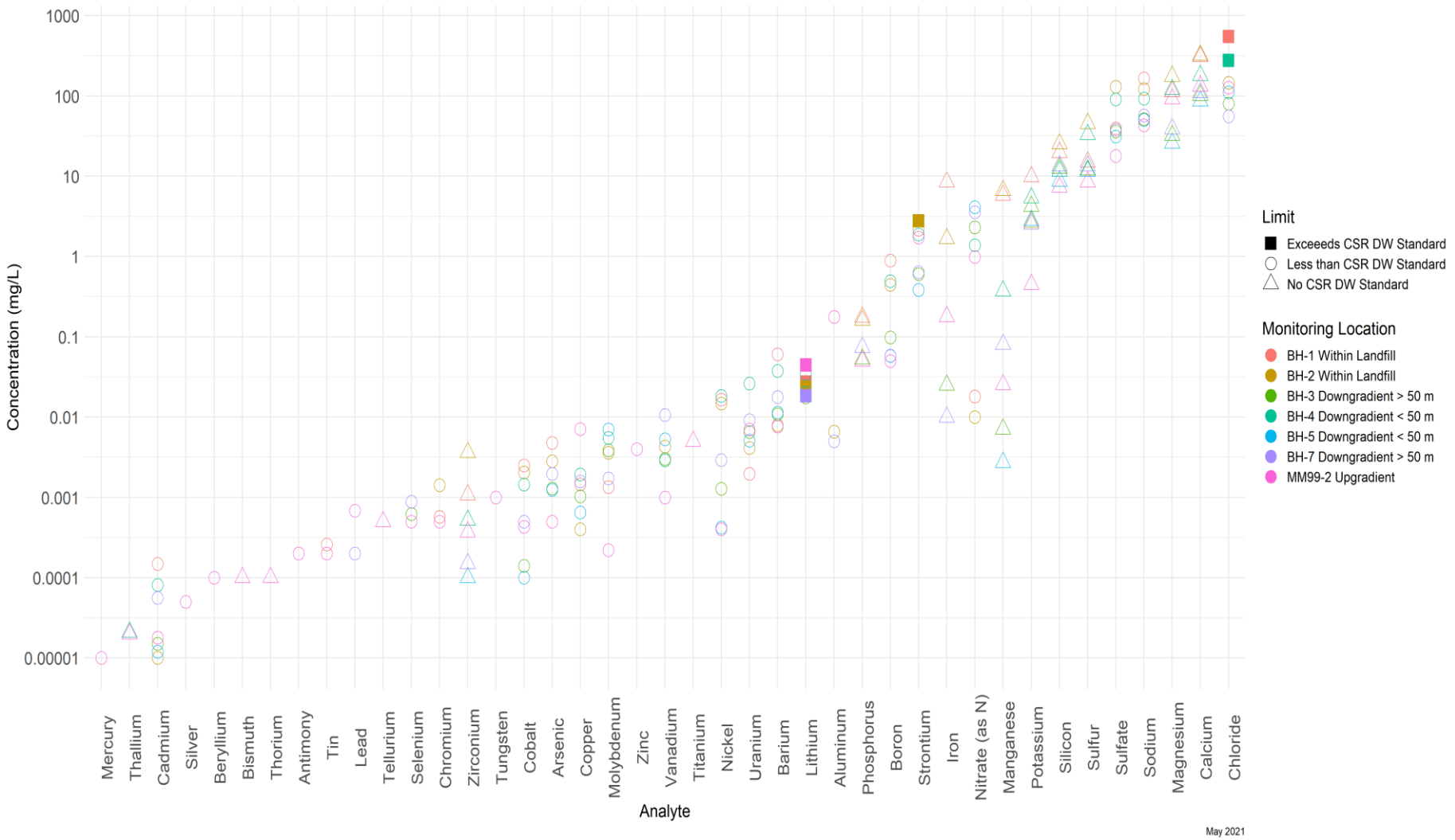

Figure 4: Groundwater Quality Summary, May 2021

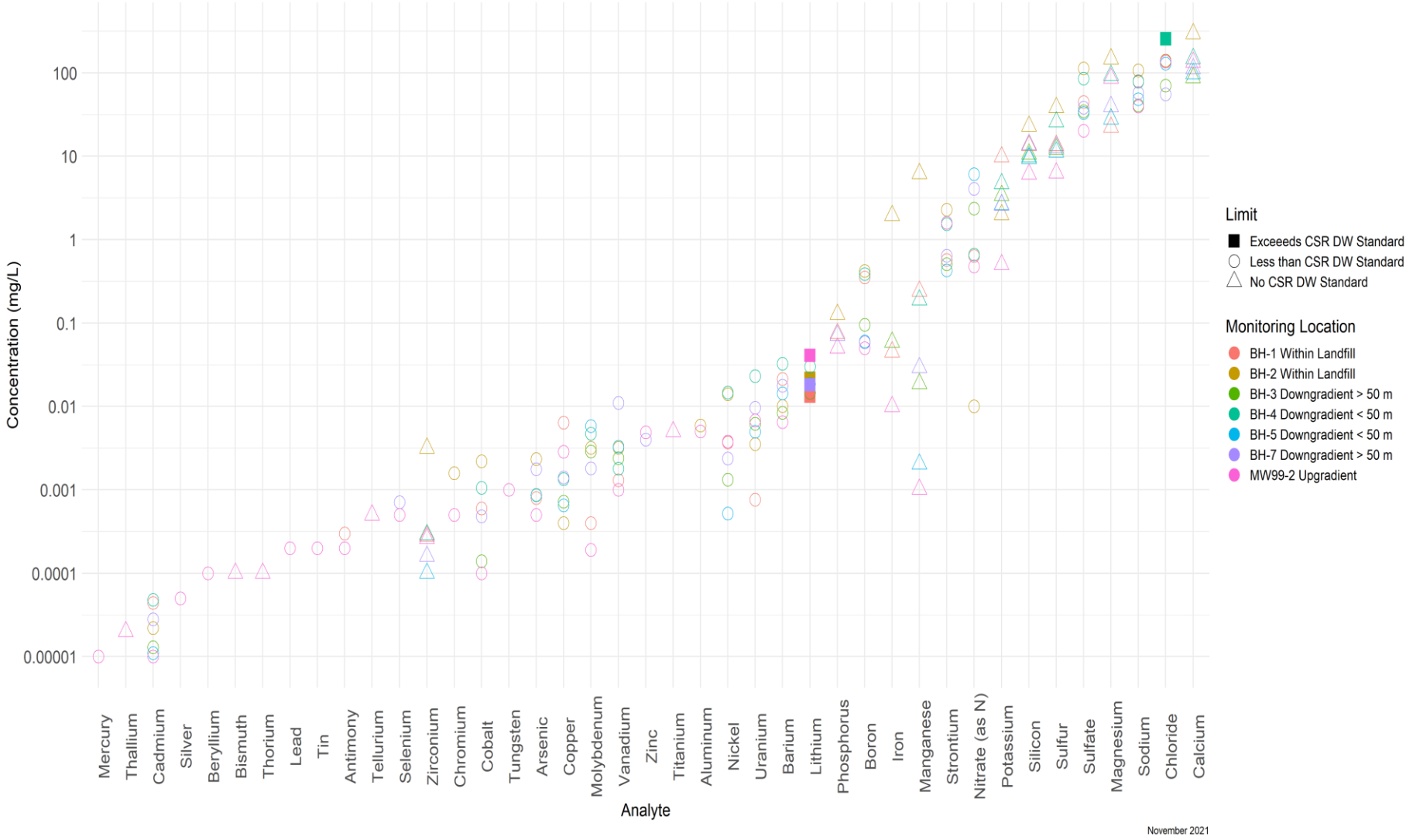

Figure 5: Groundwater Quality Summary, November 2021

A summary of the parameters that exceed the CSR DW standards in the May and November 2021 sampling events is provided in Table 1.

Table 1: BC CSR Drinking Water Exceedances, 2021

Parameter	CSR DW Standard	Upgradient	Within Landfill		Downgradient (< 50 m)		Downgradient (> 50 m)	
		MW99-2	BH-1	BH-2	BH-4	BH-5	BH-3	BH-7
May 2021								
Chloride	250	-	548	-	277	-	-	-
Lithium	0.008	0.0445	0.0273	0.0235	-	-	-	0.0184 (0.0187)
Strontium	2.5	-	-	2.78	-	-	-	-
November 2021								
Chloride	250	-	-	-	256	-	-	-
Lithium	0.008	0.0409	0.0132 (0.0134)	0.0218	-	-	-	0.0182

Notes:

Concentrations are in milligrams per litre (mg/L)

"-" indicates no CSR DW exceedance

(0.01) duplicate sample results are shown in brackets

- **Chloride:** Chloride exceeded the BC CSR DW standard at BH-1 (within the landfill) in May 2021, and at BH-4 (downgradient within 50 m of the landfill) in May and November 2021. The CSR DW chloride standard of 250 mg/L is to protect against taste and odours concern and is equal to the 2014 Health Canada Guidelines for Canadian Drinking Water Quality.
- **Lithium:** Lithium exceeded the BC CSR DW standard at four of the seven monitoring wells sampled in 2021, including the upgradient background monitoring well, MW99-2. The lithium concentrations at the landfill wells ranged from 0.0132 mg/L to 0.0445 mg/L in 2021, with the highest concentration reported at the background well. The lithium concentrations in the wells sampled were less than the ENV Protocol 9 Regional Background Estimate (0.096 mg/L); however, the Regional Background Estimate was not applied to BH-1, BH-2, BH-7 and MW99-2, as these wells are located just outside the mapped boundary. Based on the landfill background concentration, the Protocol 9 Background Estimate, and the range of lithium concentrations at the Site, it is inferred that the lithium concentrations reported at the Site are considered representative of background conditions.
- **Strontium:** Strontium exceeded the BC CSR DW standard at BH-2 (within the Landfill) in May 2021. The strontium concentration in BH-2 was less than the ENV Protocol 9 Regional Background Estimate; however, the Regional Background Estimate was not applied to BH-2 as this well is located just outside the mapped boundary.

In addition, the cobalt concentrations at BH-1 and BH-2 exceeded the CSR DW standard but were less than the provincial cobalt interim background groundwater concentration estimate, and uranium at BH-4 exceeded the CSR DW standards but were less than the Protocol 9 Regional Background Estimates. As such, these parameter concentrations are not considered contaminated under Section 11(3) of the CSR with respect to that substance.

The groundwater monitoring results summarized above suggest that any impacts from the landfill on groundwater quality are within the landfill footprint or downgradient within 50 m of the landfill. Furthermore, groundwater concentrations of several parameters (cobalt, lithium, and uranium) are inferred to be representative of background groundwater quality based on the concentrations of these parameters reported in the upgradient monitoring well and the Protocol 9 Regional Background Estimates for the Thompson Okanagan Region.

Groundwater concentrations of VOCs, EPHs, PAHs, and BTEX from BH-1 in May 2021 were less than the CSR DW standards (Table B-2 in Appendix B) and less than the laboratory reporting limits. Therefore, these parameters were excluded from Figure 4.

5.2.2 Groundwater Results Relative to Historical Data (Trend Analyses)

Analyses of select key parameters in groundwater that may be indicative of impacts from landfill leachate are presented in this section, including chloride, ammonia, nitrate plus nitrite, iron and manganese. A times-series of values for the key parameters are provided in Figure 6. The results are separated according to the well location: hydraulically upgradient, within the landfill footprint, hydraulically downgradient less than 50 m from the Site boundary, and hydraulically downgradient greater than 50 m from the Site boundary. A dotted vertical line is placed at the year 2010, the year that the landfill stopped receiving waste. If the concentration is above the CSR DW standard for a parameter the colour of the result is dark orange, if it is less than the CSR DW standard the result is green, and if there is no CSR DW standard then the result is blue. Note that in cases where a result was below the laboratory reporting limit, the result was plotted as being equal to the laboratory reporting limit.

As shown in Figure 6, the concentrations of the key parameters are generally relatively low in the upgradient well, highest at the wells within the landfill, decreasing in the downgradient wells less than 50 m from the Site boundary, and low in the downgradient wells greater than 50 m from the Site boundary. There are no parameter exceedances for these key parameters at the monitoring wells located greater than 50 m from the Site boundary. The concentrations of the key parameters in the monitoring wells within and downgradient within 50 m have generally exhibited a decreasing trend following cessation of filling in 2010. It is noted that the Site was partially covered after filling ceased, which may have limited infiltration and thereby further reduced leaching.

Individual discussion for each of the key parameters follows.

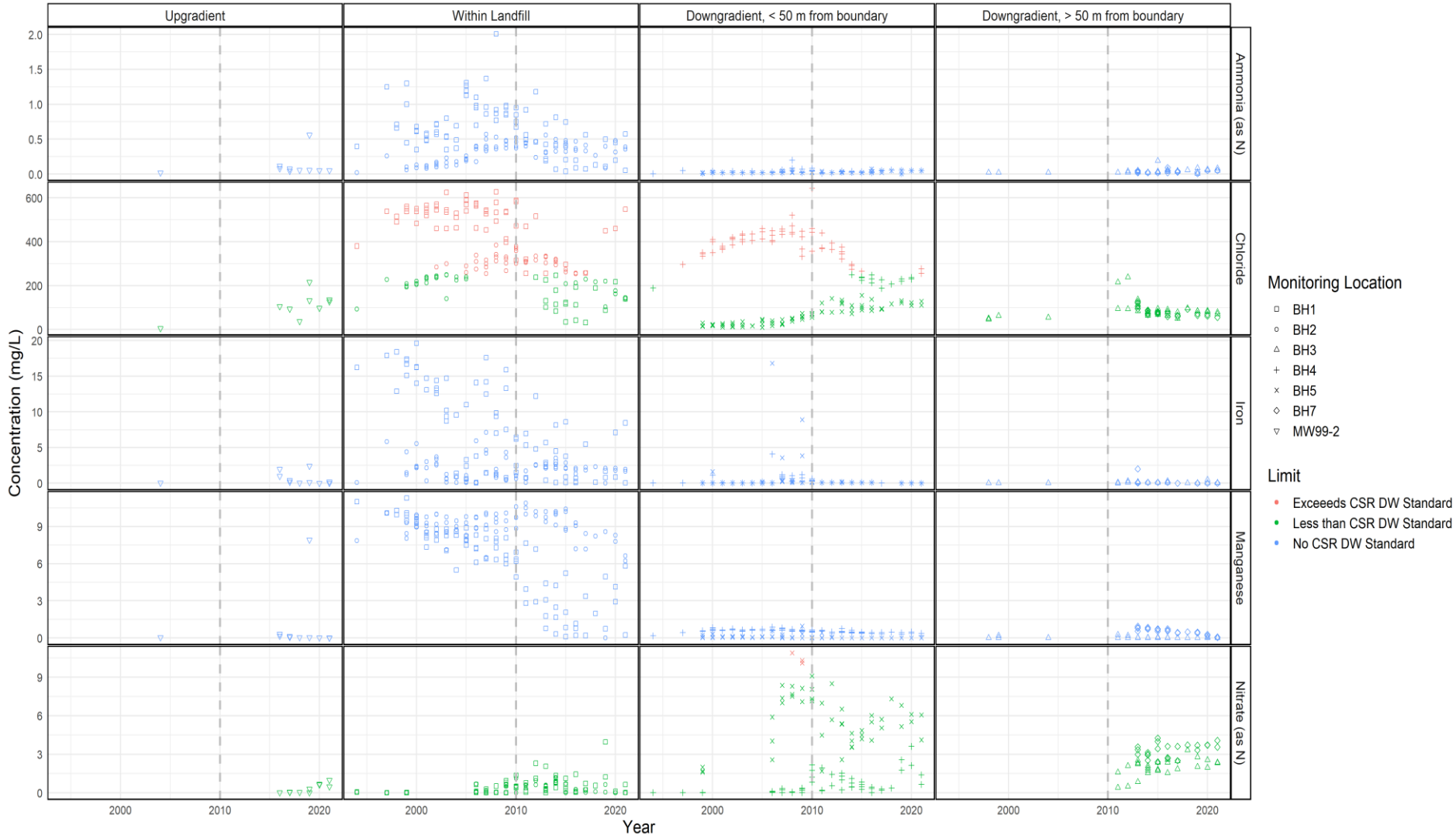

Figure 6: Values of Key Parameters Over Time

5.2.2.1 Chloride

Chloride concentrations in groundwater can become elevated from leachate impacts; however, chloride occurs naturally in groundwater and there are other sources of chloride in groundwater (i.e., road salt and septic influences). Elevated concentrations of chloride in groundwater downgradient of a landfill do not conclusively indicate an impact from the landfill. However, chloride can move through groundwater more quickly than some other parameters, which are subject to processes that slow their movement, and is therefore potentially an indicator that impacts from other parameters may appear at a later time.

Chloride concentrations are generally highest in the wells located within the landfill and are elevated in the downgradient wells within 50 m of the landfill (Figure 6). The lowest chloride concentrations are in the upgradient well, MW99-2, and the downgradient wells located more than 50 m from the landfill, BH-3 and BH-7. Both wells located within the landfill limits, BH-1 and BH-2, generally show a decline after filling ceased in 2010. Similarly, chloride concentrations in BH-5, located downgradient within 50 m of the landfill, indicate a slow increase from before 2010 to a few years after, and in recent years, the chloride concentrations have generally remained stable and less than the CSR DW standard. In the other well located downgradient within 50 m of the landfill (BH-4), chloride concentrations were decreasing between 2010 to 2018, but appear to be increasing in recent years, and in 2021, the chloride concentrations at BH-4 in May and November exceeded the CSR DW standard.

These observations are consistent with there being some impact on chloride concentrations in groundwater from the landfill. The chloride concentrations have decreased in monitoring wells within the landfill since filling ceased in 2010, however, chloride impacts are still apparent at downgradient monitoring wells with 50 m of the landfill and decrease with increasing distance from the landfill. The expectation is that with the cessation of landfilling, and with the closure works limiting infiltration, any elevation of chloride concentrations due to landfilling will gradually approach pre-landfill levels over time (assuming no other source exists). The groundwater analytical results reported so far are consistent with that expectation.

5.2.2.2 Ammonia and Nitrate

Decomposition of waste can lead to consumption of oxygen and therefore result in the anaerobic conditions that favour ammonia production. After closure of a landfill, it is expected that decomposition rates will decline over time as organic matter decomposes, and thus ammonia is expected to generally decline over time. There are no CSR DW standards for ammonia, and nitrate concentrations in the wells have been less than the CSR DW standards since 2010.

Concentrations of ammonia are elevated at wells located within the landfill, BH-1 and BH-2, relative to upgradient well MW99-2 (Figure 6). In general, ammonia concentrations are lowest in wells located both upgradient and downgradient of the landfill. This is consistent with ammonia being released due to decomposition of organic matter under low oxygen conditions within the landfill. Furthermore, ammonia may be oxidized, at least in part, to nitrate.

As shown in Figure 6, nitrate concentrations are relatively low at the wells located within the landfill, and higher in downgradient wells, particularly those located within 50 m of the landfill. This pattern is consistent with ammonia being released from decomposition of waste and then being oxidized to nitrate downgradient from the landfill.

Since the landfill stopped receiving waste in 2010, ammonia concentrations in the monitoring wells within the landfill have generally been declining. while nitrate concentrations in the landfill monitoring wells remain stable.

5.2.2.3 Iron and Manganese

Elevated iron and manganese can sometimes be direct indicators of landfill impacts, in that decomposition of waste can result in anaerobic conditions that tend to mobilize iron from naturally (and sometimes unnaturally) occurring sources. The solubility of iron, though, depends on other factors, such as pH. There are no CSR DW standards for iron or manganese at the Site. Iron and manganese concentrations within the landfill relative are elevated relative to the upgradient and downgradient monitoring wells. This pattern is consistent with iron and manganese being mobilized in the reducing conditions present in groundwater impacted by anaerobic conditions within the landfill, and with concentrations being lower in more oxidizing conditions downgradient of the landfill.

5.3 Landfill Gas Monitoring

The 2021 landfill gas monitoring events were completed in January, February, March, April, May, June, July, August, September, October, November and December. Note that the monitoring events conducted in June, July, September and October are partial rounds that include specified vapour wells only. The vapour monitoring results for 2021 are presented in Table B-3 provided in Appendix B.

Methane levels are critical at landfills since methane poses a potential risk to be explosive over a range of concentrations that could be generated at a landfill. Methane was the main focus of the LGMP (Golder 2013) and was discussed further in the Closure Plan (Golder 2015). The monitoring results for methane are discussed in Section 5.3.1, while the results of the other landfill gas concentrations measured, including hydrogen sulphide, carbon dioxide, and oxygen, are discussed in Section 5.3.2.

5.3.1 Methane

The methane action level for *Inside-Boundary* vapour wells is 25% LEL, while the action level for the *Near-Boundary* and *Outside-Boundary* vapour wells is 10% LEL. Methane readings greater than these action levels reported in 2021 are summarized in Table 2, by location.

Table 2: Exceedances of Methane Action Levels in 2021, by Location

Location (Relative to the landfill)	Number of Exceedances of Methane Action Level		
	Inner-Boundary (>25% LEL)	Near-Boundary (>10% LEL)	Outside-Boundary (>10% LEL)
North	0	0	0
East	BH102 – February 2021	0	-
South	0	-	-
West	0	0	0

"0" Indicates no exceedance of action levels were reported

"-" Indicates no associated vapour wells; % LEL = percent lower explosive limit

As indicated in Table 2, there was one action level exceedances at BH102, located on the east side of the landfill, in February 2021. There were no action level exceedances reported at *Near-Boundary* or *Outside-Boundary* vapour wells in 2021.

A summary of the 2021 methane action level exceedances by vapour well is provided in Table 3, along with the associated carbon dioxide and oxygen measurements.

Table 3: Exceedances of Methane Action Levels in 2021, by Vapour Well

Vapour Well	Date	Action Level (% LEL)	Methane (%LEL)	Carbon Dioxide (%)	Oxygen (%)
BH102	7 February 2021	25	100	24.9	0.9

% LEL = percent lower explosive limit

% = percent

In the subsequent monitoring event, the methane reading in BH102 on 11 March 2021 was measured to be 17% LEL, less than the action level, and the methane readings were 0% LEL for the remainder of the 2021 monitoring events.

There are three step-out vapour wells associated with BH102 (VP07-02, VP15-01, and VP15-02). In these three step-out vapour wells, the methane concentrations measured on 7 February 2021 are summarized in Table 4. It is noted that RDCO have frequently encountered difficulty in collecting samples from VP15-02 due to high purge back pressure. The methane concentrations in the associated step-out vapour wells for BH102 were below the action level; as such, no additional action was required for the action level exceedance reported at BH102.

Table 4: Summary of Exceedances of Methane Action Levels and Step-Out Vapour Well Results

Vapour Well Exhibiting Action Level Exceedance	Date	Associated Step-Out Vapour Well	Action Level (% LEL)	Methane (%LEL)
BH102	7 February 2021	VP07-02 (NB)	10	0
		VP15-01 (NB)	10	0
		VP15-02 (NB)	10	N/A – back pressure

% LEL = percent lower explosive limit

NB = Near Boundary

N/A = not applicable

The maximum methane concentration recorded by vapour well and year is illustrated in Figure 7. Note that the *Outside Boundary* vapour wells located to the north of the landfill were removed in mid-2018 as part of the development work on these off-site properties.

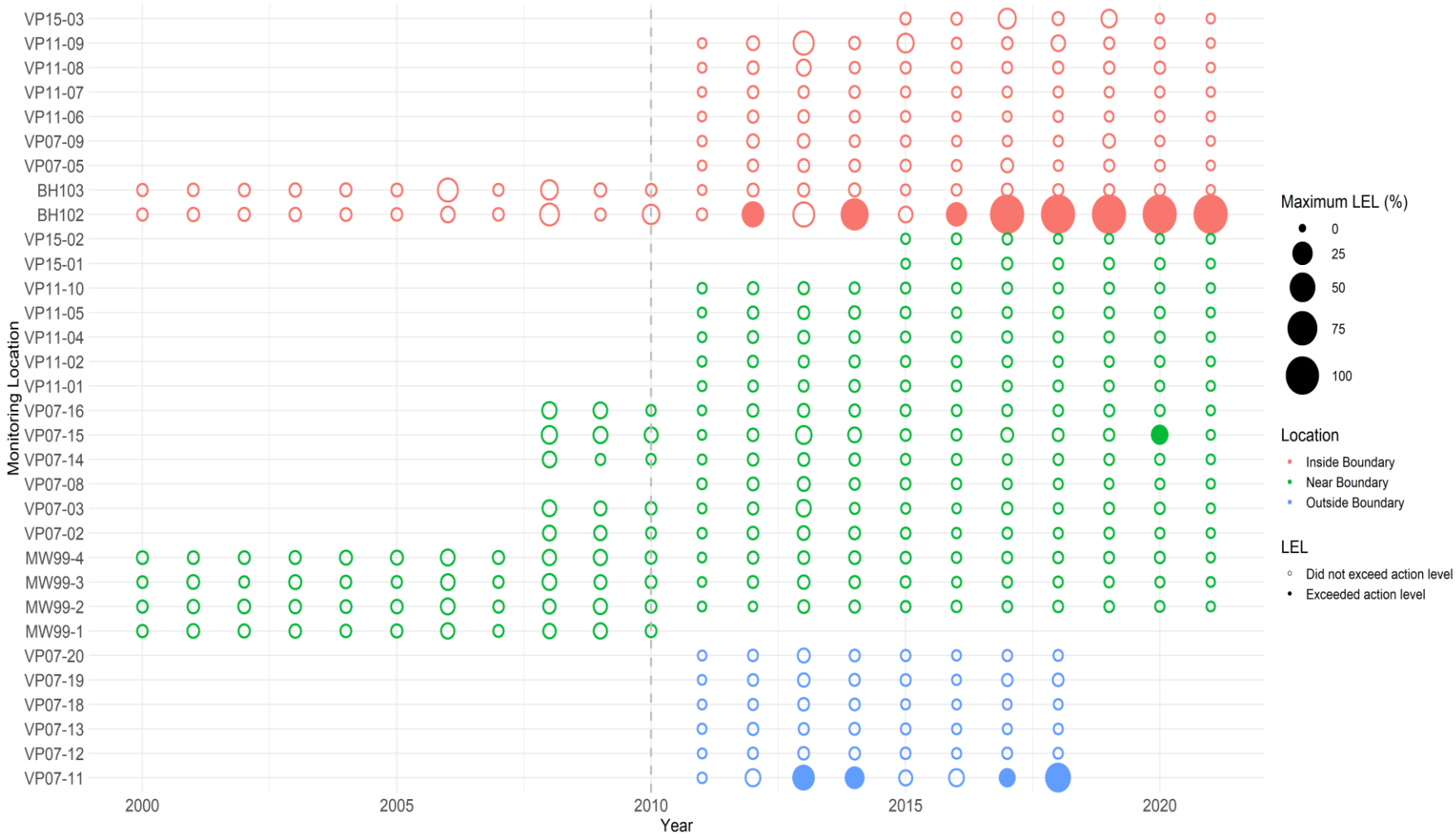

Figure 7: Maximum Methane Levels, by Vapour Well and Year

5.3.2 Other Landfill Gases

The median, maximum, and minimum measurements of hydrogen sulfide, oxygen, and carbon dioxide measured in 2021 are summarized in Table 5.

Table 5: Median, Maximum, and Minimum Measurements of Other Landfill Gases, 2021

Gas	Median	Maximum	Minimum
Hydrogen Sulfide (ppm)	0	0	0
Oxygen (%)	19.3	20.9	0.9
Carbon Dioxide (%)	1.2	24.9	0

ppm = parts per million
% = percent

Hydrogen sulfide concentrations measured in 2021 were below the detection limit of the instrument, similar to previous monitoring events.

The measured concentrations of oxygen and carbon dioxide vary considerably between vapour wells, and also vary over time at a given vapour well. Oxygen levels have historically varied from essentially atmospheric levels of just under 21% down to undetectable concentrations. Carbon dioxide concentrations have historically varied from undetectable concentrations up to a maximum of 37.1% reported at BH102 on 15 May 2017. In 2021, the maximum carbon dioxide concentration measured was 24.9% at BH102 on 7 February 2021.

5.4 Groundwater Elevations

The depth to groundwater and calculated groundwater elevations from the 2021 monitoring events are presented in Table B-4 of Appendix B. The groundwater elevations measured in 2021 are similar to those recorded in the past, as illustrated in Figure 8. The range of groundwater elevations at a given well are small compared with the differences between wells, hence the pattern of groundwater flow beneath the landfill is expected to remain fairly consistent from year to year.

The groundwater elevations and estimated groundwater elevation contours are included in Figure 2. Groundwater elevations are sufficiently consistent that Figure 2 has not been updated with 2021 data; it would not make any appreciable difference to the shape of the groundwater contours or to the inferred flow direction. Based on historical groundwater elevation measurements, as well as the general topography of the area, the inferred groundwater flow at the Site is in a southeasterly direction.

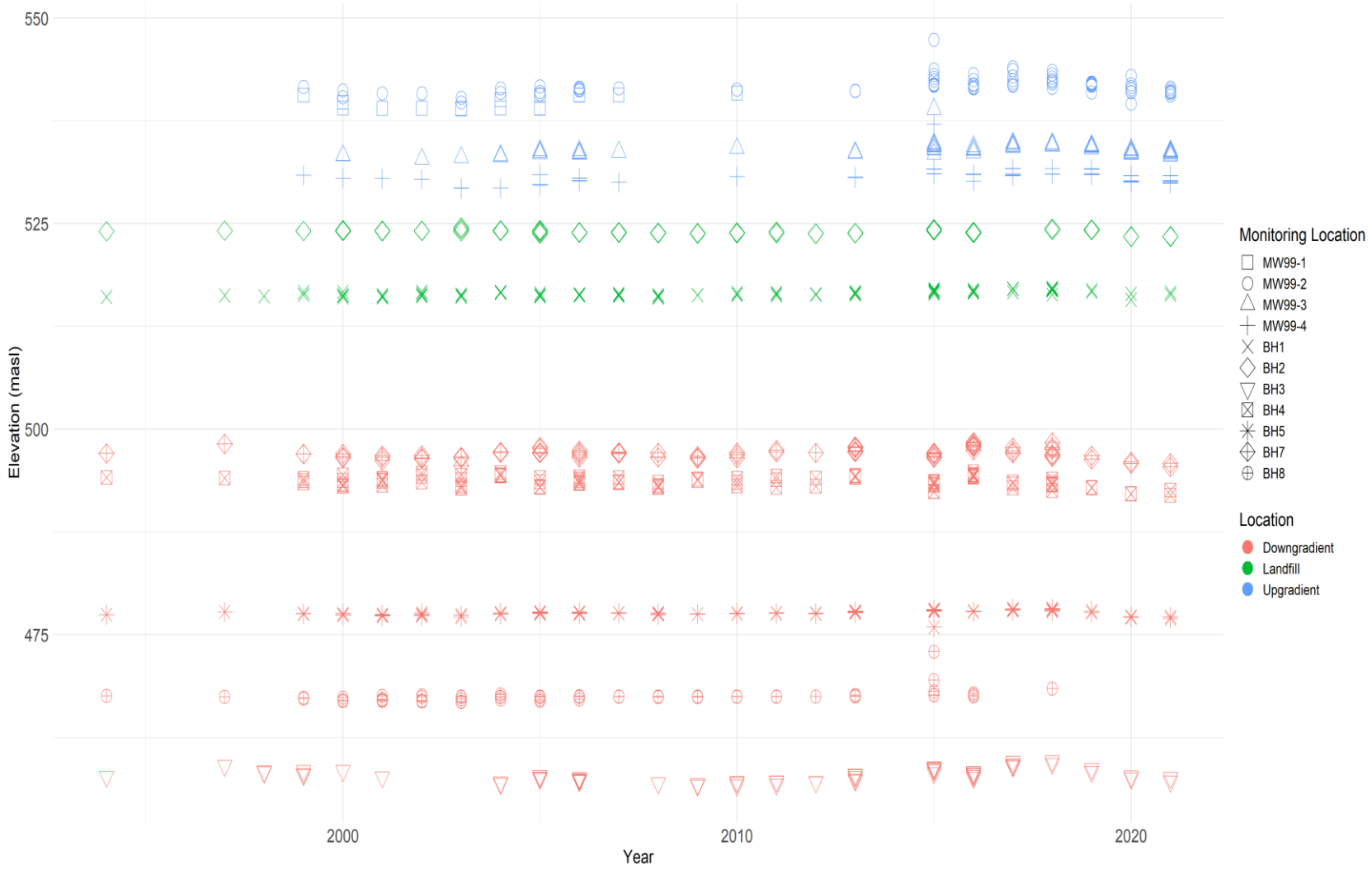

Figure 8: Groundwater Elevations, by Well

5.5 Quality Assurance / Quality Control (QA/QC)

The results of the Quality Assurance / Quality Control (QA/QC) program are provided in Appendix D including the calculated RPD and DF values for the paired groundwater analyses (presented in Table D-1). No field or laboratory QA/QC issues that would adversely affect interpretation of the data or identifying exceedances of CSR DW standards were identified. As such, the results of the QA/QC program suggest that groundwater data collected during 2021 are accurate and reproducible and can be relied upon for the purposes of this report.

6.0 DISCUSSION OF GROUNDWATER AND LANDFILL GAS MONITORING AND SAMPLING

There are two main components to the current monitoring program at the Westside Landfill: 1) groundwater monitoring and sampling, and 2) landfill gas monitoring. The key results from each component are summarized in the following sections.

6.1 Groundwater Monitoring and Sampling

As discussed in Section 5.2.1, exceedances of the CSR DW standards were reported for chloride, lithium, and strontium in 2021, including:

- **Chloride** at BH-1 (within the landfill) in May 2021 and BH-4 (downgradient within 50 m of the landfill) in May and November 2021.
- **Lithium** at four of the seven monitoring wells sampled in 2021, including the upgradient background monitoring well, MW99-2. The lithium concentrations in the wells sampled were less than the ENV Protocol 9 Regional Background Estimate (0.096 mg/L); however, the Regional Background Estimate was not applied to BH-1, BH-2, BH-7, and MW99-2, as these wells are located just outside the mapped boundary. Based on the landfill background concentration, the Protocol 9 Background Estimate, and the range of lithium concentrations at the Site, it is inferred that the lithium concentrations reported at the Site are considered representative of background conditions.
- **Strontium** at BH-2 (within the landfill) in May 2021. The strontium concentration in BH-2 was less than the ENV Protocol 9 Regional Background Estimate; however, the Regional Background Estimate was not applied to BH-2 as this well is located just outside the mapped boundary.

In addition, the cobalt concentrations at BH-1 and BH-2 exceeded the CSR DW standard but were less than the provincial cobalt interim background groundwater concentration estimate, and uranium at BH-4 exceeded the CSR DW standards but were less than the Protocol 9 Regional Background Estimates. As such, these parameter concentrations are not considered contaminated under Section 11(3) of the CSR with respect to that substance.

The groundwater monitoring results suggest that any impacts of the landfill on groundwater quality (greater than the CSR DW standards) are within the landfill footprint or downgradient within 50 m of the landfill. Furthermore, groundwater concentrations of several parameters (cobalt, lithium, and uranium) are inferred to be representative of background groundwater quality based on the concentrations of these parameters reported in the upgradient monitoring well and the Protocol 9 Regional Background Estimates for the Thompson Okanagan Region.

As discussed in Section 5.2.2, groundwater quality in relation to the key parameters selected as potential indicators of impacts from landfill leachate (including chloride, ammonia, nitrate/nitrite, iron, and manganese) appears to be generally improving in the downgradient monitoring wells. The trend to lower concentrations started circa 2011, following cessation of disposal at the Westside Landfill in 2010, and placement of cover soils over a significant portion of the formerly active area.

6.2 Landfill Gas

Under the LGMP (Golder 2013), methane measurements are to be compared to criteria specific to the monitoring location, based on the location of the monitor relative to the property boundary. Vapour well BH102 was the only vapour well in 2021 at which the associated action level was exceeded. The methane reading of 100% LEL at BH102 in February 2021 exceeded the methane action level for *Inside-Boundary* vapour wells of 25% LEL. The reported concentrations of methane at the three step-out vapour wells in February 2021 were below their associated action levels as outlined in the LGMP, such that no further action or reporting was required. In the subsequent monitoring event, the methane reading in BH102 on 11 March 2021 was measured to be 17% LEL, less than the action level, and the methane readings were 0% LEL for the remainder of the 2021 monitoring events.

The concentrations of hydrogen sulphide reported in 2021 were below the instrument detection limits, while the concentrations of carbon dioxide and oxygen varied from well to well and from reading to reading.

7.0 RECOMMENDATIONS

Recommendations for changes to the monitoring and inspection plan outlined in the Closure Plan were formally accepted by the ENV as of September 2017. In 2020, an Updated Landfill Monitoring Program (LMP) report was prepared to 1) reflect the landfill gas monitoring wells installed since the 2014 Updated LMP, 2) update the LMP to reflect the vapour wells decommissioned in 2018 and provide recommendations for replacement of the decommissioned vapour wells, and 3) review the required monitoring and sampling requirements following closure activities of the Westside Landfill (Golder 2020). At the time of writing this report, the amendment application for OC PR#12217 and Updated Landfill Monitoring Program report were under review with ENV. Recommendations provided in the 2020 Updated LMP included:

- Replacement of VP07-11 due to the elevated methane identified in 2017 and 2018. We understand that RDCO has not received permission to complete this from the property owner(s) due to access constraints and future development activities. Without access to the property(ies) north of the Site, Golder recommends installing three replacement vapour wells on the Site, along the north Site boundary, at strategic locations and screened at strategic depths. The location and depth of the three replacement vapour wells and recommended monitoring schedule are detailed in the 2020 Updated Landfill Monitoring Program.
- For groundwater sampling, the revisions included continue groundwater sampling and analysis every two years at BH-1 for EPH, BTEX, VOCs, TDS, BOD and COD and discontinue analysis at BH-1 for all other analyses under Section 3.3.4 of OC PR#12217; and discontinue all analysis at BH-4 under Sections 3.3.3 and 3.3.4 of OC PR#12217.

- It was recommended that, following two complete years of post-closure monitoring, the Updated LMP monitoring and sampling requirements be re-assessed. As the closure works were completed on 7 November 2018 with the conclusion of the seeding and fertilizing activities at the Site, as such it was recommended that the Updated LMP requirements be re-assessed following the completion and submission of the 2021 Monitoring Report.

Following completion and submission of this report, three full years of post-closure monitoring data are available. As such, Golder recommends that the monitoring and sampling requirements outlined in the Updated LMP be re-assessed.

8.0 LIMITATIONS AND USE OF REPORT

This report was prepared for the exclusive use of Regional District of the Central Okanagan. Any use which a third party makes of this report, or any reliance on or decisions to be made based on it are the responsibility of such third parties. Golder accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions taken based on this report.

The report, which includes all appendices and attachments, is based on data and information collected during the investigation conducted by Golder Associates Ltd.'s personnel. It provides a level of assurance commensurate with the level of study. The report is based solely on the Site conditions at the time of the Site investigation conducted in 2021, as described in this report.

In evaluating the Site, Golder has relied in good faith on information provided by the individuals and agencies noted in this report. We accept no responsibility for any deficiency, misstatements, or inaccuracies contained in this report as a result of omissions, misinterpretations of fraudulent acts of the persons or agencies interviewed.

The assessment of environmental conditions and possible hazards at this Site has been made using the results of chemical analysis of discrete groundwater samples from a limited number of locations. The Site conditions between sampling locations have been inferred based on conditions observed at borehole, monitoring well, and test pit locations. Subsurface conditions may vary from these sample locations. Additional study, including further subsurface investigation, can reduce the inherent uncertainties associated with this type of study. However, it is never possible, even with exhaustive sampling and testing, to dismiss the possibility that part of a Site may be contaminated and remain undetected.

This investigation was performed according to current professional standards and practices in the environmental field. If new information is discovered during future work, including excavations, borings, or other activities or studies, Golder should be requested to re-evaluate the conclusions of this report, and to provide amendments as required.

9.0 CLOSURE

We trust that this report provides you with the information that you require at this time. Should you require additional information or have any questions, please feel free to contact the undersigned at your earliest convenience.

Golder Associates Ltd.

Mackenzie Scherer, BSc, CIT
Geoscientist

Darlene Atkinson, MSc, PEng, CSAP
Associate, Senior Environmental Engineer

MS/DA/jts

https://golderassociates.sharepoint.com/sites/112657/project files/6 deliverables/issued to client_for wp/19127217-003-r-rev0/19127217-003-r-rev0-2021 amr 25apr_22.docx

PERMIT TO PRACTICE #1003064
Engineers & Geoscientists BC

10.0 REFERENCES

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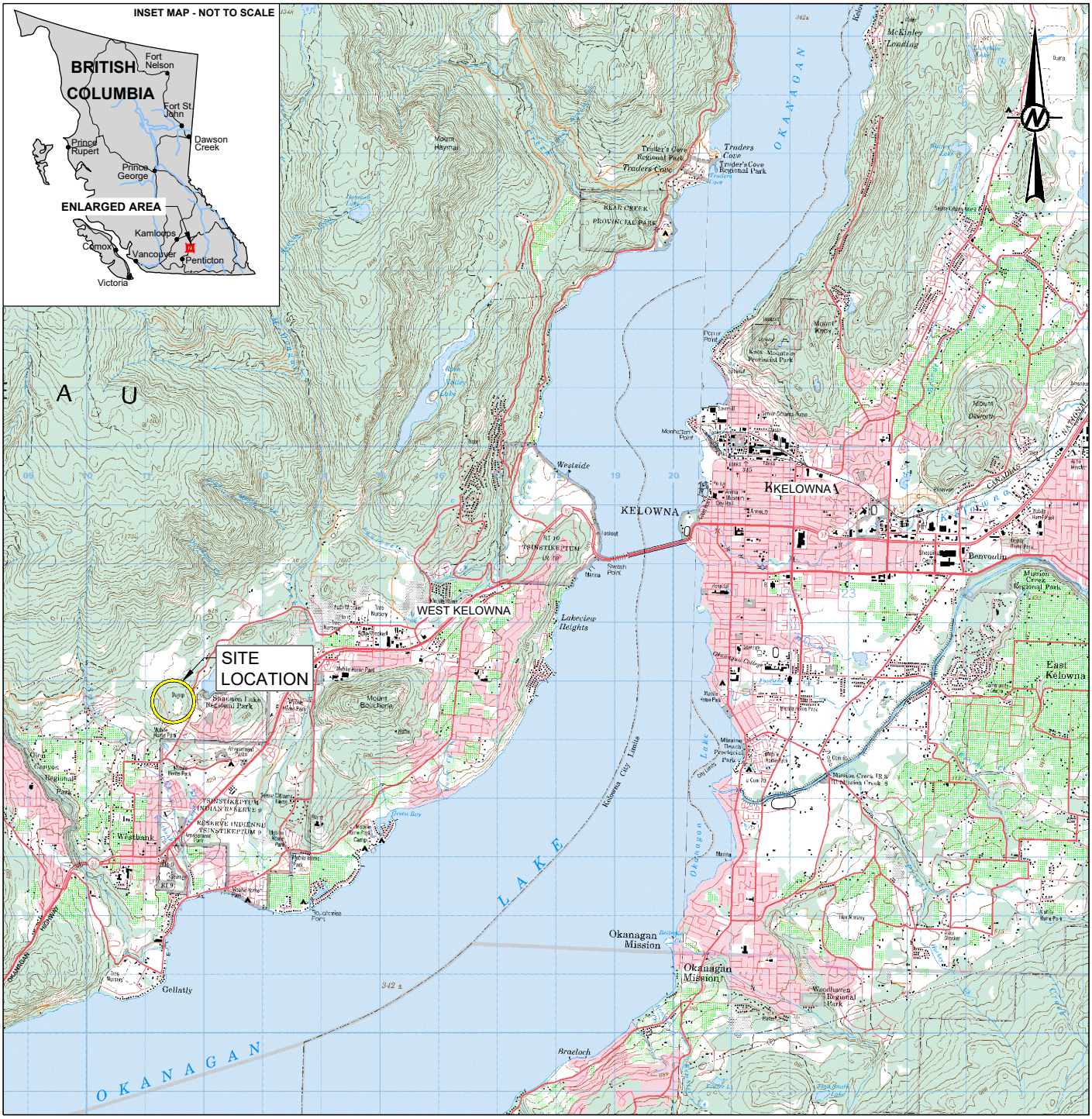


REFERENCE

1. TOPOGRAPHIC MAPS 82E/13 AND /14 © 2001 AND 1999 HER MAJESTY THE QUEEN IN RIGHT OF CANADA. DEPARTMENT OF NATURAL RESOURCES. ALL RIGHTS RESERVED.

NOT FOR CONSTRUCTION

0 2,500 5,000
1:100,000 METRES

CLIENT
REGIONAL DISTRICT OF CENTRAL OKANAGAN

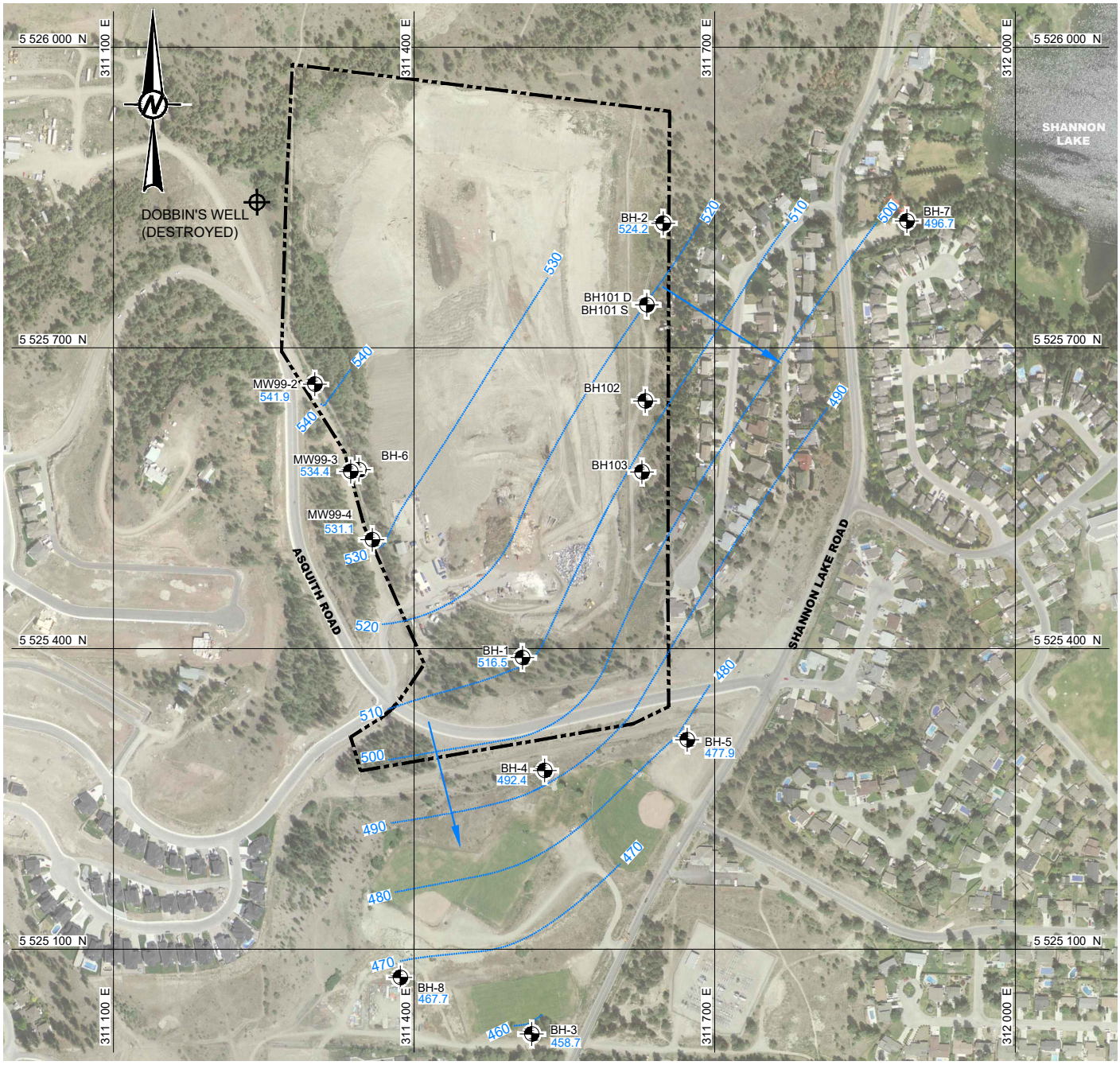
CONSULTANT
WSP GOLDER

YYYY-MM-DD	2022-04-22
PREPARED	R. MARTIN
DESIGN	M. SCHERER
REVIEW	M. SCHERER
APPROVED	D. ATKINSON

PROJECT
2021 MONITORING REPORT
WESTSIDE LANDFILL
WEST KELOWNA, B.C.

TITLE
KEY PLAN

PROJECT No.	PHASE/DOC#	Rev.	FIGURE
19127217	2000/003	0	1



LEGEND

- APPROXIMATE LANDFILL BOUNDARY
- GROUNDWATER MONITORING WELL LOCATION
- DOMESTIC WATER WELL LOCATION
- 458.3 — MONITORING WELL GROUNDWATER ELEVATION (MEASURED ON AUG. 12, 2015)
- INFERRED DIRECTION OF GROUNDWATER FLOW
- 470 — INFERRED GROUNDWATER CONTOUR (10m INTERVAL)

NOTES

1. ALL UNITS IN METRES UNLESS OTHERWISE STATED.
2. COORDINATES ARE IN UTM NAD83, ZONE 10.

REFERENCE

1. ORTHOPHOTO OBTAINED FROM RDCO. IMAGERY DATE: 2009

NOT FOR CONSTRUCTION

0 100 200
1:6,000 METRES

CLIENT
REGIONAL DISTRICT OF CENTRAL OKANAGAN

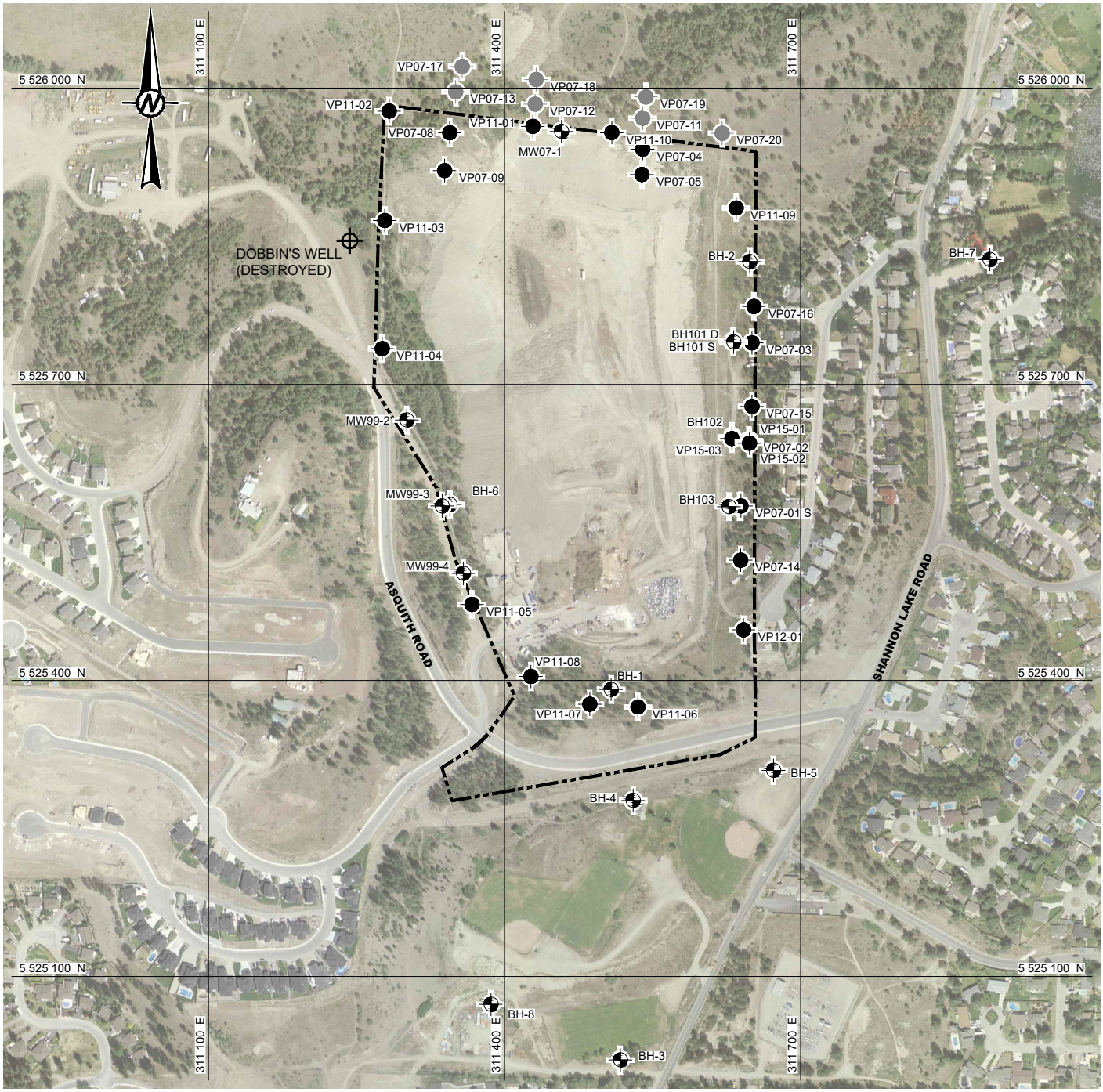
CONSULTANT
WSP GOLDER

YYYY-MM-DD	2022-04-22
PREPARED	R. MARTIN
DESIGN	M. SCHERER
REVIEW	M. SCHERER
APPROVED	D. ATKINSON

PROJECT
2021 MONITORING REPORT
WESTSIDE LANDFILL
WEST KELOWNA, B.C.

TITLE
GROUNDWATER MONITORING LOCATIONS AND INFERRED DIRECTION OF GROUNDWATER FLOW

PROJECT No.	PHASE/DOC#	Rev.	FIGURE
19127217	2000/003	0	2



LEGEND

- APPROXIMATE LANDFILL BOUNDARY
- MONITORING WELL LOCATION
- SOIL VAPOUR WELL LOCATION
- MONITORING LOCATION DECOMMISSIONED IN JUNE 2018
- APPROXIMATE FORMER LOCATION OF DOMESTIC WATER WELL

NOTES

1. ALL UNITS IN METRES UNLESS OTHERWISE STATED.
2. COORDINATES ARE IN UTM NAD83, ZONE 10.

REFERENCE

1. ORTHOPHOTO OBTAINED FROM RDCO. IMAGERY DATE: 2009

NOT FOR CONSTRUCTION

0 100 200
1:6,000 METRES

CLIENT
REGIONAL DISTRICT OF CENTRAL OKANAGAN

CONSULTANT
WSP GOLDER

YYYY-MM-DD	2022-04-22
PREPARED	R. MARTIN
DESIGN	M. SCHERER
REVIEW	M. SCHERER
APPROVED	D. ATKINSON

PROJECT
2021 MONITORING REPORT
WESTSIDE LANDFILL
WEST KELOWNA, B.C.

TITLE
GROUNDWATER MONITORING AND SOIL VAPOUR WELL LOCATIONS

PROJECT No.	PHASE/DOC#	Rev.	FIGURE
19127217	2000/003	0	3

APPENDIX A

Westside Landfill Operational Certificate Letter

POLLUTION
PREVENTION

Suite 201
3547 Skaha Lake Road
Penticton
British Columbia V2A 7K2
Telephone: (250) 490-8200
Fax: (250) 492-1314

BRITISH COLUMBIA

MINISTRY OF ENVIRONMENT,
LANDS AND PARKS

OPERATIONAL CERTIFICATE
PR 12217

Under the provisions of the Waste Management Act and in accordance with the Approved Regional District of Central Okanagan Solid Waste Management Plan,

Regional District of Central Okanagan

1450 KLO Road

Kelowna, British Columbia

V1W 3Z4

is authorized to manage recyclable materials and to discharge refuse to the ground at a landfill facility located approximately 2.5 km north of Westbank, British Columbia, subject to the conditions listed below. Contravention of any of these conditions is a violation of the *Waste Management Act* and may result in prosecution.

1 AUTHORIZED DISCHARGES

1.1 The discharge of refuse to which this Sub-Section is applicable is shown on the attached Site Plan A. The reference number for this discharge is E223888.

1.1.1. The maximum rate at which refuse may be discharged to the landfill is 20,000 tonnes per year.

1.1.2 The type of refuse which may be discharged is municipal solid waste and other wastes as authorized by the Regional Waste Manager.

1.1.3 The works authorized are a sanitary landfill and related appurtenances.

1.1.4 The location from which the discharge originates is generally the area on the west side of Okanagan Lake within the boundaries of the Regional District of Central Okanagan.

T.R. Forty, P.Eng.
Assistant Regional Waste Manager

Date Issued: May 28, 1997
Amendment Date:
(most recent)

1.1.5 The location of the approximate area of discharge is that Part of District Lot 3794 ODYD shown on Plan C11135 Except Plan KAP46607 as shown on Site Plan A.

2 GENERAL REQUIREMENTS

2.1 Maintenance of Works and Emergency Procedures

The holder of the Operational Certificate shall inspect the landfill, any related pollution control works and designated areas for managing recyclable or reusable materials regularly and maintain them in good working order. In the event of an emergency or condition beyond the control of the holder of the Operational Certificate which prevents continuing operation of the authorized method of pollution control, the holder of the Operational Certificate shall immediately notify the Regional Waste Manager and take appropriate remedial action.

2.2 Process Modifications

The holder of the Operational Certificate shall notify the Regional Waste Manager prior to implementing changes to any process that may affect the quality and/or quantity of the discharge.

2.3 Plans - New Works

Plans and specifications of any new works related to this facility shall be submitted to the Regional Waste Manager and his consent obtained before construction commences. The works shall be constructed in accordance with such plans. Review of the submitted plans and specifications is for the purpose of administration of the Operational Certificate and only implies that the works specified therein meet the appropriate guidelines, criteria or standards.

2.4 Operational and Closure Plan

2.4.1 An *Operational and Closure Plan*, prepared by a suitably qualified professional shall be submitted for authorization by the Regional Waste Manager, on or before July 31, 1997.

T.R. Forty, P.Eng.
Assistant Regional Waste Manager

2.4.2 The *Operational and Closure Plan* shall include the following:

- Anticipated total waste volumes and tonnage, and life of the landfill (ie: closure date);
- A topographic plan showing the final elevation contours of the landfill and surface water diversion and drainage controls;
- Design of the final cover including the thickness and permeability of barrier layers and drainage layers, and information on topsoil, vegetative cover and erosion prevention controls;
- Procedures for notifying the public about the closure and about alternative waste disposal facilities;
- Rodent and nuisance wildlife control procedures;
- Proposed end use of the property after closure;
- A plan for monitoring groundwater, surface water and landfill gas, erosion and settlement for a minimum post-closure period of 25 years;
- A plan and accompanying design for the collection, storage and treatment/use of landfill gas for a minimum of 25 years;
- A plan for operation of any required pollution abatement engineering works such as leachate collection and treatment systems, for a minimum post-closure period of 25 years;
- A schedule of reserve funds or security to be collected each year until closure; to cover estimated costs of closure, post-closure and a contingency for remediation;
- A screening plan, ie: vegetative or berm, designed by a landscape architect with particular focus on the east side of the landfill;
- A detailed fill plan for the east side of the landfill;
- A perimeter and electric bear control fencing design;
- Litter and odour control measures;
- Design of gas monitoring wells for lateral migration and the proposed gas monitoring program;
- Final cover design and a schedule to cover previously filled areas that are no longer going to receive waste, particularly on the east side of the landfill;
- Contingency plan & notification procedures in the event of an emergency;
- Training procedures for operators; and
- Any other site specific concerns as identified by the Regional Waste Manager.

2.4.3 Terms of reference for the Operational and Closure Plan are subject to authorization by the Regional Waste Manager.

T.R. Forty, P.Eng.
Assistant Regional Waste Manager

Date Issued: May 28, 1997
Amendment Date:

2.4.4 The Regional Waste Manager may request revisions to the *Operational and Closure Plan*. Terms of reference for the revisions to the *Operational and Closure Plan* are subject to authorization by the Regional Waste Manager.

2.4.5 Operation of this landfill is to be in substantial accordance with the authorized *Operational and Closure Plan*.

2.4.6 If there is an inconsistency between this Operational Certificate and the authorized *Operational and Closure Plan*, the Operational Certificate shall take precedence.

2.5 Ground and Surface Water Quality Impairment

2.5.1 Landfills must not be operated in a manner such that ground or surface water quality decreases beyond that allowed by the *Approved and Working Criteria for Water Quality* dated 1995 prepared by the Water Quality Branch of the Ministry of Environment, Lands and Parks at or beyond the landfill property boundary. The appropriate water quality criteria will be specified by the Regional Waste Manager after reviewing uses of the ground and surface water resources.

2.5.2 If excursions result to the specified water quality criteria, the Regional Waste Manager may require that leachate management control measures or works be undertaken. Terms of reference for any leachate management study and/or design work is subject to the authorization of the Regional Waste Manager.

2.6 Landfill Gas Management

2.6.1 An assessment of the emissions of non-methane organic compounds (NMOCs) is required for landfills exceeding a total capacity of 100,000 tonnes. If NMOCs are determined to exceed 150 tonnes/year, landfill gas recovery and management systems will be required to be designed, installed and operational within 3 years. If NMOCs are projected to be less than 150 tonnes/year for the operating life of the landfill, an assessment for the need of passive gas venting will be required. Terms of reference for any landfill gas study or design is subject to the authorization of the Regional Waste Manager.

2.6.2 The gas monitoring wells, designed by a suitably qualified professional, are to be installed on or before August 31, 1998.

T.R. Forty, P.Eng.
Assistant Regional Waste Manager

Date Issued: May 28, 1997
Amendment Date:
(most recent)

2.7 Property Boundary

The buffer zone between any municipal solid waste discharged after the issuance of this Operational Certificate and the property boundary is to be at least 50 metres of which the 15 metres closest to the property boundary must be reserved for natural or landscaped screening (berms or vegetative screens). Depending on adjacent land use and environmental factors, buffer zones of less than 50 metres but not less than 15 metres may be authorized by the Regional Waste Manager.

2.8 Other Facilities

The distance between the discharged municipal solid waste and the nearest residence, water supply intake, hotel, restaurant, food processing facility, school, church or public park is to be a minimum of 300 metres. Greater or lesser separation distances may be authorized where justified. For those landfills designed to collect and recover methane gas generated, the issue of potential on-site or off-site users of the energy should be addressed in siting the landfill, consistent with the preceding regarding public places. An exemption is granted to discharge municipal solid waste closer than 300 m to the existing residences located in the subdivision to the east of the landfill.

2.9 Natural Control Landfill

2.9.1 The bottommost solid waste cell is to be at least 1.2 metres above the seasonal high water table. Greater or lesser separation depths may be authorized based on soil permeability and the leachate renovation capability of the soil.

2.9.2 There is to be at least a 2 metres thick layer of low permeability soil with a hydraulic conductivity of 1 x 10-6 cm/s or less (i.e. silt or clay), below each of the bottommost waste cells. Lesser thicknesses or no layer of low permeability soil may be authorized based on the potential for leachate generation and the unsaturated depth, permeability and leachate renovation capability of the existing soil.

2.10 Water

The disposal of municipal solid waste into water is unacceptable. Surface water diversion to restrict storm water runoff from contacting the wastes is required.

T.R. Forty, P.Eng.
Assistant Regional Waste Manager

2.11 Final Cover

Final cover for landfill sites is to consist of a minimum of 1 metre of low permeability (<1 x 10-5 cm/s) compacted soil plus a minimum of 0.15 metre of topsoil with authorized vegetation established. The depth of the topsoil layer should be related to the type of vegetation proposed (ie rooting depth). Soils of higher permeability may be authorized based on leachate generation potential at the landfill site. Final cover is to be constructed with slopes between 4% and 33% with appropriate run-on/run-off drainage controls and erosion controls. An assessment of the need for gas collection and recovery systems shall be made so that, in the event such systems are required, cover can be appropriately designed and constructed. Final cover is to be installed within 90 days of landfill closure or on any areas of the landfill which will not receive any more refuse within the next 12 months. Completed portions of the landfill are to progressively receive final cover during the active life of the landfill.

Additional layers of natural materials including earth and aggregate and/or synthetic materials may be necessary for inclusion in the final cover design due to site specific conditions and the presence of management systems for leachate and landfill gas.

2.12 Access Road

An appropriately constructed and maintained access road to, and a road system within the landfill site capable of supporting all vehicles hauling waste, are required during the operating life of the landfill.

2.13 Fencing and Access

2.13.1 Fencing is required to be installed around the perimeter of the landfill on or before April 1, 1998. The type and extent of fencing will depend on the existing natural vegetation and topographic features and is to be authorized by the Regional Waste Manager. All access points are to have locking gates.

2.13.2 Bears shall be prevented from accessing any and all putrescible refuse from April to November inclusive through the use of electric fencing. Electric fencing is to be installed on or before April 1, 1998 and maintained thereafter.

T.R. Forty, P.Eng.
Assistant Regional Waste Manager

2.13.3 The holder of the Operational Certificate is to conduct a public relations campaign 3 months prior to the installation of electric fencing. The purpose of the campaign is to inform the public of the impacts of installing electric fencing around the landfill. The Conservation Officer Service is to be consulted in the development of the public relations campaign.

2.13.4 Signage is to be attached to the electric fence at regular intervals with an appropriate safety warning indicating that the fence is electrified.

2.14 Design by Qualified Persons

All landfills are to be designed by persons qualified in landfill site selection, design and operation. All plans, specifications, and reports are to be sealed by a professional engineer or geoscientist licensed to practice in the province of British Columbia.

2.15 Prohibited Wastes

The co-disposal of the following wastes with the rest of the municipal solid waste is prohibited unless specifically authorized by the Regional Waste Manager:

- Special Wastes other than those specifically authorized in the *Special Waste Regulation*
- Bulk liquids and semisolid sludges which contain free liquid;
- Liquid or semisolid wastes including septage, black water, sewage treatment sludge, etc.;
- Automobiles, white goods, other large metallic objects and tires;
- Biomedical waste as defined in the document *Guidelines for the Management of Biomedical Waste in Canada* (CCME, February 1992); and
- Dead animals and slaughter house, fish hatchery and farming wastes or cannery wastes and byproducts.

Burial of these wastes in dedicated locations (i.e. avoiding co-disposal) at a landfill site may be authorized by the Regional Waste Manager only if there is no other viable alternative such as treatment/disposal, recycling, reprocessing or composting. The viability of alternatives is to be determined by the Regional Waste Manager based on submission of cost data by the holder of the Operational Certificate. For those cases in which the dedicated disposal of otherwise prohibited wastes is authorized, the specific on-site location of the disposal shall be recorded to allow ready access to the waste should corrective or further action pertaining to the management of these wastes be required by the Ministry at some time in the future.

2.16 Hydrocarbon Contaminated Soils

The deposit of hydrocarbon contaminated soils below the *Special Waste Regulation* criteria is authorized at this landfill subject to the following conditions:

- Soil contaminated with hydrocarbons shall be deposited in layers less than 0.3 meters; and

- Soil contaminated with hydrocarbons shall be deposited a minimum of 1.2 meters above the seasonal high groundwater level and a minimum of 2.0 meters below the final grade of the landfill to prevent the impact on groundwater and any future vegetation on the site.

2.17 Designated Areas

Maintain areas for the separation, handling and storage of recyclable or reusable materials where applicable.

When a separated recyclable material is a special waste it is to be stored and managed in accordance with the *Special Waste Regulation*.

Composting of yard waste is to be in accordance with the *Production and Use of Compost Regulation*.

2.18 Signs

A sign is to be posted at each entrance of the landfill with the following current information:

- Site name
- Owner and operator
- Contact phone number and address for owner and operator
- Phone number in case of emergency (such as fire)
- Hours of operation (if applicable)
- Materials/wastes accepted for landfill and recycling
- Materials/wastes banned
- Tipping fees (if applicable)

Additional signs which clearly indicate the directions to the active tipping face, public disposal area, recycling and waste separation areas, etc. should also be displayed.

T.R. Forty, P.Eng.
Assistant Regional Waste Manager

2.19 Supervision

Fulltime, trained operators on-site are required at this landfill during operating hours. The gates are to be locked to prevent unauthorized access during non-operating hours. Properly designed and maintained public waste disposal and/or recyclable material bins situated outside the main gate may be provided for after hours use. The operator is required to be familiar with the Operational Certificate, inspection records, the authorized *Operations and Closure Plan* and all annual reports.

2.20 Scavenging

Scavenging of waste is to be prevented. The salvaging of wastes should be encouraged by providing areas and facilities for separation of recyclable or reusable materials.

2.21 Dust Control

Dust created within the landfill property is to be controlled, using methods and materials acceptable to the Regional Waste Manager, such that it does not cause a public nuisance.

2.22 Waste Compaction and Covering

2.22.1 Wastes are to be spread in thin layers (0.6 m or less) on the working face and compacted. The working face area should be minimized as much as possible. A compacted layer of cover material of at least 0.15 metre of soil or functionally equivalent depth of other cover material, as authorized by the Regional Waste Manager, is to be placed on all exposed solid waste at the end of each day of operation. If the landfill should operate continuously 24 hours per day, 0.15 m of cover material is to be applied at a frequency authorized by the Regional Waste Manager. Under specific circumstances, such as during bear season, the Regional Waste Manager may specify more stringent cover requirements. During periods of extreme weather conditions, such as those that cause the ground to freeze, an exemption to the normal cover requirements may be authorized at a frequency authorized by the Regional Waste Manager.

2.22.2 An intermediate cover consisting of a compacted layer of at least 0.30 metre of soil or functionally equivalent depth of other cover material is to be placed where no additional solid waste has been deposited or will be deposited within a period of 30 days.

T.R. Forty, P.Eng.
Assistant Regional Waste Manager

2.23 **Litter Control**

Litter is to be controlled by compacting the waste, minimizing the working face area, applying cover, providing litter control fences and instituting a regular litter pickup and general good housekeeping program or any other measures required by the Regional Waste Manager.

2.24 **Vectors**

Vectors are to be controlled by the application of cover material at a specified frequency or by other control measures as required and authorized by the Regional Waste Manager.

2.25 **Wildlife**

The landfill is to be operated so as to minimize the attraction of wildlife such as bears and birds by applying cover at required frequencies and instituting a good housekeeping program. Further control measures, such as bear control fences, and bird control devices, may be specified by the Regional Waste Manager.

2.26 **Fire Protection**

Adequate fire fighting equipment is to be available to extinguish surface or underground fires. Recyclables and reusable materials are to be stored in such a manner to not constitute a fire hazard.

3 <u>MONITORING AND REPORTING REQUIREMENTS</u>

3.1 **Municipal Solid Waste Measurement**

3.1.1 Provide and maintain a weigh scale and record the weight of refuse discharged to the landfill over a 24-hour period.

3.1.2 Record the weight of recyclable and reusable materials not being discharged and that are being separated, stored or processed at the landfill over a 24-hour period.

3.1.3 Density tests are to be performed utilizing a known scaled volume of representative compacted refuse at a frequency of at least once per year and reported in kg per m3.

T.R. Forty, P.Eng.
Assistant Regional Waste Manager

3.2 Water Levels

Measure the water level and determine the elevation, on a quarterly basis, in monitoring wells BH1 (E224611), BH2 (E224612), BH4 (E224617), BH5 (E224618), BH6 (E224620), BH7 (E224621), BH8 (E224623) and Dobbin's Well (E224624) as shown on Site Plan B.

3.3 Water Quality

3.3.1 Install a suitable sampling facility and obtain a grab sample on a quarterly basis, of the groundwater, in monitoring wells BH1 (E224611), BH2 (E224612), BH4 (E224617), BH5 (E224618) and Dobbin's Well (E224624) as shown on Site Plan B.

3.3.2 Obtain analyses of the samples in section 3.3.1 for the following:

conductivity, total alkalinity ($CaCO_3$), chloride, sulphate, ammonia nitrogen, nitrate nitrogen, aluminum, antimony, arsenic, barium, beryllium, bismuth, cadmium, calcium, chromium, cobalt, copper, iron, lead, lithium, magnesium, manganese, molybdenum, nickel, phosphorous, potassium, selenium, strontium, thallium, tin, titanium, tungsten, vanadium, and zinc.

3.3.3 Obtain grab samples, every two years, of the groundwater in monitoring wells BH1 (E224611) and BH4 (E224617) as shown on Site Plan B.

3.3.4 Obtain analyses of the samples in section 3.3.3 for the following:

total dissolved solids, boron, total purgeable hydrocarbons, total extractable hydrocarbons, volatile organics (EPA 624) and acid and base/neutral extractable organics (EPA 625) , BOD, COD, and phenolics.

3.3.5 Obtain suitable grab samples, on an annual basis, of the groundwater in all domestic water wells being used for drinking water purposes within 1000m down-gradient of the landfill subject to obtaining permission from the water well owner.

3.3.6 Obtain analyses of the samples in section 3.3.5 for conductivity and chloride.

Date Issued: May 28, 1997
Amendment Date:

T.R. Forty, P.Eng.
Assistant Regional Waste Manager

3.4 Vegetation Monitoring

Inspect vegetation during the growing season in the vicinity of the landfill at least once per year to determine if any environmental impacts are occurring.

3.5 Sampling and Analytical Requirements

3.5.1 The sampling and monitoring requirements specified above shall be carried out in accordance with the appropriate procedures listed in the table below. Alternative test methods may be used provided that the alternative test methods are authorized by the Regional Waste Manager prior to performing the actual source testing. Test methods for parameters not listed below require the consent of the Regional Waste Manager.

DISCHARGES TO AIR, AMBIENT AIR:		
Parameter	Source Testing Procedure	Analytical Procedure
Particulate Matter Rate of Discharge (flow rate) Gaseous emissions	Stationary Emission Testing Code - contained in British Columbia Field Sampling Manual for Continuous Monitoring plus the Collection of Air, Air-Emission, Water, Wastewater, Soil, Sediment, and Biological Samples, 1996 Permittee Edition	A Laboratory Manual for the Chemical Analysis of Ambient Air, Emissions, Precipitation, Soil and Vegetation, 3rd edition, April, 1983, 253 pp.
LIQUID EFFLUENTS, SURFACE WATER, GROUND WATER, SOILS, SEDIMENTS, VEGETATIVE MATTER:		
Parameter	Source Testing Procedure	Analytical Procedure
Metals Nutrients Organics Toxicity	British Columbia Field Sampling Manual for Continuous Monitoring plus the Collection of Air, Air-Emission, Water, Wastewater, Soil, Sediment, and Biological Samples, 1996 Permittee Edition	British Columbia Environmental Laboratory Manual for the Analysis of Water, Wastewater, Sediment and Biological Materials, March, 1994, Permittee Edition

The above manuals are available from Queen's Printer Publications Centre, P.O. Box 9452, Stn. Prov. Govt, Victoria, BC, V8W 9V7 (1-800-663-6105 or (250) 387-4609). The above manuals are also available for inspection at all Pollution Prevention offices.

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

3.5.3 Maintain the groundwater monitoring wells including provisions to ensure protection from damage due to vehicles or vandalism.

T.R. Forty, P.Eng.
Assistant Regional Waste Manager

Date Issued: May 28, 1997
Amendment Date:
(most recent)

3.5.4 Groundwater monitoring wells are to be covered with lockable caps, fitted with locks all keyed alike, and a key is to be provided to the Regional Waste Manager.

3.5.5 Three well bore volumes are to be pumped from each monitoring well prior to sample collection.

3.6 Changes to Sampling and Monitoring Program

On the basis of findings during routine inspections and any other information related to the effect of the discharge on the receiving environment, the Regional Waste Manager may allow reductions or require additional sampling and monitoring of the discharge and receiving environment.

3.7 Annual Report

An annual operations and monitoring report is to be submitted to the Regional Waste Manager within 60 days of the end of the calendar year. The first annual report is due on March 1, 1998. These reports are to contain at least the following information:

- Total volume and/or weight of waste discharged into the landfill for the year;
- Service population and waste discharge rate for the year (in tonnes per capita per year) and a trend analysis with a comparison to the 1990 baseline waste discharge rate of 1.20 tonnes per capita per year ;
- Authorized design volume;
- Remaining site life and capacity;
- Operational plan for next 12 months;
- Operation and maintenance expenditures;
- Monitoring data compilation, interpretation and trend analysis prepared by a suitably qualified professional regarding landfill gas, vegetation and leachate/water quality including a review of groundwater elevations and flow direction and a comparison made to the drinking water parameters found in the *Approved and Working Criteria for Water Quality* dated April 1995.;
- Amounts of leachate collected, treated and disposed;
- Any changes from authorized reports, plans and specifications;
- any changes to the contingency plan;
- Amount of landfill gas collected and its disposition;
- Review of the closure plan and associated estimated costs, including an update of the schedule of reserve funds or security to be collected each year until closure;. to cover estimated costs of closure, the 25 year post-closure period and a contingency for remediation; and
- Any other data relevant to this Operational Certificate

T.R. Forty, P.Eng.
Assistant Regional Waste Manager

3.8 **Format of Submission**

Monitoring and/or reporting information shall be submitted in an electronic and/or printed format which is suitable for review by the public and/or other government agencies and is satisfactory to the Regional Waste Manager.

3.9 **Financial Security**

Provide a future financial security of the operations at and beyond closure by establishing a Closure Fund in a form acceptable to the Regional Waste Manager, such as upfront security or a fund financed on a charge per tonne of waste disposed basis. Such a fund would be analogous to the provincial Waste Management Trust Fund which the Minister may establish under Section 53 of the *Waste Management Act*. The ultimate amount of the financial security shall meet or exceed the currently estimated closure and post-closure costs as outlined in the closure plan plus a reasonable contingency for any remediation which may be required. For municipally owned landfills, the financial security can be built up over time according to a schedule authorized by the Regional Waste Manager.

3.10 **Legal Survey**

Landfills sited on titled land must register a covenant that the property was used for the purpose of waste disposal as a charge against the title to the property as provided for under Section 215.1 of the *Land Title Act*. Landfills located on crown land are to have a "notation on file" registered that the property was used for the purpose of waste disposal.

3.11 **Buildings and Structures**

The construction of buildings and other structures on landfills containing putrescible wastes is not recommended for a minimum period of 25 years after closure due to concerns about combustible gas and excessive settlement. Such activity will only be considered and /or authorized after an investigation and report by qualified persons. The report is to be submitted for authorization to the Regional Waste Manager prior to initiating construction activities.

3.12 **Operation of Gas Recovery and Management System**

Where landfill gas recovery and management is required, operation of the system should be considered an integral part of overall landfill management. The system should be planned for from the early design stage of the landfill and arrangements made for its operation for a minimum 25 year life after closure.

T.R. Forty, P.Eng.
Assistant Regional Waste Manager

3.13 Operation of Other Control Systems

Operation of other environmental control systems for leachate and run-off as well as monitoring of leachate, groundwater and surface water must be continued during the entire post-closure period unless the early suspension of such operations or monitoring is authorized by the Regional Waste Manager.

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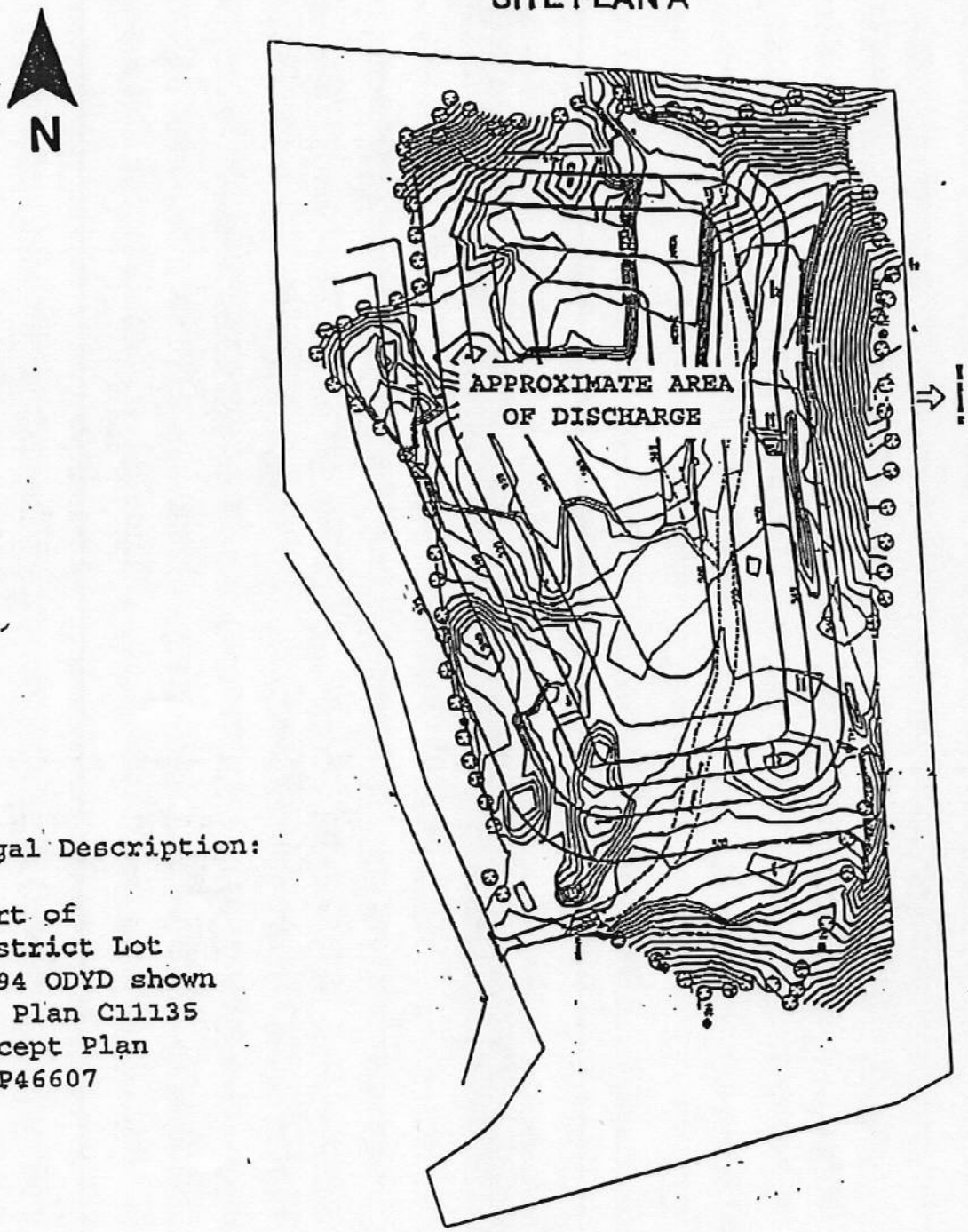
Assistant Regional Waste Manager

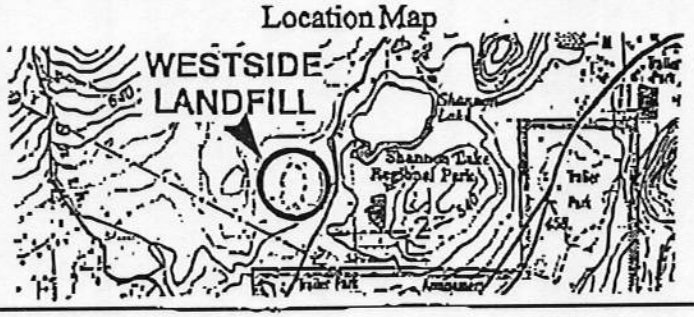
SITE PLAN A



Legal Description:

Part of
District Lot
3794 ODYD shown
on Plan C11135
Except Plan
KAP46607

Location Map



OPERATIONAL CERTIFICATE: PR-12217

Date: May 28, 1997

T.R. Forty, P.Eng.
Assistant Regional Waste Manager

PROVINCE OF
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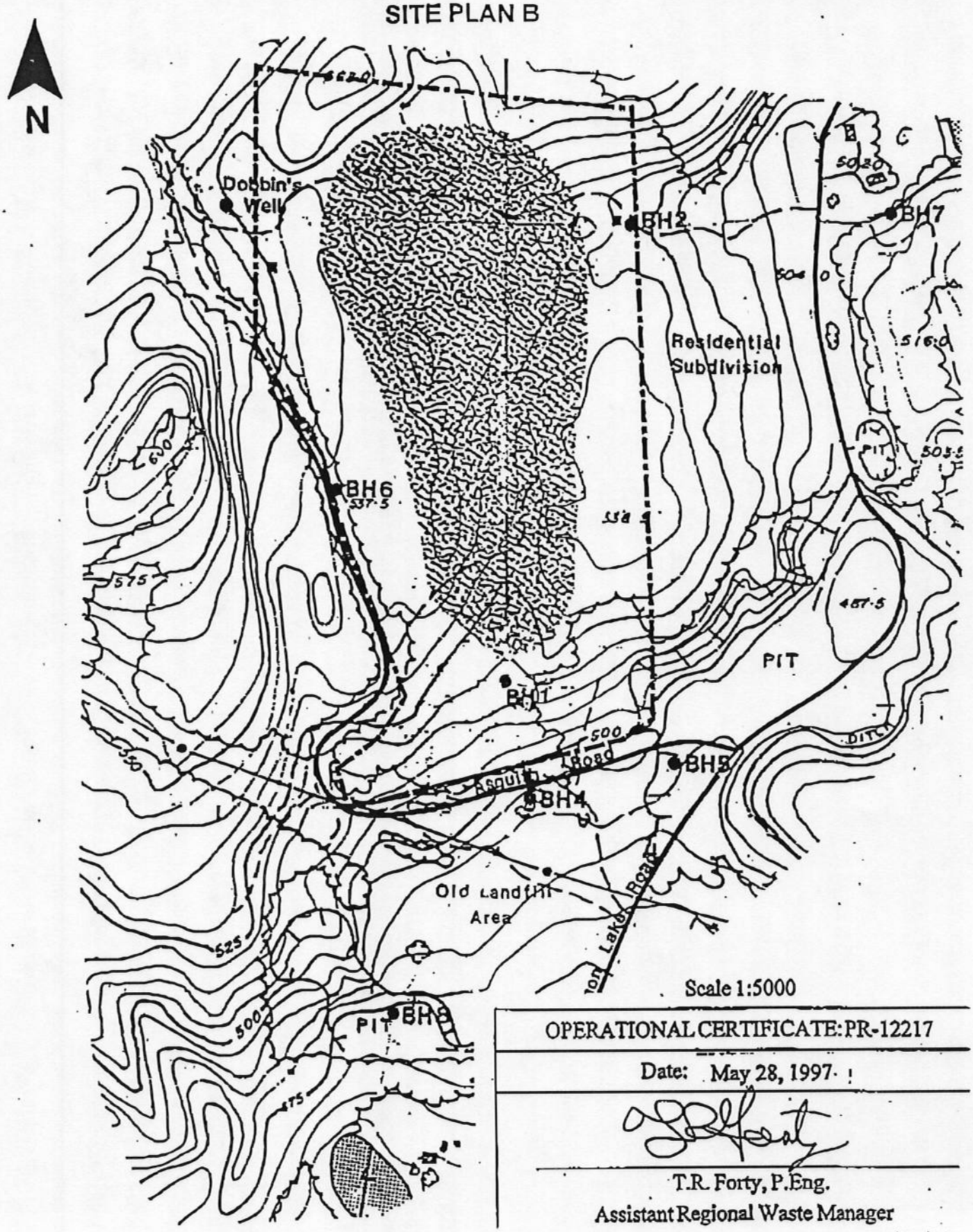
Pollution Prevention

SITE PLAN B



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OPERATIONAL CERTIFICATE: PR-12217

Date: May 28, 1997

T.R. Forty, P.Eng.

Assistant Regional Waste Manager

APPENDIX B

Tabulated Results (2021 Groundwater and Soil Gas Monitoring Results and Groundwater Elevations)

Table B-1: Groundwater Analytical Results - General and Metals Parameters
2021 Monitoring Report - Westside Landfill
West Kelowna, BC

Location Relative to Landfill				Upgradient		Within Landfill					Downgradient (< 50 m)				Downgradient (> 50 m)				
Monitoring Well				**MW99-2**		**BH-1**			**BH-2**		**BH-4**		**BH-5**		**BH-3**		**BH-7**		
Laboratory ID	**Units**	**BC CSR[1] DW**	**Regional Background Concentration[2]**	21E1381-01	21K3037-08	21E1381-02	21K3037-02	21K3037-01	21E1381-03	21K3037-03	21E1381-05	21K3037-05	21E1381-06	21K3037-06	21E1381-04	21K3037-04	21E1381-07	21E1381-08	21K3037-07
Sample Date				11-May-21	23-Nov-21	11-May-21	23-Nov-21	23-Nov-21	11-May-21	23-Nov-21	11-May-21	23-Nov-21	11-May-21	23-Nov-21	11-May-21	23-Nov-21	11-May-21	11-May-21	23-Nov-21
QA/QC							FDA	FD									FDA	FD	
General and Nutrient Parameters																			
pH	pH units			7.92	7.90	7.66	7.57	7.58	7.49	7.54	7.79	7.72	7.96	7.91	7.72	7.71	7.85	7.88	7.84
Conductivity	µS/cm			1490	1570	3030	1200	1180	2810	2860	2100	2040	889	998	983	989	1080	1060	1060
BOD, 5-Day	mg/L			-	-	2.3	-	-	-	-	<2.3	-	-	-	-	-	-	-	-
Chemical Oxygen Demand	mg/L			-	-	89	-	-	-	-	<20	-	-	-	-	-	-	-	-
Total Dissolved Solids	mg/L			-	864	1920	719	702	-	1890	1270	1210	-	574	-	577	-	-	628
Alkalinity, Total (as CaCO3)	mg/L			651	649	796	346	375	1530	1590	733	701	244	259	376	403	458	467	482
Alkalinity, Phenolphthalein (as CaCO3)	mg/L			<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Alkalinity, Bicarbonate (as CaCO3)	mg/L			651	649	796	346	375	1530	1590	733	701	244	259	376	403	458	467	482
Alkalinity, Carbonate (as CaCO3)	mg/L			<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Alkalinity, Hydroxide (as CaCO3)	mg/L			<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Ammonia (as N)	mg/L			<0.050	<0.050	0.574	0.054	<0.050	0.387	0.354	<0.050	<0.050	<0.050	<0.050	<0.050	0.083	0.050	<0.050	<0.050
Chloride	mg/L	**250**		127	136	**548**	139	133	146	141	**277**	**256**	111	129	79.9	70.3	55.7	55.4	55.3
Nitrate (as N)	mg/L	10		0.986	0.476	0.018	0.636	0.640	<0.010	<0.010	1.39	0.661	4.12	6.07	2.31	2.36	3.56	3.54	4.07
Sulfate	mg/L	500		17.9	20.2	39.5	44.9	46.4	130	113	90.5	85.6	31.1	32.9	36.2	34.5	37.8	37.9	38.4
Total Metals																			
Calcium	mg/L			-	154	-	120	121	-	365	-	193	-	116	-	123	-	-	120
Magnesium	mg/L			-	105	-	29.3	28.9	-	187	-	127	-	35.3	-	38.1	-	-	43.7
Dissolved Metals																			
Hardness, Total (as CaCO3)	mg/L			711	690	1240	311	311	1520	1340	944	755	322	360	388	335	436	436	443
Aluminum	mg/L	9.5	0.230	0.177	<0.0050	<0.0050	<0.0050	<0.0050	0.0066	0.0059	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Antimony	mg/L	0.006	0.0027	<0.00020	<0.00020	<0.00020	0.00030	0.00029	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Arsenic	mg/L	0.01	0.013	<0.00050	<0.00050	0.00477	0.00080	0.00074	0.00282	0.00234	<0.00050	<0.00050	0.00124	0.00086	0.00129	0.00087	0.00197	0.00202	0.00177
Barium	mg/L	1	0.240	0.0076	0.0065	0.0606	0.0213	0.0213	0.0079	0.0101	0.0375	0.0326	0.0114	0.0144	0.0109	0.0084	0.0178	0.0177	0.0177
Beryllium	mg/L	0.008	0.0013	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Bismuth	mg/L			<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Boron	mg/L	5	0.880	<0.0500	<0.0500	0.887	0.353	0.353	0.444	0.423	0.494	0.388	0.0583	0.0601	0.0984	0.0951	0.058	0.057	0.0586
Cadmium	mg/L	0.005	0.00033	0.000018	<0.000010	0.000149	0.000044	0.000045	<0.000010	0.000022	0.000081	0.000048	0.000012	0.000011	0.000015	0.000013	0.000056	0.000053	0.000028
Calcium	mg/L			133	134	309	87.7	88.6	322	295	180	148	86.6	98.1	102	87.9	110	110	112
Chromium	mg/L	6 [III], 0.05 [VI]	0.019	<0.00050	<0.00050	0.00057	<0.00050	<0.00050	0.00142	0.00158	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Cobalt	mg/L	0.001	**0.016, 0.020** [3]	0.00043	<0.00010	**0.00251**	0.0006	0.00054	**0.00204**	**0.00220**	**0.00145**	**0.00106**	<0.00010	<0.00010	0.00014	0.00014	0.00050	0.00050	0.00048
Copper	mg/L	1.5	0.032	0.00711	0.00286	0.00146	0.0064	0.00633	<0.00040	<0.00040	0.00193	0.00134	0.00065	0.00065	0.00103	0.00072	0.00158	0.00156	0.00141
Iron	mg/L	Note 4	12	0.179	<0.010	8.45	0.045	0.041	1.67	1.94	<0.010	<0.010	<0.010	<0.010	0.025	0.059	<0.010	<0.010	<0.010
Lead	mg/L	0.01	0.0067	0.00068	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Lithium	mg/L	**0.008**	0.096	**0.0445**	**0.0409**	**0.0273**	**0.0132**	**0.0134**	**0.0235**	**0.0218**	**0.0344**	**0.0300**	**0.0200**	**0.0185**	**0.0176**	**0.0146**	**0.0184**	**0.0187**	**0.0182**
Magnesium	mg/L			92.0	86.2	113	22.3	21.8	175.0	147	120	93.3	25.7	27.8	32.3	28.0	39.0	39.1	39.4
Manganese	mg/L	Note 4	7.6	0.0254	0.00102	5.81	0.241	0.239	6.64	6.21	0.374	0.189	0.00273	0.00204	0.00711	0.0187	0.0803	0.0799	0.0292
Mercury	mg/L	0.001	0.00057	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Molybdenum	mg/L	0.25	0.045	0.00022	0.00019	0.00134	0.00040	0.00038	0.00359	0.00319	0.0055	0.00471	0.00701	0.0058	0.00386	0.00289	0.00172	0.00156	0.00181
Nickel	mg/L	0.08	0.044	<0.00040	0.00379	0.0165	0.0037	0.00353	0.0148	0.0140	0.0183	0.0147	0.00042	0.00052	0.00128	0.00132	0.00292	0.00294	0.00237
Phosphorus	mg/L			<0.050	<0.050	0.176	0.075	0.073	0.161	0.127	<0.050	<0.050	<0.050	<0.050	0.053	<0.050	0.074	0.079	0.071
Potassium	mg/L			0.45	0.50	9.86	9.82	9.61	2.68	1.99	5.38	4.69	2.81	2.64	4.22	3.38	2.53	2.52	2.60
Selenium	mg/L	0.01	0.120	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.00050	<0.00050	0.00062	<0.00050	0.00088	0.00096	0.00071
Silicon	mg/L			7.3	6.1	19.8	13.4	13.2	25.4	23.0	11.6	9.8	8.7	9.4	12.6	10.6	13.5	14.0	13.8
Silver	mg/L	0.02	0.00098	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Sodium	mg/L	200	1600	43.2	39.4	166	79.8	78.2	122	107	92.5	78.3	50.2	48.5	51.4	40.8	57.1	57.3	57.2
Strontium	mg/L	**2.5**	47	1.72	1.59	2.16	0.57	0.564	**2.78**	2.28	1.89	1.53	0.383	0.427	0.602	0.508	0.638	0.627	0.644
Sulfur	mg/L			8.5	6.3	15.0	13.5	13.2	45.5	38.4	33.0	25.8	11.6	11.2	12.0	12.2	13.5	13.4	12.9
Tellurium	mg/L			<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Thallium	mg/L		0.00068	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	0.000021	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
Thorium	mg/L			<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Tin	mg/L	2.5		<0.00020	<0.00020	0.00026	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Titanium	mg/L		0.330	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Tungsten	mg/L	0.003		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Uranium	mg/L	0.02	**0.087**	0.007	0.00680	0.00197	0.000761	0.00075	0.00413	0.00352	**0.0261**	**0.0231**	0.00509	0.00498	0.00651	0.00619	0.00914	0.00908	0.00968
Vanadium	mg/L	0.02	0.030	<0.0010	<0.0010	<0.0010	0.0013	0.0015	0.0043	0.0032	0.0029	0.0018	0.0053	0.0033	0.003	0.0024	0.0106	0.0104	0.011
Zinc	mg/L	3	0.029	<0.0040	0.0049	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
Zirconium	mg/L			0.00037	0.00026	0.00108	0.00028	0.00025	0.00364	0.00316	0.00052	0.00029	<0.00010	<0.00010	<0.00010	<0.00010	0.00015	0.00019	0.00016

Notes:

[1] Standards shown are from BC Contaminated Sites Regulation (CSR; BC Reg. 375/96, O.C. 1480/96 and M182, as updated [includes amendments up to BC Reg. 179/2021, updated to 7 July 2021]).

[2] From BC ENV Protocol 9 (V3, 13 May 2021) for the Thompson Okanagan Region. Regional background concentrations were applied only to monitoring wells BH3, BH4, and BH5, as they are located within the Thompson Okanagan Region, while monitoring wells BH1, BH2, BH7, and MW99-2 are located outside the Thompson Okanagan Region boundaries to the north. A substance concentration above the applicable CSR standard, but below the regional background concentration for that substance is not flagged as a BC CSR exceedance.

[3] The interim cobalt value of 0.020 mg/L for the remaining regions in the province remains in effect.

[4] None of the Schedule 2 activities listed in footnotes of CSR Schedule 3.2 standards for iron or manganese were applicable to the Westside Landfill; therefore, there are no applicable CSR DW standards for iron or manganese.

Land use abbreviations: DW = Drinking Water.

III = Trivalent chromium; VI = hexavalent chromium

QA/QC = Quality Assurance and Quality Control; FDA = Field Duplicate Available; FD = Field Duplicate

< 0.010	Indicates parameter concentration ies less than the laboratory detection limit.
1320	Indicates parameter concentration exceeds the CSR DW standard (but is less than the Interim Provincial Background Concentration for cobalt).
1320	Indicates parameter concentration exceeds the CSR DW standard.

Table B-2: Groundwater Analytical Results - Hydrocarbon Parameters
2021 Monitoring Report - Westside Landfill
West Kelowna, BC

		Location Relative to Landfill	Within Landfill
Monitoring Well	**Units**	**BC CSR[1] DW**	BH 1
Laboratory ID			21E1381-02
Sample Date			11-May-21
Aromatic Hydrocarbons (BTEX)			
Benzene	µg/L	5	<0.5
Ethylbenzene	µg/L	140	<1.0
Methyl tert-butyl ether	µg/L	95	<1.1
Styrene	µg/L	800	<1.0
Toluene	µg/L	60	<1.0
Xylenes (total)	µg/L	90	<2.0
Petroleum Hydrocarbons (PHCs)			
LEPHw	µg/L		<250
EPHw (C10-19)	µg/L	5000	<250
HEPHw	µg/L		<250
EPHw (C19-32)	µg/L		<250
Polycyclic Aromatic Hydrocarbons (PAHs)			
Acenaphthene	µg/L	250	<0.050
Acenaphthylene	µg/L		<0.200
Acridine	µg/L		<0.050
Anthracene	µg/L	1,000	<0.010
Benz(a)anthracene	µg/L	0.07	<0.010
Benzo(a)pyrene	µg/L	0.01	<0.010
Benzo(b+j)fluoranthene	µg/L	0.07	<0.050
Benzo(g,h,i)perylene	µg/L		<0.050
Benzo(k)fluoranthene	µg/L		<0.050
2-Chloronaphthalene	µg/L		<0.100
Chrysene	µg/L	7	<0.050
Dibenz(a,h)anthracene	µg/L	0.01	<0.010
Fluoranthene	µg/L	150	<0.030
Fluorene	µg/L	150	<0.050
Indeno(1,2,3-cd)pyrene	µg/L		<0.050
1-Methylnaphthalene	µg/L	5.5	<0.100
2-Methylnaphthalene	µg/L	15	<0.100
Naphthalene	µg/L	80	<0.200
Phenanthrene	µg/L		<0.100
Pyrene	µg/L	100	<0.020
Quinoline	µg/L	0.05	<0.050
Volatile Organic Compounds (VOCs)			
Bromodichloromethane	µg/L	100	<1.0
Bromoform	µg/L	100	<1.0
Carbon tetrachloride	µg/L	2	<0.5
Chlorobenzene	µg/L	80	<1.0
Chloroethane	µg/L		<2.0
Chloroform	µg/L	100	<1.0
Dibromochloromethane	µg/L	100	<1.0
1,2-Dibromoethane	µg/L		<0.3
Dibromomethane	µg/L		<1.0
1,2-Dichlorobenzene	µg/L	200	<0.5
1,3-Dichlorobenzene	µg/L		<1.0
1,4-Dichlorobenzene	µg/L	5	<1.0
1,1-Dichloroethane	µg/L	30	<1.0
1,2-Dichloroethane	µg/L	5	<1.0
1,1-Dichloroethylene	µg/L	14	<1.0
cis-1,2-Dichloroethylene	µg/L	8	<1.0
trans-1,2-Dichloroethylene	µg/L	80	<1.0
Dichloromethane	µg/L	50	<3.0
1,2-Dichloropropane	µg/L	4.5	<1.0
1,3-Dichloropropene (cis + trans)	µg/L	1.5	<1.0
1,1,2,2-Tetrachloroethane	µg/L	0.8	<0.5
Tetrachloroethylene	µg/L	30	<1.0
1,1,1-Trichloroethane	µg/L	8,000	<1.0
1,1,2-Trichloroethane	µg/L	3	<1.0
Trichloroethylene	µg/L	5	<1.0
Trichlorofluoromethane	µg/L	1,000	<1.0
Vinyl chloride	µg/L	2	<1.0

Notes:

[1] Standards shown are from BC Contaminated Sites Regulation (CSR; BC Reg. 375/96, O.C. 1480/96 and M182, as updated [includes amendments up to BC Reg. 179/2021, updated to 7 July 2021]).

Land use abbreviations: DW = Drinking Water.

< 0.010	Indicates parameter concentration ies less than the laboratory detection limit.
1320	Indicates parameter concentration exceeds the CSR DW standard.

Table B-3: Summary of Soil Gas Monitoring Results
2021 Monitoring Report - Westside Landfill
West Kelowna, BC

Date	Monitor ID	Methane (ppm)	CO_2 (%)	O_2 (%)	H_2S (ppm)	LEL (%)	Water Depth (mbtoc)	Notes
January								
	VP12-01	65	1.3	18.5	0	0	0	
	VP07-14	NA	NA	NA	NA	NA	1.87	no sample - water too high
	BH103	0	2.7	15.3	0	0	0	
	VP07-01d	55	1.2	19.3	0	0	0	
	VP07-01s	15	0.7	20.2	0	0	0	
	BH102	17000	12.4	3.5	0	1.5	0	
	VP15-01	65	1.2	19.2	0	0	No Water	
	VP15-02	NA	NA	NA	NA	NA	5.195	no sample - purge back pressure
	VP15-03	0	0.1	20.9	0	0	7.77	
	VP07-02	35	0.9	19.8	0	0	0	
	VP07-15	210	4.4	13.5	0	0	0	
	BH101s	35	1	20	0	0	0	
	BH101d	300	2.7	12	0	0	0	
	VP07-03	75	0.5	20.7	0	0	0	
	VP07-16	135	2.5	19.1	0	0	0	
9-Jan-21	VP11-09	35	1	19.8	0	0	0	
	VP11-10	35	0	20.9	0	0	0	
	MW07-1	15	0.7	20.7	0	0	3.095	
	VP11-01	45	0.6	19.2	0	0	0	
	VP11-02	85	1.5	18.4	0	0	0	
	VP07-05	95	1.3	17	0	0	0	
	VP07-08	35	0.4	19.1	0	0	0	
	VP07-09	50	0.2	18.2	0	0	0	
	VP11-05	120	3.5	16.8	0	0	0	
	MW99-4	175	4.6	15	0	0	6.11	
	MW99-3	35	1.2	19.2	0	0	4.45	
	MW99-2	65	1.9	18.4	0	0	4.83	
	VP11-04	55	1.4	17.9	0	0	0	
	VP11-08	20	0.9	20.9	0	0	0	
	VP11-07	35	0.9	20.5	0	0	0	
	VP11-06	15	0.6	20.9	0	0	0	
February								
	VP12-01	65	1.5	18.8	0	0	0	
	VP07-14	NA	NA	NA	NA	NA	1.81	no sample - water too high
	BH103	200	4.1	13.9	0	0	0	
	VP07-01d	10	0.6	20.7	0	0	0	
	VP07-01s	5	0.5	20.9	0	0	0	
	BH102	50250	24.9	0.9	0	100	0	
	VP15-01	70	1.5	18.9	0	0	No Water	
	VP15-02	NA	NA	NA	NA	NA	5.24	no sample - purge back pressure
	VP15-03	35	0	20.9	0	0	8.565	
	VP07-02	55	1.3	19.4	0	0	0	
	VP07-15	165	4.3	16.7	0	0	0	
	BH101s	75	1.5	17.8	0	0	0	
	BH101d	340	6.4	8	0	0	0	
	VP07-03	15	0.4	20.9	0	0	0	
	VP07-16	75	2.2	19.1	0	0	0	
7-Feb-21	VP11-09	75	1.2	18.2	0	0	0	
	VP11-10	15	0.1	20.9	0	0	0	
	MW07-1	70	0.7	20.7	0	0	3.4	
	VP11-01	20	0.4	20	0	0	0	
	VP11-02	65	1.2	18.9	0	0	0	
	VP07-05	20	0	20.9	0	0	0	
	VP07-08	50	0.4	19.4	0	0	0	
	VP07-09	35	0.2	20.2	0	0	0	
	VP11-05	175	3	18.1	0	0	0	
	MW99-4	170	4.2	15.6	0	0	6.01	
	MW99-3	50	1.2	19.8	0	0	4.38	
	MW99-2	55	1.5	18.9	0	0	5.025	
	VP11-04	95	1.2	17.9	0	0	0	
	VP11-08	45	1.5	20.4	0	0	0	
	VP11-07	35	1	20.4	0	0	0	
	VP11-06	20	0.6	20.9	0	0	0	

Table B-3: Summary of Soil Gas Monitoring Results
2021 Monitoring Report - Westside Landfill
West Kelowna, BC

Date	Monitor ID	Methane (ppm)	CO_2 (%)	O_2 (%)	H_2S (ppm)	LEL (%)	Water Depth (mbtoc)	Notes
March								
	VP12-01	30	1.2	19.9	0	0	0	
	VP07-14	NA	NA	NA	NA	NA	1.995	no sample - water too high
	BH103	230	5.7	13.1	0	0	0	
	VP07-01d	0	0	20.9	0	0	0	
	VP07-01s	10	0.4	20.9	0	0	0	
	BH102	8500	21.7	0.9	0	17	0	
	VP15-01	80	1.8	18.7	0	0	No Water	
	VP15-02	NA	NA	NA	NA	NA	5.27	no sample - purge back pressure
	VP15-03	90	0	20.9	0	0	8.835	
	VP07-02	30	0.8	19.6	0	0	0	
	VP07-15	170	4.9	15.6	0	0	0	
	BH101s	70	1.7	18.3	0	0	0	
	BH101d	520	8.1	8.5	0	0	0	
	VP07-03	35	0.4	20.9	0	0	0	
	VP07-16	135	2.5	18.9	0	0	0	
11-Mar-21	VP11-09	30	1.2	19.9	0	0	0	
	VP11-10	10	0.2	20.9	0	0	0	
	MW07-1	35	1	20.1	0	0	3.965	
	VP11-01	15	0.7	19.3	0	0	0	
	VP11-02	40	1.1	19	0	0	0	
	VP07-05	0	0	20.5	0	0	0	
	VP07-08	15	0.4	20.1	0	0	0	
	VP07-09	15	0.1	19.9	0	0	0	
	VP11-05	140	2.3	18	0	0	0	
	MW99-4	220	4.3	17	0	0	5.43	
	MW99-3	40	1.3	19.8	0	0	4.44	
	MW99-2	65	1.3	19.1	0	0	5.26	
	VP11-04	60	1.3	18.2	0	0	0	
	VP11-08	35	1.2	20.9	0	0	0	
	VP11-07	25	0.7	20.9	0	0	0	
	VP11-06	15	0.4	20.9	0	0	0	
April								
	VP12-01	80	1.5	18.5	0	0	0	
	VP07-14	115	2.2	17.6	0	0	2.08	
	BH103	195	9.5	11.4	0	0	0	
	VP07-01d	55	1.1	18.7	0	0	0	
	VP07-01s	5	0.6	19.9	0	0	0	
	BH102	810	17.6	5.8	0	0	0	
	VP15-01	70	2.5	17.9	0	0	No Water	
	VP15-02	NA	NA	NA	NA	NA	5.295	no sample - purge back pressure
	VP15-03	5	0	20.6	0	0	8.92	
	VP07-02	15	1.6	18.5	0	0	0	
	VP07-15	190	5.3	15	0	0	0	
	BH101s	95	1.8	17.9	0	0	0	
	BH101d	440	10.8	6.3	0	0	0	
	VP07-03	10	0.4	20.1	0	0	0	
	VP07-16	85	2.2	17.9	0	0	0	
3-Apr-21	VP11-09	45	1.3	18.9	0	0	0	
	VP11-10	5	0.4	20.4	0	0	0	
	MW07-1	35	1.1	19.1	0	0	4.025	
	VP11-01	25	0.9	19.4	0	0	0	
	VP11-02	55	1.4	18.9	0	0	0	
	VP07-05	150	4.6	15.6	0	0	0	
	VP07-08	15	0.1	20.1	0	0	0	
	VP07-09	30	0.6	19.7	0	0	0	
	VP11-05	160	2.5	18.9	0	0	0	
	MW99-4	150	3.1	18.7	0	0	5.41	
	MW99-3	55	1.5	19.4	0	0	4.515	
	MW99-2	90	1.6	18.7	0	0	5.365	
	VP11-04	70	1.4	18.9	0	0	0	
	VP11-08	105	2.9	16.9	0	0	0	
	VP11-07	30	1	19.7	0	0	0	
	VP11-06	35	0.5	20.1	0	0	0	

Table B-3: Summary of Soil Gas Monitoring Results
2021 Monitoring Report - Westside Landfill
West Kelowna, BC

Date	Monitor ID	Methane (ppm)	CO_2 (%)	O_2 (%)	H_2S (ppm)	LEL (%)	Water Depth (mbtoc)	Notes
May								
4-May-21	VP12-01	0	1.7	19	0	0	0	
	VP07-14	0	3	19.6	0	0	2.22	
9-May-21	BH103	200	9	15.2	0	0	0	
	VP07-01d	44	1	18.2	0	0	0	
	VP07-01s	4	0.6	19.8	0	0	0	
	BH102	8000	15.1	10.2	0	0	0	
	VP15-01	30	2.41	19.2	0	0	No Water	
	VP15-02	NA	NA	NA	NA	NA	5.305	no sample - purge back pressure
	VP15-03	190	0	20.9	0	0	8.8	(purge back pressure buildup)
	VP07-02	20	1.7	19.2	0	0	0	
	VP07-15	160	4.4	17.3	0	0	0	
	BH101s	50	3.4	18	0	0	0	
	BH101d	400	19.1	5.7	0	0	0	
	VP07-03	30	1	20	0	0	0	
	VP07-16	130	4.3	16.8	0	0	0	
	VP11-09	30	1.2	19.2	0	0	0	
	VP11-10	2	0.4	20	0	0	0	
	MW07-1	10	1.8	18.6	0	0	4.13	
	VP11-01	20	0.9	19.4	0	0	0	
	VP11-02	25	1.8	18.9	0	0	0	
	VP07-05	100	7	15.5	0	0	0	
	VP07-08	10	1	19.1	0	0	0	
	VP07-09	30	0.1	19.2	0	0	0	
	VP11-05	140	1.8	19.2	0	0	0	
	MW99-4	90	2.1	19.1	0	0	5.43	
	MW99-3	45	1.9	18.6	0	0	4.615	
	MW99-2	95	1.8	18.9	0	0	5.511	
	VP11-04	30	1.6	18.9	0	0	0	
	VP11-08	105	7.1	14.2	0	0	0	
	VP11-07	10	1.2	19.4	0	0	0	
	VP11-06	10	1	19.8	0	0	0	
June								
12-Jun-21	BH103	155	4.6	17.1	0	0	0	
	BH102	230	5	16.4	0	0	0	
	VP15-01	35	1.3	19.2	0	0	No Water	
	VP15-02						5.325	purge back pressure - something covering screens
	VP15-03						8.97	purge back pressure - something covering screens
	VP11-09	55	0.9	19.2	0	0	0	
	VP11-08	160	5	16.4	0	0	0	
	VP11-07	35	1.2	20.4	0	0	0	
	VP11-06	25	0.9	20.9	0	0	0	
July								
24-Jul-21	BH103	70	2.4	18.8	0	0	0	
	BH102	15	1.4	19.3	0	0	0	
	VP15-01	45	1.2	19.3	0	0	No Water	
	VP15-02						4.325	purge back pressure - something covering screens
	VP15-03	0	0	20.9	0	0	8.995	purge back pressure - something covering screens
	VP11-09	0	0.7	20.5	0	0	0	
	VP11-08	155	5.6	15	0	0	0	
	VP11-07	10	0.9	20.5	0	0	0	
	VP11-06	0	0.6	20.8	0	0	0	

Table B-3: Summary of Soil Gas Monitoring Results
2021 Monitoring Report - Westside Landfill
West Kelowna, BC

Date	Monitor ID	Methane (ppm)	CO_2 (%)	O_2 (%)	H_2S (ppm)	LEL (%)	Water Depth (mbtoc)	Notes
August								
7-Aug-21	VP12-01	20	1.2	20.7	0	0	0	
	VP07-14	70	2.4	19.3	0	0	No Water	
	BH103	40	1.8	20.1	0	0	0	
	VP07-01d	0	0.4	20.9	0	0	0	
	VP07-01s	75	2	19.3	0	0	0	
	BH102	15	1.2	20.4	0	0	0	
	VP15-01	20	1.1	20.7	0	0	No Water	
	VP15-02	NA	NA	NA	NA	NA	5.32	no sample - purge back pressure
	VP15-03	20	0	20.9	0	0	8.98	
	VP07-02	55	0.9	20.7	0	0	0	
	VP07-15	70	1.9	19.3	0	0	0	
	BH101s	75	2.8	18.7	0	0	0	
	BH101d	450	15.7	10.5	0	0	0	
	VP07-03	15	0.7	20.9	0	0	0	
	VP07-16	95	2.9	18.7	0	0	0	
	VP11-09	0	0.7	20.9	0	0	0	
	VP11-10	0	0.2	20.9	0	0	0	
	MW07-1	45	1.7	19.3	0	0	4.83	
	VP11-01	0	0.2	20.9	0	0	0	
	VP11-02	15	1	20.1	0	0	0	
	VP07-05	30	0.4	20.9	0	0	0	
	VP07-08	0	1	20.9	0	0	0	
	VP07-09	0	0.5	19.1	0	0	0	
	VP11-05	80	1	19.7	0	0	0	
	MW99-4	30	1.4	19.7	0	0	6.21	
	MW99-3	30	0.8	19.7	0	0	4.775	
	MW99-2	35	1.6	19.7	0	0	5.345	
	VP11-04	20	1.3	19.7	0	0	0	
	VP11-08	320	6.7	14.4	0	0	0	
	VP11-07	20	1.1	20.9	0	0	0	
	VP11-06	0	0.8	20.9	0	0	0	
September								
11-Sep-21	BH103	0	1.5	20	0	0	0	
	BH102	0	1.1	20.4	0	0	0	
	VP15-01	10	1	20	0	0	No Water	
	VP15-02						5.315	purge back pressure - something covering screens
	VP15-03						8.99	purge back pressure - something covering screens
	VP11-09	0	0.5	20.9	0	0	0	
	VP11-08	380	8.3	12.9	0	0	0	
	VP11-07	10	1	20.9	0	0	0	
	VP11-06	0	0.6	20.9	0	0	0	
October								
4-Oct-21	BH103	115	1.3	19.4	0	0	0	
	BH102	75	1.1	19.4	0	0	0	
	VP15-01	70	0.9	19.2	0	0	No Water	
	VP15-02						5.32	purge back pressure - something covering screens
	VP15-03	135	0.2	20.6	0	0	8.95	purge back pressure - something covering screens
	VP11-09	0	0.2	20.9	0	0	0	
	VP11-08	175	4.9	16.1	0	0	0	
	VP11-07	25	0.7	20.9	0	0	0	
	VP11-06	20	0.5	20.9	0	0	0	

Table B-3: Summary of Soil Gas Monitoring Results
2021 Monitoring Report - Westside Landfill
West Kelowna, BC

Date	Monitor ID	Methane (ppm)	CO_2 (%)	O_2 (%)	H_2S (ppm)	LEL (%)	Water Depth (mbtoc)	Notes
November								
27-Nov-21	VP12-01	65	1.1	19.4	0	0	0	
	VP07-14	185	4.2	16.2	0	0	No Water	
	BH103	110	2.3	16.9	0	0	0	
	VP07-01d	30	1	19.9	0	0	0	
	VP07-01s	25	0.6	20.3	0	0	0	
	BH102	300	3.9	14.6	0	0	0	
	VP15-01	160	1.3	19.3	0	0	No Water	
	VP15-02	NA	NA	NA	NA	NA	5.355	no sample - purge back pressure
	VP15-03	45	0	20.9	0	0	9	
	VP07-02	145	0.9	20.1	0	0	0	
	VP07-15	210	2.3	18.1	0	0	0	
	BH101s	290	4.3	15.9	0	0	0	
	BH101d	480	9.7	10.3	0	0	0	
	VP07-03	95	0.1	20.9	0	0	0	
	VP07-16	200	2.4	18.9	0	0	0	
	VP11-09	70	0.8	19.9	0	0	0	
	VP11-10	35	0.1	20.9	0	0	0	
	MW07-1	80	1.3	19.9	0	0	3.965	
	VP11-01	35	0.4	20.9	0	0	0	
	VP11-02	75	1.2	19.8	0	0	0	
	VP07-05	95	1.2	18.8	0	0	0	
	VP07-08	105	0.6	18.8	0	0	0	
	VP07-09	25	0.2	19.7	0	0	0	
	VP11-05	210	2.5	16.7	0	0	0	
	MW99-4	195	3.1	16.7	0	0	6.355	
	MW99-3	100	1.1	20.2	0	0	4.98	
	MW99-2	115	1.7	19	0	0	5.815	
	VP11-04	115	1.5	18.7	0	0	0	
	VP11-08	75	1.2	20.1	0	0	0	
	VP11-07	75	1	19.6	0	0	0	
	VP11-06	40	0.8	20.2	0	0	0	
December								
7-Dec-21	VP11-05	105	3.5	16.7	0	0	0	
	MW99-4	155	3.9	15.6	0	0	6.335	
	MW99-3	45	1.3	20.2	0	0	5.01	
	MW99-2	85	2.1	19	0	0	5.38	
	VP11-04	70	1.5	18.3	0	0	0	
	VP11-08	35	1	20.4	0	0	0	
	VP11-07	50	1.3	19.6	0	0	0	
	VP11-06	35	0.9	20.2	0	0	0	
8-Dec-21	VP12-01							not able to locate - 1 ft of snow
	VP07-14							not able to locate - 1 ft of snow
	BH103	135	2.6	16.5	0	0	0	
	VP07-01d	40	1.3	19.3	0	0	0	
	VP07-01s	10	0.3	20.9	0	0	0	
	BH102	420	5.1	11.8	0	0	0	
	VP15-01	0	0	20.9	0	0	No Water	
	VP15-02	35	1.3	19.4	0	0	5.38	
	VP15-03	25	0	20.9	0	0	8.99	
	VP07-02	40	1.3	19.6	0	0	0	
	VP07-15	80	2.2	18.3	0	0	0	
	BH101s	120	3.3	17.3	0	0	0	
	BH101d	440	10.6	8.7	0	0	0	
	VP07-03	10	0.2	20.9	0	0	0	
	VP07-16	70	2.2	19.2	0	0	0	
	VP11-09	10	1	20	0	0	0	
11-Dec-21	VP11-10	0	0	20.9	0	0	0	
	MW07-1	55	1.1	20.3	0	0	3.95	
	VP11-01	20	0.3	20.7	0	0	0	
	VP11-02	95	1.2	19.7	0	0	0	
	VP07-05	115	1.5	18.3	0	0	0	
	VP07-08	75	0.6	18.4	0	0	0	
	VP07-09	35	0.1	20.9	0	0	0	

Notes
ppm = parts per million
mbtoc = metres below top of casing

Table B-4: Groundwater Elevations
2021 Monitoring Report - Westside Landfill
West Kelowna, BC

Monitor	BH-1		BH-2		BH-3		BH-4		BH-5		BH-7		MW99-2		MW99-3		MW99-4	
Top of Pipe Elevation[1] (masl)	519.31		526.92		471.93		494.59		488.75		500.16		546.37		538.25		536.25	
Date	**Depth to Water** (mbtop)	**Elevation** (masl)	**Depth to Water** (mbtop)	**Elevation** (masl)	**Depth to Water** (mbtop)	**Elevation** (masl)	**Depth to Water** (mbtop)	**Elevation** (masl)	**Depth to Water** (mbtop)	**Elevation** (masl)	**Depth to Water** (mbtop)	**Elevation** (masl)	**Depth to Water** (mbtop)	**Elevation** (masl)	**Depth to Water** (mbtop)	**Elevation** (masl)	**Depth to Water** (mbtop)	**Elevation** (masl)
09-Jan-21	-	-	-	-	-	-	-	-	-	-	-	-	4.83	541.54	4.450	533.80	6.110	530.14
07-Feb-21	-	-	-	-	-	-	-	-	-	-	-	-	5.025	541.34	4.380	533.87	6.010	530.24
11-Mar-21	-	-	-	-	-	-	-	-	-	-	-	-	5.260	541.11	4.440	533.81	5.430	530.82
03-Apr-21	-	-	-	-	-	-	-	-	-	-	-	-	5.365	541.00	4.515	533.74	5.410	530.84
09-May-21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4.615	533.64	5.430	530.82
11-May-21	2.965	516.34	3.46	523.46	14.32	457.61	2.615	491.98	11.55	477.20	4.30	495.86	5.530	540.84	-	-	-	-
07-Aug-21	-	-	-	-	-	-	-	-	-	-	-	-	5.345	541.02	4.775	533.48	6.210	530.04
23-Nov-21	2.66	516.65	3.51	523.41	14.76	457.17	2.00	492.59	11.78	476.97	4.75	495.41	5.350	541.02	-	-	-	-
27-Nov-21	-	-	-	-	-	-	-	-	-	-	-	-	5.815	540.55	4.980	533.27	6.355	529.90
07-Dec-21	-	-	-	-	-	-	-	-	-	-	-	-	5.375	540.99	5.010	533.24	6.335	529.92

Notes:

[1] The top of pipe elevations shown were surveyed in 2015 by AllTerra Land Surveying Ltc

masl = meters above sea level; mbtop = meters below top of pipe

"-" indicates that no water level was recorded or no elevation was calculated

APPENDIX C

CARO Laboratory Certificate of Analysis (COA) Reports

CERTIFICATE OF ANALYSIS

REPORTED TO	Regional District of Central Okanagan 1450 KLO Road KELOWNA, BC V1W 3Z4		
ATTENTION	Angela Lambrecht	**WORK ORDER**	21E1381
PO NUMBER	60167	**RECEIVED / TEMP**	2021-05-11 14:58 / 14°C
PROJECT	Westside Landfill	**REPORTED**	2021-05-18 14:59
PROJECT INFO	1417953	**COC NUMBER**	000001

Introduction:

CARO Analytical Services is a testing laboratory full of smart, engaged scientists driven to make the world a safer and healthier place. Through our clients' projects we become an essential element for a better world. We employ methods conducted in accordance with recognized professional standards using accepted testing methodologies and quality control efforts. CARO is accredited by the Canadian Association for Laboratories Accreditation (CALA) to ISO/IEC 17025:2017 for specific tests listed in the scope of accreditation approved by CALA.

Big Picture Sidekicks

You know that the sample you collected after snowshoeing to site, digging 5 meters, and racing to get it on a plane so you can submit it to the lab for time sensitive results needed to make important and expensive decisions (whew) is VERY important. We know that too.

We've Got Chemistry

It's simple. We figure the more you enjoy working with our fun and engaged team members; the more likely you are to give us continued opportunities to support you.

Ahead of the Curve

Through research, regulation knowledge, and instrumentation, we are your analytical centre for the technical knowledge you need, BEFORE you need it, so you can stay up to date and in the know.

If you have any questions or concerns, please contact me at bwhitehead@caro.ca

Authorized By:

Brent Whitehead
Client Scientist - Team Lead

CARO ANALYTICAL SERVICES

TEST RESULTS

REPORTED TO	Regional District of Central Okanagan	**WORK ORDER**	21E1381
PROJECT	Westside Landfill	**REPORTED**	2021-05-18 14:59

Analyte	Result	RL	Units	Analyzed	Qualifier
MW-99-2 (21E1381-01) | Matrix: Water | Sampled: 2021-05-11 11:32					
Anions					
Chloride	**127**	0.10	mg/L	2021-05-14	
Nitrate (as N)	**0.986**	0.010	mg/L	2021-05-14	
Sulfate	**17.9**	1.0	mg/L	2021-05-14	
Calculated Parameters					
Hardness, Total (as CaCO3)	**711**	0.500	mg/L	N/A	
Dissolved Metals					
Lithium, dissolved	**0.0445**	0.00010	mg/L	2021-05-14	
Aluminum, dissolved	**0.177**	0.0050	mg/L	2021-05-14	
Antimony, dissolved	< 0.00020	0.00020	mg/L	2021-05-14	
Arsenic, dissolved	< 0.00050	0.00050	mg/L	2021-05-14	
Barium, dissolved	**0.0076**	0.0050	mg/L	2021-05-14	
Beryllium, dissolved	< 0.00010	0.00010	mg/L	2021-05-14	
Bismuth, dissolved	< 0.00010	0.00010	mg/L	2021-05-14	
Boron, dissolved	< 0.0500	0.0500	mg/L	2021-05-14	
Cadmium, dissolved	**0.000018**	0.000010	mg/L	2021-05-14	
Calcium, dissolved	**133**	0.20	mg/L	2021-05-14	
Chromium, dissolved	< 0.00050	0.00050	mg/L	2021-05-14	
Cobalt, dissolved	**0.00043**	0.00010	mg/L	2021-05-14	
Copper, dissolved	**0.00711**	0.00040	mg/L	2021-05-14	
Iron, dissolved	**0.179**	0.010	mg/L	2021-05-14	
Lead, dissolved	**0.00068**	0.00020	mg/L	2021-05-14	
Magnesium, dissolved	**92.0**	0.010	mg/L	2021-05-14	
Manganese, dissolved	**0.0254**	0.00020	mg/L	2021-05-14	
Mercury, dissolved	< 0.000010	0.000010	mg/L	2021-05-15	
Molybdenum, dissolved	**0.00022**	0.00010	mg/L	2021-05-14	
Nickel, dissolved	< 0.00040	0.00040	mg/L	2021-05-14	
Phosphorus, dissolved	< 0.050	0.050	mg/L	2021-05-14	
Potassium, dissolved	**0.45**	0.10	mg/L	2021-05-14	
Selenium, dissolved	< 0.00050	0.00050	mg/L	2021-05-14	
Silicon, dissolved	**7.3**	1.0	mg/L	2021-05-14	
Silver, dissolved	< 0.000050	0.000050	mg/L	2021-05-14	
Sodium, dissolved	**43.2**	0.10	mg/L	2021-05-14	
Strontium, dissolved	**1.72**	0.0010	mg/L	2021-05-14	
Sulfur, dissolved	**8.5**	3.0	mg/L	2021-05-14	
Tellurium, dissolved	< 0.00050	0.00050	mg/L	2021-05-14	
Thallium, dissolved	< 0.000020	0.000020	mg/L	2021-05-14	
Thorium, dissolved	< 0.00010	0.00010	mg/L	2021-05-14	
Tin, dissolved	< 0.00020	0.00020	mg/L	2021-05-14	
Titanium, dissolved	< 0.0050	0.0050	mg/L	2021-05-14	
Tungsten, dissolved	< 0.0010	0.0010	mg/L	2021-05-14	
Uranium, dissolved	**0.00700**	0.000020	mg/L	2021-05-14	
Vanadium, dissolved	< 0.0010	0.0010	mg/L	2021-05-14	

TEST RESULTS

REPORTED TO	Regional District of Central Okanagan	**WORK ORDER**	21E1381
PROJECT	Westside Landfill	**REPORTED**	2021-05-18 14:59

Analyte	Result	RL	Units	Analyzed	Qualifier
MW-99-2 (21E1381-01) | Matrix: Water | Sampled: 2021-05-11 11:32, Continued					
Dissolved Metals, Continued					
Zinc, dissolved	< 0.0040	0.0040	mg/L	2021-05-14	
Zirconium, dissolved	**0.00037**	0.00010	mg/L	2021-05-14	
General Parameters					
Alkalinity, Total (as CaCO3)	**651**	1.0	mg/L	2021-05-14	
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0	mg/L	2021-05-14	
Alkalinity, Bicarbonate (as CaCO3)	**651**	1.0	mg/L	2021-05-14	
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0	mg/L	2021-05-14	
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0	mg/L	2021-05-14	
Ammonia, Total (as N)	< 0.050	0.050	mg/L	2021-05-14	
Conductivity (EC)	**1490**	2.0	µS/cm	2021-05-14	
pH	**7.92**	0.10	pH units	2021-05-14	HT2
BH 1 (21E1381-02) | Matrix: Water | Sampled: 2021-05-11 12:01					
Anions					
Chloride	**548**	0.10	mg/L	2021-05-14	
Nitrate (as N)	**0.018**	0.010	mg/L	2021-05-14	
Sulfate	**39.5**	1.0	mg/L	2021-05-14	
BCMOE Aggregate Hydrocarbons					
EPHw10-19	< 250	250	µg/L	2021-05-16	
EPHw19-32	< 250	250	µg/L	2021-05-16	
LEPHw	< 250	250	µg/L	N/A	
HEPHw	< 250	250	µg/L	N/A	
Surrogate: 2-Methylnonane (EPH/F2-4)	*105*	*60-126*	%	*2021-05-16*	
Calculated Parameters					
Hardness, Total (as CaCO3)	**1240**	0.500	mg/L	N/A	
Dissolved Metals					
Lithium, dissolved	**0.0273**	0.00010	mg/L	2021-05-14	
Aluminum, dissolved	< 0.0050	0.0050	mg/L	2021-05-14	
Antimony, dissolved	< 0.00020	0.00020	mg/L	2021-05-14	
Arsenic, dissolved	**0.00477**	0.00050	mg/L	2021-05-14	
Barium, dissolved	**0.0606**	0.0050	mg/L	2021-05-14	
Beryllium, dissolved	< 0.00010	0.00010	mg/L	2021-05-14	
Bismuth, dissolved	< 0.00010	0.00010	mg/L	2021-05-14	
Boron, dissolved	**0.887**	0.0500	mg/L	2021-05-14	
Cadmium, dissolved	**0.000149**	0.000010	mg/L	2021-05-14	
Calcium, dissolved	**309**	0.20	mg/L	2021-05-14	
Chromium, dissolved	**0.00057**	0.00050	mg/L	2021-05-14	
Cobalt, dissolved	**0.00251**	0.00010	mg/L	2021-05-14	
Copper, dissolved	**0.00146**	0.00040	mg/L	2021-05-14	

TEST RESULTS

REPORTED TO	Regional District of Central Okanagan	**WORK ORDER**	21E1381
PROJECT	Westside Landfill	**REPORTED**	2021-05-18 14:59

Analyte	Result	RL	Units	Analyzed	Qualifier
BH 1 (21E1381-02) | Matrix: Water | Sampled: 2021-05-11 12:01, Continued					
Dissolved Metals, Continued					
Iron, dissolved	**8.45**	0.010	mg/L	2021-05-14	
Lead, dissolved	< 0.00020	0.00020	mg/L	2021-05-14	
Magnesium, dissolved	**113**	0.010	mg/L	2021-05-14	
Manganese, dissolved	**5.81**	0.00020	mg/L	2021-05-14	
Mercury, dissolved	< 0.000010	0.000010	mg/L	2021-05-15	
Molybdenum, dissolved	**0.00134**	0.00010	mg/L	2021-05-14	
Nickel, dissolved	**0.0165**	0.00040	mg/L	2021-05-14	
Phosphorus, dissolved	**0.176**	0.050	mg/L	2021-05-14	
Potassium, dissolved	**9.86**	0.10	mg/L	2021-05-14	
Selenium, dissolved	< 0.00050	0.00050	mg/L	2021-05-14	
Silicon, dissolved	**19.8**	1.0	mg/L	2021-05-14	
Silver, dissolved	< 0.000050	0.000050	mg/L	2021-05-14	
Sodium, dissolved	**166**	0.10	mg/L	2021-05-14	
Strontium, dissolved	**2.16**	0.0010	mg/L	2021-05-14	
Sulfur, dissolved	**15.0**	3.0	mg/L	2021-05-14	
Tellurium, dissolved	< 0.00050	0.00050	mg/L	2021-05-14	
Thallium, dissolved	< 0.000020	0.000020	mg/L	2021-05-14	
Thorium, dissolved	< 0.00010	0.00010	mg/L	2021-05-14	
Tin, dissolved	**0.00026**	0.00020	mg/L	2021-05-14	
Titanium, dissolved	< 0.0050	0.0050	mg/L	2021-05-14	
Tungsten, dissolved	< 0.0010	0.0010	mg/L	2021-05-14	
Uranium, dissolved	**0.00197**	0.000020	mg/L	2021-05-14	
Vanadium, dissolved	< 0.0010	0.0010	mg/L	2021-05-14	
Zinc, dissolved	< 0.0040	0.0040	mg/L	2021-05-14	
Zirconium, dissolved	**0.00108**	0.00010	mg/L	2021-05-14	
General Parameters					
Alkalinity, Total (as CaCO3)	**796**	1.0	mg/L	2021-05-14	
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0	mg/L	2021-05-14	
Alkalinity, Bicarbonate (as CaCO3)	**796**	1.0	mg/L	2021-05-14	
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0	mg/L	2021-05-14	
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0	mg/L	2021-05-14	
Ammonia, Total (as N)	**0.574**	0.050	mg/L	2021-05-14	
BOD, 5-day	**2.3**	2.0	mg/L	2021-05-18	
Chemical Oxygen Demand	**89**	20	mg/L	2021-05-14	
Conductivity (EC)	**3030**	2.0	µS/cm	2021-05-14	
pH	**7.66**	0.10	pH units	2021-05-14	HT2
Solids, Total Dissolved	**1920**	15	mg/L	2021-05-15	
Polycyclic Aromatic Hydrocarbons (PAH)					
Acenaphthene	< 0.050	0.050	µg/L	2021-05-17	
Acenaphthylene	< 0.200	0.200	µg/L	2021-05-17	
Acridine	< 0.050	0.050	µg/L	2021-05-17	
Anthracene	< 0.010	0.010	µg/L	2021-05-17	

TEST RESULTS

REPORTED TO	Regional District of Central Okanagan	**WORK ORDER**	21E1381
PROJECT	Westside Landfill	**REPORTED**	2021-05-18 14:59

Analyte	Result	RL	Units	Analyzed	Qualifier
BH 1 (21E1381-02) | Matrix: Water | Sampled: 2021-05-11 12:01, Continued					
Polycyclic Aromatic Hydrocarbons (PAH), Continued					
Benz(a)anthracene	< 0.010	0.010	µg/L	2021-05-17	
Benzo(a)pyrene	< 0.010	0.010	µg/L	2021-05-17	
Benzo(b+j)fluoranthene	< 0.050	0.050	µg/L	2021-05-17	
Benzo(g,h,i)perylene	< 0.050	0.050	µg/L	2021-05-17	
Benzo(k)fluoranthene	< 0.050	0.050	µg/L	2021-05-17	
2-Chloronaphthalene	< 0.100	0.100	µg/L	2021-05-17	
Chrysene	< 0.050	0.050	µg/L	2021-05-17	
Dibenz(a,h)anthracene	< 0.010	0.010	µg/L	2021-05-17	
Fluoranthene	< 0.030	0.030	µg/L	2021-05-17	
Fluorene	< 0.050	0.050	µg/L	2021-05-17	
Indeno(1,2,3-cd)pyrene	< 0.050	0.050	µg/L	2021-05-17	
1-Methylnaphthalene	< 0.100	0.100	µg/L	2021-05-17	
2-Methylnaphthalene	< 0.100	0.100	µg/L	2021-05-17	
Naphthalene	< 0.200	0.200	µg/L	2021-05-17	
Phenanthrene	< 0.100	0.100	µg/L	2021-05-17	
Pyrene	< 0.020	0.020	µg/L	2021-05-17	
Quinoline	< 0.050	0.050	µg/L	2021-05-17	
Surrogate: Acridine-d9	*117*	*50-140*	%	*2021-05-17*	
Surrogate: Naphthalene-d8	*102*	*50-140*	%	*2021-05-17*	
Surrogate: Perylene-d12	*113*	*50-140*	%	*2021-05-17*	
Volatile Organic Compounds (VOC)					CT8
Benzene	< 0.5	0.5	µg/L	2021-05-15	
Bromodichloromethane	< 1.0	1.0	µg/L	2021-05-15	
Bromoform	< 1.0	1.0	µg/L	2021-05-15	
Carbon tetrachloride	< 0.5	0.5	µg/L	2021-05-15	
Chlorobenzene	< 1.0	1.0	µg/L	2021-05-15	
Chloroethane	< 2.0	2.0	µg/L	2021-05-15	
Chloroform	< 1.0	1.0	µg/L	2021-05-15	
Dibromochloromethane	< 1.0	1.0	µg/L	2021-05-15	
1,2-Dibromoethane	< 0.3	0.3	µg/L	2021-05-15	
Dibromomethane	< 1.0	1.0	µg/L	2021-05-15	
1,2-Dichlorobenzene	< 0.5	0.5	µg/L	2021-05-15	
1,3-Dichlorobenzene	< 1.0	1.0	µg/L	2021-05-15	
1,4-Dichlorobenzene	< 1.0	1.0	µg/L	2021-05-15	
1,1-Dichloroethane	< 1.0	1.0	µg/L	2021-05-15	
1,2-Dichloroethane	< 1.0	1.0	µg/L	2021-05-15	
1,1-Dichloroethylene	< 1.0	1.0	µg/L	2021-05-15	
cis-1,2-Dichloroethylene	< 1.0	1.0	µg/L	2021-05-15	
trans-1,2-Dichloroethylene	< 1.0	1.0	µg/L	2021-05-15	
Dichloromethane	< 3.0	3.0	µg/L	2021-05-15	
1,2-Dichloropropane	< 1.0	1.0	µg/L	2021-05-15	
1,3-Dichloropropene (cis + trans)	< 1.0	1.0	µg/L	2021-05-15	

TEST RESULTS

REPORTED TO	Regional District of Central Okanagan	**WORK ORDER**	21E1381
PROJECT	Westside Landfill	**REPORTED**	2021-05-18 14:59

Analyte	Result	RL	Units	Analyzed	Qualifier
BH 1 (21E1381-02) | Matrix: Water | Sampled: 2021-05-11 12:01, Continued					
Volatile Organic Compounds (VOC), Continued					CT8
Ethylbenzene	< 1.0	1.0	µg/L	2021-05-15	
Methyl tert-butyl ether	< 1.1	1.0	µg/L	2021-05-15	RA1
Styrene	< 1.0	1.0	µg/L	2021-05-15	
1,1,2,2-Tetrachloroethane	< 0.5	0.5	µg/L	2021-05-15	
Tetrachloroethylene	< 1.0	1.0	µg/L	2021-05-15	
Toluene	< 1.0	1.0	µg/L	2021-05-15	
1,1,1-Trichloroethane	< 1.0	1.0	µg/L	2021-05-15	
1,1,2-Trichloroethane	< 1.0	1.0	µg/L	2021-05-15	
Trichloroethylene	< 1.0	1.0	µg/L	2021-05-15	
Trichlorofluoromethane	< 1.0	1.0	µg/L	2021-05-15	
Vinyl chloride	< 1.0	1.0	µg/L	2021-05-15	
Xylenes (total)	< 2.0	2.0	µg/L	2021-05-15	
Surrogate: Toluene-d8	*83*	*70-130*	%	*2021-05-15*	
Surrogate: 4-Bromofluorobenzene	*89*	*70-130*	%	*2021-05-15*	
BH2 (21E1381-03) | Matrix: Water | Sampled: 2021-05-11 10:58					
Anions					
Chloride	**146**	0.10	mg/L	2021-05-14	
Nitrate (as N)	< 0.010	0.010	mg/L	2021-05-14	
Sulfate	**130**	1.0	mg/L	2021-05-14	
Calculated Parameters					
Hardness, Total (as CaCO3)	**1520**	0.500	mg/L	N/A	
Dissolved Metals					
Lithium, dissolved	**0.0235**	0.00010	mg/L	2021-05-14	
Aluminum, dissolved	**0.0066**	0.0050	mg/L	2021-05-14	
Antimony, dissolved	< 0.00020	0.00020	mg/L	2021-05-14	
Arsenic, dissolved	**0.00282**	0.00050	mg/L	2021-05-14	
Barium, dissolved	**0.0079**	0.0050	mg/L	2021-05-14	
Beryllium, dissolved	< 0.00010	0.00010	mg/L	2021-05-14	
Bismuth, dissolved	< 0.00010	0.00010	mg/L	2021-05-14	
Boron, dissolved	**0.444**	0.0500	mg/L	2021-05-14	
Cadmium, dissolved	< 0.000010	0.000010	mg/L	2021-05-14	
Calcium, dissolved	**322**	0.20	mg/L	2021-05-14	
Chromium, dissolved	**0.00142**	0.00050	mg/L	2021-05-14	
Cobalt, dissolved	**0.00204**	0.00010	mg/L	2021-05-14	
Copper, dissolved	< 0.00040	0.00040	mg/L	2021-05-14	
Iron, dissolved	**1.67**	0.010	mg/L	2021-05-14	
Lead, dissolved	< 0.00020	0.00020	mg/L	2021-05-14	
Magnesium, dissolved	**175**	0.010	mg/L	2021-05-14	
Manganese, dissolved	**6.64**	0.00020	mg/L	2021-05-14	

TEST RESULTS

REPORTED TO	Regional District of Central Okanagan	**WORK ORDER**	21E1381
PROJECT	Westside Landfill	**REPORTED**	2021-05-18 14:59

Analyte	Result	RL	Units	Analyzed	Qualifier
BH2 (21E1381-03) | Matrix: Water | Sampled: 2021-05-11 10:58, Continued					
Dissolved Metals, Continued					
Mercury, dissolved	< 0.000010	0.000010	mg/L	2021-05-15	
Molybdenum, dissolved	**0.00359**	0.00010	mg/L	2021-05-14	
Nickel, dissolved	**0.0148**	0.00040	mg/L	2021-05-14	
Phosphorus, dissolved	**0.161**	0.050	mg/L	2021-05-14	
Potassium, dissolved	**2.68**	0.10	mg/L	2021-05-14	
Selenium, dissolved	< 0.00050	0.00050	mg/L	2021-05-14	
Silicon, dissolved	**25.4**	1.0	mg/L	2021-05-14	
Silver, dissolved	< 0.000050	0.000050	mg/L	2021-05-14	
Sodium, dissolved	**122**	0.10	mg/L	2021-05-14	
Strontium, dissolved	**2.78**	0.0010	mg/L	2021-05-14	
Sulfur, dissolved	**45.5**	3.0	mg/L	2021-05-14	
Tellurium, dissolved	< 0.00050	0.00050	mg/L	2021-05-14	
Thallium, dissolved	< 0.000020	0.000020	mg/L	2021-05-14	
Thorium, dissolved	< 0.00010	0.00010	mg/L	2021-05-14	
Tin, dissolved	< 0.00020	0.00020	mg/L	2021-05-14	
Titanium, dissolved	< 0.0050	0.0050	mg/L	2021-05-14	
Tungsten, dissolved	< 0.0010	0.0010	mg/L	2021-05-14	
Uranium, dissolved	**0.00413**	0.000020	mg/L	2021-05-14	
Vanadium, dissolved	**0.0043**	0.0010	mg/L	2021-05-14	
Zinc, dissolved	< 0.0040	0.0040	mg/L	2021-05-14	
Zirconium, dissolved	**0.00364**	0.00010	mg/L	2021-05-14	
General Parameters					
Alkalinity, Total (as CaCO3)	**1530**	1.0	mg/L	2021-05-14	
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0	mg/L	2021-05-14	
Alkalinity, Bicarbonate (as CaCO3)	**1530**	1.0	mg/L	2021-05-14	
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0	mg/L	2021-05-14	
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0	mg/L	2021-05-14	
Ammonia, Total (as N)	**0.387**	0.050	mg/L	2021-05-14	
Conductivity (EC)	**2810**	2.0	µS/cm	2021-05-14	
pH	**7.49**	0.10	pH units	2021-05-14	HT2
BH3 (21E1381-04) | Matrix: Water | Sampled: 2021-05-11 09:01					
Anions					
Chloride	**79.9**	0.10	mg/L	2021-05-14	
Nitrate (as N)	**2.31**	0.010	mg/L	2021-05-14	
Sulfate	**36.2**	1.0	mg/L	2021-05-14	
Calculated Parameters					
Hardness, Total (as CaCO3)	**388**	0.500	mg/L	N/A	
Dissolved Metals					
Lithium, dissolved	**0.0176**	0.00010	mg/L	2021-05-14	

TEST RESULTS

REPORTED TO	Regional District of Central Okanagan	**WORK ORDER**	21E1381
PROJECT	Westside Landfill	**REPORTED**	2021-05-18 14:59

Analyte	Result	RL	Units	Analyzed	Qualifier
BH3 (21E1381-04) | Matrix: Water | Sampled: 2021-05-11 09:01, Continued					
Dissolved Metals, Continued					
Aluminum, dissolved	< 0.0050	0.0050	mg/L	2021-05-14	
Antimony, dissolved	< 0.00020	0.00020	mg/L	2021-05-14	
Arsenic, dissolved	**0.00129**	0.00050	mg/L	2021-05-14	
Barium, dissolved	**0.0109**	0.0050	mg/L	2021-05-14	
Beryllium, dissolved	< 0.00010	0.00010	mg/L	2021-05-14	
Bismuth, dissolved	< 0.00010	0.00010	mg/L	2021-05-14	
Boron, dissolved	**0.0984**	0.0500	mg/L	2021-05-14	
Cadmium, dissolved	**0.000015**	0.000010	mg/L	2021-05-14	
Calcium, dissolved	**102**	0.20	mg/L	2021-05-14	
Chromium, dissolved	< 0.00050	0.00050	mg/L	2021-05-14	
Cobalt, dissolved	**0.00014**	0.00010	mg/L	2021-05-14	
Copper, dissolved	**0.00103**	0.00040	mg/L	2021-05-14	
Iron, dissolved	**0.025**	0.010	mg/L	2021-05-14	
Lead, dissolved	< 0.00020	0.00020	mg/L	2021-05-14	
Magnesium, dissolved	**32.3**	0.010	mg/L	2021-05-14	
Manganese, dissolved	**0.00711**	0.00020	mg/L	2021-05-14	
Mercury, dissolved	< 0.000010	0.000010	mg/L	2021-05-15	
Molybdenum, dissolved	**0.00386**	0.00010	mg/L	2021-05-14	
Nickel, dissolved	**0.00128**	0.00040	mg/L	2021-05-14	
Phosphorus, dissolved	**0.053**	0.050	mg/L	2021-05-14	
Potassium, dissolved	**4.22**	0.10	mg/L	2021-05-14	
Selenium, dissolved	**0.00062**	0.00050	mg/L	2021-05-14	
Silicon, dissolved	**12.6**	1.0	mg/L	2021-05-14	
Silver, dissolved	< 0.000050	0.000050	mg/L	2021-05-14	
Sodium, dissolved	**51.4**	0.10	mg/L	2021-05-14	
Strontium, dissolved	**0.602**	0.0010	mg/L	2021-05-14	
Sulfur, dissolved	**12.0**	3.0	mg/L	2021-05-14	
Tellurium, dissolved	< 0.00050	0.00050	mg/L	2021-05-14	
Thallium, dissolved	< 0.000020	0.000020	mg/L	2021-05-14	
Thorium, dissolved	< 0.00010	0.00010	mg/L	2021-05-14	
Tin, dissolved	< 0.00020	0.00020	mg/L	2021-05-14	
Titanium, dissolved	< 0.0050	0.0050	mg/L	2021-05-14	
Tungsten, dissolved	< 0.0010	0.0010	mg/L	2021-05-14	
Uranium, dissolved	**0.00651**	0.000020	mg/L	2021-05-14	
Vanadium, dissolved	**0.0030**	0.0010	mg/L	2021-05-14	
Zinc, dissolved	< 0.0040	0.0040	mg/L	2021-05-14	
Zirconium, dissolved	< 0.00010	0.00010	mg/L	2021-05-14	
General Parameters					
Alkalinity, Total (as CaCO3)	**376**	1.0	mg/L	2021-05-14	
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0	mg/L	2021-05-14	
Alkalinity, Bicarbonate (as CaCO3)	**376**	1.0	mg/L	2021-05-14	
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0	mg/L	2021-05-14	

TEST RESULTS

REPORTED TO	Regional District of Central Okanagan	**WORK ORDER**	21E1381
PROJECT	Westside Landfill	**REPORTED**	2021-05-18 14:59

Analyte	Result	RL	Units	Analyzed	Qualifier
BH3 (21E1381-04) | Matrix: Water | Sampled: 2021-05-11 09:01, Continued					
General Parameters, Continued					
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0	mg/L	2021-05-14	
Ammonia, Total (as N)	< 0.050	0.050	mg/L	2021-05-14	
Conductivity (EC)	**983**	2.0	µS/cm	2021-05-14	
pH	**7.72**	0.10	pH units	2021-05-14	HT2
BH4 (21E1381-05) | Matrix: Water | Sampled: 2021-05-11 09:35					
Anions					
Chloride	**277**	0.10	mg/L	2021-05-14	
Nitrate (as N)	**1.39**	0.010	mg/L	2021-05-14	
Sulfate	**90.5**	1.0	mg/L	2021-05-14	
Calculated Parameters					
Hardness, Total (as CaCO3)	**944**	0.500	mg/L	N/A	
Dissolved Metals					
Lithium, dissolved	**0.0344**	0.00010	mg/L	2021-05-14	
Aluminum, dissolved	< 0.0050	0.0050	mg/L	2021-05-14	
Antimony, dissolved	< 0.00020	0.00020	mg/L	2021-05-14	
Arsenic, dissolved	< 0.00050	0.00050	mg/L	2021-05-14	
Barium, dissolved	**0.0375**	0.0050	mg/L	2021-05-14	
Beryllium, dissolved	< 0.00010	0.00010	mg/L	2021-05-14	
Bismuth, dissolved	< 0.00010	0.00010	mg/L	2021-05-14	
Boron, dissolved	**0.494**	0.0500	mg/L	2021-05-14	
Cadmium, dissolved	**0.000081**	0.000010	mg/L	2021-05-14	
Calcium, dissolved	**180**	0.20	mg/L	2021-05-14	
Chromium, dissolved	< 0.00050	0.00050	mg/L	2021-05-14	
Cobalt, dissolved	**0.00145**	0.00010	mg/L	2021-05-14	
Copper, dissolved	**0.00193**	0.00040	mg/L	2021-05-14	
Iron, dissolved	< 0.010	0.010	mg/L	2021-05-14	
Lead, dissolved	< 0.00020	0.00020	mg/L	2021-05-14	
Magnesium, dissolved	**120**	0.010	mg/L	2021-05-14	
Manganese, dissolved	**0.374**	0.00020	mg/L	2021-05-14	
Mercury, dissolved	< 0.000010	0.000010	mg/L	2021-05-15	
Molybdenum, dissolved	**0.00550**	0.00010	mg/L	2021-05-14	
Nickel, dissolved	**0.0183**	0.00040	mg/L	2021-05-14	
Phosphorus, dissolved	< 0.050	0.050	mg/L	2021-05-14	
Potassium, dissolved	**5.38**	0.10	mg/L	2021-05-14	
Selenium, dissolved	< 0.00050	0.00050	mg/L	2021-05-14	
Silicon, dissolved	**11.6**	1.0	mg/L	2021-05-14	
Silver, dissolved	< 0.000050	0.000050	mg/L	2021-05-14	
Sodium, dissolved	**92.5**	0.10	mg/L	2021-05-14	
Strontium, dissolved	**1.89**	0.0010	mg/L	2021-05-14	

TEST RESULTS

REPORTED TO	Regional District of Central Okanagan	**WORK ORDER**	21E1381
PROJECT	Westside Landfill	**REPORTED**	2021-05-18 14:59

Analyte	Result	RL	Units	Analyzed	Qualifier
BH4 (21E1381-05) | Matrix: Water | Sampled: 2021-05-11 09:35, Continued					
Dissolved Metals, Continued					
Sulfur, dissolved	**33.0**	3.0	mg/L	2021-05-14	
Tellurium, dissolved	< 0.00050	0.00050	mg/L	2021-05-14	
Thallium, dissolved	**0.000021**	0.000020	mg/L	2021-05-14	
Thorium, dissolved	< 0.00010	0.00010	mg/L	2021-05-14	
Tin, dissolved	< 0.00020	0.00020	mg/L	2021-05-14	
Titanium, dissolved	< 0.0050	0.0050	mg/L	2021-05-14	
Tungsten, dissolved	< 0.0010	0.0010	mg/L	2021-05-14	
Uranium, dissolved	**0.0261**	0.000020	mg/L	2021-05-14	
Vanadium, dissolved	**0.0029**	0.0010	mg/L	2021-05-14	
Zinc, dissolved	< 0.0040	0.0040	mg/L	2021-05-14	
Zirconium, dissolved	**0.00052**	0.00010	mg/L	2021-05-14	
General Parameters					
Alkalinity, Total (as CaCO3)	**733**	1.0	mg/L	2021-05-14	
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0	mg/L	2021-05-14	
Alkalinity, Bicarbonate (as CaCO3)	**733**	1.0	mg/L	2021-05-14	
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0	mg/L	2021-05-14	
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0	mg/L	2021-05-14	
Ammonia, Total (as N)	< 0.050	0.050	mg/L	2021-05-14	
BOD, 5-day	< 2.3	2.0	mg/L	2021-05-18	
Chemical Oxygen Demand	< 20	20	mg/L	2021-05-14	
Conductivity (EC)	**2100**	2.0	µS/cm	2021-05-14	
pH	**7.79**	0.10	pH units	2021-05-14	HT2
Solids, Total Dissolved	**1270**	15	mg/L	2021-05-15	
BH5 (21E1381-06) | Matrix: Water | Sampled: 2021-05-11 10:01					
Anions					
Chloride	**111**	0.10	mg/L	2021-05-14	
Nitrate (as N)	**4.12**	0.010	mg/L	2021-05-14	
Sulfate	**31.1**	1.0	mg/L	2021-05-14	
Calculated Parameters					
Hardness, Total (as CaCO3)	**322**	0.500	mg/L	N/A	
Dissolved Metals					
Lithium, dissolved	**0.0200**	0.00010	mg/L	2021-05-14	
Aluminum, dissolved	< 0.0050	0.0050	mg/L	2021-05-14	
Antimony, dissolved	< 0.00020	0.00020	mg/L	2021-05-14	
Arsenic, dissolved	**0.00124**	0.00050	mg/L	2021-05-14	
Barium, dissolved	**0.0114**	0.0050	mg/L	2021-05-14	
Beryllium, dissolved	< 0.00010	0.00010	mg/L	2021-05-14	
Bismuth, dissolved	< 0.00010	0.00010	mg/L	2021-05-14	
Boron, dissolved	**0.0583**	0.0500	mg/L	2021-05-14	

TEST RESULTS

REPORTED TO	Regional District of Central Okanagan	**WORK ORDER**	21E1381
PROJECT	Westside Landfill	**REPORTED**	2021-05-18 14:59

Analyte	Result	RL	Units	Analyzed	Qualifier
BH5 (21E1381-06) | Matrix: Water | Sampled: 2021-05-11 10:01, Continued					
Dissolved Metals, Continued					
Cadmium, dissolved	**0.000012**	0.000010	mg/L	2021-05-14	
Calcium, dissolved	**86.6**	0.20	mg/L	2021-05-14	
Chromium, dissolved	< 0.00050	0.00050	mg/L	2021-05-14	
Cobalt, dissolved	< 0.00010	0.00010	mg/L	2021-05-14	
Copper, dissolved	**0.00065**	0.00040	mg/L	2021-05-14	
Iron, dissolved	< 0.010	0.010	mg/L	2021-05-14	
Lead, dissolved	< 0.00020	0.00020	mg/L	2021-05-14	
Magnesium, dissolved	**25.7**	0.010	mg/L	2021-05-14	
Manganese, dissolved	**0.00273**	0.00020	mg/L	2021-05-14	
Mercury, dissolved	< 0.000010	0.000010	mg/L	2021-05-15	
Molybdenum, dissolved	**0.00701**	0.00010	mg/L	2021-05-14	
Nickel, dissolved	**0.00042**	0.00040	mg/L	2021-05-14	
Phosphorus, dissolved	< 0.050	0.050	mg/L	2021-05-14	
Potassium, dissolved	**2.81**	0.10	mg/L	2021-05-14	
Selenium, dissolved	**0.00050**	0.00050	mg/L	2021-05-14	
Silicon, dissolved	**8.7**	1.0	mg/L	2021-05-14	
Silver, dissolved	< 0.000050	0.000050	mg/L	2021-05-14	
Sodium, dissolved	**50.2**	0.10	mg/L	2021-05-14	
Strontium, dissolved	**0.383**	0.0010	mg/L	2021-05-14	
Sulfur, dissolved	**11.6**	3.0	mg/L	2021-05-14	
Tellurium, dissolved	< 0.00050	0.00050	mg/L	2021-05-14	
Thallium, dissolved	< 0.000020	0.000020	mg/L	2021-05-14	
Thorium, dissolved	< 0.00010	0.00010	mg/L	2021-05-14	
Tin, dissolved	< 0.00020	0.00020	mg/L	2021-05-14	
Titanium, dissolved	< 0.0050	0.0050	mg/L	2021-05-14	
Tungsten, dissolved	< 0.0010	0.0010	mg/L	2021-05-14	
Uranium, dissolved	**0.00509**	0.000020	mg/L	2021-05-14	
Vanadium, dissolved	**0.0053**	0.0010	mg/L	2021-05-14	
Zinc, dissolved	< 0.0040	0.0040	mg/L	2021-05-14	
Zirconium, dissolved	< 0.00010	0.00010	mg/L	2021-05-14	
General Parameters					
Alkalinity, Total (as CaCO3)	**244**	1.0	mg/L	2021-05-14	
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0	mg/L	2021-05-14	
Alkalinity, Bicarbonate (as CaCO3)	**244**	1.0	mg/L	2021-05-14	
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0	mg/L	2021-05-14	
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0	mg/L	2021-05-14	
Ammonia, Total (as N)	< 0.050	0.050	mg/L	2021-05-14	
Conductivity (EC)	**889**	2.0	µS/cm	2021-05-14	
pH	**7.96**	0.10	pH units	2021-05-14	HT2
BH7 (21E1381-07) | Matrix: Water | Sampled: 2021-05-11 10:32					

TEST RESULTS

REPORTED TO	Regional District of Central Okanagan	**WORK ORDER**	21E1381
PROJECT	Westside Landfill	**REPORTED**	2021-05-18 14:59

Analyte	Result	RL	Units	Analyzed	Qualifier
BH7 (21E1381-07) | Matrix: Water | Sampled: 2021-05-11 10:32, Continued					
Anions					
Chloride	**55.7**	0.10	mg/L	2021-05-14	
Nitrate (as N)	**3.56**	0.010	mg/L	2021-05-14	
Sulfate	**37.8**	1.0	mg/L	2021-05-14	
Calculated Parameters					
Hardness, Total (as CaCO3)	**436**	0.500	mg/L	N/A	
Dissolved Metals					
Lithium, dissolved	**0.0184**	0.00010	mg/L	2021-05-14	
Aluminum, dissolved	< 0.0050	0.0050	mg/L	2021-05-14	
Antimony, dissolved	< 0.00020	0.00020	mg/L	2021-05-14	
Arsenic, dissolved	**0.00197**	0.00050	mg/L	2021-05-14	
Barium, dissolved	**0.0178**	0.0050	mg/L	2021-05-14	
Beryllium, dissolved	< 0.00010	0.00010	mg/L	2021-05-14	
Bismuth, dissolved	< 0.00010	0.00010	mg/L	2021-05-14	
Boron, dissolved	**0.0579**	0.0500	mg/L	2021-05-14	
Cadmium, dissolved	**0.000056**	0.000010	mg/L	2021-05-14	
Calcium, dissolved	**110**	0.20	mg/L	2021-05-14	
Chromium, dissolved	< 0.00050	0.00050	mg/L	2021-05-14	
Cobalt, dissolved	**0.00050**	0.00010	mg/L	2021-05-14	
Copper, dissolved	**0.00158**	0.00040	mg/L	2021-05-14	
Iron, dissolved	< 0.010	0.010	mg/L	2021-05-14	
Lead, dissolved	< 0.00020	0.00020	mg/L	2021-05-14	
Magnesium, dissolved	**39.0**	0.010	mg/L	2021-05-14	
Manganese, dissolved	**0.0803**	0.00020	mg/L	2021-05-14	
Mercury, dissolved	< 0.000010	0.000010	mg/L	2021-05-15	
Molybdenum, dissolved	**0.00172**	0.00010	mg/L	2021-05-14	
Nickel, dissolved	**0.00292**	0.00040	mg/L	2021-05-14	
Phosphorus, dissolved	**0.074**	0.050	mg/L	2021-05-14	
Potassium, dissolved	**2.53**	0.10	mg/L	2021-05-14	
Selenium, dissolved	**0.00088**	0.00050	mg/L	2021-05-14	
Silicon, dissolved	**13.5**	1.0	mg/L	2021-05-14	
Silver, dissolved	< 0.000050	0.000050	mg/L	2021-05-14	
Sodium, dissolved	**57.1**	0.10	mg/L	2021-05-14	
Strontium, dissolved	**0.638**	0.0010	mg/L	2021-05-14	
Sulfur, dissolved	**13.5**	3.0	mg/L	2021-05-14	
Tellurium, dissolved	< 0.00050	0.00050	mg/L	2021-05-14	
Thallium, dissolved	< 0.000020	0.000020	mg/L	2021-05-14	
Thorium, dissolved	< 0.00010	0.00010	mg/L	2021-05-14	
Tin, dissolved	< 0.00020	0.00020	mg/L	2021-05-14	
Titanium, dissolved	< 0.0050	0.0050	mg/L	2021-05-14	
Tungsten, dissolved	< 0.0010	0.0010	mg/L	2021-05-14	
Uranium, dissolved	**0.00914**	0.000020	mg/L	2021-05-14	
Vanadium, dissolved	**0.0106**	0.0010	mg/L	2021-05-14	

TEST RESULTS

REPORTED TO	Regional District of Central Okanagan	**WORK ORDER**	21E1381
PROJECT	Westside Landfill	**REPORTED**	2021-05-18 14:59

Analyte	Result	RL	Units	Analyzed	Qualifier
BH7 (21E1381-07) | Matrix: Water | Sampled: 2021-05-11 10:32, Continued					
Dissolved Metals, Continued					
Zinc, dissolved	< 0.0040	0.0040	mg/L	2021-05-14	
Zirconium, dissolved	**0.00015**	0.00010	mg/L	2021-05-14	
General Parameters					
Alkalinity, Total (as CaCO3)	**458**	1.0	mg/L	2021-05-14	
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0	mg/L	2021-05-14	
Alkalinity, Bicarbonate (as CaCO3)	**458**	1.0	mg/L	2021-05-14	
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0	mg/L	2021-05-14	
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0	mg/L	2021-05-14	
Ammonia, Total (as N)	**0.050**	0.050	mg/L	2021-05-14	
Conductivity (EC)	**1080**	2.0	µS/cm	2021-05-14	
pH	**7.85**	0.10	pH units	2021-05-14	HT2
Duplicate (21E1381-08) | Matrix: Water | Sampled: 2021-05-11 10:35					
Anions					
Chloride	**55.4**	0.10	mg/L	2021-05-14	
Nitrate (as N)	**3.54**	0.010	mg/L	2021-05-14	
Sulfate	**37.9**	1.0	mg/L	2021-05-14	
Calculated Parameters					
Hardness, Total (as CaCO3)	**436**	0.500	mg/L	N/A	
Dissolved Metals					
Lithium, dissolved	**0.0187**	0.00010	mg/L	2021-05-14	
Aluminum, dissolved	< 0.0050	0.0050	mg/L	2021-05-14	
Antimony, dissolved	< 0.00020	0.00020	mg/L	2021-05-14	
Arsenic, dissolved	**0.00202**	0.00050	mg/L	2021-05-14	
Barium, dissolved	**0.0177**	0.0050	mg/L	2021-05-14	
Beryllium, dissolved	< 0.00010	0.00010	mg/L	2021-05-14	
Bismuth, dissolved	< 0.00010	0.00010	mg/L	2021-05-14	
Boron, dissolved	**0.0573**	0.0500	mg/L	2021-05-14	
Cadmium, dissolved	**0.000053**	0.000010	mg/L	2021-05-14	
Calcium, dissolved	**110**	0.20	mg/L	2021-05-14	
Chromium, dissolved	< 0.00050	0.00050	mg/L	2021-05-14	
Cobalt, dissolved	**0.00050**	0.00010	mg/L	2021-05-14	
Copper, dissolved	**0.00156**	0.00040	mg/L	2021-05-14	
Iron, dissolved	< 0.010	0.010	mg/L	2021-05-14	
Lead, dissolved	< 0.00020	0.00020	mg/L	2021-05-14	
Magnesium, dissolved	**39.1**	0.010	mg/L	2021-05-14	
Manganese, dissolved	**0.0799**	0.00020	mg/L	2021-05-14	
Mercury, dissolved	< 0.000010	0.000010	mg/L	2021-05-15	
Molybdenum, dissolved	**0.00156**	0.00010	mg/L	2021-05-14	
Nickel, dissolved	**0.00294**	0.00040	mg/L	2021-05-14	

TEST RESULTS

REPORTED TO	Regional District of Central Okanagan	**WORK ORDER**	21E1381
PROJECT	Westside Landfill	**REPORTED**	2021-05-18 14:59

Analyte	Result	RL	Units	Analyzed	Qualifier
Duplicate (21E1381-08) | Matrix: Water | Sampled: 2021-05-11 10:35, Continued					
Dissolved Metals, Continued					
Phosphorus, dissolved	**0.079**	0.050	mg/L	2021-05-14	
Potassium, dissolved	**2.52**	0.10	mg/L	2021-05-14	
Selenium, dissolved	**0.00096**	0.00050	mg/L	2021-05-14	
Silicon, dissolved	**14.0**	1.0	mg/L	2021-05-14	
Silver, dissolved	< 0.000050	0.000050	mg/L	2021-05-14	
Sodium, dissolved	**57.3**	0.10	mg/L	2021-05-14	
Strontium, dissolved	**0.627**	0.0010	mg/L	2021-05-14	
Sulfur, dissolved	**13.4**	3.0	mg/L	2021-05-14	
Tellurium, dissolved	< 0.00050	0.00050	mg/L	2021-05-14	
Thallium, dissolved	< 0.000020	0.000020	mg/L	2021-05-14	
Thorium, dissolved	< 0.00010	0.00010	mg/L	2021-05-14	
Tin, dissolved	< 0.00020	0.00020	mg/L	2021-05-14	
Titanium, dissolved	< 0.0050	0.0050	mg/L	2021-05-14	
Tungsten, dissolved	< 0.0010	0.0010	mg/L	2021-05-14	
Uranium, dissolved	**0.00908**	0.000020	mg/L	2021-05-14	
Vanadium, dissolved	**0.0104**	0.0010	mg/L	2021-05-14	
Zinc, dissolved	< 0.0040	0.0040	mg/L	2021-05-14	
Zirconium, dissolved	**0.00019**	0.00010	mg/L	2021-05-14	
General Parameters					
Alkalinity, Total (as CaCO3)	**467**	1.0	mg/L	2021-05-14	
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0	mg/L	2021-05-14	
Alkalinity, Bicarbonate (as CaCO3)	**467**	1.0	mg/L	2021-05-14	
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0	mg/L	2021-05-14	
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0	mg/L	2021-05-14	
Ammonia, Total (as N)	< 0.050	0.050	mg/L	2021-05-14	
Conductivity (EC)	**1060**	2.0	µS/cm	2021-05-14	
pH	**7.88**	0.10	pH units	2021-05-14	HT2

Sample Qualifiers:

CT8	Headspace in sample container is greater than 5% volume - VOC results may be compromised
HT2	The 15 minute recommended holding time (from sampling to analysis) has been exceeded - field analysis is recommended.
RA1	The Reporting Limit has been raised due to matrix interference.

APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO	Regional District of Central Okanagan	**WORK ORDER**	21E1381
PROJECT	Westside Landfill	**REPORTED**	2021-05-18 14:59

Analysis Description	Method Ref.	Technique	Accredited	Location
Alkalinity in Water	SM 2320 B* (2017)	Titration with H2SO4	✓	Kelowna
Ammonia, Total in Water	SM 4500-NH3 G* (2017)	Automated Colorimetry (Phenate)	✓	Kelowna
Anions in Water	SM 4110 B (2017)	Ion Chromatography	✓	Kelowna
Biochemical Oxygen Demand in Water	SM 5210 B (2017)	Dissolved Oxygen Meter	✓	Kelowna
Chemical Oxygen Demand in Water	SM 5220 D* (2017)	Closed Reflux, Colorimetry	✓	Kelowna
Conductivity in Water	SM 2510 B (2017)	Conductivity Meter	✓	Kelowna
Dissolved Metals in Water	EPA 200.8 / EPA 6020B	0.45 µm Filtration / Inductively Coupled Plasma-Mass Spectroscopy (ICP-MS)	✓	Richmond
EPH in Water	EPA 3511* / BCMOE EPHw	Hexane MicroExtraction (Base/Neutral) / Gas Chromatography (GC-FID)	✓	Richmond
Hardness in Water	SM 2340 B (2017)	Calculation: 2.497 [diss Ca] + 4.118 [diss Mg]	✓	N/A
HEPHw in Water	BCMOE LEPH/HEPH	Calculation		N/A
LEPHw in Water	BCMOE LEPH/HEPH	Calculation		N/A
Mercury, dissolved in Water	EPA 245.7*	BrCl2 Oxidation / Cold Vapor Atomic Fluorescence Spectrometry (CVAFS)	✓	Richmond
pH in Water	SM 4500-H+ B (2017)	Electrometry	✓	Kelowna
Polycyclic Aromatic Hydrocarbons in Water	EPA 3511* / EPA 8270D	Hexane MicroExtraction (Base/Neutral) / GC-MSD (SIM)	✓	Richmond
Solids, Total Dissolved in Water	SM 2540 C* (2017)	Gravimetry (Dried at 103-105C)	✓	Kelowna
Volatile Organic Compounds in Water	EPA 5030B / EPA 8260D	Purge&Trap / GC-MSD (SIM)	✓	Richmond

Note: An asterisk in the Method Reference indicates that the CARO method has been modified from the reference method

Glossary of Terms:

RL	Reporting Limit (default)
<	Less than the specified Reporting Limit (RL) - the actual RL may be higher than the default RL due to various factors
mg/L	Milligrams per litre
pH units	pH < 7 = acidic, ph > 7 = basic
µg/L	Micrograms per litre
µS/cm	Microsiemens per centimetre
BCMOE	British Columbia Environmental Laboratory Manual, British Columbia Ministry of Environment
EPA	United States Environmental Protection Agency Test Methods
SM	Standard Methods for the Examination of Water and Wastewater, American Public Health Association

APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO	Regional District of Central Okanagan	**WORK ORDER**	21E1381
PROJECT	Westside Landfill	**REPORTED**	2021-05-18 14:59

General Comments:

The results in this report apply to the samples analyzed in accordance with the Chain of Custody document. This analytical report must be reproduced in its entirety. CARO is not responsible for any loss or damage resulting directly or indirectly from error or omission in the conduct of testing. Liability is limited to the cost of analysis. Samples will be disposed of 30 days after the test report has been issued or once samples expire, whichever comes first. Longer hold is possible if agreed to in writing.

Please note any regulatory guidelines applied to this report are added as a convenience to the client, at their request, to help provide some initial context to analytical results obtained. Although CARO makes every effort to ensure accuracy of the associated regulatory guideline(s) applied, the guidelines applied cannot be assumed to be correct due to a variety of factors and as such CARO Analytical Services assumes no liability or responsibility for the use of those guidelines to make any decisions. The original source of the regulation should be verified and a review of the guideline (s) should be validated as correct in order to make any decisions arising from the comparison of the analytical data obtained to the relevant regulatory guideline for one's particular circumstances. Further, CARO Analytical Services assumes no liability or responsibility for any loss attributed from the use of these guidelines in any way.

APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO	Regional District of Central Okanagan	**WORK ORDER**	21E1381
PROJECT	Westside Landfill	**REPORTED**	2021-05-18 14:59

The following section displays the quality control (QC) data that is associated with your sample data. Groups of samples are prepared in "batches" and analyzed in conjunction with QC samples that ensure your data is of the highest quality. Common QC types include:

- **Method Blank (Blk)**: A blank sample that undergoes sample processing identical to that carried out for the test samples. Method blank results are used to assess contamination from the laboratory environment and reagents.
- **Duplicate (Dup)**: An additional or second portion of a randomly selected sample in the analytical run carried through the entire analytical process. Duplicates provide a measure of the analytical method's precision (reproducibility).
- **Blank Spike (BS)**: A sample of known concentration which undergoes processing identical to that carried out for test samples, also referred to as a laboratory control sample (LCS). Blank spikes provide a measure of the analytical method's accuracy.
- **Matrix Spike (MS)**: A second aliquot of sample is fortified with with a known concentration of target analytes and carried through the entire analytical process. Matrix spikes evaluate potential matrix effects that may affect the analyte recovery.
- **Reference Material (SRM)**: A homogenous material of similar matrix to the samples, certified for the parameter(s) listed. Reference Materials ensure that the analytical process is adequate to achieve acceptable recoveries of the parameter(s) tested.

Each QC type is analyzed at a 5-10% frequency, i.e. one blank/duplicate/spike for every 10-20 samples. For all types of QC, the specified recovery (% Rec) and relative percent difference (RPD) limits are derived from long-term method performance averages and/or prescribed by the reference method.

Analyte	Result	RL	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
Anions, Batch B1E1407										
Blank (B1E1407-BLK1)				Prepared: 2021-05-14, Analyzed: 2021-05-14						
Chloride	< 0.10	0.10	mg/L							
Nitrate (as N)	< 0.010	0.010	mg/L							
Sulfate	< 1.0	1.0	mg/L							
Blank (B1E1407-BLK3)				Prepared: 2021-05-14, Analyzed: 2021-05-14						
Chloride	< 0.10	0.10	mg/L							
Nitrate (as N)	< 0.010	0.010	mg/L							
Sulfate	< 1.0	1.0	mg/L							
LCS (B1E1407-BS1)				Prepared: 2021-05-14, Analyzed: 2021-05-14						
Chloride	16.1	0.10	mg/L	16.0		101	90-110			
Nitrate (as N)	4.05	0.010	mg/L	4.00		101	90-110			
Sulfate	16.1	1.0	mg/L	16.0		101	90-110			
LCS (B1E1407-BS3)				Prepared: 2021-05-14, Analyzed: 2021-05-14						
Chloride	16.0	0.10	mg/L	16.0		100	90-110			
Nitrate (as N)	4.03	0.010	mg/L	4.00		101	90-110			
Sulfate	16.1	1.0	mg/L	16.0		100	90-110			
BCMOE Aggregate Hydrocarbons, Batch B1E1579										
Blank (B1E1579-BLK1)				Prepared: 2021-05-16, Analyzed: 2021-05-16						
EPHw10-19	< 250	250	µg/L							
EPHw19-32	< 250	250	µg/L							
Surrogate: 2-Methylnonane (EPH/F2-4)	*399*		*µg/L*	444		*90*	*60-126*			
LCS (B1E1579-BS2)				Prepared: 2021-05-16, Analyzed: 2021-05-16						
EPHw10-19	13800	250	µg/L	15400		90	70-117			
EPHw19-32	20900	250	µg/L	22100		95	70-113			
Surrogate: 2-Methylnonane (EPH/F2-4)	*297*		*µg/L*	444		*67*	*60-126*			
LCS Dup (B1E1579-BSD2)				Prepared: 2021-05-16, Analyzed: 2021-05-16						
EPHw10-19	13700	250	µg/L	15400		89	70-117	< 1	20	
EPHw19-32	20900	250	µg/L	22100		94	70-113	< 1	20	
Surrogate: 2-Methylnonane (EPH/F2-4)	*270*		*µg/L*	444		*61*	*60-126*			

APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO	Regional District of Central Okanagan	**WORK ORDER**	21E1381
PROJECT	Westside Landfill	**REPORTED**	2021-05-18 14:59

Analyte	Result	RL	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
Dissolved Metals, Batch B1E1470										
Blank (B1E1470-BLK1)				Prepared: 2021-05-14, Analyzed: 2021-05-14						
Lithium, dissolved	< 0.00010	0.00010	mg/L							
Aluminum, dissolved	< 0.0050	0.0050	mg/L							
Antimony, dissolved	< 0.00020	0.00020	mg/L							
Arsenic, dissolved	< 0.00050	0.00050	mg/L							
Barium, dissolved	< 0.0050	0.0050	mg/L							
Beryllium, dissolved	< 0.00010	0.00010	mg/L							
Bismuth, dissolved	< 0.00010	0.00010	mg/L							
Boron, dissolved	< 0.0500	0.0500	mg/L							
Cadmium, dissolved	< 0.000010	0.000010	mg/L							
Calcium, dissolved	< 0.20	0.20	mg/L							
Chromium, dissolved	< 0.00050	0.00050	mg/L							
Cobalt, dissolved	< 0.00010	0.00010	mg/L							
Copper, dissolved	< 0.00040	0.00040	mg/L							
Iron, dissolved	< 0.010	0.010	mg/L							
Lead, dissolved	< 0.00020	0.00020	mg/L							
Magnesium, dissolved	< 0.010	0.010	mg/L							
Manganese, dissolved	< 0.00020	0.00020	mg/L							
Molybdenum, dissolved	< 0.00010	0.00010	mg/L							
Nickel, dissolved	< 0.00040	0.00040	mg/L							
Phosphorus, dissolved	< 0.050	0.050	mg/L							
Potassium, dissolved	< 0.10	0.10	mg/L							
Selenium, dissolved	< 0.00050	0.00050	mg/L							
Silicon, dissolved	< 1.0	1.0	mg/L							
Silver, dissolved	< 0.000050	0.000050	mg/L							
Sodium, dissolved	< 0.10	0.10	mg/L							
Strontium, dissolved	< 0.0010	0.0010	mg/L							
Sulfur, dissolved	< 3.0	3.0	mg/L							
Tellurium, dissolved	< 0.00050	0.00050	mg/L							
Thallium, dissolved	< 0.000020	0.000020	mg/L							
Thorium, dissolved	< 0.00010	0.00010	mg/L							
Tin, dissolved	< 0.00020	0.00020	mg/L							
Titanium, dissolved	< 0.0050	0.0050	mg/L							
Tungsten, dissolved	< 0.0010	0.0010	mg/L							
Uranium, dissolved	< 0.000020	0.000020	mg/L							
Vanadium, dissolved	< 0.0010	0.0010	mg/L							
Zinc, dissolved	< 0.0040	0.0040	mg/L							
Zirconium, dissolved	< 0.00010	0.00010	mg/L							
LCS (B1E1470-BS1)				Prepared: 2021-05-14, Analyzed: 2021-05-14						
Lithium, dissolved	0.0223	0.00010	mg/L	0.0200		112	80-120			
Aluminum, dissolved	0.0218	0.0050	mg/L	0.0199		109	80-120			
Antimony, dissolved	0.0183	0.00020	mg/L	0.0200		91	80-120			
Arsenic, dissolved	0.0191	0.00050	mg/L	0.0200		96	80-120			
Barium, dissolved	0.0194	0.0050	mg/L	0.0198		98	80-120			
Beryllium, dissolved	0.0217	0.00010	mg/L	0.0198		110	80-120			
Bismuth, dissolved	0.0193	0.00010	mg/L	0.0200		97	80-120			
Boron, dissolved	< 0.0500	0.0500	mg/L	0.0200		109	80-120			
Cadmium, dissolved	0.0197	0.000010	mg/L	0.0199		99	80-120			
Calcium, dissolved	2.22	0.20	mg/L	2.02		110	80-120			
Chromium, dissolved	0.0198	0.00050	mg/L	0.0198		100	80-120			
Cobalt, dissolved	0.0194	0.00010	mg/L	0.0199		97	80-120			
Copper, dissolved	0.0189	0.00040	mg/L	0.0200		95	80-120			
Iron, dissolved	1.92	0.010	mg/L	2.02		95	80-120			
Lead, dissolved	0.0191	0.00020	mg/L	0.0199		96	80-120			
Magnesium, dissolved	2.26	0.010	mg/L	2.02		112	80-120			
Manganese, dissolved	0.0183	0.00020	mg/L	0.0199		92	80-120			

APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO	Regional District of Central Okanagan	**WORK ORDER**	21E1381
PROJECT	Westside Landfill	**REPORTED**	2021-05-18 14:59

Analyte	Result	RL	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
Dissolved Metals, Batch B1E1470, Continued										
LCS (B1E1470-BS1), Continued				Prepared: 2021-05-14, Analyzed: 2021-05-14						
Molybdenum, dissolved	0.0184	0.00010	mg/L	0.0200		92	80-120			
Nickel, dissolved	0.0195	0.00040	mg/L	0.0200		97	80-120			
Phosphorus, dissolved	1.99	0.050	mg/L	2.00		100	80-120			
Potassium, dissolved	2.13	0.10	mg/L	2.02		106	80-120			
Selenium, dissolved	0.0192	0.00050	mg/L	0.0200		96	80-120			
Silicon, dissolved	2.1	1.0	mg/L	2.00		106	80-120			
Silver, dissolved	0.0190	0.000050	mg/L	0.0200		95	80-120			
Sodium, dissolved	2.21	0.10	mg/L	2.02		109	80-120			
Strontium, dissolved	0.0180	0.0010	mg/L	0.0200		90	80-120			
Sulfur, dissolved	5.3	3.0	mg/L	5.00		106	80-120			
Tellurium, dissolved	0.0204	0.00050	mg/L	0.0200		102	80-120			
Thallium, dissolved	0.0187	0.000020	mg/L	0.0199		94	80-120			
Thorium, dissolved	0.0182	0.00010	mg/L	0.0200		91	80-120			
Tin, dissolved	0.0210	0.00020	mg/L	0.0200		105	80-120			
Titanium, dissolved	0.0211	0.0050	mg/L	0.0200		106	80-120			
Tungsten, dissolved	0.0198	0.0010	mg/L	0.0200		99	80-120			
Uranium, dissolved	0.0185	0.000020	mg/L	0.0200		93	80-120			
Vanadium, dissolved	0.0211	0.0010	mg/L	0.0200		105	80-120			
Zinc, dissolved	0.0207	0.0040	mg/L	0.0200		103	80-120			
Zirconium, dissolved	0.0191	0.00010	mg/L	0.0200		95	80-120			
LCS (B1E1470-BS2)				Prepared: 2021-05-14, Analyzed: 2021-05-14						
Lithium, dissolved	0.0205	0.00010	mg/L	0.0200		102	80-120			
Aluminum, dissolved	0.0212	0.0050	mg/L	0.0199		107	80-120			
Antimony, dissolved	0.0185	0.00020	mg/L	0.0200		93	80-120			
Arsenic, dissolved	0.0193	0.00050	mg/L	0.0200		96	80-120			
Barium, dissolved	0.0191	0.0050	mg/L	0.0198		96	80-120			
Beryllium, dissolved	0.0206	0.00010	mg/L	0.0198		104	80-120			
Bismuth, dissolved	0.0194	0.00010	mg/L	0.0200		97	80-120			
Boron, dissolved	< 0.0500	0.0500	mg/L	0.0200		113	80-120			
Cadmium, dissolved	0.0195	0.000010	mg/L	0.0199		98	80-120			
Calcium, dissolved	2.15	0.20	mg/L	2.02		107	80-120			
Chromium, dissolved	0.0193	0.00050	mg/L	0.0198		98	80-120			
Cobalt, dissolved	0.0190	0.00010	mg/L	0.0199		95	80-120			
Copper, dissolved	0.0189	0.00040	mg/L	0.0200		95	80-120			
Iron, dissolved	1.91	0.010	mg/L	2.02		95	80-120			
Lead, dissolved	0.0193	0.00020	mg/L	0.0199		97	80-120			
Magnesium, dissolved	2.18	0.010	mg/L	2.02		108	80-120			
Manganese, dissolved	0.0181	0.00020	mg/L	0.0199		91	80-120			
Molybdenum, dissolved	0.0185	0.00010	mg/L	0.0200		93	80-120			
Nickel, dissolved	0.0193	0.00040	mg/L	0.0200		96	80-120			
Phosphorus, dissolved	1.99	0.050	mg/L	2.00		100	80-120			
Potassium, dissolved	2.10	0.10	mg/L	2.02		104	80-120			
Selenium, dissolved	0.0197	0.00050	mg/L	0.0200		99	80-120			
Silicon, dissolved	2.1	1.0	mg/L	2.00		107	80-120			
Silver, dissolved	0.0191	0.000050	mg/L	0.0200		96	80-120			
Sodium, dissolved	2.11	0.10	mg/L	2.02		104	80-120			
Strontium, dissolved	0.0177	0.0010	mg/L	0.0200		88	80-120			
Sulfur, dissolved	4.2	3.0	mg/L	5.00		84	80-120			
Tellurium, dissolved	0.0199	0.00050	mg/L	0.0200		99	80-120			
Thallium, dissolved	0.0187	0.000020	mg/L	0.0199		94	80-120			
Thorium, dissolved	0.0185	0.00010	mg/L	0.0200		93	80-120			
Tin, dissolved	0.0213	0.00020	mg/L	0.0200		106	80-120			
Titanium, dissolved	0.0209	0.0050	mg/L	0.0200		104	80-120			
Tungsten, dissolved	0.0194	0.0010	mg/L	0.0200		97	80-120			
Uranium, dissolved	0.0187	0.000020	mg/L	0.0200		94	80-120			

APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO	Regional District of Central Okanagan	**WORK ORDER**	21E1381
PROJECT	Westside Landfill	**REPORTED**	2021-05-18 14:59

Analyte	Result	RL	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
Dissolved Metals, Batch B1E1470, Continued										
LCS (B1E1470-BS2), Continued				Prepared: 2021-05-14, Analyzed: 2021-05-14						
Vanadium, dissolved	0.0182	0.0010	mg/L	0.0200		91	80-120			
Zinc, dissolved	0.0209	0.0040	mg/L	0.0200		105	80-120			
Zirconium, dissolved	0.0194	0.00010	mg/L	0.0200		97	80-120			
Duplicate (B1E1470-DUP2)				**Source: 21E1381-07**	Prepared: 2021-05-14, Analyzed: 2021-05-14					
Lithium, dissolved	0.0185	0.00010	mg/L		0.0184			< 1	20	
Aluminum, dissolved	< 0.0050	0.0050	mg/L		< 0.0050				20	
Antimony, dissolved	< 0.00020	0.00020	mg/L		< 0.00020				20	
Arsenic, dissolved	0.00183	0.00050	mg/L		0.00197				20	
Barium, dissolved	0.0176	0.0050	mg/L		0.0178				20	
Beryllium, dissolved	< 0.00010	0.00010	mg/L		< 0.00010				20	
Bismuth, dissolved	< 0.00010	0.00010	mg/L		< 0.00010				20	
Boron, dissolved	0.0598	0.0500	mg/L		0.0579				20	
Cadmium, dissolved	0.000059	0.000010	mg/L		0.000056			5	20	
Calcium, dissolved	111	0.20	mg/L		110			< 1	20	
Chromium, dissolved	< 0.00050	0.00050	mg/L		< 0.00050				20	
Cobalt, dissolved	0.00052	0.00010	mg/L		0.00050			3	20	
Copper, dissolved	0.00159	0.00040	mg/L		0.00158				20	
Iron, dissolved	< 0.010	0.010	mg/L		< 0.010				20	
Lead, dissolved	< 0.00020	0.00020	mg/L		< 0.00020				20	
Magnesium, dissolved	39.3	0.010	mg/L		39.0			< 1	20	
Manganese, dissolved	0.0810	0.00020	mg/L		0.0803			< 1	20	
Molybdenum, dissolved	0.00157	0.00010	mg/L		0.00172			9	20	
Nickel, dissolved	0.00339	0.00040	mg/L		0.00292			15	20	
Phosphorus, dissolved	0.070	0.050	mg/L		0.074				20	
Potassium, dissolved	2.53	0.10	mg/L		2.53			< 1	20	
Selenium, dissolved	0.00084	0.00050	mg/L		0.00088				20	
Silicon, dissolved	13.5	1.0	mg/L		13.5			< 1	20	
Silver, dissolved	< 0.000050	0.000050	mg/L		< 0.000050				20	
Sodium, dissolved	57.1	0.10	mg/L		57.1			< 1	20	
Strontium, dissolved	0.642	0.0010	mg/L		0.638			< 1	20	
Sulfur, dissolved	14.4	3.0	mg/L		13.5				20	
Tellurium, dissolved	< 0.00050	0.00050	mg/L		< 0.00050				20	
Thallium, dissolved	< 0.000020	0.000020	mg/L		< 0.000020				20	
Thorium, dissolved	< 0.00010	0.00010	mg/L		< 0.00010				20	
Tin, dissolved	< 0.00020	0.00020	mg/L		< 0.00020				20	
Titanium, dissolved	< 0.0050	0.0050	mg/L		< 0.0050				20	
Tungsten, dissolved	< 0.0010	0.0010	mg/L		< 0.0010				20	
Uranium, dissolved	0.00916	0.000020	mg/L		0.00914			< 1	20	
Vanadium, dissolved	0.0109	0.0010	mg/L		0.0106			2	20	
Zinc, dissolved	0.0059	0.0040	mg/L		< 0.0040				20	
Zirconium, dissolved	0.00015	0.00010	mg/L		0.00015				20	
Reference (B1E1470-SRM1)				Prepared: 2021-05-14, Analyzed: 2021-05-14						
Lithium, dissolved	0.113	0.00010	mg/L	0.100		113	70-130			
Aluminum, dissolved	0.238	0.0050	mg/L	0.235		101	70-130			
Antimony, dissolved	0.0450	0.00020	mg/L	0.0431		104	70-130			
Arsenic, dissolved	0.438	0.00050	mg/L	0.423		104	70-130			
Barium, dissolved	3.22	0.0050	mg/L	3.30		97	70-130			
Beryllium, dissolved	0.232	0.00010	mg/L	0.209		111	70-130			
Boron, dissolved	1.69	0.0500	mg/L	1.65		102	70-130			
Cadmium, dissolved	0.217	0.000010	mg/L	0.221		98	70-130			
Calcium, dissolved	7.71	0.20	mg/L	7.72		100	70-130			
Chromium, dissolved	0.423	0.00050	mg/L	0.434		98	70-130			
Cobalt, dissolved	0.122	0.00010	mg/L	0.124		99	70-130			
Copper, dissolved	0.782	0.00040	mg/L	0.815		96	70-130			
Iron, dissolved	1.23	0.010	mg/L	1.27		97	70-130			

APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO	Regional District of Central Okanagan	**WORK ORDER**	21E1381
PROJECT	Westside Landfill	**REPORTED**	2021-05-18 14:59

Analyte	Result	RL	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
Dissolved Metals, Batch B1E1470, Continued										
Reference (B1E1470-SRM1), Continued				Prepared: 2021-05-14, Analyzed: 2021-05-14						
Lead, dissolved	0.105	0.00020	mg/L	0.110		95	70-130			
Magnesium, dissolved	7.35	0.010	mg/L	6.59		112	70-130			
Manganese, dissolved	0.312	0.00020	mg/L	0.342		91	70-130			
Molybdenum, dissolved	0.388	0.00010	mg/L	0.404		96	70-130			
Nickel, dissolved	0.822	0.00040	mg/L	0.835		98	70-130			
Phosphorus, dissolved	0.550	0.050	mg/L	0.499		110	70-130			
Potassium, dissolved	3.23	0.10	mg/L	2.88		112	70-130			
Selenium, dissolved	0.0326	0.00050	mg/L	0.0324		101	70-130			
Sodium, dissolved	18.1	0.10	mg/L	18.0		100	70-130			
Strontium, dissolved	0.825	0.0010	mg/L	0.935		88	70-130			
Thallium, dissolved	0.0360	0.000020	mg/L	0.0385		94	70-130			
Uranium, dissolved	0.229	0.000020	mg/L	0.258		89	70-130			
Vanadium, dissolved	0.832	0.0010	mg/L	0.873		95	70-130			
Zinc, dissolved	0.906	0.0040	mg/L	0.848		107	70-130			
Reference (B1E1470-SRM2)				Prepared: 2021-05-14, Analyzed: 2021-05-14						
Lithium, dissolved	0.105	0.00010	mg/L	0.100		105	70-130			
Aluminum, dissolved	0.226	0.0050	mg/L	0.235		96	70-130			
Antimony, dissolved	0.0456	0.00020	mg/L	0.0431		106	70-130			
Arsenic, dissolved	0.441	0.00050	mg/L	0.423		104	70-130			
Barium, dissolved	3.25	0.0050	mg/L	3.30		98	70-130			
Beryllium, dissolved	0.220	0.00010	mg/L	0.209		105	70-130			
Boron, dissolved	1.59	0.0500	mg/L	1.65		96	70-130			
Cadmium, dissolved	0.219	0.000010	mg/L	0.221		99	70-130			
Calcium, dissolved	7.69	0.20	mg/L	7.72		100	70-130			
Chromium, dissolved	0.423	0.00050	mg/L	0.434		97	70-130			
Cobalt, dissolved	0.123	0.00010	mg/L	0.124		99	70-130			
Copper, dissolved	0.783	0.00040	mg/L	0.815		96	70-130			
Iron, dissolved	1.22	0.010	mg/L	1.27		96	70-130			
Lead, dissolved	0.108	0.00020	mg/L	0.110		98	70-130			
Magnesium, dissolved	7.07	0.010	mg/L	6.59		107	70-130			
Manganese, dissolved	0.310	0.00020	mg/L	0.342		91	70-130			
Molybdenum, dissolved	0.391	0.00010	mg/L	0.404		97	70-130			
Nickel, dissolved	0.826	0.00040	mg/L	0.835		99	70-130			
Phosphorus, dissolved	0.527	0.050	mg/L	0.499		106	70-130			
Potassium, dissolved	3.14	0.10	mg/L	2.88		109	70-130			
Selenium, dissolved	0.0339	0.00050	mg/L	0.0324		105	70-130			
Sodium, dissolved	17.3	0.10	mg/L	18.0		96	70-130			
Strontium, dissolved	0.825	0.0010	mg/L	0.935		88	70-130			
Thallium, dissolved	0.0372	0.000020	mg/L	0.0385		97	70-130			
Uranium, dissolved	0.239	0.000020	mg/L	0.258		93	70-130			
Vanadium, dissolved	0.835	0.0010	mg/L	0.873		96	70-130			
Zinc, dissolved	0.902	0.0040	mg/L	0.848		106	70-130			
Dissolved Metals, Batch B1E1549										
Blank (B1E1549-BLK1)				Prepared: 2021-05-15, Analyzed: 2021-05-15						
Mercury, dissolved	< 0.000010	0.000010	mg/L							
Blank (B1E1549-BLK2)				Prepared: 2021-05-15, Analyzed: 2021-05-15						
Mercury, dissolved	< 0.000010	0.000010	mg/L							
Duplicate (B1E1549-DUP2)			**Source: 21E1381-06**	Prepared: 2021-05-15, Analyzed: 2021-05-15						
Mercury, dissolved	< 0.000010	0.000010	mg/L		< 0.000010				20	

APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO	Regional District of Central Okanagan	**WORK ORDER**	21E1381
PROJECT	Westside Landfill	**REPORTED**	2021-05-18 14:59

Analyte	Result	RL	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
Dissolved Metals, Batch B1E1549, Continued										
Matrix Spike (B1E1549-MS2)		**Source: 21E1381-07**		Prepared: 2021-05-15, Analyzed: 2021-05-15						
Mercury, dissolved	0.000181	0.000010	mg/L	0.000250	< 0.000010	72	70-130			
Reference (B1E1549-SRM1)				Prepared: 2021-05-15, Analyzed: 2021-05-15						
Mercury, dissolved	0.00470	0.000010	mg/L	0.00581		81	70-130			
Reference (B1E1549-SRM2)				Prepared: 2021-05-15, Analyzed: 2021-05-15						
Mercury, dissolved	0.00467	0.000010	mg/L	0.00581		80	70-130			
General Parameters, Batch B1E1266										
Blank (B1E1266-BLK1)				Prepared: 2021-05-13, Analyzed: 2021-05-18						
BOD, 5-day	< 2.0	2.0	mg/L							
LCS (B1E1266-BS1)				Prepared: 2021-05-13, Analyzed: 2021-05-18						
BOD, 5-day	203	38.5	mg/L	180		113	85-115			
General Parameters, Batch B1E1450										
Blank (B1E1450-BLK1)				Prepared: 2021-05-14, Analyzed: 2021-05-14						
Chemical Oxygen Demand	< 20	20	mg/L							
Blank (B1E1450-BLK2)				Prepared: 2021-05-14, Analyzed: 2021-05-14						
Chemical Oxygen Demand	< 20	20	mg/L							
LCS (B1E1450-BS1)				Prepared: 2021-05-14, Analyzed: 2021-05-14						
Chemical Oxygen Demand	502	20	mg/L	500		100	89-115			
LCS (B1E1450-BS2)				Prepared: 2021-05-14, Analyzed: 2021-05-14						
Chemical Oxygen Demand	497	20	mg/L	500		99	89-115			
General Parameters, Batch B1E1454										
Blank (B1E1454-BLK1)				Prepared: 2021-05-14, Analyzed: 2021-05-14						
Ammonia, Total (as N)	< 0.050	0.050	mg/L							
Blank (B1E1454-BLK2)				Prepared: 2021-05-14, Analyzed: 2021-05-14						
Ammonia, Total (as N)	< 0.050	0.050	mg/L							
LCS (B1E1454-BS1)				Prepared: 2021-05-14, Analyzed: 2021-05-14						
Ammonia, Total (as N)	1.00	0.050	mg/L	1.00		100	90-115			
LCS (B1E1454-BS2)				Prepared: 2021-05-14, Analyzed: 2021-05-14						
Ammonia, Total (as N)	0.976	0.050	mg/L	1.00		98	90-115			
Duplicate (B1E1454-DUP2)		**Source: 21E1381-06**		Prepared: 2021-05-14, Analyzed: 2021-05-14						
Ammonia, Total (as N)	< 0.050	0.050	mg/L		< 0.050				15	
Matrix Spike (B1E1454-MS2)		**Source: 21E1381-06**		Prepared: 2021-05-14, Analyzed: 2021-05-14						
Ammonia, Total (as N)	0.255	0.050	mg/L	0.250	< 0.050	102	75-125			
General Parameters, Batch B1E1519										
Blank (B1E1519-BLK1)				Prepared: 2021-05-14, Analyzed: 2021-05-14						
Alkalinity, Total (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Bicarbonate (as CaCO3)	< 1.0	1.0	mg/L							

APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO	Regional District of Central Okanagan	**WORK ORDER**	21E1381
PROJECT	Westside Landfill	**REPORTED**	2021-05-18 14:59

Analyte	Result	RL	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
General Parameters, Batch B1E1519, Continued										
Blank (B1E1519-BLK1), Continued				Prepared: 2021-05-14, Analyzed: 2021-05-14						
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0	mg/L							
Conductivity (EC)	< 2.0	2.0	µS/cm							
Blank (B1E1519-BLK2)				Prepared: 2021-05-14, Analyzed: 2021-05-14						
Alkalinity, Total (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Bicarbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0	mg/L							
Conductivity (EC)	< 2.0	2.0	µS/cm							
Blank (B1E1519-BLK3)				Prepared: 2021-05-17, Analyzed: 2021-05-17						
Alkalinity, Total (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Bicarbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0	mg/L							
Conductivity (EC)	< 2.0	2.0	µS/cm							
LCS (B1E1519-BS1)				Prepared: 2021-05-14, Analyzed: 2021-05-14						
Alkalinity, Total (as CaCO3)	107	1.0	mg/L	100		107	80-120			
LCS (B1E1519-BS2)				Prepared: 2021-05-14, Analyzed: 2021-05-14						
Alkalinity, Total (as CaCO3)	107	1.0	mg/L	100		107	80-120			
LCS (B1E1519-BS3)				Prepared: 2021-05-14, Analyzed: 2021-05-14						
Alkalinity, Total (as CaCO3)	107	1.0	mg/L	100		107	80-120			
LCS (B1E1519-BS4)				Prepared: 2021-05-14, Analyzed: 2021-05-14						
Conductivity (EC)	1420	2.0	µS/cm	1410		101	95-105			
LCS (B1E1519-BS5)				Prepared: 2021-05-14, Analyzed: 2021-05-14						
Conductivity (EC)	1420	2.0	µS/cm	1410		101	95-105			
LCS (B1E1519-BS6)				Prepared: 2021-05-14, Analyzed: 2021-05-14						
Conductivity (EC)	1440	2.0	µS/cm	1410		102	95-105			
Reference (B1E1519-SRM1)				Prepared: 2021-05-14, Analyzed: 2021-05-14						
pH	7.00	0.10	pH units	7.01		100	98-102			
Reference (B1E1519-SRM2)				Prepared: 2021-05-14, Analyzed: 2021-05-14						
pH	7.00	0.10	pH units	7.01		100	98-102			
Reference (B1E1519-SRM3)				Prepared: 2021-05-17, Analyzed: 2021-05-17						
pH	7.00	0.10	pH units	7.01		100	98-102			
General Parameters, Batch B1E1552										
Blank (B1E1552-BLK1)				Prepared: 2021-05-15, Analyzed: 2021-05-15						
Solids, Total Dissolved	< 15	15	mg/L							
LCS (B1E1552-BS1)				Prepared: 2021-05-15, Analyzed: 2021-05-15						
Solids, Total Dissolved	246	15	mg/L	240		102	85-115			
Polycyclic Aromatic Hydrocarbons (PAH), Batch B1E1579										

APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO	Regional District of Central Okanagan	**WORK ORDER**	21E1381
PROJECT	Westside Landfill	**REPORTED**	2021-05-18 14:59

Analyte	Result	RL	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
Polycyclic Aromatic Hydrocarbons (PAH), Batch B1E1579, Continued										
Blank (B1E1579-BLK1)				Prepared: 2021-05-16, Analyzed: 2021-05-17						
Acenaphthene	< 0.050	0.050	µg/L							
Acenaphthylene	< 0.200	0.200	µg/L							
Acridine	< 0.050	0.050	µg/L							
Anthracene	< 0.010	0.010	µg/L							
Benz(a)anthracene	< 0.010	0.010	µg/L							
Benzo(a)pyrene	< 0.010	0.010	µg/L							
Benzo(b+j)fluoranthene	< 0.050	0.050	µg/L							
Benzo(g,h,i)perylene	< 0.050	0.050	µg/L							
Benzo(k)fluoranthene	< 0.050	0.050	µg/L							
2-Chloronaphthalene	< 0.100	0.100	µg/L							
Chrysene	< 0.050	0.050	µg/L							
Dibenz(a,h)anthracene	< 0.010	0.010	µg/L							
Fluoranthene	< 0.030	0.030	µg/L							
Fluorene	< 0.050	0.050	µg/L							
Indeno(1,2,3-cd)pyrene	< 0.050	0.050	µg/L							
1-Methylnaphthalene	< 0.100	0.100	µg/L							
2-Methylnaphthalene	< 0.100	0.100	µg/L							
Naphthalene	< 0.200	0.200	µg/L							
Phenanthrene	< 0.100	0.100	µg/L							
Pyrene	< 0.020	0.020	µg/L							
Quinoline	< 0.050	0.050	µg/L							
Surrogate: Acridine-d9	*3.66*		*µg/L*	4.44		*82*	*50-140*			
Surrogate: Naphthalene-d8	*4.41*		*µg/L*	4.47		*99*	*50-140*			
Surrogate: Perylene-d12	*4.41*		*µg/L*	4.47		*99*	*50-140*			
LCS (B1E1579-BS1)				Prepared: 2021-05-16, Analyzed: 2021-05-17						
Acenaphthene	4.28	0.050	µg/L	4.44		96	55-137			
Acenaphthylene	4.38	0.200	µg/L	4.44		99	53-140			
Acridine	3.47	0.050	µg/L	4.40		79	50-120			
Anthracene	4.63	0.010	µg/L	4.44		104	64-130			
Benz(a)anthracene	3.90	0.010	µg/L	4.44		88	57-140			
Benzo(a)pyrene	3.92	0.010	µg/L	4.44		88	63-133			
Benzo(b+j)fluoranthene	8.14	0.050	µg/L	8.89		92	60-129			
Benzo(g,h,i)perylene	4.13	0.050	µg/L	4.44		93	52-139			
Benzo(k)fluoranthene	3.73	0.050	µg/L	4.44		84	50-138			
2-Chloronaphthalene	4.30	0.100	µg/L	4.38		98	50-139			
Chrysene	4.36	0.050	µg/L	4.44		98	59-140			
Dibenz(a,h)anthracene	3.86	0.010	µg/L	4.44		87	53-136			
Fluoranthene	4.07	0.030	µg/L	4.44		92	67-135			
Fluorene	3.93	0.050	µg/L	4.44		89	57-134			
Indeno(1,2,3-cd)pyrene	3.97	0.050	µg/L	4.44		89	52-129			
1-Methylnaphthalene	4.18	0.100	µg/L	4.44		94	50-140			
2-Methylnaphthalene	4.03	0.100	µg/L	4.44		91	50-140			
Naphthalene	4.13	0.200	µg/L	4.44		93	50-140			
Phenanthrene	4.12	0.100	µg/L	4.44		93	61-134			
Pyrene	4.11	0.020	µg/L	4.44		93	66-131			
Quinoline	4.07	0.050	µg/L	4.44		92	50-140			
Surrogate: Acridine-d9	*4.10*		*µg/L*	4.44		*92*	*50-140*			
Surrogate: Naphthalene-d8	*4.30*		*µg/L*	4.47		*96*	*50-140*			
Surrogate: Perylene-d12	*3.78*		*µg/L*	4.47		*85*	*50-140*			
LCS Dup (B1E1579-BSD1)				Prepared: 2021-05-16, Analyzed: 2021-05-17						
Acenaphthene	3.92	0.050	µg/L	4.44		88	55-137	9	30	
Acenaphthylene	3.98	0.200	µg/L	4.44		90	53-140	10	30	
Acridine	3.17	0.050	µg/L	4.40		72	50-120	9	30	
Anthracene	4.38	0.010	µg/L	4.44		99	64-130	6	30	

APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO	Regional District of Central Okanagan	**WORK ORDER**	21E1381
PROJECT	Westside Landfill	**REPORTED**	2021-05-18 14:59

Analyte	Result	RL	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
Polycyclic Aromatic Hydrocarbons (PAH), Batch B1E1579, Continued										
LCS Dup (B1E1579-BSD1), Continued				Prepared: 2021-05-16, Analyzed: 2021-05-17						
Benz(a)anthracene	3.36	0.010	µg/L	4.44		76	57-140	15	30	
Benzo(a)pyrene	3.99	0.010	µg/L	4.44		90	63-133	2	30	
Benzo(b+j)fluoranthene	7.78	0.050	µg/L	8.89		88	60-129	5	30	
Benzo(g,h,i)perylene	3.72	0.050	µg/L	4.44		84	52-139	10	30	
Benzo(k)fluoranthene	3.38	0.050	µg/L	4.44		76	50-138	10	30	
2-Chloronaphthalene	3.96	0.100	µg/L	4.38		91	50-139	8	30	
Chrysene	3.92	0.050	µg/L	4.44		88	59-140	11	30	
Dibenz(a,h)anthracene	3.36	0.010	µg/L	4.44		76	53-136	14	30	
Fluoranthene	3.64	0.030	µg/L	4.44		82	67-135	11	30	
Fluorene	3.61	0.050	µg/L	4.44		81	57-134	8	30	
Indeno(1,2,3-cd)pyrene	3.50	0.050	µg/L	4.44		79	52-129	12	30	
1-Methylnaphthalene	3.85	0.100	µg/L	4.44		87	50-140	8	30	
2-Methylnaphthalene	3.80	0.100	µg/L	4.44		86	50-140	6	30	
Naphthalene	3.86	0.200	µg/L	4.44		87	50-140	7	30	
Phenanthrene	3.58	0.100	µg/L	4.44		80	61-134	14	30	
Pyrene	3.65	0.020	µg/L	4.44		82	66-131	12	30	
Quinoline	4.05	0.050	µg/L	4.44		91	50-140	< 1	30	
Surrogate: Acridine-d9	*3.73*		*µg/L*	4.44		*84*	*50-140*			
Surrogate: Naphthalene-d8	*3.95*		*µg/L*	4.47		*88*	*50-140*			
Surrogate: Perylene-d12	*3.84*		*µg/L*	4.47		*86*	*50-140*			
Volatile Organic Compounds (VOC), Batch B1E1458										
Blank (B1E1458-BLK1)				Prepared: 2021-05-15, Analyzed: 2021-05-15						
Benzene	< 0.5	0.5	µg/L							
Bromodichloromethane	< 1.0	1.0	µg/L							
Bromoform	< 1.0	1.0	µg/L							
Carbon tetrachloride	< 0.5	0.5	µg/L							
Chlorobenzene	< 1.0	1.0	µg/L							
Chloroethane	< 2.0	2.0	µg/L							
Chloroform	< 1.0	1.0	µg/L							
Dibromochloromethane	< 1.0	1.0	µg/L							
1,2-Dibromoethane	< 0.3	0.3	µg/L							
Dibromomethane	< 1.0	1.0	µg/L							
1,2-Dichlorobenzene	< 0.5	0.5	µg/L							
1,3-Dichlorobenzene	< 1.0	1.0	µg/L							
1,4-Dichlorobenzene	< 1.0	1.0	µg/L							
1,1-Dichloroethane	< 1.0	1.0	µg/L							
1,2-Dichloroethane	< 1.0	1.0	µg/L							
1,1-Dichloroethylene	< 1.0	1.0	µg/L							
cis-1,2-Dichloroethylene	< 1.0	1.0	µg/L							
trans-1,2-Dichloroethylene	< 1.0	1.0	µg/L							
Dichloromethane	< 3.0	3.0	µg/L							
1,2-Dichloropropane	< 1.0	1.0	µg/L							
1,3-Dichloropropene (cis + trans)	< 1.0	1.0	µg/L							
Ethylbenzene	< 1.0	1.0	µg/L							
Methyl tert-butyl ether	< 1.0	1.0	µg/L							
Styrene	< 1.0	1.0	µg/L							
1,1,2,2-Tetrachloroethane	< 0.5	0.5	µg/L							
Tetrachloroethylene	< 1.0	1.0	µg/L							
Toluene	< 1.0	1.0	µg/L							
1,1,1-Trichloroethane	< 1.0	1.0	µg/L							
1,1,2-Trichloroethane	< 1.0	1.0	µg/L							
Trichloroethylene	< 1.0	1.0	µg/L							
Trichlorofluoromethane	< 1.0	1.0	µg/L							
Vinyl chloride	< 1.0	1.0	µg/L							

APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO	Regional District of Central Okanagan	**WORK ORDER**	21E1381
PROJECT	Westside Landfill	**REPORTED**	2021-05-18 14:59

Analyte	Result	RL	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
Volatile Organic Compounds (VOC), Batch B1E1458, Continued										
Blank (B1E1458-BLK1), Continued				Prepared: 2021-05-15, Analyzed: 2021-05-15						
Xylenes (total)	< 2.0	2.0	µg/L							
Surrogate: Toluene-d8	*22.3*		*µg/L*	26.5		*84*	*70-130*			
Surrogate: 4-Bromofluorobenzene	*22.4*		*µg/L*	24.9		*90*	*70-130*			
LCS (B1E1458-BS1)				Prepared: 2021-05-15, Analyzed: 2021-05-15						
Benzene	25.3	0.5	µg/L	20.0		126	70-130			
Bromodichloromethane	23.9	1.0	µg/L	20.0		120	70-130			
Bromoform	22.2	1.0	µg/L	20.1		110	70-130			
Carbon tetrachloride	22.6	0.5	µg/L	20.2		112	70-130			
Chlorobenzene	25.4	1.0	µg/L	20.1		126	70-130			
Chloroform	26.3	1.0	µg/L	20.1		131	70-130			SPK
Dibromochloromethane	23.2	1.0	µg/L	20.2		115	70-130			
1,2-Dibromoethane	23.9	0.3	µg/L	20.0		119	70-130			
Dibromomethane	22.0	1.0	µg/L	20.0		110	70-130			
1,2-Dichlorobenzene	23.4	0.5	µg/L	20.1		116	70-130			
1,3-Dichlorobenzene	22.9	1.0	µg/L	20.1		114	70-130			
1,4-Dichlorobenzene	24.8	1.0	µg/L	20.1		123	70-130			
1,1-Dichloroethane	25.2	1.0	µg/L	20.1		126	70-130			
1,2-Dichloroethane	22.9	1.0	µg/L	20.1		114	70-130			
1,1-Dichloroethylene	20.0	1.0	µg/L	20.1		100	70-130			
cis-1,2-Dichloroethylene	23.8	1.0	µg/L	20.0		119	70-130			
trans-1,2-Dichloroethylene	24.4	1.0	µg/L	20.0		122	70-130			
Dichloromethane	22.9	3.0	µg/L	20.1		114	70-130			
1,2-Dichloropropane	26.2	1.0	µg/L	20.1		130	70-130			
1,3-Dichloropropene (cis + trans)	52.6	1.0	µg/L	40.0		131	70-130			SPK
Ethylbenzene	29.2	1.0	µg/L	20.0		146	70-130			SPK
Methyl tert-butyl ether	26.8	1.0	µg/L	20.0		134	70-130			SPK
Styrene	27.3	1.0	µg/L	20.0		136	70-130			SPK
1,1,2,2-Tetrachloroethane	24.4	0.5	µg/L	20.1		122	70-130			
Tetrachloroethylene	19.9	1.0	µg/L	20.1		99	70-130			
Toluene	23.4	1.0	µg/L	20.0		117	70-130			
1,1,1-Trichloroethane	24.8	1.0	µg/L	20.0		124	70-130			
1,1,2-Trichloroethane	24.8	1.0	µg/L	20.1		123	70-130			
Trichloroethylene	24.3	1.0	µg/L	20.1		121	70-130			
Trichlorofluoromethane	< 1.0	1.0	µg/L	20.0			60-140			SPK
Vinyl chloride	< 1.0	1.0	µg/L	20.0			60-140			SPK
Xylenes (total)	79.1	2.0	µg/L	60.0		132	70-130			SPK
Surrogate: Toluene-d8	*23.4*		*µg/L*	26.5		*88*	*70-130*			
Surrogate: 4-Bromofluorobenzene	*23.7*		*µg/L*	24.9		*95*	*70-130*			

QC Qualifiers:

SPK The recovery of this analyte was outside of established control limits.

CERTIFICATE OF ANALYSIS

REPORTED TO	Regional District of Central Okanagan 1450 KLO Road KELOWNA, BC V1W 3Z4		
ATTENTION	Angela Lambrecht	**WORK ORDER**	21K3037
PO NUMBER	60167	**RECEIVED / TEMP**	2021-11-23 11:44 / 10.9°C
PROJECT	Westside Landfill	**REPORTED**	2021-11-29 17:00
PROJECT INFO	041440062	**COC NUMBER**	44496.40731

Introduction:

CARO Analytical Services is a testing laboratory full of smart, engaged scientists driven to make the world a safer and healthier place. Through our clients' projects we become an essential element for a better world. We employ methods conducted in accordance with recognized professional standards using accepted testing methodologies and quality control efforts. CARO is accredited by the Canadian Association for Laboratories Accreditation (CALA) to ISO/IEC 17025:2017 for specific tests listed in the scope of accreditation approved by CALA.

Big Picture Sidekicks

You know that the sample you collected after snowshoeing to site, digging 5 meters, and racing to get it on a plane so you can submit it to the lab for time sensitive results needed to make important and expensive decisions (whew) is VERY important. We know that too.

We've Got Chemistry

It's simple. We figure the more you enjoy working with our fun and engaged team members; the more likely you are to give us continued opportunities to support you.

Ahead of the Curve

Through research, regulation knowledge, and instrumentation, we are your analytical centre for the technical knowledge you need, BEFORE you need it, so you can stay up to date and in the know.

If you have any questions or concerns, please contact me at bwhitehead@caro.ca

Authorized By:

Brent Whitehead
Client Scientist - Team Lead

CARO ANALYTICAL SERVICES

TEST RESULTS

REPORTED TO	Regional District of Central Okanagan	**WORK ORDER**	21K3037
PROJECT	Westside Landfill	**REPORTED**	2021-11-29 17:00

Analyte	Result	RL	Units	Analyzed	Qualifier
BHA (21K3037-01) | Matrix: Water | Sampled: 2021-11-23 10:42					
Anions					
Chloride	**133**	0.10	mg/L	2021-11-26	
Nitrate (as N)	**0.640**	0.010	mg/L	2021-11-26	
Sulfate	**46.4**	1.0	mg/L	2021-11-26	
Calculated Parameters					
Hardness, Total (as CaCO3)	**311**	0.500	mg/L	N/A	
Dissolved Metals					
Aluminum, dissolved	< 0.0050	0.0050	mg/L	2021-11-25	
Antimony, dissolved	**0.00029**	0.00020	mg/L	2021-11-25	
Arsenic, dissolved	**0.00074**	0.00050	mg/L	2021-11-25	
Barium, dissolved	**0.0213**	0.0050	mg/L	2021-11-25	
Beryllium, dissolved	< 0.00010	0.00010	mg/L	2021-11-25	
Bismuth, dissolved	< 0.00010	0.00010	mg/L	2021-11-25	
Boron, dissolved	**0.353**	0.0500	mg/L	2021-11-25	
Cadmium, dissolved	**0.000045**	0.000010	mg/L	2021-11-25	
Calcium, dissolved	**88.6**	0.20	mg/L	2021-11-25	
Chromium, dissolved	< 0.00050	0.00050	mg/L	2021-11-25	
Cobalt, dissolved	**0.00054**	0.00010	mg/L	2021-11-25	
Copper, dissolved	**0.00633**	0.00040	mg/L	2021-11-25	
Iron, dissolved	**0.041**	0.010	mg/L	2021-11-25	
Lead, dissolved	< 0.00020	0.00020	mg/L	2021-11-25	
Lithium, dissolved	**0.0134**	0.00010	mg/L	2021-11-25	
Magnesium, dissolved	**21.8**	0.010	mg/L	2021-11-25	
Manganese, dissolved	**0.239**	0.00020	mg/L	2021-11-25	
Mercury, dissolved	< 0.000010	0.000010	mg/L	2021-11-26	
Molybdenum, dissolved	**0.00038**	0.00010	mg/L	2021-11-25	
Nickel, dissolved	**0.00353**	0.00040	mg/L	2021-11-25	
Phosphorus, dissolved	**0.073**	0.050	mg/L	2021-11-25	
Potassium, dissolved	**9.61**	0.10	mg/L	2021-11-25	
Selenium, dissolved	< 0.00050	0.00050	mg/L	2021-11-25	
Silicon, dissolved	**13.2**	1.0	mg/L	2021-11-25	
Silver, dissolved	< 0.000050	0.000050	mg/L	2021-11-25	
Sodium, dissolved	**78.2**	0.10	mg/L	2021-11-25	
Strontium, dissolved	**0.564**	0.0010	mg/L	2021-11-25	
Sulfur, dissolved	**13.2**	3.0	mg/L	2021-11-25	
Tellurium, dissolved	< 0.00050	0.00050	mg/L	2021-11-25	
Thallium, dissolved	< 0.000020	0.000020	mg/L	2021-11-25	
Thorium, dissolved	< 0.00010	0.00010	mg/L	2021-11-25	
Tin, dissolved	< 0.00020	0.00020	mg/L	2021-11-25	
Titanium, dissolved	< 0.0050	0.0050	mg/L	2021-11-25	
Tungsten, dissolved	< 0.0010	0.0010	mg/L	2021-11-25	
Uranium, dissolved	**0.000750**	0.000020	mg/L	2021-11-25	
Vanadium, dissolved	**0.0015**	0.0010	mg/L	2021-11-25	

TEST RESULTS

REPORTED TO	Regional District of Central Okanagan	**WORK ORDER**	21K3037
PROJECT	Westside Landfill	**REPORTED**	2021-11-29 17:00

Analyte	Result	RL	Units	Analyzed	Qualifier
BHA (21K3037-01) | Matrix: Water | Sampled: 2021-11-23 10:42, Continued					
Dissolved Metals, Continued					
Zinc, dissolved	< 0.0040	0.0040	mg/L	2021-11-25	
Zirconium, dissolved	**0.00025**	0.00010	mg/L	2021-11-25	
General Parameters					
Alkalinity, Total (as CaCO3)	**375**	1.0	mg/L	2021-11-25	
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0	mg/L	2021-11-25	
Alkalinity, Bicarbonate (as CaCO3)	**375**	1.0	mg/L	2021-11-25	
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0	mg/L	2021-11-25	
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0	mg/L	2021-11-25	
Ammonia, Total (as N)	< 0.050	0.050	mg/L	2021-11-25	
Conductivity (EC)	**1180**	2.0	µS/cm	2021-11-25	
pH	**7.58**	0.10	pH units	2021-11-25	HT2
Solids, Total Dissolved	**702**	15	mg/L	2021-11-24	
Total Metals					
Calcium, total	**121**	0.20	mg/L	2021-11-26	
Magnesium, total	**28.9**	0.010	mg/L	2021-11-26	
BH1 (21K3037-02) | Matrix: Water | Sampled: 2021-11-23 10:39					
Anions					
Chloride	**139**	0.10	mg/L	2021-11-26	
Nitrate (as N)	**0.636**	0.010	mg/L	2021-11-26	
Sulfate	**44.9**	1.0	mg/L	2021-11-26	
Calculated Parameters					
Hardness, Total (as CaCO3)	**311**	0.500	mg/L	N/A	
Dissolved Metals					
Aluminum, dissolved	< 0.0050	0.0050	mg/L	2021-11-25	
Antimony, dissolved	**0.00030**	0.00020	mg/L	2021-11-25	
Arsenic, dissolved	**0.00080**	0.00050	mg/L	2021-11-25	
Barium, dissolved	**0.0213**	0.0050	mg/L	2021-11-25	
Beryllium, dissolved	< 0.00010	0.00010	mg/L	2021-11-25	
Bismuth, dissolved	< 0.00010	0.00010	mg/L	2021-11-25	
Boron, dissolved	**0.353**	0.0500	mg/L	2021-11-25	
Cadmium, dissolved	**0.000044**	0.000010	mg/L	2021-11-25	
Calcium, dissolved	**87.7**	0.20	mg/L	2021-11-25	
Chromium, dissolved	< 0.00050	0.00050	mg/L	2021-11-25	
Cobalt, dissolved	**0.00060**	0.00010	mg/L	2021-11-25	
Copper, dissolved	**0.00640**	0.00040	mg/L	2021-11-25	
Iron, dissolved	**0.045**	0.010	mg/L	2021-11-25	
Lead, dissolved	< 0.00020	0.00020	mg/L	2021-11-25	
Lithium, dissolved	**0.0132**	0.00010	mg/L	2021-11-25	

TEST RESULTS

REPORTED TO	Regional District of Central Okanagan	**WORK ORDER**	21K3037
PROJECT	Westside Landfill	**REPORTED**	2021-11-29 17:00

Analyte	Result	RL	Units	Analyzed	Qualifier
BH1 (21K3037-02) | Matrix: Water | Sampled: 2021-11-23 10:39, Continued					
Dissolved Metals, Continued					
Magnesium, dissolved	**22.3**	0.010	mg/L	2021-11-25	
Manganese, dissolved	**0.241**	0.00020	mg/L	2021-11-25	
Mercury, dissolved	< 0.000010	0.000010	mg/L	2021-11-26	
Molybdenum, dissolved	**0.00040**	0.00010	mg/L	2021-11-25	
Nickel, dissolved	**0.00370**	0.00040	mg/L	2021-11-25	
Phosphorus, dissolved	**0.075**	0.050	mg/L	2021-11-25	
Potassium, dissolved	**9.82**	0.10	mg/L	2021-11-25	
Selenium, dissolved	< 0.00050	0.00050	mg/L	2021-11-25	
Silicon, dissolved	**13.4**	1.0	mg/L	2021-11-25	
Silver, dissolved	< 0.000050	0.000050	mg/L	2021-11-25	
Sodium, dissolved	**79.8**	0.10	mg/L	2021-11-25	
Strontium, dissolved	**0.570**	0.0010	mg/L	2021-11-25	
Sulfur, dissolved	**13.5**	3.0	mg/L	2021-11-25	
Tellurium, dissolved	< 0.00050	0.00050	mg/L	2021-11-25	
Thallium, dissolved	< 0.000020	0.000020	mg/L	2021-11-25	
Thorium, dissolved	< 0.00010	0.00010	mg/L	2021-11-25	
Tin, dissolved	< 0.00020	0.00020	mg/L	2021-11-25	
Titanium, dissolved	< 0.0050	0.0050	mg/L	2021-11-25	
Tungsten, dissolved	< 0.0010	0.0010	mg/L	2021-11-25	
Uranium, dissolved	**0.000761**	0.000020	mg/L	2021-11-25	
Vanadium, dissolved	**0.0013**	0.0010	mg/L	2021-11-25	
Zinc, dissolved	< 0.0040	0.0040	mg/L	2021-11-25	
Zirconium, dissolved	**0.00028**	0.00010	mg/L	2021-11-25	
General Parameters					
Alkalinity, Total (as CaCO3)	**346**	1.0	mg/L	2021-11-25	
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0	mg/L	2021-11-25	
Alkalinity, Bicarbonate (as CaCO3)	**346**	1.0	mg/L	2021-11-25	
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0	mg/L	2021-11-25	
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0	mg/L	2021-11-25	
Ammonia, Total (as N)	**0.054**	0.050	mg/L	2021-11-25	
Conductivity (EC)	**1200**	2.0	µS/cm	2021-11-25	
pH	**7.57**	0.10	pH units	2021-11-25	HT2
Solids, Total Dissolved	**719**	15	mg/L	2021-11-24	
Total Metals					
Calcium, total	**120**	0.20	mg/L	2021-11-26	
Magnesium, total	**29.3**	0.010	mg/L	2021-11-26	
BH2 (21K3037-03) | Matrix: Water | Sampled: 2021-11-23 10:10					
Anions					
Chloride	**141**	0.10	mg/L	2021-11-26	

TEST RESULTS

REPORTED TO	Regional District of Central Okanagan	**WORK ORDER**	21K3037
PROJECT	Westside Landfill	**REPORTED**	2021-11-29 17:00

Analyte	Result	RL	Units	Analyzed	Qualifier
BH2 (21K3037-03) | Matrix: Water | Sampled: 2021-11-23 10:10, Continued					
Anions, Continued					
Nitrate (as N)	< 0.010	0.010	mg/L	2021-11-26	
Sulfate	**113**	1.0	mg/L	2021-11-26	
Calculated Parameters					
Hardness, Total (as CaCO3)	**1340**	0.500	mg/L	N/A	
Dissolved Metals					
Aluminum, dissolved	**0.0059**	0.0050	mg/L	2021-11-25	
Antimony, dissolved	< 0.00020	0.00020	mg/L	2021-11-25	
Arsenic, dissolved	**0.00234**	0.00050	mg/L	2021-11-25	
Barium, dissolved	**0.0101**	0.0050	mg/L	2021-11-25	
Beryllium, dissolved	< 0.00010	0.00010	mg/L	2021-11-25	
Bismuth, dissolved	< 0.00010	0.00010	mg/L	2021-11-25	
Boron, dissolved	**0.423**	0.0500	mg/L	2021-11-25	
Cadmium, dissolved	**0.000022**	0.000010	mg/L	2021-11-25	
Calcium, dissolved	**295**	0.20	mg/L	2021-11-25	
Chromium, dissolved	**0.00158**	0.00050	mg/L	2021-11-25	
Cobalt, dissolved	**0.00220**	0.00010	mg/L	2021-11-25	
Copper, dissolved	< 0.00040	0.00040	mg/L	2021-11-25	
Iron, dissolved	**1.94**	0.010	mg/L	2021-11-25	
Lead, dissolved	< 0.00020	0.00020	mg/L	2021-11-25	
Lithium, dissolved	**0.0218**	0.00010	mg/L	2021-11-25	
Magnesium, dissolved	**147**	0.010	mg/L	2021-11-25	
Manganese, dissolved	**6.21**	0.00020	mg/L	2021-11-25	
Mercury, dissolved	< 0.000010	0.000010	mg/L	2021-11-26	
Molybdenum, dissolved	**0.00319**	0.00010	mg/L	2021-11-25	
Nickel, dissolved	**0.0140**	0.00040	mg/L	2021-11-25	
Phosphorus, dissolved	**0.127**	0.050	mg/L	2021-11-25	
Potassium, dissolved	**1.99**	0.10	mg/L	2021-11-25	
Selenium, dissolved	< 0.00050	0.00050	mg/L	2021-11-25	
Silicon, dissolved	**23.0**	1.0	mg/L	2021-11-25	
Silver, dissolved	< 0.000050	0.000050	mg/L	2021-11-25	
Sodium, dissolved	**107**	0.10	mg/L	2021-11-25	
Strontium, dissolved	**2.28**	0.0010	mg/L	2021-11-25	
Sulfur, dissolved	**38.4**	3.0	mg/L	2021-11-25	
Tellurium, dissolved	< 0.00050	0.00050	mg/L	2021-11-25	
Thallium, dissolved	< 0.000020	0.000020	mg/L	2021-11-25	
Thorium, dissolved	< 0.00010	0.00010	mg/L	2021-11-25	
Tin, dissolved	< 0.00020	0.00020	mg/L	2021-11-25	
Titanium, dissolved	< 0.0050	0.0050	mg/L	2021-11-25	
Tungsten, dissolved	< 0.0010	0.0010	mg/L	2021-11-25	
Uranium, dissolved	**0.00352**	0.000020	mg/L	2021-11-25	
Vanadium, dissolved	**0.0032**	0.0010	mg/L	2021-11-25	
Zinc, dissolved	< 0.0040	0.0040	mg/L	2021-11-25	

TEST RESULTS

REPORTED TO	Regional District of Central Okanagan	**WORK ORDER**	21K3037
PROJECT	Westside Landfill	**REPORTED**	2021-11-29 17:00

Analyte	Result	RL	Units	Analyzed	Qualifier
BH2 (21K3037-03) | Matrix: Water | Sampled: 2021-11-23 10:10, Continued					
Dissolved Metals, Continued					
Zirconium, dissolved	**0.00316**	0.00010	mg/L	2021-11-25	
General Parameters					
Alkalinity, Total (as CaCO3)	**1590**	1.0	mg/L	2021-11-25	
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0	mg/L	2021-11-25	
Alkalinity, Bicarbonate (as CaCO3)	**1590**	1.0	mg/L	2021-11-25	
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0	mg/L	2021-11-25	
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0	mg/L	2021-11-25	
Ammonia, Total (as N)	**0.354**	0.050	mg/L	2021-11-25	
Conductivity (EC)	**2860**	2.0	µS/cm	2021-11-25	
pH	**7.54**	0.10	pH units	2021-11-25	HT2
Solids, Total Dissolved	**1890**	15	mg/L	2021-11-24	
Total Metals					
Calcium, total	**365**	0.20	mg/L	2021-11-26	
Magnesium, total	**187**	0.010	mg/L	2021-11-26	
BH3 (21K3037-04) | Matrix: Water | Sampled: 2021-11-23 08:55					
Anions					
Chloride	**70.3**	0.10	mg/L	2021-11-26	
Nitrate (as N)	**2.36**	0.010	mg/L	2021-11-26	
Sulfate	**34.5**	1.0	mg/L	2021-11-26	
Calculated Parameters					
Hardness, Total (as CaCO3)	**335**	0.500	mg/L	N/A	
Dissolved Metals					
Aluminum, dissolved	< 0.0050	0.0050	mg/L	2021-11-25	
Antimony, dissolved	< 0.00020	0.00020	mg/L	2021-11-25	
Arsenic, dissolved	**0.00087**	0.00050	mg/L	2021-11-25	
Barium, dissolved	**0.0084**	0.0050	mg/L	2021-11-25	
Beryllium, dissolved	< 0.00010	0.00010	mg/L	2021-11-25	
Bismuth, dissolved	< 0.00010	0.00010	mg/L	2021-11-25	
Boron, dissolved	**0.0951**	0.0500	mg/L	2021-11-25	
Cadmium, dissolved	**0.000013**	0.000010	mg/L	2021-11-25	
Calcium, dissolved	**87.9**	0.20	mg/L	2021-11-25	
Chromium, dissolved	< 0.00050	0.00050	mg/L	2021-11-25	
Cobalt, dissolved	**0.00014**	0.00010	mg/L	2021-11-25	
Copper, dissolved	**0.00072**	0.00040	mg/L	2021-11-25	
Iron, dissolved	**0.059**	0.010	mg/L	2021-11-25	
Lead, dissolved	< 0.00020	0.00020	mg/L	2021-11-25	
Lithium, dissolved	**0.0146**	0.00010	mg/L	2021-11-25	
Magnesium, dissolved	**28.0**	0.010	mg/L	2021-11-25	

TEST RESULTS

REPORTED TO	Regional District of Central Okanagan	**WORK ORDER**	21K3037
PROJECT	Westside Landfill	**REPORTED**	2021-11-29 17:00

Analyte	Result	RL	Units	Analyzed	Qualifier
BH3 (21K3037-04) | Matrix: Water | Sampled: 2021-11-23 08:55, Continued					
Dissolved Metals, Continued					
Manganese, dissolved	**0.0187**	0.00020	mg/L	2021-11-25	
Mercury, dissolved	< 0.000010	0.000010	mg/L	2021-11-26	
Molybdenum, dissolved	**0.00289**	0.00010	mg/L	2021-11-25	
Nickel, dissolved	**0.00132**	0.00040	mg/L	2021-11-25	
Phosphorus, dissolved	< 0.050	0.050	mg/L	2021-11-25	
Potassium, dissolved	**3.38**	0.10	mg/L	2021-11-25	
Selenium, dissolved	< 0.00050	0.00050	mg/L	2021-11-25	
Silicon, dissolved	**10.6**	1.0	mg/L	2021-11-25	
Silver, dissolved	< 0.000050	0.000050	mg/L	2021-11-25	
Sodium, dissolved	**40.8**	0.10	mg/L	2021-11-25	
Strontium, dissolved	**0.508**	0.0010	mg/L	2021-11-25	
Sulfur, dissolved	**12.2**	3.0	mg/L	2021-11-25	
Tellurium, dissolved	< 0.00050	0.00050	mg/L	2021-11-25	
Thallium, dissolved	< 0.000020	0.000020	mg/L	2021-11-25	
Thorium, dissolved	< 0.00010	0.00010	mg/L	2021-11-25	
Tin, dissolved	< 0.00020	0.00020	mg/L	2021-11-25	
Titanium, dissolved	< 0.0050	0.0050	mg/L	2021-11-25	
Tungsten, dissolved	< 0.0010	0.0010	mg/L	2021-11-25	
Uranium, dissolved	**0.00619**	0.000020	mg/L	2021-11-25	
Vanadium, dissolved	**0.0024**	0.0010	mg/L	2021-11-25	
Zinc, dissolved	< 0.0040	0.0040	mg/L	2021-11-25	
Zirconium, dissolved	< 0.00010	0.00010	mg/L	2021-11-25	
General Parameters					
Alkalinity, Total (as CaCO3)	**403**	1.0	mg/L	2021-11-25	
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0	mg/L	2021-11-25	
Alkalinity, Bicarbonate (as CaCO3)	**403**	1.0	mg/L	2021-11-25	
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0	mg/L	2021-11-25	
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0	mg/L	2021-11-25	
Ammonia, Total (as N)	**0.083**	0.050	mg/L	2021-11-25	
Conductivity (EC)	**989**	2.0	µS/cm	2021-11-25	
pH	**7.71**	0.10	pH units	2021-11-25	HT2
Solids, Total Dissolved	**577**	15	mg/L	2021-11-24	
Total Metals					
Calcium, total	**123**	0.20	mg/L	2021-11-26	
Magnesium, total	**38.1**	0.010	mg/L	2021-11-26	
BH4 (21K3037-05) | Matrix: Water | Sampled: 2021-11-23 09:13					
Anions					
Chloride	**256**	0.10	mg/L	2021-11-26	
Nitrate (as N)	**0.661**	0.010	mg/L	2021-11-26	

CARO ANALYTICAL SERVICES

TEST RESULTS

REPORTED TO	Regional District of Central Okanagan	**WORK ORDER**	21K3037
PROJECT	Westside Landfill	**REPORTED**	2021-11-29 17:00

Analyte	Result	RL	Units	Analyzed	Qualifier
BH4 (21K3037-05) | Matrix: Water | Sampled: 2021-11-23 09:13, Continued					
Anions, Continued					
Sulfate	**85.6**	1.0	mg/L	2021-11-26	
Calculated Parameters					
Hardness, Total (as CaCO3)	**755**	0.500	mg/L	N/A	
Dissolved Metals					
Aluminum, dissolved	< 0.0050	0.0050	mg/L	2021-11-25	
Antimony, dissolved	< 0.00020	0.00020	mg/L	2021-11-25	
Arsenic, dissolved	< 0.00050	0.00050	mg/L	2021-11-25	
Barium, dissolved	**0.0326**	0.0050	mg/L	2021-11-25	
Beryllium, dissolved	< 0.00010	0.00010	mg/L	2021-11-25	
Bismuth, dissolved	< 0.00010	0.00010	mg/L	2021-11-25	
Boron, dissolved	**0.388**	0.0500	mg/L	2021-11-25	
Cadmium, dissolved	**0.000048**	0.000010	mg/L	2021-11-25	
Calcium, dissolved	**148**	0.20	mg/L	2021-11-25	
Chromium, dissolved	< 0.00050	0.00050	mg/L	2021-11-25	
Cobalt, dissolved	**0.00106**	0.00010	mg/L	2021-11-25	
Copper, dissolved	**0.00134**	0.00040	mg/L	2021-11-25	
Iron, dissolved	< 0.010	0.010	mg/L	2021-11-25	
Lead, dissolved	< 0.00020	0.00020	mg/L	2021-11-25	
Lithium, dissolved	**0.0300**	0.00010	mg/L	2021-11-25	
Magnesium, dissolved	**93.3**	0.010	mg/L	2021-11-25	
Manganese, dissolved	**0.189**	0.00020	mg/L	2021-11-25	
Mercury, dissolved	< 0.000010	0.000010	mg/L	2021-11-26	
Molybdenum, dissolved	**0.00471**	0.00010	mg/L	2021-11-25	
Nickel, dissolved	**0.0147**	0.00040	mg/L	2021-11-25	
Phosphorus, dissolved	< 0.050	0.050	mg/L	2021-11-25	
Potassium, dissolved	**4.69**	0.10	mg/L	2021-11-25	
Selenium, dissolved	< 0.00050	0.00050	mg/L	2021-11-25	
Silicon, dissolved	**9.8**	1.0	mg/L	2021-11-25	
Silver, dissolved	< 0.000050	0.000050	mg/L	2021-11-25	
Sodium, dissolved	**78.3**	0.10	mg/L	2021-11-25	
Strontium, dissolved	**1.53**	0.0010	mg/L	2021-11-25	
Sulfur, dissolved	**25.8**	3.0	mg/L	2021-11-25	
Tellurium, dissolved	< 0.00050	0.00050	mg/L	2021-11-25	
Thallium, dissolved	< 0.000020	0.000020	mg/L	2021-11-25	
Thorium, dissolved	< 0.00010	0.00010	mg/L	2021-11-25	
Tin, dissolved	< 0.00020	0.00020	mg/L	2021-11-25	
Titanium, dissolved	< 0.0050	0.0050	mg/L	2021-11-25	
Tungsten, dissolved	< 0.0010	0.0010	mg/L	2021-11-25	
Uranium, dissolved	**0.0231**	0.000020	mg/L	2021-11-25	
Vanadium, dissolved	**0.0018**	0.0010	mg/L	2021-11-25	
Zinc, dissolved	< 0.0040	0.0040	mg/L	2021-11-25	
Zirconium, dissolved	**0.00029**	0.00010	mg/L	2021-11-25	

TEST RESULTS

REPORTED TO	Regional District of Central Okanagan	**WORK ORDER**	21K3037
PROJECT	Westside Landfill	**REPORTED**	2021-11-29 17:00

Analyte	Result	RL	Units	Analyzed	Qualifier
BH4 (21K3037-05) | Matrix: Water | Sampled: 2021-11-23 09:13, Continued					
General Parameters					
Alkalinity, Total (as CaCO3)	**701**	1.0	mg/L	2021-11-25	
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0	mg/L	2021-11-25	
Alkalinity, Bicarbonate (as CaCO3)	**701**	1.0	mg/L	2021-11-25	
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0	mg/L	2021-11-25	
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0	mg/L	2021-11-25	
Ammonia, Total (as N)	< 0.050	0.050	mg/L	2021-11-25	
Conductivity (EC)	**2040**	2.0	µS/cm	2021-11-25	
pH	**7.72**	0.10	pH units	2021-11-25	HT2
Solids, Total Dissolved	**1210**	15	mg/L	2021-11-25	
Total Metals					
Calcium, total	**193**	0.20	mg/L	2021-11-26	
Magnesium, total	**127**	0.010	mg/L	2021-11-26	
BH5 (21K3037-06) | Matrix: Water | Sampled: 2021-11-23 09:31					
Anions					
Chloride	**129**	0.10	mg/L	2021-11-26	
Nitrate (as N)	**6.07**	0.010	mg/L	2021-11-26	
Sulfate	**32.9**	1.0	mg/L	2021-11-26	
Calculated Parameters					
Hardness, Total (as CaCO3)	**360**	0.500	mg/L	N/A	
Dissolved Metals					
Aluminum, dissolved	< 0.0050	0.0050	mg/L	2021-11-25	
Antimony, dissolved	< 0.00020	0.00020	mg/L	2021-11-25	
Arsenic, dissolved	**0.00086**	0.00050	mg/L	2021-11-25	
Barium, dissolved	**0.0144**	0.0050	mg/L	2021-11-25	
Beryllium, dissolved	< 0.00010	0.00010	mg/L	2021-11-25	
Bismuth, dissolved	< 0.00010	0.00010	mg/L	2021-11-25	
Boron, dissolved	**0.0601**	0.0500	mg/L	2021-11-25	
Cadmium, dissolved	**0.000011**	0.000010	mg/L	2021-11-25	
Calcium, dissolved	**98.1**	0.20	mg/L	2021-11-25	
Chromium, dissolved	< 0.00050	0.00050	mg/L	2021-11-25	
Cobalt, dissolved	< 0.00010	0.00010	mg/L	2021-11-25	
Copper, dissolved	**0.00065**	0.00040	mg/L	2021-11-25	
Iron, dissolved	< 0.010	0.010	mg/L	2021-11-25	
Lead, dissolved	< 0.00020	0.00020	mg/L	2021-11-25	
Lithium, dissolved	**0.0185**	0.00010	mg/L	2021-11-25	
Magnesium, dissolved	**27.8**	0.010	mg/L	2021-11-25	
Manganese, dissolved	**0.00204**	0.00020	mg/L	2021-11-25	
Mercury, dissolved	< 0.000010	0.000010	mg/L	2021-11-26	
Molybdenum, dissolved	**0.00580**	0.00010	mg/L	2021-11-25	

TEST RESULTS

REPORTED TO	Regional District of Central Okanagan	**WORK ORDER**	21K3037
PROJECT	Westside Landfill	**REPORTED**	2021-11-29 17:00

Analyte	Result	RL	Units	Analyzed	Qualifier
BH5 (21K3037-06) | Matrix: Water | Sampled: 2021-11-23 09:31, Continued					
Dissolved Metals, Continued					
Nickel, dissolved	**0.00052**	0.00040	mg/L	2021-11-25	
Phosphorus, dissolved	< 0.050	0.050	mg/L	2021-11-25	
Potassium, dissolved	**2.64**	0.10	mg/L	2021-11-25	
Selenium, dissolved	< 0.00050	0.00050	mg/L	2021-11-25	
Silicon, dissolved	**9.4**	1.0	mg/L	2021-11-25	
Silver, dissolved	< 0.000050	0.000050	mg/L	2021-11-25	
Sodium, dissolved	**48.5**	0.10	mg/L	2021-11-25	
Strontium, dissolved	**0.427**	0.0010	mg/L	2021-11-25	
Sulfur, dissolved	**11.2**	3.0	mg/L	2021-11-25	
Tellurium, dissolved	< 0.00050	0.00050	mg/L	2021-11-25	
Thallium, dissolved	< 0.000020	0.000020	mg/L	2021-11-25	
Thorium, dissolved	< 0.00010	0.00010	mg/L	2021-11-25	
Tin, dissolved	< 0.00020	0.00020	mg/L	2021-11-25	
Titanium, dissolved	< 0.0050	0.0050	mg/L	2021-11-25	
Tungsten, dissolved	< 0.0010	0.0010	mg/L	2021-11-25	
Uranium, dissolved	**0.00498**	0.000020	mg/L	2021-11-25	
Vanadium, dissolved	**0.0033**	0.0010	mg/L	2021-11-25	
Zinc, dissolved	< 0.0040	0.0040	mg/L	2021-11-25	
Zirconium, dissolved	< 0.00010	0.00010	mg/L	2021-11-25	
General Parameters					
Alkalinity, Total (as CaCO3)	**259**	1.0	mg/L	2021-11-25	
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0	mg/L	2021-11-25	
Alkalinity, Bicarbonate (as CaCO3)	**259**	1.0	mg/L	2021-11-25	
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0	mg/L	2021-11-25	
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0	mg/L	2021-11-25	
Ammonia, Total (as N)	< 0.050	0.050	mg/L	2021-11-25	
Conductivity (EC)	**998**	2.0	µS/cm	2021-11-25	
pH	**7.91**	0.10	pH units	2021-11-25	HT2
Solids, Total Dissolved	**574**	15	mg/L	2021-11-25	
Total Metals					
Calcium, total	**116**	0.20	mg/L	2021-11-26	
Magnesium, total	**35.3**	0.010	mg/L	2021-11-26	
BH7 (21K3037-07) | Matrix: Water | Sampled: 2021-11-23 09:56					
Anions					
Chloride	**55.3**	0.10	mg/L	2021-11-26	
Nitrate (as N)	**4.07**	0.010	mg/L	2021-11-26	
Sulfate	**38.4**	1.0	mg/L	2021-11-26	
Calculated Parameters					
Hardness, Total (as CaCO3)	**443**	0.500	mg/L	N/A	

TEST RESULTS

REPORTED TO	Regional District of Central Okanagan	**WORK ORDER**	21K3037
PROJECT	Westside Landfill	**REPORTED**	2021-11-29 17:00

Analyte	Result	RL	Units	Analyzed	Qualifier
BH7 (21K3037-07) | Matrix: Water | Sampled: 2021-11-23 09:56, Continued					
Dissolved Metals					
Aluminum, dissolved	< 0.0050	0.0050	mg/L	2021-11-25	
Antimony, dissolved	< 0.00020	0.00020	mg/L	2021-11-25	
Arsenic, dissolved	**0.00177**	0.00050	mg/L	2021-11-25	
Barium, dissolved	**0.0177**	0.0050	mg/L	2021-11-25	
Beryllium, dissolved	< 0.00010	0.00010	mg/L	2021-11-25	
Bismuth, dissolved	< 0.00010	0.00010	mg/L	2021-11-25	
Boron, dissolved	**0.0586**	0.0500	mg/L	2021-11-25	
Cadmium, dissolved	**0.000028**	0.000010	mg/L	2021-11-25	
Calcium, dissolved	**112**	0.20	mg/L	2021-11-25	
Chromium, dissolved	< 0.00050	0.00050	mg/L	2021-11-25	
Cobalt, dissolved	**0.00048**	0.00010	mg/L	2021-11-25	
Copper, dissolved	**0.00141**	0.00040	mg/L	2021-11-25	
Iron, dissolved	< 0.010	0.010	mg/L	2021-11-25	
Lead, dissolved	< 0.00020	0.00020	mg/L	2021-11-25	
Lithium, dissolved	**0.0182**	0.00010	mg/L	2021-11-25	
Magnesium, dissolved	**39.4**	0.010	mg/L	2021-11-25	
Manganese, dissolved	**0.0292**	0.00020	mg/L	2021-11-25	
Mercury, dissolved	< 0.000010	0.000010	mg/L	2021-11-26	
Molybdenum, dissolved	**0.00181**	0.00010	mg/L	2021-11-25	
Nickel, dissolved	**0.00237**	0.00040	mg/L	2021-11-25	
Phosphorus, dissolved	**0.071**	0.050	mg/L	2021-11-25	
Potassium, dissolved	**2.60**	0.10	mg/L	2021-11-25	
Selenium, dissolved	**0.00071**	0.00050	mg/L	2021-11-25	
Silicon, dissolved	**13.8**	1.0	mg/L	2021-11-25	
Silver, dissolved	< 0.000050	0.000050	mg/L	2021-11-25	
Sodium, dissolved	**57.2**	0.10	mg/L	2021-11-25	
Strontium, dissolved	**0.644**	0.0010	mg/L	2021-11-25	
Sulfur, dissolved	**12.9**	3.0	mg/L	2021-11-25	
Tellurium, dissolved	< 0.00050	0.00050	mg/L	2021-11-25	
Thallium, dissolved	< 0.000020	0.000020	mg/L	2021-11-25	
Thorium, dissolved	< 0.00010	0.00010	mg/L	2021-11-25	
Tin, dissolved	< 0.00020	0.00020	mg/L	2021-11-25	
Titanium, dissolved	< 0.0050	0.0050	mg/L	2021-11-25	
Tungsten, dissolved	< 0.0010	0.0010	mg/L	2021-11-25	
Uranium, dissolved	**0.00968**	0.000020	mg/L	2021-11-25	
Vanadium, dissolved	**0.0110**	0.0010	mg/L	2021-11-25	
Zinc, dissolved	< 0.0040	0.0040	mg/L	2021-11-25	
Zirconium, dissolved	**0.00016**	0.00010	mg/L	2021-11-25	
General Parameters					
Alkalinity, Total (as CaCO3)	**482**	1.0	mg/L	2021-11-25	
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0	mg/L	2021-11-25	
Alkalinity, Bicarbonate (as CaCO3)	**482**	1.0	mg/L	2021-11-25	

TEST RESULTS

REPORTED TO	Regional District of Central Okanagan	**WORK ORDER**	21K3037
PROJECT	Westside Landfill	**REPORTED**	2021-11-29 17:00

Analyte	Result	RL	Units	Analyzed	Qualifier
BH7 (21K3037-07) | Matrix: Water | Sampled: 2021-11-23 09:56, Continued					
General Parameters, Continued					
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0	mg/L	2021-11-25	
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0	mg/L	2021-11-25	
Ammonia, Total (as N)	< 0.050	0.050	mg/L	2021-11-25	
Conductivity (EC)	**1060**	2.0	µS/cm	2021-11-25	
pH	**7.84**	0.10	pH units	2021-11-25	HT2
Solids, Total Dissolved	**628**	15	mg/L	2021-11-25	
Total Metals					
Calcium, total	**120**	0.20	mg/L	2021-11-26	
Magnesium, total	**43.7**	0.010	mg/L	2021-11-26	
MW 99-2 (21K3037-08) | Matrix: Water | Sampled: 2021-11-23 11:00					
Anions					
Chloride	**136**	0.10	mg/L	2021-11-26	
Nitrate (as N)	**0.476**	0.010	mg/L	2021-11-26	
Sulfate	**20.2**	1.0	mg/L	2021-11-26	
Calculated Parameters					
Hardness, Total (as CaCO3)	**690**	0.500	mg/L	N/A	
Dissolved Metals					
Aluminum, dissolved	< 0.0050	0.0050	mg/L	2021-11-25	
Antimony, dissolved	< 0.00020	0.00020	mg/L	2021-11-25	
Arsenic, dissolved	< 0.00050	0.00050	mg/L	2021-11-25	
Barium, dissolved	**0.0065**	0.0050	mg/L	2021-11-25	
Beryllium, dissolved	< 0.00010	0.00010	mg/L	2021-11-25	
Bismuth, dissolved	< 0.00010	0.00010	mg/L	2021-11-25	
Boron, dissolved	< 0.0500	0.0500	mg/L	2021-11-25	
Cadmium, dissolved	< 0.000010	0.000010	mg/L	2021-11-25	
Calcium, dissolved	**134**	0.20	mg/L	2021-11-25	
Chromium, dissolved	< 0.00050	0.00050	mg/L	2021-11-25	
Cobalt, dissolved	< 0.00010	0.00010	mg/L	2021-11-25	
Copper, dissolved	**0.00286**	0.00040	mg/L	2021-11-25	
Iron, dissolved	< 0.010	0.010	mg/L	2021-11-25	
Lead, dissolved	< 0.00020	0.00020	mg/L	2021-11-25	
Lithium, dissolved	**0.0409**	0.00010	mg/L	2021-11-25	
Magnesium, dissolved	**86.2**	0.010	mg/L	2021-11-25	
Manganese, dissolved	**0.00102**	0.00020	mg/L	2021-11-25	
Mercury, dissolved	< 0.000010	0.000010	mg/L	2021-11-26	
Molybdenum, dissolved	**0.00019**	0.00010	mg/L	2021-11-25	
Nickel, dissolved	**0.00379**	0.00040	mg/L	2021-11-25	
Phosphorus, dissolved	< 0.050	0.050	mg/L	2021-11-25	
Potassium, dissolved	**0.50**	0.10	mg/L	2021-11-25	

TEST RESULTS

REPORTED TO	Regional District of Central Okanagan	**WORK ORDER**	21K3037
PROJECT	Westside Landfill	**REPORTED**	2021-11-29 17:00

Analyte	Result	RL	Units	Analyzed	Qualifier
MW 99-2 (21K3037-08) | Matrix: Water | Sampled: 2021-11-23 11:00, Continued					
Dissolved Metals, Continued					
Selenium, dissolved	< 0.00050	0.00050	mg/L	2021-11-25	
Silicon, dissolved	**6.1**	1.0	mg/L	2021-11-25	
Silver, dissolved	< 0.000050	0.000050	mg/L	2021-11-25	
Sodium, dissolved	**39.4**	0.10	mg/L	2021-11-25	
Strontium, dissolved	**1.59**	0.0010	mg/L	2021-11-25	
Sulfur, dissolved	**6.3**	3.0	mg/L	2021-11-25	
Tellurium, dissolved	< 0.00050	0.00050	mg/L	2021-11-25	
Thallium, dissolved	< 0.000020	0.000020	mg/L	2021-11-25	
Thorium, dissolved	< 0.00010	0.00010	mg/L	2021-11-25	
Tin, dissolved	< 0.00020	0.00020	mg/L	2021-11-25	
Titanium, dissolved	< 0.0050	0.0050	mg/L	2021-11-25	
Tungsten, dissolved	< 0.0010	0.0010	mg/L	2021-11-25	
Uranium, dissolved	**0.00680**	0.000020	mg/L	2021-11-25	
Vanadium, dissolved	< 0.0010	0.0010	mg/L	2021-11-25	
Zinc, dissolved	**0.0049**	0.0040	mg/L	2021-11-25	
Zirconium, dissolved	**0.00026**	0.00010	mg/L	2021-11-25	
General Parameters					
Alkalinity, Total (as CaCO3)	**649**	1.0	mg/L	2021-11-25	
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0	mg/L	2021-11-25	
Alkalinity, Bicarbonate (as CaCO3)	**649**	1.0	mg/L	2021-11-25	
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0	mg/L	2021-11-25	
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0	mg/L	2021-11-25	
Ammonia, Total (as N)	< 0.050	0.050	mg/L	2021-11-25	
Conductivity (EC)	**1570**	2.0	µS/cm	2021-11-25	
pH	**7.90**	0.10	pH units	2021-11-25	HT2
Solids, Total Dissolved	**864**	15	mg/L	2021-11-25	
Total Metals					
Calcium, total	**154**	0.20	mg/L	2021-11-26	
Magnesium, total	**105**	0.010	mg/L	2021-11-26	

Sample Qualifiers:

HT2 The 15 minute recommended holding time (from sampling to analysis) has been exceeded - field analysis is recommended.

APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO	Regional District of Central Okanagan	**WORK ORDER**	21K3037
PROJECT	Westside Landfill	**REPORTED**	2021-11-29 17:00

Analysis Description	Method Ref.	Technique	Accredited	Location
Alkalinity in Water	SM 2320 B* (2017)	Titration with H2SO4	✓	Kelowna
Ammonia, Total in Water	SM 4500-NH3 G* (2017)	Automated Colorimetry (Phenate)	✓	Kelowna
Anions in Water	SM 4110 B (2017)	Ion Chromatography	✓	Kelowna
Conductivity in Water	SM 2510 B (2017)	Conductivity Meter	✓	Kelowna
Dissolved Metals in Water	EPA 200.8 / EPA 6020B	0.45 µm Filtration / Inductively Coupled Plasma-Mass Spectroscopy (ICP-MS)	✓	Richmond
Hardness in Water	SM 2340 B* (2017)	Calculation: 2.497 [total Ca] + 4.118 [total Mg] (Est)	✓	N/A
Mercury, dissolved in Water	EPA 245.7*	BrCl2 Oxidation / Cold Vapor Atomic Fluorescence Spectrometry (CVAFS)	✓	Richmond
pH in Water	SM 4500-H+ B (2017)	Electrometry	✓	Kelowna
Solids, Total Dissolved in Water	SM 2540 C* (2017)	Gravimetry (Dried at 103-105C)	✓	Kelowna
Total Metals in Water	EPA 200.2 / EPA 6020B	HNO3+HCl Hot Block Digestion / Inductively Coupled Plasma-Mass Spectroscopy (ICP-MS)	✓	Richmond

Note: An asterisk in the Method Reference indicates that the CARO method has been modified from the reference method

Glossary of Terms:

RL	Reporting Limit (default)
<	Less than the specified Reporting Limit (RL) - the actual RL may be higher than the default RL due to various factors
mg/L	Milligrams per litre
pH units	pH < 7 = acidic, ph > 7 = basic
µS/cm	Microsiemens per centimetre
EPA	United States Environmental Protection Agency Test Methods
SM	Standard Methods for the Examination of Water and Wastewater, American Public Health Association

General Comments:

The results in this report apply to the samples analyzed in accordance with the Chain of Custody document. This analytical report must be reproduced in its entirety. CARO is not responsible for any loss or damage resulting directly or indirectly from error or omission in the conduct of testing. Liability is limited to the cost of analysis. Samples will be disposed of 30 days after the test report has been issued or once samples expire, whichever comes first. Longer hold is possible if agreed to in writing.

Please note any regulatory guidelines applied to this report are added as a convenience to the client, at their request, to help provide some initial context to analytical results obtained. Although CARO makes every effort to ensure accuracy of the associated regulatory guideline(s) applied, the guidelines applied cannot be assumed to be correct due to a variety of factors and as such CARO Analytical Services assumes no liability or responsibility for the use of those guidelines to make any decisions. The original source of the regulation should be verified and a review of the guideline (s) should be validated as correct in order to make any decisions arising from the comparison of the analytical data obtained to the relevant regulatory guideline for one's particular circumstances. Further, CARO Analytical Services assumes no liability or responsibility for any loss attributed from the use of these guidelines in any way.

APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO	Regional District of Central Okanagan	**WORK ORDER**	21K3037
PROJECT	Westside Landfill	**REPORTED**	2021-11-29 17:00

The following section displays the quality control (QC) data that is associated with your sample data. Groups of samples are prepared in "batches" and analyzed in conjunction with QC samples that ensure your data is of the highest quality. Common QC types include:

- **Method Blank (Blk)**: A blank sample that undergoes sample processing identical to that carried out for the test samples. Method blank results are used to assess contamination from the laboratory environment and reagents.
- **Duplicate (Dup)**: An additional or second portion of a randomly selected sample in the analytical run carried through the entire analytical process. Duplicates provide a measure of the analytical method's precision (reproducibility).
- **Blank Spike (BS)**: A sample of known concentration which undergoes processing identical to that carried out for test samples, also referred to as a laboratory control sample (LCS). Blank spikes provide a measure of the analytical method's accuracy.
- **Matrix Spike (MS)**: A second aliquot of sample is fortified with a known concentration of target analytes and carried through the entire analytical process. Matrix spikes evaluate potential matrix effects that may affect the analyte recovery.
- **Reference Material (SRM)**: A homogenous material of similar matrix to the samples, certified for the parameter(s) listed. Reference Materials ensure that the analytical process is adequate to achieve acceptable recoveries of the parameter(s) tested.

Each QC type is analyzed at a 5-10% frequency, i.e. one blank/duplicate/spike for every 10-20 samples. For all types of QC, the specified recovery (% Rec) and relative percent difference (RPD) limits are derived from long-term method performance averages and/or prescribed by the reference method.

Analyte	Result	RL	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
Anions, Batch B1K2679										
Blank (B1K2679-BLK2)				Prepared: 2021-11-26, Analyzed: 2021-11-26						
Chloride	< 0.10	0.10	mg/L							
Nitrate (as N)	< 0.010	0.010	mg/L							
Sulfate	< 1.0	1.0	mg/L							
LCS (B1K2679-BS2)				Prepared: 2021-11-26, Analyzed: 2021-11-26						
Chloride	16.1	0.10	mg/L	16.0		100	90-110			
Nitrate (as N)	4.13	0.010	mg/L	4.00		103	90-110			
Sulfate	16.1	1.0	mg/L	16.0		101	90-110			
Dissolved Metals, Batch B1K2850										
Blank (B1K2850-BLK1)				Prepared: 2021-11-25, Analyzed: 2021-11-25						
Aluminum, dissolved	< 0.0050	0.0050	mg/L							
Antimony, dissolved	< 0.00020	0.00020	mg/L							
Arsenic, dissolved	< 0.00050	0.00050	mg/L							
Barium, dissolved	< 0.0050	0.0050	mg/L							
Beryllium, dissolved	< 0.00010	0.00010	mg/L							
Bismuth, dissolved	< 0.00010	0.00010	mg/L							
Boron, dissolved	< 0.0500	0.0500	mg/L							
Cadmium, dissolved	< 0.000010	0.000010	mg/L							
Calcium, dissolved, dissolved	< 0.20	0.20	mg/L							
Chromium, dissolved	< 0.00050	0.00050	mg/L							
Cobalt, dissolved	< 0.00010	0.00010	mg/L							
Copper, dissolved	< 0.00040	0.00040	mg/L							
Iron, dissolved	< 0.010	0.010	mg/L							
Lead, dissolved	< 0.00020	0.00020	mg/L							
Lithium, dissolved	< 0.00010	0.00010	mg/L							
Magnesium, dissolved, dissolved	< 0.010	0.010	mg/L							
Manganese, dissolved	< 0.00020	0.00020	mg/L							
Molybdenum, dissolved	< 0.00010	0.00010	mg/L							
Nickel, dissolved	< 0.00040	0.00040	mg/L							
Phosphorus, dissolved	< 0.050	0.050	mg/L							
Potassium, dissolved	< 0.10	0.10	mg/L							
Selenium, dissolved	< 0.00050	0.00050	mg/L							
Silicon, dissolved	< 1.0	1.0	mg/L							
Silver, dissolved	< 0.000050	0.000050	mg/L							

APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO	Regional District of Central Okanagan	**WORK ORDER**	21K3037
PROJECT	Westside Landfill	**REPORTED**	2021-11-29 17:00

Analyte	Result	RL	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
Dissolved Metals, Batch B1K2850, Continued										
Blank (B1K2850-BLK1), Continued				Prepared: 2021-11-25, Analyzed: 2021-11-25						
Sodium, dissolved	< 0.10	0.10	mg/L							
Strontium, dissolved	< 0.0010	0.0010	mg/L							
Sulfur, dissolved	< 3.0	3.0	mg/L							
Tellurium, dissolved	< 0.00050	0.00050	mg/L							
Thallium, dissolved	< 0.000020	0.000020	mg/L							
Thorium, dissolved	< 0.00010	0.00010	mg/L							
Tin, dissolved	< 0.00020	0.00020	mg/L							
Titanium, dissolved	< 0.0050	0.0050	mg/L							
Tungsten, dissolved	< 0.0010	0.0010	mg/L							
Uranium, dissolved	< 0.000020	0.000020	mg/L							
Vanadium, dissolved	< 0.0010	0.0010	mg/L							
Zinc, dissolved	< 0.0040	0.0040	mg/L							
Zirconium, dissolved	< 0.00010	0.00010	mg/L							
LCS (B1K2850-BS1)				Prepared: 2021-11-25, Analyzed: 2021-11-25						
Aluminum, dissolved	0.0205	0.0050	mg/L	0.0200		102	80-120			
Antimony, dissolved	0.0197	0.00020	mg/L	0.0200		98	80-120			
Arsenic, dissolved	0.0173	0.00050	mg/L	0.0200		87	80-120			
Barium, dissolved	0.0190	0.0050	mg/L	0.0200		95	80-120			
Beryllium, dissolved	0.0201	0.00010	mg/L	0.0200		101	80-120			
Bismuth, dissolved	0.0199	0.00010	mg/L	0.0200		100	80-120			
Boron, dissolved	< 0.0500	0.0500	mg/L	0.0200		106	80-120			
Cadmium, dissolved	0.0179	0.000010	mg/L	0.0200		89	80-120			
Calcium, dissolved, dissolved	2.01	0.20	mg/L	2.00		100	80-120			
Chromium, dissolved	0.0202	0.00050	mg/L	0.0200		101	80-120			
Cobalt, dissolved	0.0195	0.00010	mg/L	0.0200		97	80-120			
Copper, dissolved	0.0209	0.00040	mg/L	0.0200		105	80-120			
Iron, dissolved	1.90	0.010	mg/L	2.00		95	80-120			
Lead, dissolved	0.0206	0.00020	mg/L	0.0200		103	80-120			
Lithium, dissolved	0.0201	0.00010	mg/L	0.0200		101	80-120			
Magnesium, dissolved, dissolved	2.15	0.010	mg/L	2.00		107	80-120			
Manganese, dissolved	0.0188	0.00020	mg/L	0.0200		94	80-120			
Molybdenum, dissolved	0.0196	0.00010	mg/L	0.0200		98	80-120			
Nickel, dissolved	0.0201	0.00040	mg/L	0.0200		100	80-120			
Phosphorus, dissolved	1.89	0.050	mg/L	2.00		95	80-120			
Potassium, dissolved	2.09	0.10	mg/L	2.00		105	80-120			
Selenium, dissolved	0.0164	0.00050	mg/L	0.0200		82	80-120			
Silicon, dissolved	1.9	1.0	mg/L	2.00		96	80-120			
Silver, dissolved	0.0184	0.000050	mg/L	0.0200		92	80-120			
Sodium, dissolved	2.03	0.10	mg/L	2.00		101	80-120			
Strontium, dissolved	0.0178	0.0010	mg/L	0.0200		89	80-120			
Sulfur, dissolved	4.7	3.0	mg/L	5.00		95	80-120			
Tellurium, dissolved	0.0168	0.00050	mg/L	0.0200		84	80-120			
Thallium, dissolved	0.0192	0.000020	mg/L	0.0200		96	80-120			
Thorium, dissolved	0.0193	0.00010	mg/L	0.0200		96	80-120			
Tin, dissolved	0.0206	0.00020	mg/L	0.0200		103	80-120			
Titanium, dissolved	0.0224	0.0050	mg/L	0.0200		112	80-120			
Tungsten, dissolved	0.0207	0.0010	mg/L	0.0200		103	80-120			
Uranium, dissolved	0.0200	0.000020	mg/L	0.0200		100	80-120			
Vanadium, dissolved	0.0209	0.0010	mg/L	0.0200		105	80-120			
Zinc, dissolved	0.0200	0.0040	mg/L	0.0200		100	80-120			
Zirconium, dissolved	0.0209	0.00010	mg/L	0.0200		105	80-120			
Duplicate (B1K2850-DUP1)		**Source: 21K3037-08**		Prepared: 2021-11-25, Analyzed: 2021-11-25						
Aluminum, dissolved	< 0.0050	0.0050	mg/L		< 0.0050				20	
Antimony, dissolved	< 0.00020	0.00020	mg/L		< 0.00020				20	
Arsenic, dissolved	< 0.00050	0.00050	mg/L		< 0.00050				20	

APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO	Regional District of Central Okanagan	**WORK ORDER**	21K3037
PROJECT	Westside Landfill	**REPORTED**	2021-11-29 17:00

Analyte	Result	RL	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
Dissolved Metals, Batch B1K2850, Continued										
Duplicate (B1K2850-DUP1), Continued		**Source: 21K3037-08**		Prepared: 2021-11-25, Analyzed: 2021-11-25						
Barium, dissolved	0.0066	0.0050	mg/L		0.0065				20	
Beryllium, dissolved	< 0.00010	0.00010	mg/L		< 0.00010				20	
Bismuth, dissolved	< 0.00010	0.00010	mg/L		< 0.00010				20	
Boron, dissolved	< 0.0500	0.0500	mg/L		< 0.0500				20	
Cadmium, dissolved	< 0.000010	0.000010	mg/L		< 0.000010				20	
Calcium, dissolved, dissolved	130	0.20	mg/L		134			3	20	
Chromium, dissolved	< 0.00050	0.00050	mg/L		< 0.00050				20	
Cobalt, dissolved	< 0.00010	0.00010	mg/L		< 0.00010				20	
Copper, dissolved	0.00234	0.00040	mg/L		0.00286			20	20	
Iron, dissolved	< 0.010	0.010	mg/L		< 0.010				20	
Lead, dissolved	< 0.00020	0.00020	mg/L		< 0.00020				20	
Lithium, dissolved	0.0400	0.00010	mg/L		0.0409			2	20	
Magnesium, dissolved, dissolved	87.1	0.010	mg/L		86.2			1	20	
Manganese, dissolved	0.00113	0.00020	mg/L		0.00102			10	20	
Molybdenum, dissolved	0.00020	0.00010	mg/L		0.00019				20	
Nickel, dissolved	< 0.00040	0.00040	mg/L		0.00379				20	
Phosphorus, dissolved	< 0.050	0.050	mg/L		< 0.050				20	
Potassium, dissolved	0.51	0.10	mg/L		0.50			< 1	20	
Selenium, dissolved	< 0.00050	0.00050	mg/L		< 0.00050				20	
Silicon, dissolved	6.0	1.0	mg/L		6.1			2	20	
Silver, dissolved	< 0.000050	0.000050	mg/L		< 0.000050				20	
Sodium, dissolved	39.7	0.10	mg/L		39.4			< 1	20	
Strontium, dissolved	1.64	0.0010	mg/L		1.59			3	20	
Sulfur, dissolved	6.3	3.0	mg/L		6.3				20	
Tellurium, dissolved	< 0.00050	0.00050	mg/L		< 0.00050				20	
Thallium, dissolved	< 0.000020	0.000020	mg/L		< 0.000020				20	
Thorium, dissolved	< 0.00010	0.00010	mg/L		< 0.00010				20	
Tin, dissolved	< 0.00020	0.00020	mg/L		< 0.00020				20	
Titanium, dissolved	< 0.0050	0.0050	mg/L		< 0.0050				20	
Tungsten, dissolved	< 0.0010	0.0010	mg/L		< 0.0010				20	
Uranium, dissolved	0.00650	0.000020	mg/L		0.00680			5	20	
Vanadium, dissolved	< 0.0010	0.0010	mg/L		< 0.0010				20	
Zinc, dissolved	< 0.0040	0.0040	mg/L		0.0049				20	
Zirconium, dissolved	0.00029	0.00010	mg/L		0.00026				20	
Reference (B1K2850-SRM1)				Prepared: 2021-11-25, Analyzed: 2021-11-25						
Aluminum, dissolved	0.223	0.0050	mg/L	0.235		95	70-130			
Antimony, dissolved	0.0430	0.00020	mg/L	0.0431		100	70-130			
Arsenic, dissolved	0.399	0.00050	mg/L	0.423		94	70-130			
Barium, dissolved	3.01	0.0050	mg/L	3.30		91	70-130			
Beryllium, dissolved	0.226	0.00010	mg/L	0.209		108	70-130			
Boron, dissolved	1.72	0.0500	mg/L	1.65		104	70-130			
Cadmium, dissolved	0.202	0.000010	mg/L	0.221		91	70-130			
Calcium, dissolved, dissolved	7.91	0.20	mg/L	7.72		102	70-130			
Chromium, dissolved	0.441	0.00050	mg/L	0.434		102	70-130			
Cobalt, dissolved	0.125	0.00010	mg/L	0.124		101	70-130			
Copper, dissolved	0.790	0.00040	mg/L	0.815		97	70-130			
Iron, dissolved	1.22	0.010	mg/L	1.27		96	70-130			
Lead, dissolved	0.123	0.00020	mg/L	0.110		112	70-130			
Lithium, dissolved	0.109	0.00010	mg/L	0.100		109	70-130			
Magnesium, dissolved, dissolved	7.27	0.010	mg/L	6.59		110	70-130			
Manganese, dissolved	0.324	0.00020	mg/L	0.342		95	70-130			
Molybdenum, dissolved	0.401	0.00010	mg/L	0.404		99	70-130			
Nickel, dissolved	0.852	0.00040	mg/L	0.835		102	70-130			
Phosphorus, dissolved	0.504	0.050	mg/L	0.499		101	70-130			
Potassium, dissolved	3.17	0.10	mg/L	2.88		110	70-130			

APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO	Regional District of Central Okanagan	**WORK ORDER**	21K3037
PROJECT	Westside Landfill	**REPORTED**	2021-11-29 17:00

Analyte	Result	RL	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
Dissolved Metals, Batch B1K2850, Continued										
Reference (B1K2850-SRM1), Continued				Prepared: 2021-11-25, Analyzed: 2021-11-25						
Selenium, dissolved	0.0291	0.00050	mg/L	0.0324		90	70-130			
Sodium, dissolved	17.8	0.10	mg/L	18.0		99	70-130			
Strontium, dissolved	0.836	0.0010	mg/L	0.935		89	70-130			
Thallium, dissolved	0.0403	0.000020	mg/L	0.0385		105	70-130			
Uranium, dissolved	0.257	0.000020	mg/L	0.258		100	70-130			
Vanadium, dissolved	0.881	0.0010	mg/L	0.873		101	70-130			
Zinc, dissolved	0.881	0.0040	mg/L	0.848		104	70-130			
Dissolved Metals, Batch B1K2939										
Blank (B1K2939-BLK1)				Prepared: 2021-11-26, Analyzed: 2021-11-26						
Mercury, dissolved	< 0.000010	0.000010	mg/L							
Blank (B1K2939-BLK2)				Prepared: 2021-11-26, Analyzed: 2021-11-26						
Mercury, dissolved	< 0.000010	0.000010	mg/L							
Blank (B1K2939-BLK3)				Prepared: 2021-11-26, Analyzed: 2021-11-26						
Mercury, dissolved	< 0.000010	0.000010	mg/L							
Reference (B1K2939-SRM1)				Prepared: 2021-11-26, Analyzed: 2021-11-26						
Mercury, dissolved	0.000459	0.000010	mg/L	0.000500		92	0-200			
Reference (B1K2939-SRM2)				Prepared: 2021-11-26, Analyzed: 2021-11-26						
Mercury, dissolved	0.000481	0.000010	mg/L	0.000500		96	0-200			
Reference (B1K2939-SRM3)				Prepared: 2021-11-26, Analyzed: 2021-11-26						
Mercury, dissolved	0.000464	0.000010	mg/L	0.000500		93	0-200			
General Parameters, Batch B1K2611										
Blank (B1K2611-BLK1)				Prepared: 2021-11-24, Analyzed: 2021-11-24						
Solids, Total Dissolved	< 15	15	mg/L							
LCS (B1K2611-BS1)				Prepared: 2021-11-24, Analyzed: 2021-11-24						
Solids, Total Dissolved	242	15	mg/L	240		101	85-115			
General Parameters, Batch B1K2715										
Blank (B1K2715-BLK1)				Prepared: 2021-11-25, Analyzed: 2021-11-25						
Ammonia, Total (as N)	< 0.050	0.050	mg/L							
Blank (B1K2715-BLK2)				Prepared: 2021-11-25, Analyzed: 2021-11-25						
Ammonia, Total (as N)	< 0.050	0.050	mg/L							
Blank (B1K2715-BLK3)				Prepared: 2021-11-25, Analyzed: 2021-11-25						
Ammonia, Total (as N)	< 0.050	0.050	mg/L							
Blank (B1K2715-BLK4)				Prepared: 2021-11-25, Analyzed: 2021-11-25						
Ammonia, Total (as N)	< 0.050	0.050	mg/L							
LCS (B1K2715-BS1)				Prepared: 2021-11-25, Analyzed: 2021-11-25						
Ammonia, Total (as N)	0.947	0.050	mg/L	1.00		95	90-115			
LCS (B1K2715-BS2)				Prepared: 2021-11-25, Analyzed: 2021-11-25						
Ammonia, Total (as N)	0.967	0.050	mg/L	1.00		97	90-115			

APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO	Regional District of Central Okanagan	**WORK ORDER**	21K3037
PROJECT	Westside Landfill	**REPORTED**	2021-11-29 17:00

Analyte	Result	RL	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
General Parameters, Batch B1K2715, Continued										
LCS (B1K2715-BS3)				Prepared: 2021-11-25, Analyzed: 2021-11-25						
Ammonia, Total (as N)	0.953	0.050	mg/L	1.00		95	90-115			
LCS (B1K2715-BS4)				Prepared: 2021-11-25, Analyzed: 2021-11-25						
Ammonia, Total (as N)	0.971	0.050	mg/L	1.00		97	90-115			
Duplicate (B1K2715-DUP2)		**Source: 21K3037-01**		Prepared: 2021-11-25, Analyzed: 2021-11-25						
Ammonia, Total (as N)	< 0.050	0.050	mg/L		< 0.050				15	
Duplicate (B1K2715-DUP3)		**Source: 21K3037-07**		Prepared: 2021-11-25, Analyzed: 2021-11-25						
Ammonia, Total (as N)	< 0.050	0.050	mg/L		< 0.050				15	
Matrix Spike (B1K2715-MS2)		**Source: 21K3037-01**		Prepared: 2021-11-25, Analyzed: 2021-11-25						
Ammonia, Total (as N)	0.239	0.050	mg/L	0.250	< 0.050	78	75-125			
Matrix Spike (B1K2715-MS3)		**Source: 21K3037-07**		Prepared: 2021-11-25, Analyzed: 2021-11-25						
Ammonia, Total (as N)	0.240	0.050	mg/L	0.250	< 0.050	90	75-125			
General Parameters, Batch B1K2761										
Blank (B1K2761-BLK1)				Prepared: 2021-11-25, Analyzed: 2021-11-25						
Solids, Total Dissolved	< 15	15	mg/L							
LCS (B1K2761-BS1)				Prepared: 2021-11-25, Analyzed: 2021-11-25						
Solids, Total Dissolved	228	15	mg/L	240		95	85-115			
General Parameters, Batch B1K2778										
Blank (B1K2778-BLK1)				Prepared: 2021-11-25, Analyzed: 2021-11-25						
Alkalinity, Total (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Bicarbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0	mg/L							
Conductivity (EC)	< 2.0	2.0	µS/cm							
Blank (B1K2778-BLK2)				Prepared: 2021-11-25, Analyzed: 2021-11-25						
Alkalinity, Total (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Bicarbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0	mg/L							
Conductivity (EC)	< 2.0	2.0	µS/cm							
LCS (B1K2778-BS1)				Prepared: 2021-11-25, Analyzed: 2021-11-25						
Alkalinity, Total (as CaCO3)	108	1.0	mg/L	100		108	80-120			
LCS (B1K2778-BS2)				Prepared: 2021-11-25, Analyzed: 2021-11-25						
Alkalinity, Total (as CaCO3)	108	1.0	mg/L	100		108	80-120			
LCS (B1K2778-BS3)				Prepared: 2021-11-25, Analyzed: 2021-11-25						
Conductivity (EC)	1420	2.0	µS/cm	1410		101	95-105			
LCS (B1K2778-BS4)				Prepared: 2021-11-25, Analyzed: 2021-11-25						
Conductivity (EC)	1440	2.0	µS/cm	1410		102	95-105			
Duplicate (B1K2778-DUP2)		**Source: 21K3037-02**		Prepared: 2021-11-25, Analyzed: 2021-11-25						
Alkalinity, Total (as CaCO3)	379	1.0	mg/L		346			9	10	

APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO	Regional District of Central Okanagan	**WORK ORDER**	21K3037
PROJECT	Westside Landfill	**REPORTED**	2021-11-29 17:00

Analyte	Result	RL	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
General Parameters, Batch B1K2778, Continued										
Duplicate (B1K2778-DUP2), Continued		**Source: 21K3037-02**		Prepared: 2021-11-25, Analyzed: 2021-11-25						
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0	mg/L		< 1.0				10	
Alkalinity, Bicarbonate (as CaCO3)	379	1.0	mg/L		346			9	10	
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0	mg/L		< 1.0				10	
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0	mg/L		< 1.0				10	
Conductivity (EC)	1200	2.0	µS/cm		1200			< 1	5	
pH	7.51	0.10	pH units		7.57			< 1	4	
Reference (B1K2778-SRM1)				Prepared: 2021-11-25, Analyzed: 2021-11-25						
pH	7.00	0.10	pH units	7.01		100	98-102			
Reference (B1K2778-SRM2)				Prepared: 2021-11-25, Analyzed: 2021-11-25						
pH	7.00	0.10	pH units	7.01		100	98-102			
Total Metals, Batch B1K2835										
Blank (B1K2835-BLK1)				Prepared: 2021-11-25, Analyzed: 2021-11-26						
Calcium, total	< 0.20	0.20	mg/L							
Magnesium, total	< 0.010	0.010	mg/L							
LCS (B1K2835-BS1)				Prepared: 2021-11-25, Analyzed: 2021-11-26						
Calcium, total	2.05	0.20	mg/L	2.00		103	80-120			
Magnesium, total	2.13	0.010	mg/L	2.00		107	80-120			
Reference (B1K2835-SRM1)				Prepared: 2021-11-25, Analyzed: 2021-11-26						
Calcium, total	1.07	0.20	mg/L	0.938		114	70-130			
Magnesium, total	0.133	0.010	mg/L	0.112		119	70-130			

APPENDIX D

Quality Assurance / Quality Control (QA/QC) Results

1.0 METHODS

A Quality Assurance/Quality Control (QA/QC) program was developed and implemented for the purpose of obtaining sampling and analytical data that were interpretable, meaningful and reproducible. This involved using QA/QC measures in both the collection (field) and analysis (laboratory) of samples.

The following sections include a summary of the QA/QC procedures established for the field groundwater sampling program, a review of the resultant data, and the QA/QC measures implemented by the analytical laboratory. The Regional District of Central Okanagan (RDCO) was responsible for following appropriate protocols during the collection and submission of groundwater samples for analysis.

1.1 Field Program

The quality assurance (QA) measures established for the field program included:

- Submission of blind field duplicate samples for a minimum of 10% of the samples analysed. A blind field duplicate samples is a second sample collected from a specific monitoring location that is submitted to the analytical laboratory without identifying the local or expected concentrations to the laboratory.
- The relative percent difference (RPD) between field duplicate 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:

$$\left|\left(\frac{(x1-x2)}{average\ (x1,x2)}\right)\right| x100$$

  where *x*1 is the original sample result and *x*2 is the field duplicate result.
- When the concentration in a sample was less than five times the reported laboratory reporting limit (LRL), the difference factor (DF) was calculated. The DF is also a measure of the variability between two outcomes from the same procedure or process and is calculated by:

$$\left|\left(\frac{(x1-x2)}{LRL}\right)\right|$$

  where x1 is the original sample result and x2 is the field duplicate result.

In 2020, the BC Ministry of Environment updated the BC Environmental Laboratory Manual which contains recommended Data Quality Objectives (DQOs) for laboratory soil and groundwater duplicates (applicable at concentrations greater than five times the LRL). 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:

- An RPD of less than 20% was applied for inorganics in groundwater.
- For substances with concentrations less than five times the LRL, the difference factor should be less than two.

1.2 Laboratory

Certificate of analysis (COA) reports were internally reviewed by the analytical laboratory prior to submission. The results of internal checks are provided within the COA reports and were used to assess the reliability, accuracy and reproducibility of the data.

The following DQOs were established for the laboratory analytical program:

- The laboratory that was used has achieved proficiency certification by the Canadian Associated for Laboratory Accreditation Inc. (CALA) for the analyses conducted.
- In addition to Golder's field duplicate samples, each analysis batch included at least one of each of the following: laboratory duplicate sample, method blank, reference material sample, method blank spike and/or matrix spike.

The following criteria were considered acceptable for laboratory QA/QC samples:

- Method blanks should be below the method detection limits used for the specific analysis.
- Laboratory duplicates should fall within the DQOs set by the laboratory.
- Analytical results for the reference materials or spiked blanks or matrix spikes should be within the target specified by the laboratory.

If internal QA/QC issues were encountered, the field samples and internal QA/QC samples were re-analysed.

2.0 RESULTS

2.1 Field Program

Two duplicate groundwater samples were collected during the 2021 monitoring program, one for each sampling event, satisfying the requirement of at least 10% duplicate samples. In May 2021, a duplicate sample was collected from BH7 and in November 2021 a duplicate sample was collected from BH1.

The calculated RPD and DF values for the paired groundwater analyses, provided in Table D-1 in Appendix D, met Golder's DQOs.

2.2 Laboratory

The analytical results were subject to the laboratory's internal quality assurance checks. The results of the laboratory QA analyses are provided with the laboratory COA reports that are available in Appendix B. The results of the laboratory QA program suggest that the laboratory groundwater quality data are accurate, reproducible and can be relied upon.

Table D-1: Quality Assurance and Quality Control Results - Groundwater
2021 Monitoring Report - Westside Landfill
West Kelowna, BC

Sample Location	Units	BH 7		Laboratory Reporting Limit	Mean	Relative Percent Difference (%)	Difference Factor (-)	BH 1		Laboratory Reporting Limit	Mean	Relative Percent Difference (%)	Difference Factor (-)
Laboratory ID		21E1381-07	21E1381-08					21K3037-02	21K3037-01				
Sample Date		11-May-21	11-May-21					23-Nov-21	23-Nov-21				
QA/QC		FDA	FD					FDA	FD				
General and Nutrient Parameters													
Conductivity	uS/cm	1080	1060	2.0	1070	1.9%	NA	1200	1180	2.0	1190	1.7%	NA
Total Dissolved Solids	mg/L	-	-	-	-	-	-	719	702	15	711	2.4%	NA
Alkalinity, Total (as CaCO3)	mg/L	458	467	1.0	463	1.9%	NA	346	375	1.0	361	8.0%	NA
Alkalinity, Phenolphthalein (as CaCO3)	mg/L	<1.0	<1.0	1.0	-	-	-	<1.0	<1.0	1.0	-	-	-
Alkalinity, Bicarbonate (as CaCO3)	mg/L	458	467	1.0	463	1.9%	NA	346	375	1.0	361	8.0%	NA
Alkalinity, Carbonate (as CaCO3)	mg/L	<1.0	<1.0	1.0	-	-	-	<1.0	<1.0	1.0	-	-	-
Alkalinity, Hydroxide (as CaCO3)	mg/L	<1.0	<1.0	1.0	-	-	-	<1.0	<1.0	1.0	-	-	-
Ammonia (as N)	mg/L	0.050	<0.050	0.050	-	-	-	0.054	<0.050	0.050	-	-	-
Chloride	mg/L	55.7	55.4	0.10	55.6	0.5%	NA	139	133	0.10	136	4.4%	NA
Nitrate (as N)	mg/L	3.56	3.54	0.010	3.55	0.6%	NA	0.636	0.640	0.010	0.638	0.6%	NA
Sulfate	mg/L	37.8	37.9	1.0	37.9	0.3%	NA	44.9	46.4	1.0	45.7	3.3%	NA
Total Metals													
Calcium	mg/L	-	-	-	-	-	-	120	121	0.20	121	0.8%	NA
Magnesium	mg/L	-	-	-	-	-	-	29.3	28.9	0.010	29.1	1.4%	NA
Dissolved Metals													
Hardness, Total (as CaCO3)	mg/L	436	436	0.500	436	0.0%	NA	311	311	0.500	311	0.0%	NA
Aluminum	mg/L	<0.0050	<0.0050	0.0050	-	-	-	<0.0050	<0.0050	0.0050	-	-	-
Antimony	mg/L	<0.00020	<0.00020	0.00020	-	-	-	0.00030	0.00029	0.00020	0.00030	NA	0.05
Arsenic	mg/L	0.00197	0.00202	0.00050	0.00200	NA	0.10	0.00080	0.00074	0.00050	0.00077	NA	0.12
Barium	mg/L	0.0178	0.0177	0.0050	0.0178	NA	0.02	0.0213	0.0213	0.0050	0.0213	NA	0.00
Beryllium	mg/L	<0.00010	<0.00010	0.00010	-	-	-	<0.00010	<0.00010	0.00010	-	-	-
Bismuth	mg/L	<0.00010	<0.00010	0.00010	-	-	-	<0.00010	<0.00010	0.00010	-	-	-
Boron	mg/L	0.058	0.057	0.0500	0.058	NA	0.01	0.353	0.353	0.0500	0.353	0.0%	NA
Cadmium	mg/L	0.000056	0.000053	0.000010	0.000055	5.5%	NA	0.000044	0.000045	0.000010	0.000045	NA	0.10
Calcium	mg/L	110	110	0.20	110	0.0%	NA	87.7	88.6	0.20	88.2	1.0%	NA
Chromium	mg/L	<0.00050	<0.00050	0.00050	-	-	-	<0.00050	<0.00050	0.00050	-	-	-
Cobalt	mg/L	0.00050	0.00050	0.00010	0.00050	0.0%	NA	0.00060	0.00054	0.00010	0.00057	10.5%	NA
Copper	mg/L	0.00158	0.00156	0.00040	0.00157	NA	0.05	0.00640	0.00633	0.00040	0.00637	1.1%	NA
Iron	mg/L	<0.010	<0.010	0.010	-	-	-	0.045	0.041	0.010	0.043	NA	0.40
Lead	mg/L	<0.00020	<0.00020	0.00020	-	-	-	<0.00020	<0.00020	0.00020	-	-	-
Lithium	mg/L	0.0184	0.0187	0.00010	0.0186	1.6%	NA	0.0132	0.0134	0.00010	0.0133	1.5%	NA
Magnesium	mg/L	39.0	39.1	0.010	39.1	0.3%	NA	22.3	21.8	0.010	22.1	2.3%	NA
Manganese	mg/L	0.0803	0.0799	0.00020	0.0801	0.5%	NA	0.241	0.239	0.00020	0.240	0.8%	NA
Mercury	mg/L	<0.000010	<0.000010	0.000010	-	-	-	<0.000010	<0.000010	0.000010	-	-	-
Molybdenum	mg/L	0.00172	0.00156	0.00010	0.00164	9.8%	NA	0.00040	0.00038	0.00010	0.00039	NA	0.20
Nickel	mg/L	0.00292	0.00294	0.00040	0.00293	0.7%	NA	0.0037	0.00353	0.00040	0.0036	4.7%	NA
Phosphorus	mg/L	0.074	0.079	0.050	0.077	NA	0.10	0.075	0.073	0.050	0.074	NA	0.04
Potassium	mg/L	2.53	2.52	0.10	2.53	0.4%	NA	9.82	9.61	0.10	9.72	2.2%	NA
Selenium	mg/L	0.00088	0.00096	0.00050	0.00092	NA	0.16	<0.00050	<0.00050	0.00050	-	-	-
Silicon	mg/L	13.5	14.0	1.0	13.8	3.6%	NA	13.4	13.2	1.0	13.3	1.5%	NA
Silver	mg/L	<0.000050	<0.000050	0.000050	-	-	-	<0.000050	<0.000050	0.000050	-	-	-
Sodium	mg/L	57.1	57.3	0.10	57.2	0.3%	NA	79.8	78.2	0.10	79.0	2.0%	NA
Strontium	mg/L	0.638	0.627	0.0010	0.633	1.7%	NA	0.570	0.564	0.0010	0.57	1.1%	NA
Sulfur	mg/L	13.5	13.4	3.0	13.5	NA	0.03	13.5	13.2	3.0	13.4	NA	0.10
Tellurium	mg/L	<0.00050	<0.00050	0.00050	-	-	-	<0.00050	<0.00050	0.00050	-	-	-
Thallium	mg/L	<0.000020	<0.000020	0.000020	-	-	-	<0.000020	<0.000020	0.000020	-	-	-
Thorium	mg/L	<0.00010	<0.00010	0.00010	-	-	-	<0.00010	<0.00010	0.00010	-	-	-
Tin	mg/L	<0.00020	<0.00020	0.00020	-	-	-	<0.00020	<0.00020	0.00020	-	-	-
Titanium	mg/L	<0.0050	<0.0050	0.0050	-	-	-	<0.0050	<0.0050	0.0050	-	-	-
Tungsten	mg/L	<0.0010	<0.0010	0.0010	-	-	-	<0.0010	<0.0010	0.0010	-	-	-
Uranium	mg/L	0.00914	0.00908	0.00002	0.00911	0.7%	NA	0.000761	0.00075	0.00002	0.00076	1.5%	NA
Vanadium	mg/L	0.0106	0.0104	0.0010	0.0105	1.9%	NA	0.0013	0.0015	0.0010	0.0014	NA	0.20
Zinc	mg/L	<0.0040	<0.0040	0.0040	-	-	-	<0.0040	<0.0040	0.0040	-	-	-
Zirconium	mg/L	0.00015	0.00019	0.00010	0.00017	NA	0.40	0.00028	0.00025	0.00010	0.00027	NA	0.30

Notes:
Laboratory Reporting Limit indicates the minimum concentration that could be measured by laboratory instrumentation for a specific sample.
Mean indicates the mean or average value calculated of a field duplicate pair (the FDA and the FD).
Relative Percent Difference is calculated when the mean value is greater than five times the laboratory reporting limit; Golder's internal QA/QC target is less than 20%.
Difference Factor is calculated when the mean value is less than five times the laboratory reporting limit; Golder's internal QA/QC target is less than 2.
NA = Not applicable
FDA = Field duplicate available
FD = Field duplicate
QA/QC = Quality assurance/quality control
<0.0050 indicates concentration is less than the laboratory reporting limit
40% indicates the parameter analysed exceeds Golder's internal QA/QC targets; refer to report.

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