REPORT

2020 Monitoring Report

Westside Landfill, West Kelowna, BC

Submitted to:

Regional District of Central Okanagan

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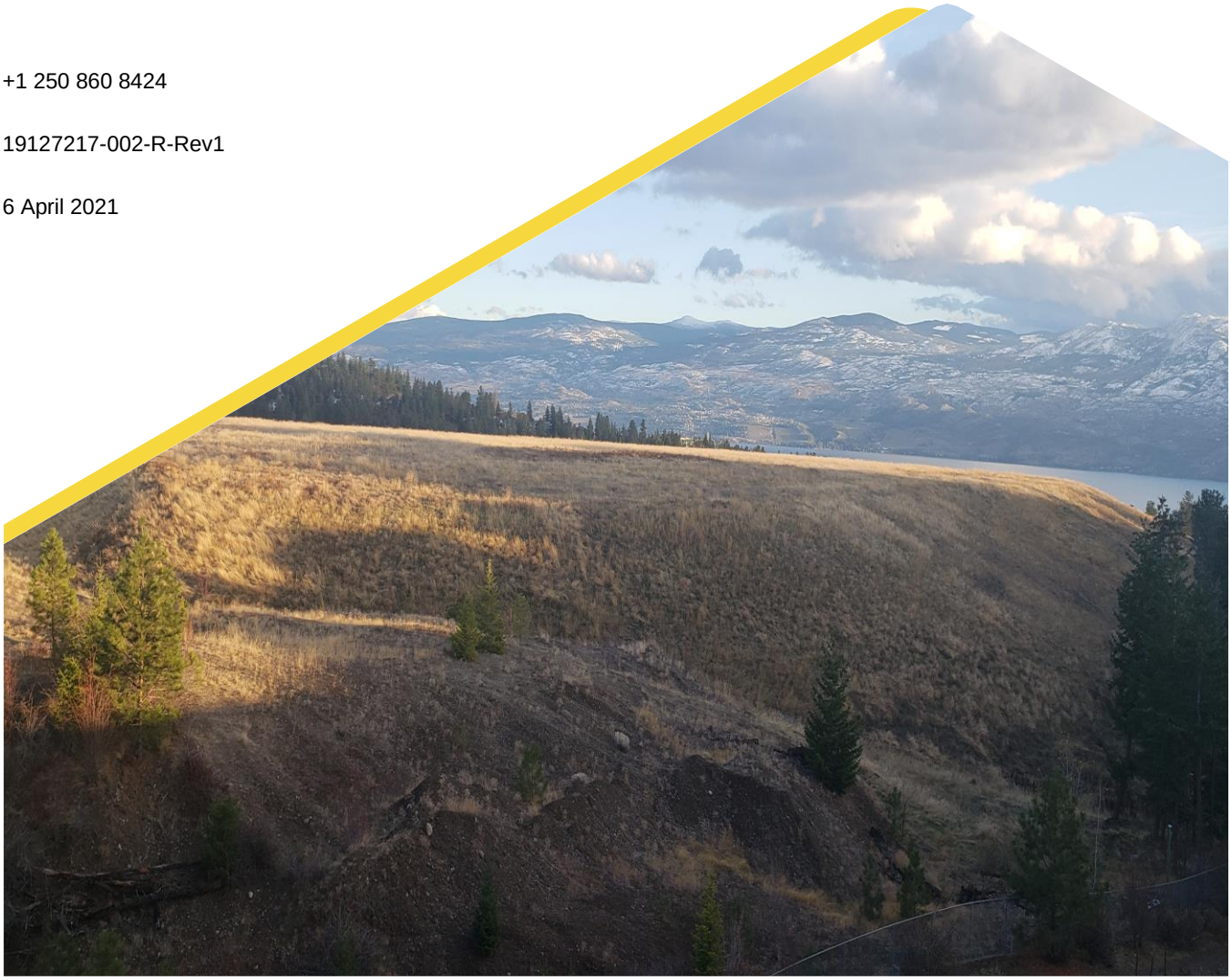

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1.0 INTRODUCTION

Golder Associates Ltd. (Golder) was retained by the Regional District of Central Okanagan (RDCO) to provide support services for the 2020 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 (Golder 2015), and has been accepted by the ENV, as confirmed in a letter dated 6 September 2017 (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.

Monitoring of the Site was carried out as initially outlined in OC PR PR#12217, with modifications over the years. The current monitoring program follows recommendations outlined in the Closure Plan (Golder 2015), but with some modifications, as will be discussed further 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 2020. Golder reviewed results from each landfill gas monitoring round 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 2020. This report summarizes the results of these inspection and monitoring activities and provides recommendations for adjustments.

[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. The regulatory environment has evolved since initial permitting. With the acceptance of the Closure Plan (Golder 2015) by the ENV in September 2017 (see Appendix A) the monitoring and inspection requirements outlined in that document became effective. As outlined in the Closure Plan, monitoring results will be 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. 131/2020 and BC Reg. 161/2020, updated to 1 February 2021]).

An additional regulation applicable to environmental investigations is the BC Groundwater Protection Regulation (BC Reg. 152/2016, including amendments up to BC Reg 152/2016, 10 June 2016). 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 1 December 2020).

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,* Version 2.0 (dated 31 October 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.

In 2017, there were significant updates to the CSR which included changes to select CSR DW standards and the addition of new CSR DW standards for some parameters that previously did not have any CSR DW standards including cobalt, lithium and strontium.

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 CSR DW standards for iron and manganese are only applicable to the Schedule 2 activities listed in respective footnotes of CSR Schedule 3.2 Generic Numerical Water Standards. 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.

Aquatic Life

Shannon Lake is located approximately 300 m to the east/northeast of the Site; however, previous investigations[2] have ruled out Shannon Lake as a receptor of groundwater from the Site. 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[3], 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[4] provides options for establishing a local background concentration in groundwater for use in the investigation and remediation of a contaminated site, where naturally occurring substance concentrations exceed the generic numerical water standards of the CSR. Protocol 9 provides background concentrations for inorganics from ENV's background groundwater database for three regions, including the Thompson Okanagan Region. However, the Site is located just outside of the Thompson-Okanagan Region boundaries shown in iMapBC; therefore, the Regional Background Concentration Estimates have not been applied to this assessment, with the exception of cobalt. Protocol 9 (Table 1) states that the interim cobalt value of 20 µg/L (0.02 mg/L) may be applied to the remaining regions in the province.

[2] Golder Associates Ltd. 2015. Closure Plan, Westside Landfill, West Kelowna, BC. 12 May 2015.

[3] https://www.alc.gov.bc.ca/alc/content/alr-maps/maps-and-gis

[4] The regional background concentrations provided in Protocol 9 recently replaced ENV Technical Bulletin 3: Regional Background Concentrations for Select Inorganic Substances in Groundwater (24 September 2018).

3.0 HYDROLOGY AND HYDROGEOLOGY

Based on available information and previous reports, the regional direction of groundwater flow is inferred to be towards the south to southeast (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 2014) 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, and were undertaken in 2018. This area was observed during the Site inspection in November 2020, as discussed further 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 reports, 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, 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 2020, and depth to groundwater was measured by RDCO staff in January, February, March, April, May, August, November and December 2020. 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 2020 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 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, hardness, alkalinity, chloride, sulphate, ammonia nitrogen, nitrate nitrogen and dissolved metals.

In the Closure Plan (Golder 2015), a well formerly used for background monitoring (Dobbin's Well) was destroyed and Golder considered options for replacing this monitoring well. Golder suggested that an existing monitoring well, MW99-2[5], would be suitable as a background monitoring well, and in 2016, Golder recommended MW99-2 be monitored for one year to assess whether it would be suitable to serve as a background monitoring well, subject to ENV approval. Based on the 2016 assessment, MW99-2 has been included in the groundwater quality monitoring program.

4.3 Landfill Gas Monitoring

The 2020 landfill gas monitoring program was conducted by RDCO staff. Complete monitoring events were completed in January, February, March, April, May, August, November and December of 2020, and partial sampling events in key locations were completed in June, July, September and October of 2020. The vapour monitoring locations are shown on Figure 3.

4.4 Groundwater Elevation Data

Groundwater depths were measured for selected wells in January, February, March, April, May, August, November and December 2020. Additional water level measurements were made, or attempted, for the groundwater wells: BH-1, BH-2, BH-3, BH-4, BH-5, BH-7, BH-8, and MW99-2.

[5] MW99-2 was only used for landfill gas monitoring prior to 2016.

4.5 Monitoring Well Survey

A survey of both 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.

5.0 RESULTS

The 2020 Site inspection, groundwater quality, landfill gas monitoring and water level results are discussed in the following sections.

5.1 Site Inspection

The 2020 Site inspection was conducted on 19 November 2020 by Mackenzie Scherer of Golder.

No issues of immediate concern were identified during the 2020 Site inspection; however, several integrity issues were noted, including:

- damage to the fencing by a fallen tree along the western property boundary (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 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 footprint 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 2014), did not contain any water during the Site inspection.

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

Photo 2: Westside Landfill vegetation cover facing south.

5.2 Groundwater Quality

The CARO laboratory Certificate of Analysis (COA) reports for the groundwater samples collected at the Site in May and November 2020 are included in Appendix B. Groundwater sampling and submission of the samples to CARO was completed by RDCO staff in 2020. The analytical results were provided to Golder by the RDCO for preparation of this report. The 2020 groundwater analytical results compared to the CSR DW standards are presented in Table C-1 in Appendix C.

5.2.1 Groundwater Monitoring Results Relative to CSR DW Standards

A summary of the 2020 groundwater analytical results is provided in Figure 4 (May 2020) and Figure 5 (November 2020). 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. The analytes are arranged in ascending order of concentration (approximately) to make reading 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). 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.

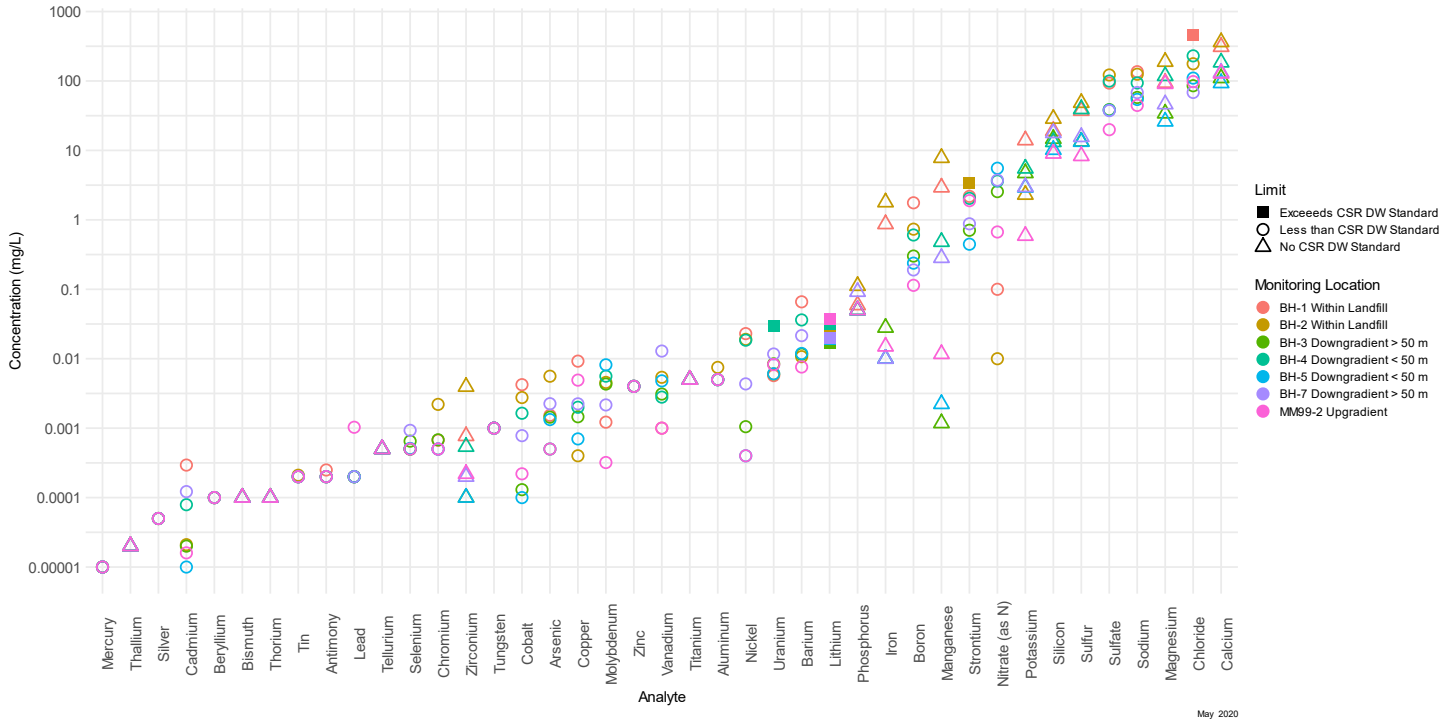


Figure 4: Groundwater Quality Summary, May 2020

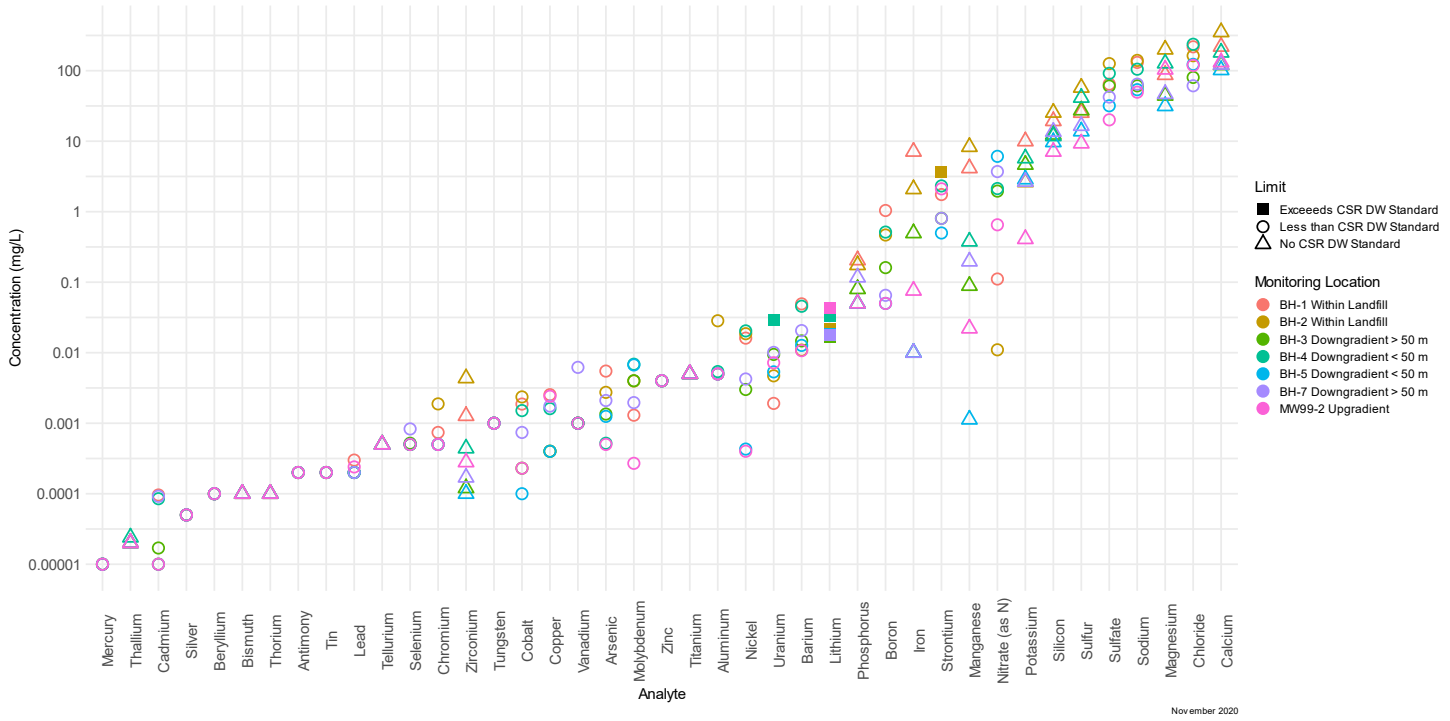


Figure 5: Groundwater Quality Summary, November 2020

The parameters that exceed the CSR DW limits in the May and November 2020 sampling rounds are summarized in Table 1[6].

Table 1: CSR Drinking Water Exceedances, 2020

Parameter	CSR DW Standard	Within Landfill		Downgradient (< 50 m)		Downgradient (> 50 m)		Upgradient
		BH-1	BH-2	BH-4	BH-5	BH-3	BH-7	MW99-2
May 2020								
Chloride	250	460	-	-	-	-	-	-
Lithium	0.008	0.0270	0.0218	0.0314	0.0193	0.0167	0.0196	0.0368
Strontium	2.5	-	3.40	-	-	-	-	-
Uranium	0.02	-	-	0.0299	-	-	-	-
November 2020								
Lithium	0.008	0.0193	0.0220	0.0330	0.0185	0.0166	0.0180	0.0425
Strontium	2.5	-	3.60	-	-	-	-	-
Uranium	0.02	-	-	0.0292	-	-	-	-

Values expressed in milligrams per litre (mg/L), "-" indicates no CSR DW exceedance.

- **Chloride:** The CSR DW standard for chloride[7] was exceeded in May 2020 at BH-1, one of the two monitoring wells located within the landfill Site. No other exceedances of the CSR DW standard for chloride were reported in 2020.
- **Lithium:** The CSR DW standard for lithium was exceeded at seven monitoring wells sampled in 2020, including the upgradient background well. The lithium concentrations at the landfill monitoring wells ranged from 0.0167 mg/L to 0.0368 mg/L (with the highest concentration reported at the background well), compared to the CSR DW standard of 0.008 mg/L. Although the Regional Background Estimates presented in Protocol 9 cannot be applied to the Site, it is noted that the background lithium estimate for the Thompson Okanagan is 0.096 mg/L. Based on the range of concentrations at the Site (including the upgradient monitoring well), it is inferred that the lithium concentrations reported at the Site are representative of background conditions.
- **Strontium:** The CSR DW standard for strontium was exceeded at BH-2, located within the landfill, in May and November 2020. No other exceedances of the CSR DW standard for strontium were reported in 2020. Although the Regional Background Estimates presented in Protocol 9 cannot be applied to the Site, it is noted that the strontium concentration at BH-2 (3.40 mg/L) is lower than the background estimate for strontium in the Thompson Okanagan of 47 mg/L.

[6] Since the cobalt groundwater concentrations in 2020 were less than the interim provincial background concentration (ENV 2021), no further discussion on cobalt is provided in this report.

[7] The CSR 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".

- **Uranium:** The CSR DW standard for uranium was exceeded at BH-4, located downgradient within 50 m of the landfill boundary, in May and November 2020. No other exceedances of the CSR DW standard for uranium were reported in 2020. Although the Regional Background Estimates presented in Protocol 9 cannot be applied to the Site, it is noted that the uranium concentration at BH-4 (0.0292 mg/L) is lower than the background estimate for uranium in the Thompson Okanagan of 0.087 mg/L. Uranium is not expected to be part of municipal waste, and thus, the uranium at BH-4 is likely not due to leaching from the landfill and is inferred to be representative of background conditions.

The results summarized above suggest that any impacts of the landfill on groundwater sufficient to cause exceedances of the CSR DW standards are confined within the landfill footprint. Furthermore, groundwater concentrations of several parameters (lithium and uranium) exceeding the CSR DW standards are inferred to be representative of background groundwater quality based on the concentration in the upgradient monitoring well and Protocol 4 Regional Estimates for the Thompson Okanagan Region.

5.2.2 Groundwater Results Relative to Historical Data (Trend Analyses)

Analyses of some key parameters that may be indicative of impacts from landfill leachate are presented in this section, including chloride, ammonia, nitrate plus nitrite, iron and manganese. 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.

The times-series of values for the key parameters listed above are provided in Figure 6. The results are separated according to monitor 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.

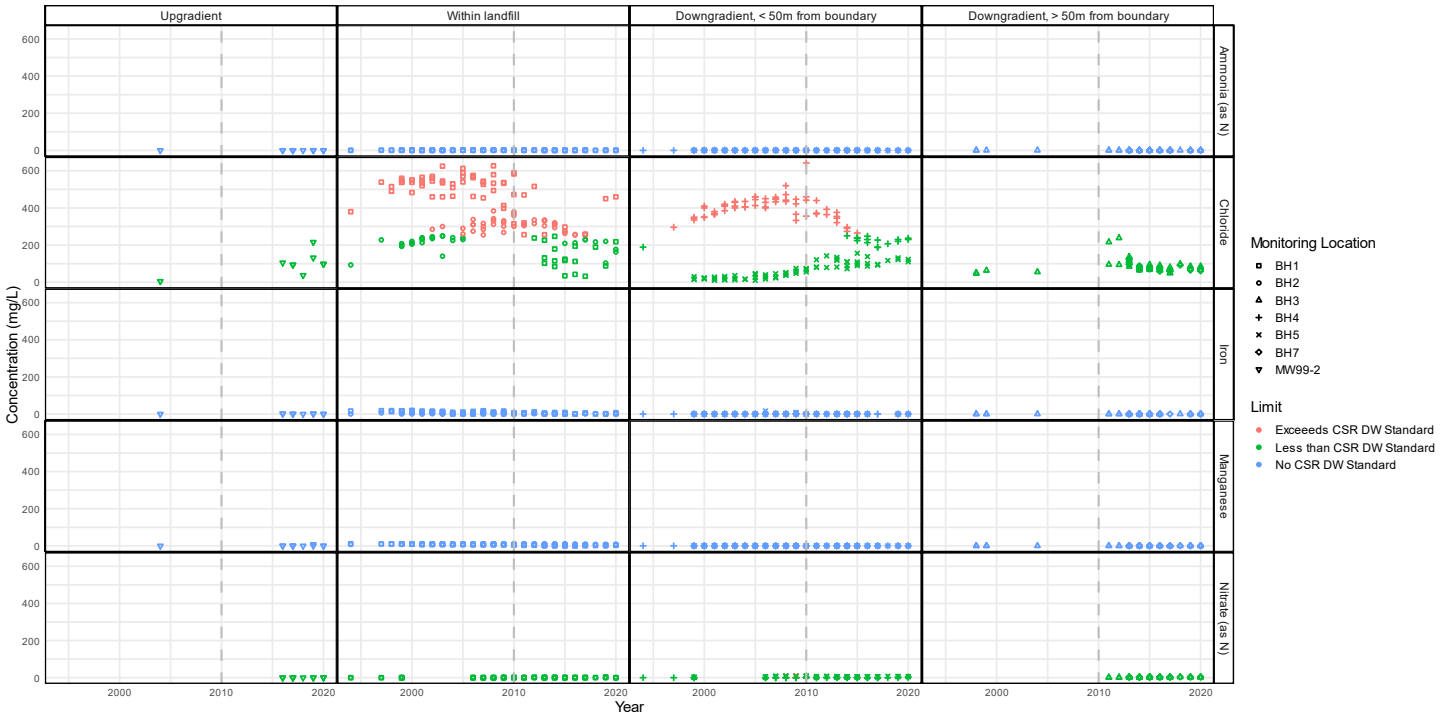


Figure 6: Values of Key Parameters Over Time

As shown in Figure 6, the values of the selected parameters are 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. With the exception of nitrate, the concentrations of these key indicators have been generally declining after the cessation of filling in 2010 in wells within the landfill and wells in downgradient locations less than 50 m from the Site boundary. It should be 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 these parameters follows.

5.2.2.1 Chloride

Chloride concentrations can become elevated from leachate impacts; however, chloride occurs naturally in groundwater and there are other sources of this parameter, including road salt and septic influences. Higher 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 (see Figure 6) and are also elevated in the downgradient wells within 50 m of the Site boundary. The lowest chloride concentrations are generally in the upgradient well and the downgradient wells located more than 50 m from the Site boundary.

Both wells (BH1 and BH2) located within the landfill limits show a decline after filling ceased in 2010, as do concentrations in BH4, located downgradient within 50 m of the Site boundary. The concentrations in BH5, located downgradient within 50 m of the Site boundary, showed a slow increase from before the cessation of filling in 2010 to a few years after, and in recent years has been roughly steady at a concentration well below the CSR DW standard of 250 mg/L. These observations are consistent with there being some impact on chloride concentrations in groundwater, which have been decreasing since filling ceased in 2010, and also 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 results so far are consistent with that expectation. In 2020, none of the downgradient wells had chloride concentrations above the CSR-DW standard.

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.

As the results presented in Figure 6 show, ammonia (which has no CSR DW standard) concentrations are elevated at within landfill wells (BH1 and BH2). Concentrations are low in wells located both upgradient and downgradient of the landfill. This is consistent with ammonia being released due to composition of organic matter under low oxygen conditions. Ammonia may be oxidized, at least in part, to nitrate. As shown in Figure 6, nitrate levels are relatively low at the wells located within the landfill, and higher in downgradient wells, particularly those located within 50 m of the Site boundary. This pattern is consistent with ammonia being released from decomposition of waste and then being oxidized to nitrate downgradient from the landfill.

Ammonia concentrations in the wells within the landfill have been generally declining since 2010. The trends in concentrations of nitrate after 2010 in downgradient wells are less clear than for ammonia, but do not appear to be increasing.

It should be noted that there is no CSR DW standard for ammonia, and also that nitrate levels have not exceeded the CSR DW standard in any well since circa 2010.

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.

Iron and manganese concentrations are elevated in the wells within the landfill relative to other locations, especially after 2010. This pattern is consistent with iron and manganese being mobilized in the reducing conditions present in groundwater impacted by anaerobic conditions within the landfill, with concentrations being lower in more oxidizing conditions downgradient of the landfill. Manganese was above the CSR DW at the upgradient well, MW99-2, in May of 2019. It is expected that this is due to reducing conditions present upgradient of the landfill.

5.3 Landfill Gas Monitoring

A landfill gas management plan (LGMP) was developed in consultation with representatives of the 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 wells that were located north of the Site boundary on the north side were removed as part of earthworks being completed on that 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 in digital format to Golder for 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% LEL, while the action level for the *Near-Boundary* and *Outside-Boundary* vapour wells is 10%.

The 2020 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 results for 2020 are presented in Table C-2 provided in Appendix C. In 2020, methane levels in two vapour wells exceeded their associated action levels:

- The methane measurements in BH102 (*Inside-Boundary* vapour well) in January, February, and March exceeded 25% LEL.
- The methane measurement in VP07-15 in March exceeded 10%.

In 2020, three additional monitoring events were required due to methane levels being elevated above the associated action levels at BH102 and VP07-15 during the monitoring event on 9 March 2020. The methane levels in the associated step-out vapour wells for BH102, VP07-02 and VP15-01, were below the action level; however, there are no step-out vapour wells for VP07-15. As such, Golder requested that the following vapour wells be monitored on 10 March 2020: BH102, VP07-02, VP07-15, VP15-01, VP15-02, and VP15-03. As per the methane action plan, prior to re-sampling, the instrument was recalibrated, and the calibration was checked before and after the re-sampling event. The results of the monitoring on 10 March 2020 indicated that the methane level in BH102 was still elevated above the associated action level; however, the methane levels at VP07-02, VP07-15, and VP15-01 were below the action level. It was inferred that the elevated methane readings at VP07-02, VP15-01, and VP07-15 on 9 March 2020 were likely associated with instrument calibration drift resultant of the high reading at BH102. To confirm the readings collected on 10 March 2020, two additional monitoring events were completed on 12 March and 16 March 2020 at BH102, VP07-02, VP07-15, VP15-01, VP15-02, and VP15-03.

The results of the monitoring on 12 and 16 March 2020 indicated that the concentration of methane at BH102 was still elevated; however, methane levels at the two associated step-out vapour wells (VP07-02 and VP15-01) and VP07-15 were below the action level. Thus, the results of the three additional monitoring events were considered valid and it was deemed no further action was required.

Methane levels are the most critical at this Site since they pose the greatest potential risk as methane is 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 results for methane are discussed further in the following Section 5.3.1. The other landfill gas concentrations measured include hydrogen sulphide, carbon dioxide and oxygen; the results for these gases 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%. Methane readings greater than these action levels reported in 2020 are summarized in Table 2 by location. It is noted that the three additional monitoring events conducted in March 2020 were not considered in the preparation of Table 2.

Table 2: Exceedances of Methane Action Levels, 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	3 (BH102)	1 (VP07-15)[1]	-
South	0	-	-
West	0	0	0

1. It was inferred that the elevated methane reading at VP07-15 on 9 March 2020 was likely associated with instrument calibration drift resultant of the high reading at BH102.

"-" Indicates no associated vapour wells.

As indicated in Table 2, there were three action level exceedances at *Inner-Boundary* vapour well BH102 and one action level exceedance at *Near-Boundary* vapour well VP07-15 (on the east side of the landfill) in 2020. There were no action level exceedances reported at *Outside-Boundary* vapour wells in 2020. The dates and locations of the exceedances are summarized in Table 3, along with associated carbon dioxide and oxygen readings.

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

Monitor	Date	Action Level (% LEL)	Methane (%LEL)	Carbon Dioxide (%)	Oxygen (%)
BH102	27 January 2020	25	100	12.7	0.7
BH102	3 February 2020	25	31	13.8	1.7
BH102	9 March 2020	25	100	26	0
VP07-15[1]	9 March 2020	10	13	9.6	8.9

1. It was inferred that the elevated methane reading at VP07-15 on 9 March 2020 was likely associated with instrument calibration drift resultant of the high reading at BH102.

There are three associated step-out vapour wells (VP07-02, VP15-01, and VP15-02[8]) associated with BH102; there are no step-out vapour wells associated with VP07-15. As indicated in Section 5.3, three additional monitoring events were conducted in March of 2020 due methane readings above the associated action levels at BH102 and VP07-15. Following the additional monitoring events, it was inferred that the elevated methane reading at VP07-15 on 9 March 2020 was likely associated with instrument calibration drift resultant of the high reading at BH102.

The maximum value of methane 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.

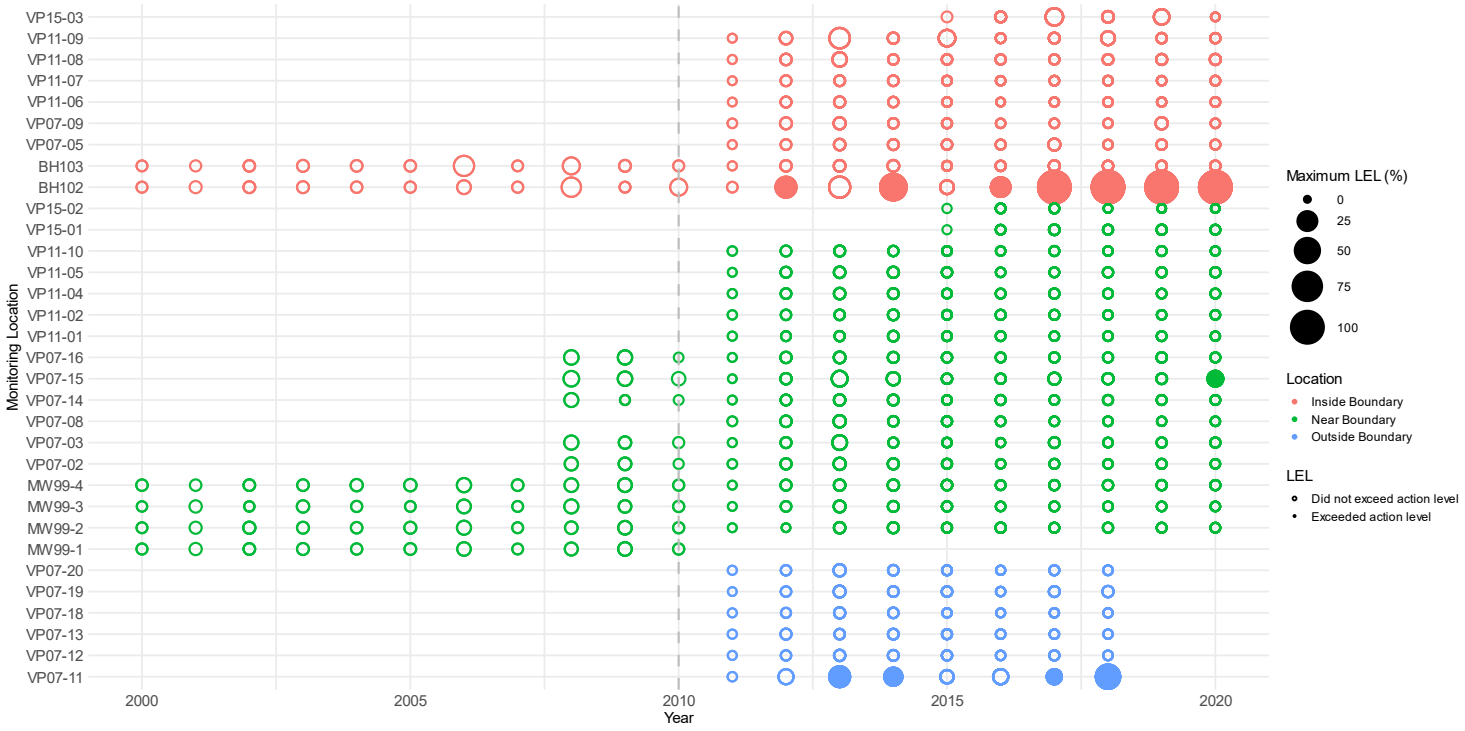


Figure 7: Maximum Methane Levels, by Vapour Well and Year

[8] It is noted that RDCO have frequently encountered difficulty in collecting samples from VP15-02 due to high purge back pressure.

5.3.2 Other Landfill Gases

The median, maximum and minimum measurements of hydrogen sulfide (H_2S), oxygen (O_2), and carbon dioxide (CO_2) measured in 2020 are summarized in Table 4.

Table 4: Median, maximum and minimum measurements of other landfill gases in 2020

Gas	Median	Maximum	Minimum
H_2S (ppm)	0	0	0
O_2 (%)	19.4	20.9	0.0
CO_2 (%)	1.2	26.0	0.0

Hydrogen sulfide values measured in 2020 were below the instrument detection limit, as has been the case in most previous years. Oxygen and carbon dioxide levels vary considerably between 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 levels, which was the case in 2020. Carbon dioxide has historically varied from the lower detection level of the instrument up to a maximum of 37% in BH102. In 2020, the maximum carbon dioxide measurement at BH102 was just 26%.

5.4 Groundwater Elevations

The depth to groundwater and calculated groundwater elevations from the 2020 monitoring events are presented in Table C-3 of Appendix C. The groundwater elevations recorded in 2020 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 2020 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.

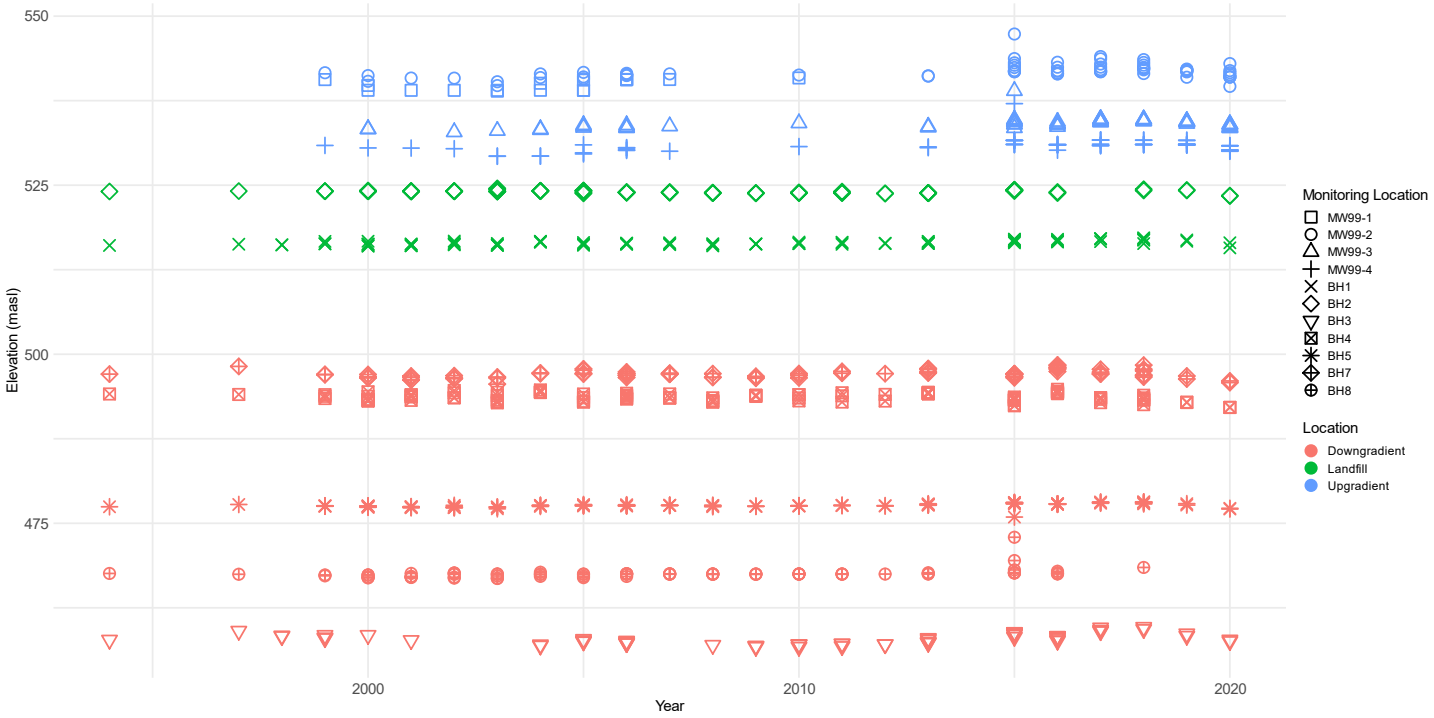


Figure 8: Groundwater Elevations, by Well

5.5 Quality Assurance / Quality Control (QA/QC)

The results of the Quality Assurance / Quality Control (QA/QC) program are provided in Appendix D; tabulated duplicate results are presented in Table C-4 in Appendix C. No field or laboratory QA/QC issues that would adversely affect interpretation of the data or identifying exceedances of relevant standards were identified.

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: groundwater monitoring and sampling, and landfill gas monitoring. The key results from each component are summarized below.

6.1 Groundwater

As discussed in Section 5.2.2, groundwater quality for parameters selected as potential indicators of contamination (including chloride, ammonia, nitrate/nitrite, iron, and manganese) appears to be generally improving in the downgradient wells. The trend to lower concentrations started around 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.

The revised CSR DW standards in 2017 introduced new groundwater exceedances for several parameters at the Site, including cobalt[9], lithium and strontium. Groundwater concentrations of these parameters exhibit similar concentrations in monitoring wells located upgradient and downgradient of the landfill.

The concentration of uranium at downgradient well BH-4 exceeded the CSR DW standard in 2020. Although the Regional Background Estimates presented in Protocol 9 cannot be applied to the Site, it is noted that the uranium concentration at BH-4 (0.0292 mg/L) is lower than the background estimate for uranium in the Thompson Okanagan of 0.087 mg/L. Uranium is not expected to be part of municipal waste, and thus, the uranium at BH-4 is likely not due to leaching from the landfill and is inferred to be representative of background conditions.

The results suggest that any impacts of the landfill on groundwater sufficient to cause exceedances of the CSR DW standards are confined within the landfill footprint and a limited distance (i.e., 50 m) downgradient. Furthermore, groundwater concentrations of lithium and uranium exceeding the CSR DW standards are inferred to be representative of background groundwater quality based on the concentration in the upgradient monitoring well and Protocol 4 Regional Estimates for the Thompson Okanagan Region.

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. In 2020, methane levels in two vapour wells exceeded their associated action levels:

- The methane measurements in BH102 (*Inside-Boundary* vapour well) in January, February, and March exceeded 25% LEL.
- The methane measurement in VP07-15 in March exceeded 10%.

[9] Although the Regional Background Concentration Estimates cannot be applied to the Site since the Site is located outside of the mapped Thompson Okanagan Region, Protocol 9 states that the interim cobalt value of 20 µg/L (0.02 mg/L) may be applied to the remaining regions in the province.

As detailed in Section 5.3, it was inferred that the elevated methane reading at VP07-15 recorded on 9 March 2020 was likely associated with instrument calibration drift resultant of the high reading at BH102. As such, similar to previous years, BH102 was the only monitor where any methane levels exceeded the associated action level.

The concentrations of hydrogen sulphide reported in 2020 were below the instrument detection limits, while the concentrations of carbon dioxide and oxygen varied considerably 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. No changes in the monitoring and inspection plan were anticipated until sufficient post-closure monitoring has been conducted to determine if the closure works affected methane (or other potentially problematic landfill gases) adversely.

An Updated Landfill Monitoring Program has been prepared by Golder[10] and is under review with ENV[11]. Recommendations provided in the 2020 Updated Landfill Monitoring Program included:

- Replace 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 BH1 for EPH, BTEX, VOCs, TDS, BOD and COD and discontinue analysis at BH1 for all other analyses under Section 3.3.4 of OC PR#12217; and discontinue all analysis at BH4 under Sections 3.3.3 and 3.3.4 of OC PR#12217.
- Following two complete years of post-closure monitoring, it is recommended that 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, it is recommended that the Updated LMP requirements be re-assessed following the completion and submission of this report.

[10] Dated 20 June 2020; Golder document reference 19127217-001-R-Rev1

[11] A Landfill Gas Management Plan was prepared in 2013 (Golder 2013). The 2014 Updated Landfill Monitoring Program (LMP) proposed some additional changes to other aspects of site monitoring, in part to reflect the fact that the Site no longer receives waste and was in the process of being closed. The proposed changes to both groundwater and landfill gas monitoring were approved by ENV 2016. Recommendations for changes to the monitoring and inspection plan outlined in the 2015 Closure Plan were formally accepted by ENV in September 2017. No changes in the monitoring and inspection plan were anticipated until sufficient post-closure monitoring has been conducted to determine if the closure works affected methane (or other potentially problematic landfill gases) adversely.

An updated LMP was prepared in 2020 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.

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 2020, 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.

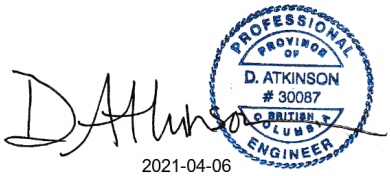
The assessment of environmental conditions and possible hazards at this Site has been made using the results of chemical analysis of discrete groundwater samples from a limited number of locations. The Site conditions between sampling locations have been inferred based on conditions observed at borehole, 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.

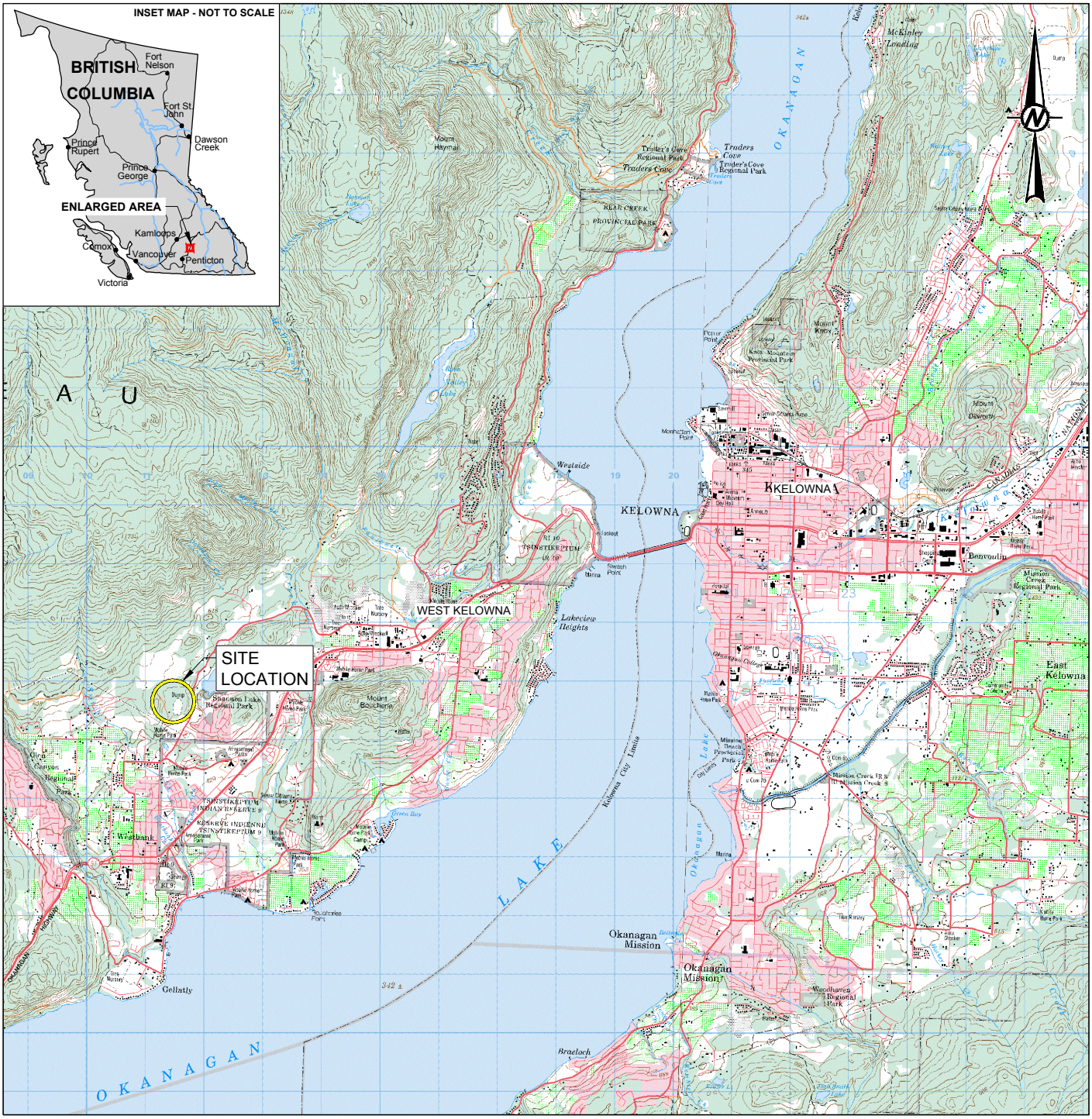


Mackenzie Scherer, BSc, CIT
Junior Geoscientist

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

MS/DVA/asd

https://golderassociates.sharepoint.com/sites/112657/project files/6 deliverables/issued to client_for wp/19127217-002-r-rev1/19127217-002-r-rev1-2020 westside landfill-06apr_21.docx



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.
   PROJECTION: TRANSVERSE MERCATOR DATUM: NAD83
   COORDINATE SYSTEM: UTM ZONE 10

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

CLIENT
REGIONAL DISTRICT OF CENTRAL OKANAGAN

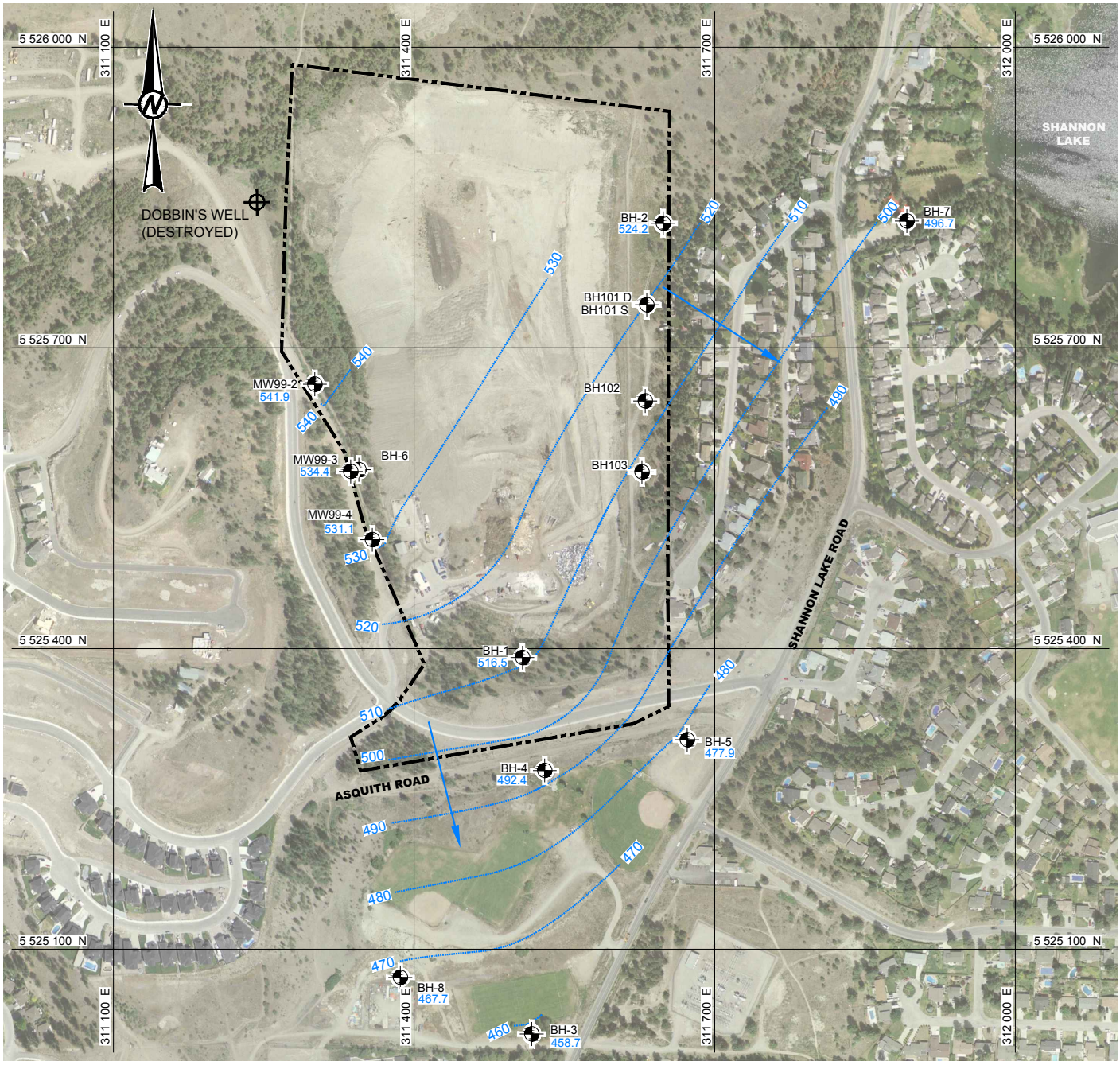
CONSULTANT
GOLDER

YYYY-MM-DD	2021-02-25
PREPARED	R. MARTIN
DESIGN	M. SCHERER
REVIEW	M. SCHERER
APPROVED	D. ATKINSON

PROJECT
2020 LANDFILL MONITORING
WESTSIDE LANDFILL
WEST KELOWNA, BC

TITLE
KEY PLAN

PROJECT No.	PHASE/DOC#	Rev.	FIGURE
19127217	1000/002	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

0 100 200
1:6,000 METRES

CLIENT
REGIONAL DISTRICT OF CENTRAL OKANAGAN

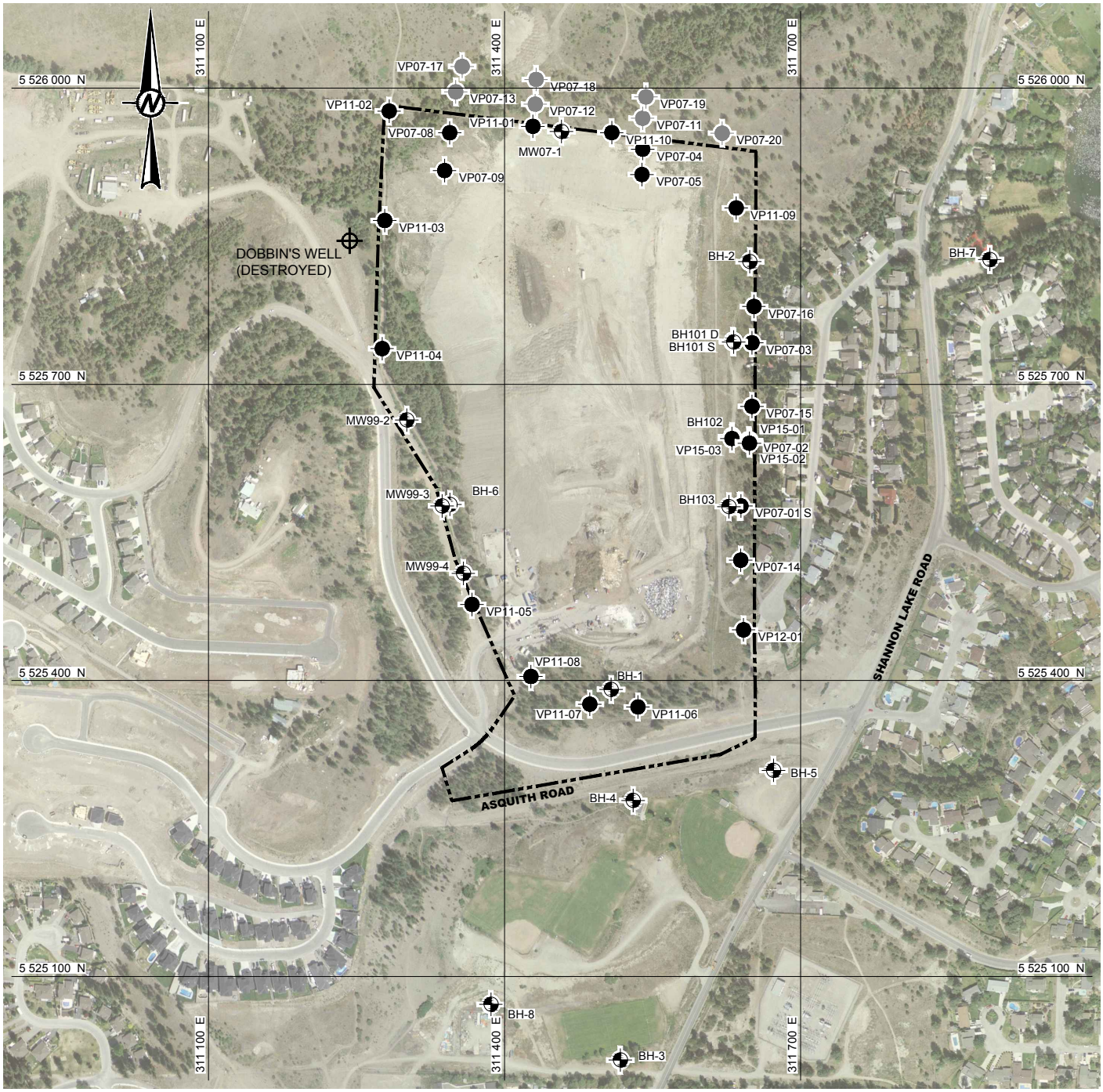
CONSULTANT
GOLDER

YYYY-MM-DD	2021-02-25
PREPARED	R. MARTIN
DESIGN	M. SCHERER
REVIEW	M. SCHERER
APPROVED	D. ATKINSON

PROJECT
2020 LANDFILL MONITORING
WESTSIDE LANDFILL
WEST KELOWNA, BC

TITLE
GROUNDWATER MONITOR LOCATIONS

PROJECT No.	PHASE/DOC#	Rev.	FIGURE
19127217	1000/002	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

0 100 200
1:6,000 METRES

CLIENT
REGIONAL DISTRICT OF CENTRAL OKANAGAN

PROJECT
2020 LANDFILL MONITORING
WESTSIDE LANDFILL
WEST KELOWNA, BC

CONSULTANT
GOLDER

YYYY-MM-DD	2021-02-25
PREPARED	R. MARTIN
DESIGN	M. SCHERER
REVIEW	M. SCHERER
APPROVED	D. ATKINSON

TITLE
GROUNDWATER MONITORING AND SOIL VAPOUR WELL

PROJECT No.	PHASE/DOC#	Rev.	FIGURE
19127217	1000/002	0	3

APPENDIX A

Westside Landfill Operational Certificate Letter

Environmental Management Act Approval of Closure Plan for Westside Landfill (Authorization 122217), 6 September 2017

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

Date Issued: May 28, 1997
Amendment Date:

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 MONITORING AND REPORTING REQUIREMENTS

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.

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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.

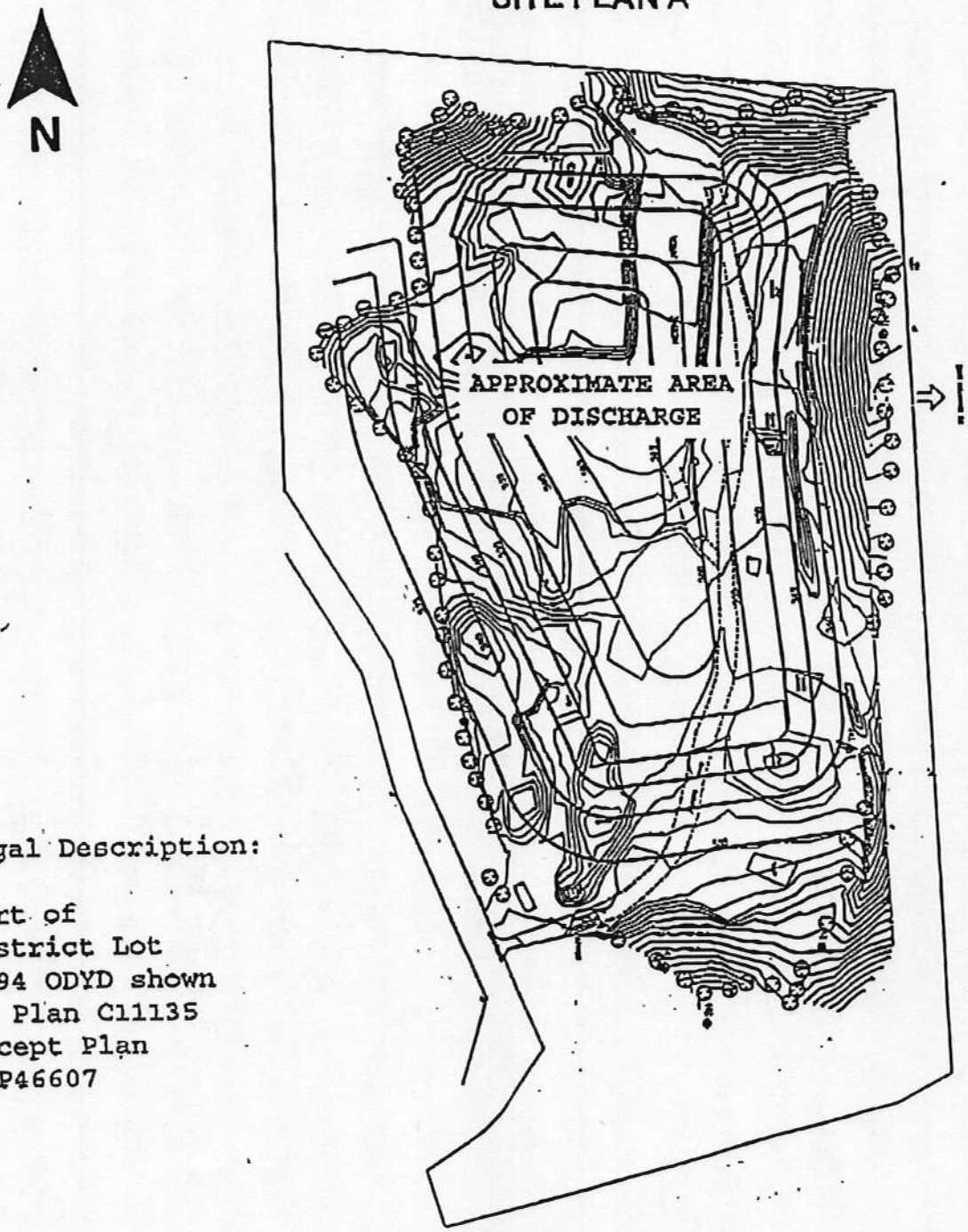
T.R. Forty, P.Eng.
Assistant Regional Waste Manager

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.

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

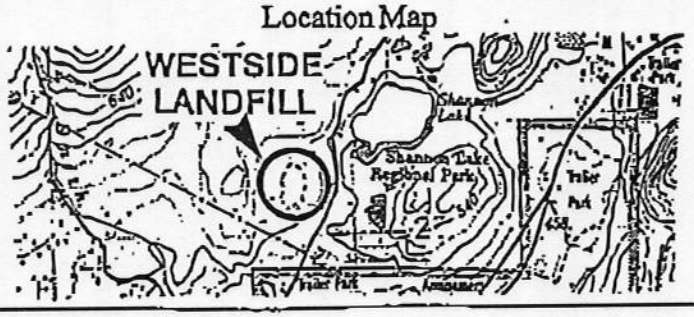
SITE PLAN A



Legal Description:

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

Location Map



OPERATIONAL CERTIFICATE: PR-12217

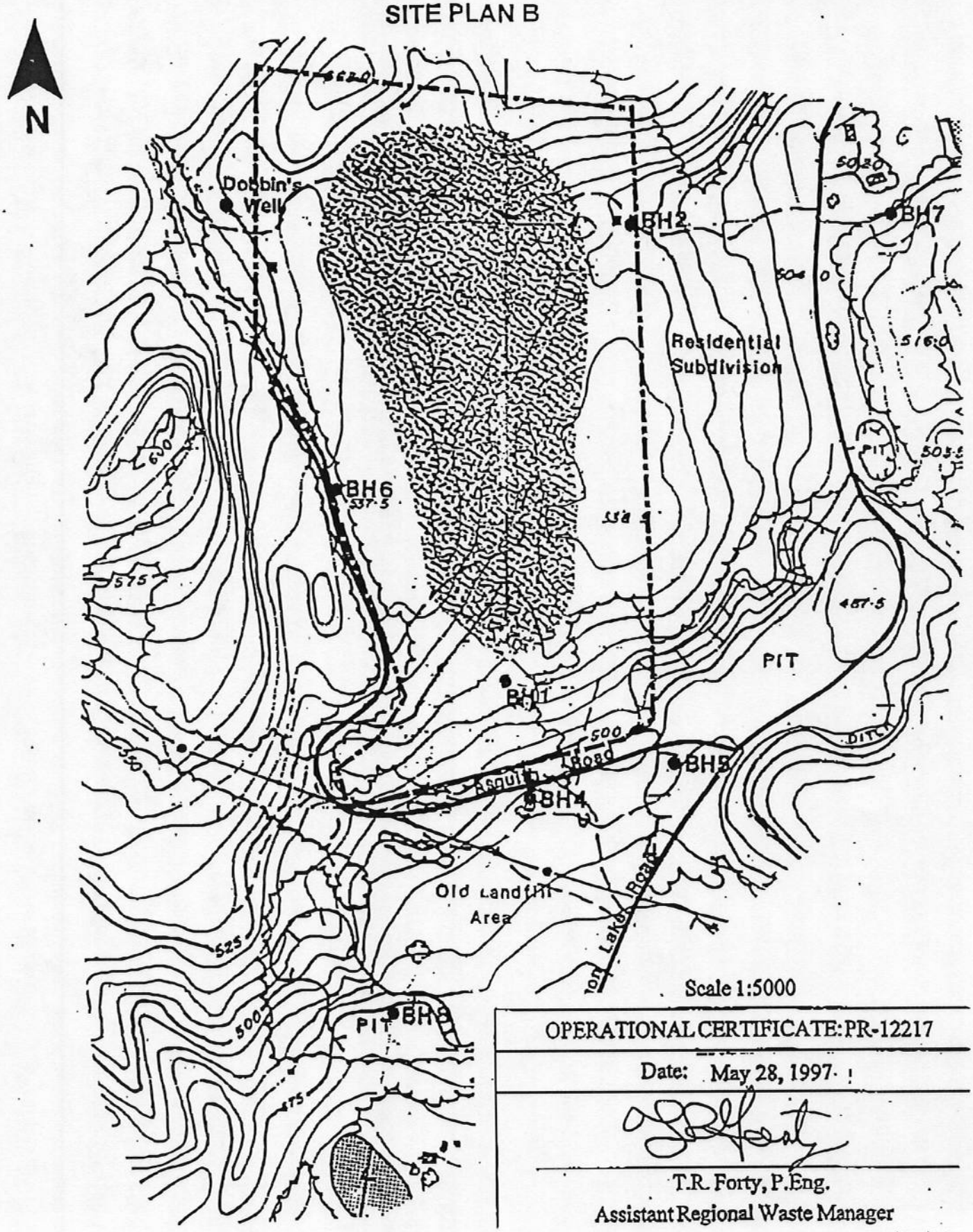
Date: May 28, 1997

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

PROVINCE OF
BRITISH COLUMBIA

Pollution Prevention

SITE PLAN B



Scale 1:5000

OPERATIONAL CERTIFICATE: PR-12217

Date: May 28, 1997

T.R. Forty, P.Eng.

Assistant Regional Waste Manager

September 6, 2017 Authorization Number: 12217

VIA EMAIL: clarke.kruiswyk@cord.bc.ca

Clarke Kruiswyk
Environmental Services Analyst
Regional District of Central Okanagan
1450 KLO Road, Kelowna, BC, V1W 3Z4

Dear Mr. Clarke Kruiswyk:

Re: *Environmental Management Act* approval of Closure Plan for Westside Landfill (Authorization 122217).

Thank you for your email dated March 10, 2016 and submission of the Westside Landfill Closure Plan dated May 12, 2015 by Golder Associates (Report Number 1406505-003-R-Rev0-5000) (the "Closure Plan"). Ministry review of the Closure Plan indicates that it conforms with current ministry policy (Landfill Criteria, 2nd Edition – 2016), and with respect to final cover, it meets the intent of clause 2.11 (Final Cover) of Operational Certificate (OC) 12217. As such, the Closure Plan is hereby approved in accordance with clause 2.4 of the OC, and the detailed final cover requirements included in clause 2.11 are replaced by those contained in the Closure Plan.

The Ministry further acknowledges that OC 12217 should now be updated to reflect the closed status of the site. The Regional District of Central Okanagan is requested to submit an application to amend the current OC to remove requirements that are no longer relevant, and instead incorporate requirements related to ongoing closure and post-closure activities. For reference, the 2016 Landfill Criteria describe the ministry's expectations pertaining to post closure operation and maintenance including but not limited to those in sections 7.4 (Post Closure Operation and Maintenance), 7.4 (Contaminating Lifespan), 9.0 (Monitorimng Criteria), and 10.3.4 (Closure Plan).

Application instructions and forms are available on the Ministry's website at: http://www2.gov.bc.ca/gov/content/environment/waste-management/waste-discharge-authorization/guidance-forms-and-fees.

If you have any questions, please contact Roshan D'Souza, Environmental Protection Officer at 250 354 6365 or email Roshan.Dsouza@gov.bc.ca.

Yours truly,

Digitally signed
by Luc Lachance
Date: 2017.09.06
16:14:04 -07'00'

Luc Lachance, P.Eng.
For Director,
Environmental Management Act

APPENDIX B

CARO Laboratory Certificates of Analysis (COAs)

CERTIFICATE OF ANALYSIS

REPORTED TO	Regional District of Central Okanagan 1450 KLO Road KELOWNA, BC V1W 3Z4		
ATTENTION	Angela Lambrecht	**WORK ORDER**	0051274
PO NUMBER	60167	**RECEIVED / TEMP**	2020-05-14 13:15 / 13°C
PROJECT	Westside Landfill	**REPORTED**	2020-05-26 08:36
PROJECT INFO	041440062	**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 17025:2005 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 acrump@caro.ca

Authorized By:

Alana Crump
Team Lead, Client Service

CARO ANALYTICAL SERVICES

TEST RESULTS

REPORTED TO	Regional District of Central Okanagan	**WORK ORDER**	0051274
PROJECT	Westside Landfill	**REPORTED**	2020-05-26 08:36

Analyte	Result	RL	Units	Analyzed	Qualifier
BHA DUP (0051274-01) | Matrix: Water | Sampled: 2020-05-14 12:25					
Anions					
Chloride	**98.3**	0.10	mg/L	2020-05-15	
Nitrate (as N)	**0.622**	0.010	mg/L	2020-05-15	
Sulfate	**19.7**	1.0	mg/L	2020-05-15	
Calculated Parameters					
Hardness, Total (as CaCO3)	**677**	0.500	mg/L	N/A	
Dissolved Metals					
Lithium, dissolved	**0.0373**	0.00010	mg/L	2020-05-21	
Aluminum, dissolved	**0.0072**	0.0050	mg/L	2020-05-21	
Antimony, dissolved	< 0.00020	0.00020	mg/L	2020-05-21	
Arsenic, dissolved	< 0.00050	0.00050	mg/L	2020-05-21	
Barium, dissolved	**0.0077**	0.0050	mg/L	2020-05-21	
Beryllium, dissolved	< 0.00010	0.00010	mg/L	2020-05-21	
Bismuth, dissolved	< 0.00010	0.00010	mg/L	2020-05-21	
Boron, dissolved	**0.0335**	0.0050	mg/L	2020-05-21	
Cadmium, dissolved	**0.000012**	0.000010	mg/L	2020-05-21	
Calcium, dissolved	**126**	0.20	mg/L	2020-05-21	
Chromium, dissolved	< 0.00050	0.00050	mg/L	2020-05-21	
Cobalt, dissolved	**0.00021**	0.00010	mg/L	2020-05-21	
Copper, dissolved	**0.00484**	0.00040	mg/L	2020-05-21	
Iron, dissolved	< 0.010	0.010	mg/L	2020-05-21	
Lead, dissolved	**0.00029**	0.00020	mg/L	2020-05-21	
Magnesium, dissolved	**87.8**	0.010	mg/L	2020-05-21	
Manganese, dissolved	**0.0116**	0.00020	mg/L	2020-05-21	
Mercury, dissolved	< 0.000010	0.000010	mg/L	2020-05-20	
Molybdenum, dissolved	**0.00034**	0.00010	mg/L	2020-05-21	
Nickel, dissolved	< 0.00040	0.00040	mg/L	2020-05-21	
Phosphorus, dissolved	< 0.050	0.050	mg/L	2020-05-21	
Potassium, dissolved	**0.51**	0.10	mg/L	2020-05-21	
Selenium, dissolved	< 0.00050	0.00050	mg/L	2020-05-21	
Silicon, dissolved	**8.4**	1.0	mg/L	2020-05-21	
Silver, dissolved	< 0.000050	0.000050	mg/L	2020-05-21	
Sodium, dissolved	**43.1**	0.10	mg/L	2020-05-21	
Strontium, dissolved	**1.85**	0.0010	mg/L	2020-05-21	
Sulfur, dissolved	**7.6**	3.0	mg/L	2020-05-21	
Tellurium, dissolved	< 0.00050	0.00050	mg/L	2020-05-21	
Thallium, dissolved	< 0.000020	0.000020	mg/L	2020-05-21	
Thorium, dissolved	< 0.00010	0.00010	mg/L	2020-05-21	
Tin, dissolved	**0.00022**	0.00020	mg/L	2020-05-21	
Titanium, dissolved	< 0.0050	0.0050	mg/L	2020-05-21	
Tungsten, dissolved	< 0.0010	0.0010	mg/L	2020-05-21	
Uranium, dissolved	**0.00804**	0.000020	mg/L	2020-05-21	

TEST RESULTS

REPORTED TO	Regional District of Central Okanagan	**WORK ORDER**	0051274
PROJECT	Westside Landfill	**REPORTED**	2020-05-26 08:36

Analyte	Result	RL	Units	Analyzed	Qualifier
BHA DUP (0051274-01) | Matrix: Water | Sampled: 2020-05-14 12:25, Continued					
Dissolved Metals, Continued					
Vanadium, dissolved	< 0.0010	0.0010	mg/L	2020-05-21	
Zinc, dissolved	< 0.0040	0.0040	mg/L	2020-05-21	
Zirconium, dissolved	**0.00028**	0.00010	mg/L	2020-05-21	
General Parameters					
Alkalinity, Total (as CaCO3)	**600**	1.0	mg/L	2020-05-19	
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0	mg/L	2020-05-19	
Alkalinity, Bicarbonate (as CaCO3)	**600**	1.0	mg/L	2020-05-19	
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0	mg/L	2020-05-19	
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0	mg/L	2020-05-19	
Ammonia, Total (as N)	< 0.050	0.050	mg/L	2020-05-21	
Conductivity (EC)	**1200**	2.0	µS/cm	2020-05-19	
pH	**7.79**	0.10	pH units	2020-05-19	HT2
BH 1 (0051274-02) | Matrix: Water | Sampled: 2020-05-14 09:25					
Anions					
Chloride	**460**	0.10	mg/L	2020-05-15	
Nitrate (as N)	< 0.100	0.010	mg/L	2020-05-15	RA1
Sulfate	**93.2**	1.0	mg/L	2020-05-15	
Calculated Parameters					
Hardness, Total (as CaCO3)	**1160**	0.500	mg/L	N/A	
Dissolved Metals					
Lithium, dissolved	**0.0270**	0.00010	mg/L	2020-05-21	
Aluminum, dissolved	< 0.0050	0.0050	mg/L	2020-05-21	
Antimony, dissolved	**0.00025**	0.00020	mg/L	2020-05-21	
Arsenic, dissolved	**0.00153**	0.00050	mg/L	2020-05-21	
Barium, dissolved	**0.0660**	0.0050	mg/L	2020-05-21	
Beryllium, dissolved	< 0.00010	0.00010	mg/L	2020-05-21	
Bismuth, dissolved	< 0.00010	0.00010	mg/L	2020-05-21	
Boron, dissolved	**1.76**	0.0050	mg/L	2020-05-21	
Cadmium, dissolved	**0.000294**	0.000010	mg/L	2020-05-21	
Calcium, dissolved	**310**	0.20	mg/L	2020-05-21	
Chromium, dissolved	**0.00067**	0.00050	mg/L	2020-05-21	
Cobalt, dissolved	**0.00423**	0.00010	mg/L	2020-05-21	
Copper, dissolved	**0.00923**	0.00040	mg/L	2020-05-21	
Iron, dissolved	**0.868**	0.010	mg/L	2020-05-21	
Lead, dissolved	< 0.00020	0.00020	mg/L	2020-05-21	
Magnesium, dissolved	**94.2**	0.010	mg/L	2020-05-21	
Manganese, dissolved	**2.93**	0.00020	mg/L	2020-05-21	
Mercury, dissolved	< 0.000010	0.000010	mg/L	2020-05-21	

TEST RESULTS

REPORTED TO	Regional District of Central Okanagan	**WORK ORDER**	0051274
PROJECT	Westside Landfill	**REPORTED**	2020-05-26 08:36

Analyte	Result	RL	Units	Analyzed	Qualifier
BH 1 (0051274-02) | Matrix: Water | Sampled: 2020-05-14 09:25, Continued					
Dissolved Metals, Continued					
Molybdenum, dissolved	**0.00122**	0.00010	mg/L	2020-05-21	
Nickel, dissolved	**0.0230**	0.00040	mg/L	2020-05-21	
Phosphorus, dissolved	**0.059**	0.050	mg/L	2020-05-21	
Potassium, dissolved	**14.0**	0.10	mg/L	2020-05-21	
Selenium, dissolved	< 0.00050	0.00050	mg/L	2020-05-21	
Silicon, dissolved	**19.1**	1.0	mg/L	2020-05-21	
Silver, dissolved	< 0.000050	0.000050	mg/L	2020-05-21	
Sodium, dissolved	**136**	0.10	mg/L	2020-05-21	
Strontium, dissolved	**2.18**	0.0010	mg/L	2020-05-21	
Sulfur, dissolved	**37.2**	3.0	mg/L	2020-05-21	
Tellurium, dissolved	< 0.00050	0.00050	mg/L	2020-05-21	
Thallium, dissolved	< 0.000020	0.000020	mg/L	2020-05-21	
Thorium, dissolved	< 0.00010	0.00010	mg/L	2020-05-21	
Tin, dissolved	< 0.00020	0.00020	mg/L	2020-05-21	
Titanium, dissolved	< 0.0050	0.0050	mg/L	2020-05-21	
Tungsten, dissolved	< 0.0010	0.0010	mg/L	2020-05-21	
Uranium, dissolved	**0.00571**	0.000020	mg/L	2020-05-21	
Vanadium, dissolved	< 0.0010	0.0010	mg/L	2020-05-21	
Zinc, dissolved	< 0.0040	0.0040	mg/L	2020-05-21	
Zirconium, dissolved	**0.00077**	0.00010	mg/L	2020-05-21	
General Parameters					
Alkalinity, Total (as CaCO3)	**706**	1.0	mg/L	2020-05-19	
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0	mg/L	2020-05-19	
Alkalinity, Bicarbonate (as CaCO3)	**706**	1.0	mg/L	2020-05-19	
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0	mg/L	2020-05-19	
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0	mg/L	2020-05-19	
Ammonia, Total (as N)	**0.199**	0.050	mg/L	2020-05-21	
Conductivity (EC)	**2510**	2.0	µS/cm	2020-05-19	
pH	**7.33**	0.10	pH units	2020-05-19	HT2
BH 2 (0051274-03) | Matrix: Water | Sampled: 2020-05-14 08:48					
Anions					
Chloride	**177**	0.10	mg/L	2020-05-15	
Nitrate (as N)	< 0.010	0.010	mg/L	2020-05-15	
Sulfate	**122**	1.0	mg/L	2020-05-15	
Calculated Parameters					
Hardness, Total (as CaCO3)	**1690**	0.500	mg/L	N/A	
Dissolved Metals					
Lithium, dissolved	**0.0218**	0.00010	mg/L	2020-05-21	

TEST RESULTS

REPORTED TO	Regional District of Central Okanagan	**WORK ORDER**	0051274
PROJECT	Westside Landfill	**REPORTED**	2020-05-26 08:36

Analyte	Result	RL	Units	Analyzed	Qualifier
BH 2 (0051274-03) | Matrix: Water | Sampled: 2020-05-14 08:48, Continued					
Dissolved Metals, Continued					
Aluminum, dissolved	**0.0075**	0.0050	mg/L	2020-05-21	
Antimony, dissolved	< 0.00020	0.00020	mg/L	2020-05-21	
Arsenic, dissolved	**0.00560**	0.00050	mg/L	2020-05-21	
Barium, dissolved	**0.0107**	0.0050	mg/L	2020-05-21	
Beryllium, dissolved	< 0.00010	0.00010	mg/L	2020-05-21	
Bismuth, dissolved	< 0.00010	0.00010	mg/L	2020-05-21	
Boron, dissolved	**0.734**	0.0050	mg/L	2020-05-21	
Cadmium, dissolved	**0.000021**	0.000010	mg/L	2020-05-21	
Calcium, dissolved	**363**	0.20	mg/L	2020-05-21	
Chromium, dissolved	**0.00220**	0.00050	mg/L	2020-05-21	
Cobalt, dissolved	**0.00276**	0.00010	mg/L	2020-05-21	
Copper, dissolved	< 0.00040	0.00040	mg/L	2020-05-21	
Iron, dissolved	**1.79**	0.010	mg/L	2020-05-21	
Lead, dissolved	< 0.00020	0.00020	mg/L	2020-05-21	
Magnesium, dissolved	**189**	0.010	mg/L	2020-05-21	
Manganese, dissolved	**7.80**	0.00020	mg/L	2020-05-21	
Mercury, dissolved	< 0.000010	0.000010	mg/L	2020-05-21	
Molybdenum, dissolved	**0.00456**	0.00010	mg/L	2020-05-21	
Nickel, dissolved	**0.0190**	0.00040	mg/L	2020-05-21	
Phosphorus, dissolved	**0.112**	0.050	mg/L	2020-05-21	
Potassium, dissolved	**2.30**	0.10	mg/L	2020-05-21	
Selenium, dissolved	< 0.00050	0.00050	mg/L	2020-05-21	
Silicon, dissolved	**28.6**	1.0	mg/L	2020-05-21	
Silver, dissolved	< 0.000050	0.000050	mg/L	2020-05-21	
Sodium, dissolved	**125**	0.10	mg/L	2020-05-21	
Strontium, dissolved	**3.40**	0.0010	mg/L	2020-05-21	
Sulfur, dissolved	**48.4**	3.0	mg/L	2020-05-21	
Tellurium, dissolved	< 0.00050	0.00050	mg/L	2020-05-21	
Thallium, dissolved	< 0.000020	0.000020	mg/L	2020-05-21	
Thorium, dissolved	< 0.00010	0.00010	mg/L	2020-05-21	
Tin, dissolved	**0.00021**	0.00020	mg/L	2020-05-21	
Titanium, dissolved	< 0.0050	0.0050	mg/L	2020-05-21	
Tungsten, dissolved	< 0.0010	0.0010	mg/L	2020-05-21	
Uranium, dissolved	**0.00603**	0.000020	mg/L	2020-05-21	
Vanadium, dissolved	**0.0054**	0.0010	mg/L	2020-05-21	
Zinc, dissolved	< 0.0040	0.0040	mg/L	2020-05-21	
Zirconium, dissolved	**0.00395**	0.00010	mg/L	2020-05-21	
General Parameters					
Alkalinity, Total (as CaCO3)	**1530**	1.0	mg/L	2020-05-19	
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0	mg/L	2020-05-19	
Alkalinity, Bicarbonate (as CaCO3)	**1530**	1.0	mg/L	2020-05-19	
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0	mg/L	2020-05-19	

TEST RESULTS

REPORTED TO	Regional District of Central Okanagan	**WORK ORDER**	0051274
PROJECT	Westside Landfill	**REPORTED**	2020-05-26 08:36

Analyte	Result	RL	Units	Analyzed	Qualifier
BH 2 (0051274-03) | Matrix: Water | Sampled: 2020-05-14 08:48, Continued					
General Parameters, Continued					
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0	mg/L	2020-05-19	
Ammonia, Total (as N)	**0.316**	0.050	mg/L	2020-05-21	
Conductivity (EC)	**2810**	2.0	µS/cm	2020-05-19	
pH	**7.49**	0.10	pH units	2020-05-19	HT2
BH 3 (0051274-04) | Matrix: Water | Sampled: 2020-05-14 12:04					
Anions					
Chloride	**85.4**	0.10	mg/L	2020-05-15	
Nitrate (as N)	**2.55**	0.010	mg/L	2020-05-15	
Sulfate	**38.7**	1.0	mg/L	2020-05-15	
Calculated Parameters					
Hardness, Total (as CaCO3)	**414**	0.500	mg/L	N/A	
Dissolved Metals					
Lithium, dissolved	**0.0167**	0.00010	mg/L	2020-05-21	
Aluminum, dissolved	< 0.0050	0.0050	mg/L	2020-05-21	
Antimony, dissolved	< 0.00020	0.00020	mg/L	2020-05-21	
Arsenic, dissolved	**0.00144**	0.00050	mg/L	2020-05-21	
Barium, dissolved	**0.0116**	0.0050	mg/L	2020-05-21	
Beryllium, dissolved	< 0.00010	0.00010	mg/L	2020-05-21	
Bismuth, dissolved	< 0.00010	0.00010	mg/L	2020-05-21	
Boron, dissolved	**0.301**	0.0050	mg/L	2020-05-21	
Cadmium, dissolved	**0.000020**	0.000010	mg/L	2020-05-21	
Calcium, dissolved	**110**	0.20	mg/L	2020-05-21	
Chromium, dissolved	**0.00068**	0.00050	mg/L	2020-05-21	
Cobalt, dissolved	**0.00013**	0.00010	mg/L	2020-05-21	
Copper, dissolved	**0.00146**	0.00040	mg/L	2020-05-21	
Iron, dissolved	**0.028**	0.010	mg/L	2020-05-21	
Lead, dissolved	< 0.00020	0.00020	mg/L	2020-05-21	
Magnesium, dissolved	**34.1**	0.010	mg/L	2020-05-21	
Manganese, dissolved	**0.00118**	0.00020	mg/L	2020-05-21	
Mercury, dissolved	< 0.000010	0.000010	mg/L	2020-05-21	
Molybdenum, dissolved	**0.00432**	0.00010	mg/L	2020-05-21	
Nickel, dissolved	**0.00105**	0.00040	mg/L	2020-05-21	
Phosphorus, dissolved	< 0.050	0.050	mg/L	2020-05-21	
Potassium, dissolved	**4.71**	0.10	mg/L	2020-05-21	
Selenium, dissolved	**0.00065**	0.00050	mg/L	2020-05-21	
Silicon, dissolved	**14.7**	1.0	mg/L	2020-05-21	
Silver, dissolved	< 0.000050	0.000050	mg/L	2020-05-21	
Sodium, dissolved	**57.9**	0.10	mg/L	2020-05-21	
Strontium, dissolved	**0.708**	0.0010	mg/L	2020-05-21	

TEST RESULTS

REPORTED TO	Regional District of Central Okanagan	**WORK ORDER**	0051274
PROJECT	Westside Landfill	**REPORTED**	2020-05-26 08:36

Analyte	Result	RL	Units	Analyzed	Qualifier
BH 3 (0051274-04) | Matrix: Water | Sampled: 2020-05-14 12:04, Continued					
Dissolved Metals, Continued					
Sulfur, dissolved	**13.4**	3.0	mg/L	2020-05-21	
Tellurium, dissolved	< 0.00050	0.00050	mg/L	2020-05-21	
Thallium, dissolved	< 0.000020	0.000020	mg/L	2020-05-21	
Thorium, dissolved	< 0.00010	0.00010	mg/L	2020-05-21	
Tin, dissolved	< 0.00020	0.00020	mg/L	2020-05-21	
Titanium, dissolved	< 0.0050	0.0050	mg/L	2020-05-21	
Tungsten, dissolved	< 0.0010	0.0010	mg/L	2020-05-21	
Uranium, dissolved	**0.00843**	0.000020	mg/L	2020-05-21	
Vanadium, dissolved	**0.0031**	0.0010	mg/L	2020-05-21	
Zinc, dissolved	< 0.0040	0.0040	mg/L	2020-05-21	
Zirconium, dissolved	< 0.00010	0.00010	mg/L	2020-05-21	
General Parameters					
Alkalinity, Total (as CaCO3)	**366**	1.0	mg/L	2020-05-19	
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0	mg/L	2020-05-19	
Alkalinity, Bicarbonate (as CaCO3)	**366**	1.0	mg/L	2020-05-19	
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0	mg/L	2020-05-19	
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0	mg/L	2020-05-19	
Ammonia, Total (as N)	**0.055**	0.050	mg/L	2020-05-21	
Conductivity (EC)	**953**	2.0	µS/cm	2020-05-19	
pH	**7.57**	0.10	pH units	2020-05-19	HT2
BH 4 (0051274-05) | Matrix: Water | Sampled: 2020-05-14 10:55					
Anions					
Chloride	**230**	0.10	mg/L	2020-05-15	
Nitrate (as N)	**3.62**	0.010	mg/L	2020-05-15	
Sulfate	**99.7**	1.0	mg/L	2020-05-15	
Calculated Parameters					
Hardness, Total (as CaCO3)	**949**	0.500	mg/L	N/A	
Dissolved Metals					
Lithium, dissolved	**0.0314**	0.00010	mg/L	2020-05-21	
Aluminum, dissolved	< 0.0050	0.0050	mg/L	2020-05-21	
Antimony, dissolved	< 0.00020	0.00020	mg/L	2020-05-21	
Arsenic, dissolved	< 0.00050	0.00050	mg/L	2020-05-21	
Barium, dissolved	**0.0362**	0.0050	mg/L	2020-05-21	
Beryllium, dissolved	< 0.00010	0.00010	mg/L	2020-05-21	
Bismuth, dissolved	< 0.00010	0.00010	mg/L	2020-05-21	
Boron, dissolved	**0.605**	0.0050	mg/L	2020-05-21	
Cadmium, dissolved	**0.000079**	0.000010	mg/L	2020-05-21	
Calcium, dissolved	**185**	0.20	mg/L	2020-05-21	

TEST RESULTS

REPORTED TO	Regional District of Central Okanagan	**WORK ORDER**	0051274
PROJECT	Westside Landfill	**REPORTED**	2020-05-26 08:36

Analyte	Result	RL	Units	Analyzed	Qualifier
BH 4 (0051274-05) | Matrix: Water | Sampled: 2020-05-14 10:55, Continued					
Dissolved Metals, Continued					
Chromium, dissolved	< 0.00050	0.00050	mg/L	2020-05-21	
Cobalt, dissolved	**0.00164**	0.00010	mg/L	2020-05-21	
Copper, dissolved	**0.00200**	0.00040	mg/L	2020-05-21	
Iron, dissolved	< 0.010	0.010	mg/L	2020-05-21	
Lead, dissolved	< 0.00020	0.00020	mg/L	2020-05-21	
Magnesium, dissolved	**118**	0.010	mg/L	2020-05-21	
Manganese, dissolved	**0.482**	0.00020	mg/L	2020-05-21	
Mercury, dissolved	< 0.000010	0.000010	mg/L	2020-05-21	
Molybdenum, dissolved	**0.00561**	0.00010	mg/L	2020-05-21	
Nickel, dissolved	**0.0185**	0.00040	mg/L	2020-05-21	
Phosphorus, dissolved	< 0.050	0.050	mg/L	2020-05-21	
Potassium, dissolved	**5.49**	0.10	mg/L	2020-05-21	
Selenium, dissolved	< 0.00050	0.00050	mg/L	2020-05-21	
Silicon, dissolved	**13.2**	1.0	mg/L	2020-05-21	
Silver, dissolved	< 0.000050	0.000050	mg/L	2020-05-21	
Sodium, dissolved	**93.7**	0.10	mg/L	2020-05-21	
Strontium, dissolved	**2.04**	0.0010	mg/L	2020-05-21	
Sulfur, dissolved	**39.4**	3.0	mg/L	2020-05-21	
Tellurium, dissolved	< 0.00050	0.00050	mg/L	2020-05-21	
Thallium, dissolved	< 0.000020	0.000020	mg/L	2020-05-21	
Thorium, dissolved	< 0.00010	0.00010	mg/L	2020-05-21	
Tin, dissolved	< 0.00020	0.00020	mg/L	2020-05-21	
Titanium, dissolved	< 0.0050	0.0050	mg/L	2020-05-21	
Tungsten, dissolved	< 0.0010	0.0010	mg/L	2020-05-21	
Uranium, dissolved	**0.0299**	0.000020	mg/L	2020-05-21	
Vanadium, dissolved	**0.0028**	0.0010	mg/L	2020-05-21	
Zinc, dissolved	< 0.0040	0.0040	mg/L	2020-05-21	
Zirconium, dissolved	**0.00054**	0.00010	mg/L	2020-05-21	
General Parameters					
Alkalinity, Total (as CaCO3)	**692**	1.0	mg/L	2020-05-19	
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0	mg/L	2020-05-19	
Alkalinity, Bicarbonate (as CaCO3)	**692**	1.0	mg/L	2020-05-19	
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0	mg/L	2020-05-19	
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0	mg/L	2020-05-19	
Ammonia, Total (as N)	< 0.050	0.050	mg/L	2020-05-21	
Conductivity (EC)	**2000**	2.0	µS/cm	2020-05-19	
pH	**7.70**	0.10	pH units	2020-05-19	HT2
BH 5 (0051274-06) | Matrix: Water | Sampled: 2020-05-14 11:20					
Anions					

TEST RESULTS

REPORTED TO	Regional District of Central Okanagan	**WORK ORDER**	0051274
PROJECT	Westside Landfill	**REPORTED**	2020-05-26 08:36

Analyte	Result	RL	Units	Analyzed	Qualifier
BH 5 (0051274-06) | Matrix: Water | Sampled: 2020-05-14 11:20, Continued					
Anions, Continued					
Chloride	**110**	0.10	mg/L	2020-05-15	
Nitrate (as N)	**5.54**	0.010	mg/L	2020-05-15	
Sulfate	**38.0**	1.0	mg/L	2020-05-15	
Calculated Parameters					
Hardness, Total (as CaCO3)	**340**	0.500	mg/L	N/A	
Dissolved Metals					
Lithium, dissolved	**0.0193**	0.00010	mg/L	2020-05-21	
Aluminum, dissolved	< 0.0050	0.0050	mg/L	2020-05-21	
Antimony, dissolved	< 0.00020	0.00020	mg/L	2020-05-21	
Arsenic, dissolved	**0.00133**	0.00050	mg/L	2020-05-21	
Barium, dissolved	**0.0119**	0.0050	mg/L	2020-05-21	
Beryllium, dissolved	< 0.00010	0.00010	mg/L	2020-05-21	
Bismuth, dissolved	< 0.00010	0.00010	mg/L	2020-05-21	
Boron, dissolved	**0.238**	0.0050	mg/L	2020-05-21	
Cadmium, dissolved	< 0.000010	0.000010	mg/L	2020-05-21	
Calcium, dissolved	**93.2**	0.20	mg/L	2020-05-21	
Chromium, dissolved	< 0.00050	0.00050	mg/L	2020-05-21	
Cobalt, dissolved	< 0.00010	0.00010	mg/L	2020-05-21	
Copper, dissolved	**0.00070**	0.00040	mg/L	2020-05-21	
Iron, dissolved	< 0.010	0.010	mg/L	2020-05-21	
Lead, dissolved	< 0.00020	0.00020	mg/L	2020-05-21	
Magnesium, dissolved	**26.1**	0.010	mg/L	2020-05-21	
Manganese, dissolved	**0.00223**	0.00020	mg/L	2020-05-21	
Mercury, dissolved	< 0.000010	0.000010	mg/L	2020-05-21	
Molybdenum, dissolved	**0.00817**	0.00010	mg/L	2020-05-21	
Nickel, dissolved	< 0.00040	0.00040	mg/L	2020-05-21	
Phosphorus, dissolved	< 0.050	0.050	mg/L	2020-05-21	
Potassium, dissolved	**2.92**	0.10	mg/L	2020-05-21	
Selenium, dissolved	**0.00051**	0.00050	mg/L	2020-05-21	
Silicon, dissolved	**10.2**	1.0	mg/L	2020-05-21	
Silver, dissolved	< 0.000050	0.000050	mg/L	2020-05-21	
Sodium, dissolved	**54.2**	0.10	mg/L	2020-05-21	
Strontium, dissolved	**0.446**	0.0010	mg/L	2020-05-21	
Sulfur, dissolved	**13.3**	3.0	mg/L	2020-05-21	
Tellurium, dissolved	< 0.00050	0.00050	mg/L	2020-05-21	
Thallium, dissolved	< 0.000020	0.000020	mg/L	2020-05-21	
Thorium, dissolved	< 0.00010	0.00010	mg/L	2020-05-21	
Tin, dissolved	< 0.00020	0.00020	mg/L	2020-05-21	
Titanium, dissolved	< 0.0050	0.0050	mg/L	2020-05-21	
Tungsten, dissolved	< 0.0010	0.0010	mg/L	2020-05-21	
Uranium, dissolved	**0.00607**	0.000020	mg/L	2020-05-21	

TEST RESULTS

REPORTED TO	Regional District of Central Okanagan	**WORK ORDER**	0051274
PROJECT	Westside Landfill	**REPORTED**	2020-05-26 08:36

Analyte	Result	RL	Units	Analyzed	Qualifier
BH 5 (0051274-06) | Matrix: Water | Sampled: 2020-05-14 11:20, Continued					
Dissolved Metals, Continued					
Vanadium, dissolved	**0.0048**	0.0010	mg/L	2020-05-21	
Zinc, dissolved	< 0.0040	0.0040	mg/L	2020-05-21	
Zirconium, dissolved	< 0.00010	0.00010	mg/L	2020-05-21	
General Parameters					
Alkalinity, Total (as CaCO3)	**245**	1.0	mg/L	2020-05-19	
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0	mg/L	2020-05-19	
Alkalinity, Bicarbonate (as CaCO3)	**245**	1.0	mg/L	2020-05-19	
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0	mg/L	2020-05-19	
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0	mg/L	2020-05-19	
Ammonia, Total (as N)	< 0.050	0.050	mg/L	2020-05-21	
Conductivity (EC)	**847**	2.0	µS/cm	2020-05-19	
pH	**7.93**	0.10	pH units	2020-05-19	HT2
BH 7 (0051274-07) | Matrix: Water | Sampled: 2020-05-14 08:20					
Anions					
Chloride	**68.4**	0.10	mg/L	2020-05-15	
Nitrate (as N)	**3.73**	0.010	mg/L	2020-05-15	
Sulfate	**37.4**	1.0	mg/L	2020-05-15	
Calculated Parameters					
Hardness, Total (as CaCO3)	**520**	0.500	mg/L	N/A	
Dissolved Metals					
Lithium, dissolved	**0.0196**	0.00010	mg/L	2020-05-21	
Aluminum, dissolved	< 0.0050	0.0050	mg/L	2020-05-21	
Antimony, dissolved	< 0.00020	0.00020	mg/L	2020-05-21	
Arsenic, dissolved	**0.00225**	0.00050	mg/L	2020-05-21	
Barium, dissolved	**0.0215**	0.0050	mg/L	2020-05-21	
Beryllium, dissolved	< 0.00010	0.00010	mg/L	2020-05-21	
Bismuth, dissolved	< 0.00010	0.00010	mg/L	2020-05-21	
Boron, dissolved	**0.190**	0.0050	mg/L	2020-05-21	
Cadmium, dissolved	**0.000122**	0.000010	mg/L	2020-05-21	
Calcium, dissolved	**132**	0.20	mg/L	2020-05-21	
Chromium, dissolved	< 0.00050	0.00050	mg/L	2020-05-21	
Cobalt, dissolved	**0.00078**	0.00010	mg/L	2020-05-21	
Copper, dissolved	**0.00224**	0.00040	mg/L	2020-05-21	
Iron, dissolved	< 0.010	0.010	mg/L	2020-05-21	
Lead, dissolved	< 0.00020	0.00020	mg/L	2020-05-21	
Magnesium, dissolved	**46.2**	0.010	mg/L	2020-05-21	
Manganese, dissolved	**0.283**	0.00020	mg/L	2020-05-21	
Mercury, dissolved	< 0.000010	0.000010	mg/L	2020-05-21	

TEST RESULTS

REPORTED TO	Regional District of Central Okanagan	**WORK ORDER**	0051274
PROJECT	Westside Landfill	**REPORTED**	2020-05-26 08:36

Analyte	Result	RL	Units	Analyzed	Qualifier
BH 7 (0051274-07) | Matrix: Water | Sampled: 2020-05-14 08:20, Continued					
Dissolved Metals, Continued					
Molybdenum, dissolved	**0.00216**	0.00010	mg/L	2020-05-21	
Nickel, dissolved	**0.00434**	0.00040	mg/L	2020-05-21	
Phosphorus, dissolved	**0.092**	0.050	mg/L	2020-05-21	
Potassium, dissolved	**2.97**	0.10	mg/L	2020-05-21	
Selenium, dissolved	**0.00093**	0.00050	mg/L	2020-05-21	
Silicon, dissolved	**17.8**	1.0	mg/L	2020-05-21	
Silver, dissolved	< 0.000050	0.000050	mg/L	2020-05-21	
Sodium, dissolved	**68.1**	0.10	mg/L	2020-05-21	
Strontium, dissolved	**0.877**	0.0010	mg/L	2020-05-21	
Sulfur, dissolved	**15.6**	3.0	mg/L	2020-05-21	
Tellurium, dissolved	< 0.00050	0.00050	mg/L	2020-05-21	
Thallium, dissolved	< 0.000020	0.000020	mg/L	2020-05-21	
Thorium, dissolved	< 0.00010	0.00010	mg/L	2020-05-21	
Tin, dissolved	< 0.00020	0.00020	mg/L	2020-05-21	
Titanium, dissolved	< 0.0050	0.0050	mg/L	2020-05-21	
Tungsten, dissolved	< 0.0010	0.0010	mg/L	2020-05-21	
Uranium, dissolved	**0.0117**	0.000020	mg/L	2020-05-21	
Vanadium, dissolved	**0.0129**	0.0010	mg/L	2020-05-21	
Zinc, dissolved	< 0.0040	0.0040	mg/L	2020-05-21	
Zirconium, dissolved	**0.00020**	0.00010	mg/L	2020-05-21	
General Parameters					
Alkalinity, Total (as CaCO3)	**470**	1.0	mg/L	2020-05-19	
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0	mg/L	2020-05-19	
Alkalinity, Bicarbonate (as CaCO3)	**470**	1.0	mg/L	2020-05-19	
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0	mg/L	2020-05-19	
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0	mg/L	2020-05-19	
Ammonia, Total (as N)	< 0.050	0.050	mg/L	2020-05-21	
Conductivity (EC)	**1060**	2.0	µS/cm	2020-05-19	
pH	**7.79**	0.10	pH units	2020-05-19	HT2
MM-99-2 (0051274-08) | Matrix: Water | Sampled: 2020-05-14 12:25					
Anions					
Chloride	**97.9**	0.10	mg/L	2020-05-15	
Nitrate (as N)	**0.669**	0.010	mg/L	2020-05-15	
Sulfate	**19.9**	1.0	mg/L	2020-05-15	
Calculated Parameters					
Hardness, Total (as CaCO3)	**694**	0.500	mg/L	N/A	
Dissolved Metals					
Lithium, dissolved	**0.0368**	0.00010	mg/L	2020-05-21	

TEST RESULTS

REPORTED TO	Regional District of Central Okanagan	**WORK ORDER**	0051274
PROJECT	Westside Landfill	**REPORTED**	2020-05-26 08:36

Analyte	Result	RL	Units	Analyzed	Qualifier
MM-99-2 (0051274-08) | Matrix: Water | Sampled: 2020-05-14 12:25, Continued					
Dissolved Metals, Continued					
Aluminum, dissolved	< 0.0050	0.0050	mg/L	2020-05-21	
Antimony, dissolved	< 0.00020	0.00020	mg/L	2020-05-21	
Arsenic, dissolved	< 0.00050	0.00050	mg/L	2020-05-21	
Barium, dissolved	**0.0076**	0.0050	mg/L	2020-05-21	
Beryllium, dissolved	< 0.00010	0.00010	mg/L	2020-05-21	
Bismuth, dissolved	< 0.00010	0.00010	mg/L	2020-05-21	
Boron, dissolved	**0.114**	0.0050	mg/L	2020-05-21	
Cadmium, dissolved	**0.000016**	0.000010	mg/L	2020-05-21	
Calcium, dissolved	**128**	0.20	mg/L	2020-05-21	
Chromium, dissolved	< 0.00050	0.00050	mg/L	2020-05-21	
Cobalt, dissolved	**0.00022**	0.00010	mg/L	2020-05-21	
Copper, dissolved	**0.00492**	0.00040	mg/L	2020-05-21	
Iron, dissolved	**0.015**	0.010	mg/L	2020-05-21	
Lead, dissolved	**0.00103**	0.00020	mg/L	2020-05-21	
Magnesium, dissolved	**90.7**	0.010	mg/L	2020-05-21	
Manganese, dissolved	**0.0117**	0.00020	mg/L	2020-05-21	
Mercury, dissolved	< 0.000010	0.000010	mg/L	2020-05-21	
Molybdenum, dissolved	**0.00032**	0.00010	mg/L	2020-05-21	
Nickel, dissolved	< 0.00040	0.00040	mg/L	2020-05-21	
Phosphorus, dissolved	< 0.050	0.050	mg/L	2020-05-21	
Potassium, dissolved	**0.59**	0.10	mg/L	2020-05-21	
Selenium, dissolved	< 0.00050	0.00050	mg/L	2020-05-21	
Silicon, dissolved	**9.0**	1.0	mg/L	2020-05-21	
Silver, dissolved	< 0.000050	0.000050	mg/L	2020-05-21	
Sodium, dissolved	**44.5**	0.10	mg/L	2020-05-21	
Strontium, dissolved	**1.89**	0.0010	mg/L	2020-05-21	
Sulfur, dissolved	**8.3**	3.0	mg/L	2020-05-21	
Tellurium, dissolved	< 0.00050	0.00050	mg/L	2020-05-21	
Thallium, dissolved	< 0.000020	0.000020	mg/L	2020-05-21	
Thorium, dissolved	< 0.00010	0.00010	mg/L	2020-05-21	
Tin, dissolved	< 0.00020	0.00020	mg/L	2020-05-21	
Titanium, dissolved	< 0.0050	0.0050	mg/L	2020-05-21	
Tungsten, dissolved	< 0.0010	0.0010	mg/L	2020-05-21	
Uranium, dissolved	**0.00822**	0.000020	mg/L	2020-05-21	
Vanadium, dissolved	< 0.0010	0.0010	mg/L	2020-05-21	
Zinc, dissolved	< 0.0040	0.0040	mg/L	2020-05-21	
Zirconium, dissolved	**0.00022**	0.00010	mg/L	2020-05-21	
General Parameters					
Alkalinity, Total (as CaCO3)	**598**	1.0	mg/L	2020-05-19	
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0	mg/L	2020-05-19	
Alkalinity, Bicarbonate (as CaCO3)	**598**	1.0	mg/L	2020-05-19	
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0	mg/L	2020-05-19	

TEST RESULTS

REPORTED TO	Regional District of Central Okanagan	**WORK ORDER**	0051274
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Analyte	Result	RL	Units	Analyzed	Qualifier
MM-99-2 (0051274-08) | Matrix: Water | Sampled: 2020-05-14 12:25, Continued					
General Parameters, Continued					
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0	mg/L	2020-05-19	
Ammonia, Total (as N)	< 0.050	0.050	mg/L	2020-05-21	
Conductivity (EC)	**1270**	2.0	µS/cm	2020-05-19	
pH	**7.84**	0.10	pH units	2020-05-19	HT2

Sample Qualifiers:

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**	0051274
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Analysis Description	Method Ref.	Technique	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 [diss Ca] + 4.118 [diss Mg]	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

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 unless otherwise agreed to in writing.

Results in **Bold** indicate values that are above CARO's method reporting limits. Any results that are above regulatory limits are highlighted **red**. Please note that results will only be highlighted red if the regulatory limits are included on the CARO report. Any Bold and/or highlighted results do not take into account method uncertainty. If you would like method uncertainty or regulatory limits to be included on your report, please contact your Account Manager:acrump@caro.ca

APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO	Regional District of Central Okanagan	**WORK ORDER**	0051274
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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 B0E1160										
Blank (B0E1160-BLK1)				Prepared: 2020-05-15, Analyzed: 2020-05-15						
Chloride	< 0.10	0.10	mg/L							
Nitrate (as N)	< 0.010	0.010	mg/L							
Sulfate	< 1.0	1.0	mg/L							
Blank (B0E1160-BLK2)				Prepared: 2020-05-15, Analyzed: 2020-05-15						
Chloride	< 0.10	0.10	mg/L							
Nitrate (as N)	< 0.010	0.010	mg/L							
Sulfate	< 1.0	1.0	mg/L							
LCS (B0E1160-BS1)				Prepared: 2020-05-15, Analyzed: 2020-05-15						
Chloride	16.0	0.10	mg/L	16.0		100	90-110			
Nitrate (as N)	3.94	0.010	mg/L	4.00		98	90-110			
Sulfate	16.0	1.0	mg/L	16.0		100	90-110			
LCS (B0E1160-BS2)				Prepared: 2020-05-15, Analyzed: 2020-05-15						
Chloride	16.1	0.10	mg/L	16.0		101	90-110			
Nitrate (as N)	3.94	0.010	mg/L	4.00		98	90-110			
Sulfate	15.9	1.0	mg/L	16.0		100	90-110			
Dissolved Metals, Batch B0E1398										
Blank (B0E1398-BLK1)				Prepared: 2020-05-19, Analyzed: 2020-05-20						
Mercury, dissolved	< 0.000010	0.000010	mg/L							
Reference (B0E1398-SRM1)				Prepared: 2020-05-19, Analyzed: 2020-05-20						
Mercury, dissolved	0.00487	0.000010	mg/L	0.00489		100	80-120			
Dissolved Metals, Batch B0E1440										
Blank (B0E1440-BLK1)				Prepared: 2020-05-21, Analyzed: 2020-05-21						
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							

APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO	Regional District of Central Okanagan	**WORK ORDER**	0051274
PROJECT	Westside Landfill	**REPORTED**	2020-05-26 08:36

Analyte	Result	RL	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
Dissolved Metals, Batch B0E1440, Continued										
Blank (B0E1440-BLK1), Continued				Prepared: 2020-05-21, Analyzed: 2020-05-21						
Beryllium, dissolved	< 0.00010	0.00010	mg/L							
Bismuth, dissolved	< 0.00010	0.00010	mg/L							
Boron, dissolved	< 0.0050	0.0050	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 (B0E1440-BS1)				Prepared: 2020-05-21, Analyzed: 2020-05-21						
Lithium, dissolved	0.0194	0.00010	mg/L	0.0200		97	80-120			
Aluminum, dissolved	0.0182	0.0050	mg/L	0.0199		91	80-120			
Antimony, dissolved	0.0186	0.00020	mg/L	0.0200		93	80-120			
Arsenic, dissolved	0.0203	0.00050	mg/L	0.0200		102	80-120			
Barium, dissolved	0.0199	0.0050	mg/L	0.0198		101	80-120			
Beryllium, dissolved	0.0195	0.00010	mg/L	0.0198		98	80-120			
Bismuth, dissolved	0.0198	0.00010	mg/L	0.0200		99	80-120			
Boron, dissolved	0.0161	0.0050	mg/L	0.0200		80	80-120			
Cadmium, dissolved	0.0194	0.000010	mg/L	0.0199		97	80-120			
Calcium, dissolved	2.19	0.20	mg/L	2.02		108	80-120			
Chromium, dissolved	0.0199	0.00050	mg/L	0.0198		101	80-120			
Cobalt, dissolved	0.0196	0.00010	mg/L	0.0199		99	80-120			
Copper, dissolved	0.0200	0.00040	mg/L	0.0200		100	80-120			
Iron, dissolved	1.99	0.010	mg/L	2.02		98	80-120			
Lead, dissolved	0.0199	0.00020	mg/L	0.0199		100	80-120			
Magnesium, dissolved	1.90	0.010	mg/L	2.02		94	80-120			
Manganese, dissolved	0.0197	0.00020	mg/L	0.0199		99	80-120			
Molybdenum, dissolved	0.0192	0.00010	mg/L	0.0200		96	80-120			
Nickel, dissolved	0.0197	0.00040	mg/L	0.0200		98	80-120			
Phosphorus, dissolved	1.93	0.050	mg/L	2.00		97	80-120			
Potassium, dissolved	1.99	0.10	mg/L	2.02		99	80-120			
Selenium, dissolved	0.0190	0.00050	mg/L	0.0200		95	80-120			

APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO	Regional District of Central Okanagan	**WORK ORDER**	0051274
PROJECT	Westside Landfill	**REPORTED**	2020-05-26 08:36

Analyte	Result	RL	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
Dissolved Metals, Batch B0E1440, Continued										
LCS (B0E1440-BS1), Continued				Prepared: 2020-05-21, Analyzed: 2020-05-21						
Silicon, dissolved	1.9	1.0	mg/L	2.00		94	80-120			
Silver, dissolved	0.0195	0.000050	mg/L	0.0200		98	80-120			
Sodium, dissolved	1.99	0.10	mg/L	2.02		99	80-120			
Strontium, dissolved	0.0192	0.0010	mg/L	0.0200		96	80-120			
Sulfur, dissolved	4.0	3.0	mg/L	5.00		80	80-120			
Tellurium, dissolved	0.0179	0.00050	mg/L	0.0200		90	80-120			
Thallium, dissolved	0.0200	0.000020	mg/L	0.0199		100	80-120			
Thorium, dissolved	0.0200	0.00010	mg/L	0.0200		100	80-120			
Tin, dissolved	0.0195	0.00020	mg/L	0.0200		97	80-120			
Titanium, dissolved	0.0202	0.0050	mg/L	0.0200		101	80-120			
Tungsten, dissolved	0.0191	0.0010	mg/L	0.0200		95	80-120			
Uranium, dissolved	0.0208	0.000020	mg/L	0.0200		104	80-120			
Vanadium, dissolved	0.0199	0.0010	mg/L	0.0200		100	80-120			
Zinc, dissolved	0.0196	0.0040	mg/L	0.0200		98	80-120			
Zirconium, dissolved	0.0190	0.00010	mg/L	0.0200		95	80-120			
Reference (B0E1440-SRM1)				Prepared: 2020-05-21, Analyzed: 2020-05-21						
Lithium, dissolved	0.104	0.00010	mg/L	0.100		104	79-118			
Aluminum, dissolved	0.246	0.0050	mg/L	0.235		105	82-114			
Antimony, dissolved	0.0452	0.00020	mg/L	0.0431		105	88-115			
Arsenic, dissolved	0.463	0.00050	mg/L	0.423		110	88-111			
Barium, dissolved	3.19	0.0050	mg/L	3.30		97	83-110			
Beryllium, dissolved	0.219	0.00010	mg/L	0.209		105	80-119			
Boron, dissolved	1.47	0.0050	mg/L	1.65		89	79-117			
Cadmium, dissolved	0.225	0.000010	mg/L	0.221		102	90-110			
Calcium, dissolved	8.15	0.20	mg/L	7.72		106	85-113			
Chromium, dissolved	0.450	0.00050	mg/L	0.434		104	88-111			
Cobalt, dissolved	0.132	0.00010	mg/L	0.124		106	0-114			
Copper, dissolved	0.874	0.00040	mg/L	0.815		107	90-117			
Iron, dissolved	1.35	0.010	mg/L	1.27		106	90-116			
Lead, dissolved	0.114	0.00020	mg/L	0.110		104	90-110			
Magnesium, dissolved	6.80	0.010	mg/L	6.59		103	88-116			
Manganese, dissolved	0.354	0.00020	mg/L	0.342		103	88-108			
Molybdenum, dissolved	0.424	0.00010	mg/L	0.404		105	88-110			
Nickel, dissolved	0.876	0.00040	mg/L	0.835		105	90-112			
Phosphorus, dissolved	0.519	0.050	mg/L	0.499		104	72-118			
Potassium, dissolved	3.14	0.10	mg/L	2.88		109	87-116			
Selenium, dissolved	0.0335	0.00050	mg/L	0.0324		103	90-122			
Sodium, dissolved	18.4	0.10	mg/L	18.0		102	86-118			
Strontium, dissolved	0.958	0.0010	mg/L	0.935		103	86-110			
Thallium, dissolved	0.0402	0.000020	mg/L	0.0385		104	90-113			
Uranium, dissolved	0.264	0.000020	mg/L	0.258		102	88-112			
Vanadium, dissolved	0.945	0.0010	mg/L	0.873		108	87-110			
Zinc, dissolved	0.897	0.0040	mg/L	0.848		106	90-113			
Dissolved Metals, Batch B0E1445										
Blank (B0E1445-BLK1)				Prepared: 2020-05-20, Analyzed: 2020-05-21						
Mercury, dissolved	< 0.000010	0.000010	mg/L							
Reference (B0E1445-SRM1)				Prepared: 2020-05-20, Analyzed: 2020-05-21						
Mercury, dissolved	0.00509	0.000010	mg/L	0.00489		104	80-120			
General Parameters, Batch B0E1346										

APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO	Regional District of Central Okanagan	**WORK ORDER**	0051274
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Analyte	Result	RL	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
General Parameters, Batch B0E1346, Continued										
Blank (B0E1346-BLK1)				Prepared: 2020-05-19, Analyzed: 2020-05-19						
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 (B0E1346-BLK2)				Prepared: 2020-05-19, Analyzed: 2020-05-19						
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 (B0E1346-BS1)				Prepared: 2020-05-19, Analyzed: 2020-05-19						
Alkalinity, Total (as CaCO3)	103	1.0	mg/L	100		103	80-120			
LCS (B0E1346-BS2)				Prepared: 2020-05-19, Analyzed: 2020-05-19						
Alkalinity, Total (as CaCO3)	104	1.0	mg/L	100		104	80-120			
LCS (B0E1346-BS3)				Prepared: 2020-05-19, Analyzed: 2020-05-19						
Conductivity (EC)	1380	2.0	µS/cm	1410		98	95-104			
LCS (B0E1346-BS4)				Prepared: 2020-05-19, Analyzed: 2020-05-19						
Conductivity (EC)	1350	2.0	µS/cm	1410		95	95-104			
Duplicate (B0E1346-DUP1)		**Source: 0051274-01**		Prepared: 2020-05-19, Analyzed: 2020-05-19						
Alkalinity, Total (as CaCO3)	599	1.0	mg/L		600			< 1	10	
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0	mg/L		< 1.0				10	
Alkalinity, Bicarbonate (as CaCO3)	599	1.0	mg/L		600			< 1	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)	1210	2.0	µS/cm		1200			< 1	5	
pH	7.84	0.10	pH units		7.79			< 1	4	
Reference (B0E1346-SRM1)				Prepared: 2020-05-19, Analyzed: 2020-05-19						
pH	7.04	0.10	pH units	7.01		100	98-102			
Reference (B0E1346-SRM2)				Prepared: 2020-05-19, Analyzed: 2020-05-19						
pH	7.04	0.10	pH units	7.01		100	98-102			
General Parameters, Batch B0E1553										
Blank (B0E1553-BLK1)				Prepared: 2020-05-21, Analyzed: 2020-05-21						
Ammonia, Total (as N)	< 0.050	0.050	mg/L							
Blank (B0E1553-BLK2)				Prepared: 2020-05-21, Analyzed: 2020-05-21						
Ammonia, Total (as N)	< 0.050	0.050	mg/L							
Blank (B0E1553-BLK3)				Prepared: 2020-05-21, Analyzed: 2020-05-21						
Ammonia, Total (as N)	< 0.050	0.050	mg/L							
Blank (B0E1553-BLK4)				Prepared: 2020-05-21, Analyzed: 2020-05-21						
Ammonia, Total (as N)	< 0.050	0.050	mg/L							

APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO	Regional District of Central Okanagan	**WORK ORDER**	0051274
PROJECT	Westside Landfill	**REPORTED**	2020-05-26 08:36

Analyte	Result	RL	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
General Parameters, Batch B0E1553, Continued										
LCS (B0E1553-BS1)				Prepared: 2020-05-21, Analyzed: 2020-05-21						
Ammonia, Total (as N)	0.921	0.050	mg/L	1.00		92	90-115			
LCS (B0E1553-BS2)				Prepared: 2020-05-21, Analyzed: 2020-05-21						
Ammonia, Total (as N)	0.921	0.050	mg/L	1.00		92	90-115			
LCS (B0E1553-BS3)				Prepared: 2020-05-21, Analyzed: 2020-05-21						
Ammonia, Total (as N)	0.949	0.050	mg/L	1.00		95	90-115			
LCS (B0E1553-BS4)				Prepared: 2020-05-21, Analyzed: 2020-05-21						
Ammonia, Total (as N)	0.982	0.050	mg/L	1.00		98	90-115			
Duplicate (B0E1553-DUP2)		**Source: 0051274-02**		Prepared: 2020-05-21, Analyzed: 2020-05-21						
Ammonia, Total (as N)	0.191	0.050	mg/L		0.199				15	
Matrix Spike (B0E1553-MS2)		**Source: 0051274-02**		Prepared: 2020-05-21, Analyzed: 2020-05-21						
Ammonia, Total (as N)	0.418	0.050	mg/L	0.250	0.199	87	75-125			

CERTIFICATE OF ANALYSIS

REPORTED TO	Regional District of Central Okanagan 1450 KLO Road KELOWNA, BC V1W 3Z4		
ATTENTION	Angela Lambrecht	**WORK ORDER**	20K1873
PO NUMBER	60167	**RECEIVED / TEMP**	2020-11-17 13:52 / 7°C
PROJECT	Westside Landfill	**REPORTED**	2020-11-25 09:23
PROJECT INFO	041440062	**COC NUMBER**	44151.46511

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.

Work Order Comments:

This is a revised report; please refer to Appendix 3 for details.

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

Authorized By:

Alana Crump
Team Lead, Client Service

CARO ANALYTICAL SERVICES

TEST RESULTS

REPORTED TO	Regional District of Central Okanagan	**WORK ORDER**	20K1873
PROJECT	Westside Landfill	**REPORTED**	2020-11-25 09:23

Analyte	Result	RL	Units	Analyzed	Qualifier
BHA (20K1873-01) | Matrix: Water | Sampled: 2020-11-17 09:10					
Anions					
Chloride	**67.0**	0.10	mg/L	2020-11-18	
Nitrate (as N)	**2.23**	0.010	mg/L	2020-11-18	
Sulfate	**44.1**	1.0	mg/L	2020-11-18	
Calculated Parameters					
Hardness, Total (as CaCO3)	**508**	0.500	mg/L	N/A	
Dissolved Metals					
Lithium, dissolved	**0.0163**	0.00010	mg/L	2020-11-21	
Aluminum, dissolved	< 0.0050	0.0050	mg/L	2020-11-21	
Antimony, dissolved	< 0.00020	0.00020	mg/L	2020-11-21	
Arsenic, dissolved	**0.00130**	0.00050	mg/L	2020-11-21	
Barium, dissolved	**0.0156**	0.0050	mg/L	2020-11-21	
Beryllium, dissolved	< 0.00010	0.00010	mg/L	2020-11-21	
Bismuth, dissolved	< 0.00010	0.00010	mg/L	2020-11-21	
Boron, dissolved	**0.178**	0.0500	mg/L	2020-11-21	
Cadmium, dissolved	**0.000023**	0.000010	mg/L	2020-11-21	
Calcium, dissolved	**124**	0.20	mg/L	2020-11-21	
Chromium, dissolved	< 0.00050	0.00050	mg/L	2020-11-21	
Cobalt, dissolved	**0.00029**	0.00010	mg/L	2020-11-21	
Copper, dissolved	< 0.00040	0.00040	mg/L	2020-11-21	
Iron, dissolved	**0.674**	0.010	mg/L	2020-11-21	
Lead, dissolved	< 0.00020	0.00020	mg/L	2020-11-21	
Magnesium, dissolved	**47.8**	0.010	mg/L	2020-11-21	
Manganese, dissolved	**0.118**	0.00020	mg/L	2020-11-21	
Mercury, dissolved	< 0.000010	0.000010	mg/L	2020-11-20	
Molybdenum, dissolved	**0.00415**	0.00010	mg/L	2020-11-21	
Nickel, dissolved	**0.00345**	0.00040	mg/L	2020-11-21	
Phosphorus, dissolved	< 0.050	0.050	mg/L	2020-11-21	
Potassium, dissolved	**4.82**	0.10	mg/L	2020-11-21	
Selenium, dissolved	**0.00053**	0.00050	mg/L	2020-11-21	
Silicon, dissolved	**12.4**	1.0	mg/L	2020-11-21	
Silver, dissolved	< 0.000050	0.000050	mg/L	2020-11-21	
Sodium, dissolved	**63.5**	0.10	mg/L	2020-11-21	
Strontium, dissolved	**0.853**	0.0010	mg/L	2020-11-21	
Sulfur, dissolved	**33.7**	3.0	mg/L	2020-11-21	
Tellurium, dissolved	< 0.00050	0.00050	mg/L	2020-11-21	
Thallium, dissolved	< 0.000020	0.000020	mg/L	2020-11-21	
Thorium, dissolved	< 0.00010	0.00010	mg/L	2020-11-21	
Tin, dissolved	< 0.00020	0.00020	mg/L	2020-11-21	
Titanium, dissolved	< 0.0050	0.0050	mg/L	2020-11-21	
Tungsten, dissolved	< 0.0010	0.0010	mg/L	2020-11-21	
Uranium, dissolved	**0.0102**	0.000020	mg/L	2020-11-21	
Vanadium, dissolved	< 0.0010	0.0010	mg/L	2020-11-21	

CARO ANALYTICAL SERVICES

TEST RESULTS

REPORTED TO	Regional District of Central Okanagan	**WORK ORDER**	20K1873
PROJECT	Westside Landfill	**REPORTED**	2020-11-25 09:23

Analyte	Result	RL	Units	Analyzed	Qualifier
BHA (20K1873-01) | Matrix: Water | Sampled: 2020-11-17 09:10, Continued					
Dissolved Metals, Continued					
Zinc, dissolved	< 0.0040	0.0040	mg/L	2020-11-21	
Zirconium, dissolved	**0.00013**	0.00010	mg/L	2020-11-21	
General Parameters					
Alkalinity, Total (as CaCO3)	**373**	1.0	mg/L	2020-11-20	
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0	mg/L	2020-11-20	
Alkalinity, Bicarbonate (as CaCO3)	**373**	1.0	mg/L	2020-11-20	
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0	mg/L	2020-11-20	
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0	mg/L	2020-11-20	
Ammonia, Total (as N)	< 0.050	0.050	mg/L	2020-11-18	
Conductivity (EC)	**980**	2.0	µS/cm	2020-11-20	
pH	**7.55**	0.10	pH units	2020-11-20	HT2
Solids, Total Dissolved	**610**	15	mg/L	2020-11-23	
BH1 (20K1873-02) | Matrix: Water | Sampled: 2020-11-17 10:46					
Anions					
Chloride	**218**	0.10	mg/L	2020-11-18	
Nitrate (as N)	**0.111**	0.010	mg/L	2020-11-18	
Sulfate	**64.5**	1.0	mg/L	2020-11-18	
Calculated Parameters					
Hardness, Total (as CaCO3)	**905**	0.500	mg/L	N/A	
Dissolved Metals					
Lithium, dissolved	**0.0193**	0.00010	mg/L	2020-11-21	
Aluminum, dissolved	< 0.0050	0.0050	mg/L	2020-11-21	
Antimony, dissolved	< 0.00020	0.00020	mg/L	2020-11-21	
Arsenic, dissolved	**0.00549**	0.00050	mg/L	2020-11-21	
Barium, dissolved	**0.0493**	0.0050	mg/L	2020-11-21	
Beryllium, dissolved	< 0.00010	0.00010	mg/L	2020-11-21	
Bismuth, dissolved	< 0.00010	0.00010	mg/L	2020-11-21	
Boron, dissolved	**1.04**	0.0500	mg/L	2020-11-21	
Cadmium, dissolved	**0.000096**	0.000010	mg/L	2020-11-21	
Calcium, dissolved	**219**	0.20	mg/L	2020-11-21	
Chromium, dissolved	**0.00074**	0.00050	mg/L	2020-11-21	
Cobalt, dissolved	**0.00187**	0.00010	mg/L	2020-11-21	
Copper, dissolved	**0.00254**	0.00040	mg/L	2020-11-21	
Iron, dissolved	**7.11**	0.010	mg/L	2020-11-21	
Lead, dissolved	**0.00030**	0.00020	mg/L	2020-11-21	
Magnesium, dissolved	**87.1**	0.010	mg/L	2020-11-21	
Manganese, dissolved	**4.14**	0.00020	mg/L	2020-11-21	
Mercury, dissolved	< 0.000010	0.000010	mg/L	2020-11-20	
Molybdenum, dissolved	**0.00130**	0.00010	mg/L	2020-11-21	

TEST RESULTS

REPORTED TO	Regional District of Central Okanagan	**WORK ORDER**	20K1873
PROJECT	Westside Landfill	**REPORTED**	2020-11-25 09:23

Analyte	Result	RL	Units	Analyzed	Qualifier
BH1 (20K1873-02) | Matrix: Water | Sampled: 2020-11-17 10:46, Continued					
Dissolved Metals, Continued					
Nickel, dissolved	**0.0161**	0.00040	mg/L	2020-11-21	
Phosphorus, dissolved	**0.205**	0.050	mg/L	2020-11-21	
Potassium, dissolved	**9.98**	0.10	mg/L	2020-11-21	
Selenium, dissolved	< 0.00050	0.00050	mg/L	2020-11-21	
Silicon, dissolved	**19.3**	1.0	mg/L	2020-11-21	
Silver, dissolved	< 0.000050	0.000050	mg/L	2020-11-21	
Sodium, dissolved	**131**	0.10	mg/L	2020-11-21	
Strontium, dissolved	**1.75**	0.0010	mg/L	2020-11-21	
Sulfur, dissolved	**25.3**	3.0	mg/L	2020-11-21	
Tellurium, dissolved	< 0.00050	0.00050	mg/L	2020-11-21	
Thallium, dissolved	< 0.000020	0.000020	mg/L	2020-11-21	
Thorium, dissolved	< 0.00010	0.00010	mg/L	2020-11-21	
Tin, dissolved	< 0.00020	0.00020	mg/L	2020-11-21	
Titanium, dissolved	< 0.0050	0.0050	mg/L	2020-11-21	
Tungsten, dissolved	< 0.0010	0.0010	mg/L	2020-11-21	
Uranium, dissolved	**0.00191**	0.000020	mg/L	2020-11-21	
Vanadium, dissolved	< 0.0010	0.0010	mg/L	2020-11-21	
Zinc, dissolved	< 0.0040	0.0040	mg/L	2020-11-21	
Zirconium, dissolved	**0.00127**	0.00010	mg/L	2020-11-21	
General Parameters					
Alkalinity, Total (as CaCO3)	**601**	1.0	mg/L	2020-11-20	
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0	mg/L	2020-11-20	
Alkalinity, Bicarbonate (as CaCO3)	**601**	1.0	mg/L	2020-11-20	
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0	mg/L	2020-11-20	
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0	mg/L	2020-11-20	
Ammonia, Total (as N)	**0.454**	0.050	mg/L	2020-11-18	
Conductivity (EC)	**1850**	2.0	µS/cm	2020-11-20	
pH	**7.32**	0.10	pH units	2020-11-20	HT2
Solids, Total Dissolved	**1100**	15	mg/L	2020-11-23	
BH2 (20K1873-03) | Matrix: Water | Sampled: 2020-11-17 10:20					
Anions					
Chloride	**163**	0.10	mg/L	2020-11-18	
Nitrate (as N)	**0.011**	0.010	mg/L	2020-11-18	
Sulfate	**126**	1.0	mg/L	2020-11-18	
Calculated Parameters					
Hardness, Total (as CaCO3)	**1700**	0.500	mg/L	N/A	
Dissolved Metals					
Lithium, dissolved	**0.0220**	0.00010	mg/L	2020-11-21	
Aluminum, dissolved	**0.0284**	0.0050	mg/L	2020-11-21	

TEST RESULTS

REPORTED TO	Regional District of Central Okanagan	**WORK ORDER**	20K1873
PROJECT	Westside Landfill	**REPORTED**	2020-11-25 09:23

Analyte	Result	RL	Units	Analyzed	Qualifier
BH2 (20K1873-03) | Matrix: Water | Sampled: 2020-11-17 10:20, Continued					
Dissolved Metals, Continued					
Antimony, dissolved	< 0.00020	0.00020	mg/L	2020-11-21	
Arsenic, dissolved	**0.00274**	0.00050	mg/L	2020-11-21	
Barium, dissolved	**0.0109**	0.0050	mg/L	2020-11-21	
Beryllium, dissolved	< 0.00010	0.00010	mg/L	2020-11-21	
Bismuth, dissolved	< 0.00010	0.00010	mg/L	2020-11-21	
Boron, dissolved	**0.467**	0.0500	mg/L	2020-11-21	
Cadmium, dissolved	< 0.000010	0.000010	mg/L	2020-11-21	
Calcium, dissolved	**352**	0.20	mg/L	2020-11-21	
Chromium, dissolved	**0.00188**	0.00050	mg/L	2020-11-21	
Cobalt, dissolved	**0.00236**	0.00010	mg/L	2020-11-21	
Copper, dissolved	< 0.00040	0.00040	mg/L	2020-11-21	
Iron, dissolved	**2.09**	0.010	mg/L	2020-11-21	
Lead, dissolved	< 0.00020	0.00020	mg/L	2020-11-21	
Magnesium, dissolved	**200**	0.010	mg/L	2020-11-21	
Manganese, dissolved	**8.30**	0.00020	mg/L	2020-11-21	
Mercury, dissolved	< 0.000010	0.000010	mg/L	2020-11-20	
Molybdenum, dissolved	**0.00397**	0.00010	mg/L	2020-11-21	
Nickel, dissolved	**0.0186**	0.00040	mg/L	2020-11-21	
Phosphorus, dissolved	**0.175**	0.050	mg/L	2020-11-21	
Potassium, dissolved	**2.62**	0.10	mg/L	2020-11-21	
Selenium, dissolved	< 0.00050	0.00050	mg/L	2020-11-21	
Silicon, dissolved	**25.4**	1.0	mg/L	2020-11-21	
Silver, dissolved	< 0.000050	0.000050	mg/L	2020-11-21	
Sodium, dissolved	**140**	0.10	mg/L	2020-11-21	
Strontium, dissolved	**3.60**	0.0010	mg/L	2020-11-21	
Sulfur, dissolved	**57.4**	3.0	mg/L	2020-11-21	
Tellurium, dissolved	< 0.00050	0.00050	mg/L	2020-11-21	
Thallium, dissolved	< 0.000020	0.000020	mg/L	2020-11-21	
Thorium, dissolved	< 0.00010	0.00010	mg/L	2020-11-21	
Tin, dissolved	< 0.00020	0.00020	mg/L	2020-11-21	
Titanium, dissolved	< 0.0050	0.0050	mg/L	2020-11-21	
Tungsten, dissolved	< 0.0010	0.0010	mg/L	2020-11-21	
Uranium, dissolved	**0.00470**	0.000020	mg/L	2020-11-21	
Vanadium, dissolved	< 0.0010	0.0010	mg/L	2020-11-21	
Zinc, dissolved	< 0.0040	0.0040	mg/L	2020-11-21	
Zirconium, dissolved	**0.00435**	0.00010	mg/L	2020-11-21	
General Parameters					
Alkalinity, Total (as CaCO3)	**1490**	1.0	mg/L	2020-11-20	
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0	mg/L	2020-11-20	
Alkalinity, Bicarbonate (as CaCO3)	**1490**	1.0	mg/L	2020-11-20	
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0	mg/L	2020-11-20	
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0	mg/L	2020-11-20	

CARO ANALYTICAL SERVICES

TEST RESULTS

REPORTED TO	Regional District of Central Okanagan	**WORK ORDER**	20K1873
PROJECT	Westside Landfill	**REPORTED**	2020-11-25 09:23

Analyte	Result	RL	Units	Analyzed	Qualifier
BH2 (20K1873-03) | Matrix: Water | Sampled: 2020-11-17 10:20, Continued					
General Parameters, Continued					
Ammonia, Total (as N)	**0.480**	0.050	mg/L	2020-11-18	
Conductivity (EC)	**3040**	2.0	µS/cm	2020-11-20	
pH	**7.55**	0.10	pH units	2020-11-20	HT2
Solids, Total Dissolved	**2120**	15	mg/L	2020-11-23	
BH3 (20K1873-04) | Matrix: Water | Sampled: 2020-11-17 09:05					
Anions					
Chloride	**80.3**	0.10	mg/L	2020-11-18	
Nitrate (as N)	**1.96**	0.010	mg/L	2020-11-18	
Sulfate	**60.5**	1.0	mg/L	2020-11-18	
Calculated Parameters					
Hardness, Total (as CaCO3)	**484**	0.500	mg/L	N/A	
Dissolved Metals					
Lithium, dissolved	**0.0166**	0.00010	mg/L	2020-11-21	
Aluminum, dissolved	< 0.0050	0.0050	mg/L	2020-11-21	
Antimony, dissolved	< 0.00020	0.00020	mg/L	2020-11-21	
Arsenic, dissolved	**0.00135**	0.00050	mg/L	2020-11-21	
Barium, dissolved	**0.0147**	0.0050	mg/L	2020-11-21	
Beryllium, dissolved	< 0.00010	0.00010	mg/L	2020-11-21	
Bismuth, dissolved	< 0.00010	0.00010	mg/L	2020-11-21	
Boron, dissolved	**0.161**	0.0500	mg/L	2020-11-21	
Cadmium, dissolved	**0.000017**	0.000010	mg/L	2020-11-21	
Calcium, dissolved	**120**	0.20	mg/L	2020-11-21	
Chromium, dissolved	< 0.00050	0.00050	mg/L	2020-11-21	
Cobalt, dissolved	**0.00023**	0.00010	mg/L	2020-11-21	
Copper, dissolved	< 0.00040	0.00040	mg/L	2020-11-21	
Iron, dissolved	**0.496**	0.010	mg/L	2020-11-21	
Lead, dissolved	< 0.00020	0.00020	mg/L	2020-11-21	
Magnesium, dissolved	**44.3**	0.010	mg/L	2020-11-21	
Manganese, dissolved	**0.0890**	0.00020	mg/L	2020-11-21	
Mercury, dissolved	< 0.000010	0.000010	mg/L	2020-11-20	
Molybdenum, dissolved	**0.00401**	0.00010	mg/L	2020-11-21	
Nickel, dissolved	**0.00301**	0.00040	mg/L	2020-11-21	
Phosphorus, dissolved	**0.080**	0.050	mg/L	2020-11-21	
Potassium, dissolved	**4.64**	0.10	mg/L	2020-11-21	
Selenium, dissolved	**0.00052**	0.00050	mg/L	2020-11-21	
Silicon, dissolved	**12.4**	1.0	mg/L	2020-11-21	
Silver, dissolved	< 0.000050	0.000050	mg/L	2020-11-21	
Sodium, dissolved	**61.0**	0.10	mg/L	2020-11-21	
Strontium, dissolved	**0.806**	0.0010	mg/L	2020-11-21	

TEST RESULTS

REPORTED TO	Regional District of Central Okanagan	**WORK ORDER**	20K1873
PROJECT	Westside Landfill	**REPORTED**	2020-11-25 09:23

Analyte	Result	RL	Units	Analyzed	Qualifier
BH3 (20K1873-04) | Matrix: Water | Sampled: 2020-11-17 09:05, Continued					
Dissolved Metals, Continued					
Sulfur, dissolved	**27.4**	3.0	mg/L	2020-11-21	
Tellurium, dissolved	< 0.00050	0.00050	mg/L	2020-11-21	
Thallium, dissolved	< 0.000020	0.000020	mg/L	2020-11-21	
Thorium, dissolved	< 0.00010	0.00010	mg/L	2020-11-21	
Tin, dissolved	< 0.00020	0.00020	mg/L	2020-11-21	
Titanium, dissolved	< 0.0050	0.0050	mg/L	2020-11-21	
Tungsten, dissolved	< 0.0010	0.0010	mg/L	2020-11-21	
Uranium, dissolved	**0.00945**	0.000020	mg/L	2020-11-21	
Vanadium, dissolved	< 0.0010	0.0010	mg/L	2020-11-21	
Zinc, dissolved	< 0.0040	0.0040	mg/L	2020-11-21	
Zirconium, dissolved	**0.00012**	0.00010	mg/L	2020-11-21	
General Parameters					
Alkalinity, Total (as CaCO3)	**379**	1.0	mg/L	2020-11-20	
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0	mg/L	2020-11-20	
Alkalinity, Bicarbonate (as CaCO3)	**379**	1.0	mg/L	2020-11-20	
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0	mg/L	2020-11-20	
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0	mg/L	2020-11-20	
Ammonia, Total (as N)	**0.066**	0.050	mg/L	2020-11-18	
Conductivity (EC)	**1070**	2.0	µS/cm	2020-11-20	
pH	**7.68**	0.10	pH units	2020-11-20	HT2
Solids, Total Dissolved	**643**	15	mg/L	2020-11-23	
BH4 (20K1873-05) | Matrix: Water | Sampled: 2020-11-17 09:43					
Anions					
Chloride	**237**	0.10	mg/L	2020-11-18	
Nitrate (as N)	**2.13**	0.010	mg/L	2020-11-18	
Sulfate	**91.6**	1.0	mg/L	2020-11-18	
Calculated Parameters					
Hardness, Total (as CaCO3)	**977**	0.500	mg/L	N/A	
Dissolved Metals					
Lithium, dissolved	**0.0330**	0.00010	mg/L	2020-11-21	
Aluminum, dissolved	**0.0054**	0.0050	mg/L	2020-11-21	
Antimony, dissolved	< 0.00020	0.00020	mg/L	2020-11-21	
Arsenic, dissolved	**0.00052**	0.00050	mg/L	2020-11-21	
Barium, dissolved	**0.0456**	0.0050	mg/L	2020-11-21	
Beryllium, dissolved	< 0.00010	0.00010	mg/L	2020-11-21	
Bismuth, dissolved	< 0.00010	0.00010	mg/L	2020-11-21	
Boron, dissolved	**0.514**	0.0500	mg/L	2020-11-21	
Cadmium, dissolved	**0.000085**	0.000010	mg/L	2020-11-21	
Calcium, dissolved	**181**	0.20	mg/L	2020-11-21	

TEST RESULTS

REPORTED TO	Regional District of Central Okanagan	**WORK ORDER**	20K1873
PROJECT	Westside Landfill	**REPORTED**	2020-11-25 09:23

Analyte	Result	RL	Units	Analyzed	Qualifier
BH4 (20K1873-05) | Matrix: Water | Sampled: 2020-11-17 09:43, Continued					
Dissolved Metals, Continued					
Chromium, dissolved	< 0.00050	0.00050	mg/L	2020-11-21	
Cobalt, dissolved	**0.00151**	0.00010	mg/L	2020-11-21	
Copper, dissolved	**0.00161**	0.00040	mg/L	2020-11-21	
Iron, dissolved	< 0.010	0.010	mg/L	2020-11-21	
Lead, dissolved	< 0.00020	0.00020	mg/L	2020-11-21	
Magnesium, dissolved	**127**	0.010	mg/L	2020-11-21	
Manganese, dissolved	**0.378**	0.00020	mg/L	2020-11-21	
Mercury, dissolved	< 0.000010	0.000010	mg/L	2020-11-21	
Molybdenum, dissolved	**0.00687**	0.00010	mg/L	2020-11-21	
Nickel, dissolved	**0.0204**	0.00040	mg/L	2020-11-21	
Phosphorus, dissolved	< 0.050	0.050	mg/L	2020-11-21	
Potassium, dissolved	**5.72**	0.10	mg/L	2020-11-21	
Selenium, dissolved	< 0.00050	0.00050	mg/L	2020-11-21	
Silicon, dissolved	**11.8**	1.0	mg/L	2020-11-21	
Silver, dissolved	< 0.000050	0.000050	mg/L	2020-11-21	
Sodium, dissolved	**105**	0.10	mg/L	2020-11-21	
Strontium, dissolved	**2.32**	0.0010	mg/L	2020-11-21	
Sulfur, dissolved	**41.4**	3.0	mg/L	2020-11-21	
Tellurium, dissolved	< 0.00050	0.00050	mg/L	2020-11-21	
Thallium, dissolved	**0.000024**	0.000020	mg/L	2020-11-21	
Thorium, dissolved	< 0.00010	0.00010	mg/L	2020-11-21	
Tin, dissolved	< 0.00020	0.00020	mg/L	2020-11-21	
Titanium, dissolved	< 0.0050	0.0050	mg/L	2020-11-21	
Tungsten, dissolved	< 0.0010	0.0010	mg/L	2020-11-21	
Uranium, dissolved	**0.0292**	0.000020	mg/L	2020-11-21	
Vanadium, dissolved	< 0.0010	0.0010	mg/L	2020-11-21	
Zinc, dissolved	< 0.0040	0.0040	mg/L	2020-11-21	
Zirconium, dissolved	**0.00044**	0.00010	mg/L	2020-11-21	
General Parameters					
Alkalinity, Total (as CaCO3)	**676**	1.0	mg/L	2020-11-20	
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0	mg/L	2020-11-20	
Alkalinity, Bicarbonate (as CaCO3)	**676**	1.0	mg/L	2020-11-20	
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0	mg/L	2020-11-20	
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0	mg/L	2020-11-20	
Ammonia, Total (as N)	< 0.050	0.050	mg/L	2020-11-18	
Conductivity (EC)	**2010**	2.0	µS/cm	2020-11-20	
pH	**7.67**	0.10	pH units	2020-11-20	HT2
Solids, Total Dissolved	**1230**	15	mg/L	2020-11-23	
BH5 (20K1873-06) | Matrix: Water | Sampled: 2020-11-17 09:25					
Anions					

TEST RESULTS

REPORTED TO	Regional District of Central Okanagan	**WORK ORDER**	20K1873
PROJECT	Westside Landfill	**REPORTED**	2020-11-25 09:23

Analyte	Result	RL	Units	Analyzed	Qualifier
BH5 (20K1873-06) | Matrix: Water | Sampled: 2020-11-17 09:25, Continued					
Anions, Continued					
Chloride	**123**	0.10	mg/L	2020-11-18	
Nitrate (as N)	**6.10**	0.010	mg/L	2020-11-18	
Sulfate	**31.8**	1.0	mg/L	2020-11-18	
Calculated Parameters					
Hardness, Total (as CaCO3)	**384**	0.500	mg/L	N/A	
Dissolved Metals					
Lithium, dissolved	**0.0185**	0.00010	mg/L	2020-11-21	
Aluminum, dissolved	< 0.0050	0.0050	mg/L	2020-11-21	
Antimony, dissolved	< 0.00020	0.00020	mg/L	2020-11-21	
Arsenic, dissolved	**0.00125**	0.00050	mg/L	2020-11-21	
Barium, dissolved	**0.0127**	0.0050	mg/L	2020-11-21	
Beryllium, dissolved	< 0.00010	0.00010	mg/L	2020-11-21	
Bismuth, dissolved	< 0.00010	0.00010	mg/L	2020-11-21	
Boron, dissolved	< 0.0500	0.0500	mg/L	2020-11-21	
Cadmium, dissolved	< 0.000010	0.000010	mg/L	2020-11-21	
Calcium, dissolved	**102**	0.20	mg/L	2020-11-21	
Chromium, dissolved	< 0.00050	0.00050	mg/L	2020-11-21	
Cobalt, dissolved	< 0.00010	0.00010	mg/L	2020-11-21	
Copper, dissolved	< 0.00040	0.00040	mg/L	2020-11-21	
Iron, dissolved	< 0.010	0.010	mg/L	2020-11-21	
Lead, dissolved	< 0.00020	0.00020	mg/L	2020-11-21	
Magnesium, dissolved	**31.5**	0.010	mg/L	2020-11-21	
Manganese, dissolved	**0.00113**	0.00020	mg/L	2020-11-21	
Mercury, dissolved	< 0.000010	0.000010	mg/L	2020-11-21	
Molybdenum, dissolved	**0.00671**	0.00010	mg/L	2020-11-21	
Nickel, dissolved	**0.00043**	0.00040	mg/L	2020-11-21	
Phosphorus, dissolved	< 0.050	0.050	mg/L	2020-11-21	
Potassium, dissolved	**2.88**	0.10	mg/L	2020-11-21	
Selenium, dissolved	< 0.00050	0.00050	mg/L	2020-11-21	
Silicon, dissolved	**9.7**	1.0	mg/L	2020-11-21	
Silver, dissolved	< 0.000050	0.000050	mg/L	2020-11-21	
Sodium, dissolved	**53.8**	0.10	mg/L	2020-11-21	
Strontium, dissolved	**0.499**	0.0010	mg/L	2020-11-21	
Sulfur, dissolved	**13.8**	3.0	mg/L	2020-11-21	
Tellurium, dissolved	< 0.00050	0.00050	mg/L	2020-11-21	
Thallium, dissolved	< 0.000020	0.000020	mg/L	2020-11-21	
Thorium, dissolved	< 0.00010	0.00010	mg/L	2020-11-21	
Tin, dissolved	< 0.00020	0.00020	mg/L	2020-11-21	
Titanium, dissolved	< 0.0050	0.0050	mg/L	2020-11-21	
Tungsten, dissolved	< 0.0010	0.0010	mg/L	2020-11-21	
Uranium, dissolved	**0.00535**	0.000020	mg/L	2020-11-21	
Vanadium, dissolved	< 0.0010	0.0010	mg/L	2020-11-21	

TEST RESULTS

REPORTED TO	Regional District of Central Okanagan	**WORK ORDER**	20K1873
PROJECT	Westside Landfill	**REPORTED**	2020-11-25 09:23

Analyte	Result	RL	Units	Analyzed	Qualifier
BH5 (20K1873-06) | Matrix: Water | Sampled: 2020-11-17 09:25, Continued					
Dissolved Metals, Continued					
Zinc, dissolved	< 0.0040	0.0040	mg/L	2020-11-21	
Zirconium, dissolved	< 0.00010	0.00010	mg/L	2020-11-21	
General Parameters					
Alkalinity, Total (as CaCO3)	**243**	1.0	mg/L	2020-11-20	
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0	mg/L	2020-11-20	
Alkalinity, Bicarbonate (as CaCO3)	**243**	1.0	mg/L	2020-11-20	
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0	mg/L	2020-11-20	
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0	mg/L	2020-11-20	
Ammonia, Total (as N)	< 0.050	0.050	mg/L	2020-11-18	
Conductivity (EC)	**960**	2.0	µS/cm	2020-11-20	
pH	**7.88**	0.10	pH units	2020-11-20	HT2
Solids, Total Dissolved	**599**	15	mg/L	2020-11-23	
BH7 (20K1873-07) | Matrix: Water | Sampled: 2020-11-17 10:05					
Anions					
Chloride	**61.1**	0.10	mg/L	2020-11-18	
Nitrate (as N)	**3.71**	0.010	mg/L	2020-11-18	
Sulfate	**42.3**	1.0	mg/L	2020-11-18	
Calculated Parameters					
Hardness, Total (as CaCO3)	**498**	0.500	mg/L	N/A	
Dissolved Metals					
Lithium, dissolved	**0.0180**	0.00010	mg/L	2020-11-21	
Aluminum, dissolved	< 0.0050	0.0050	mg/L	2020-11-21	
Antimony, dissolved	< 0.00020	0.00020	mg/L	2020-11-21	
Arsenic, dissolved	**0.00210**	0.00050	mg/L	2020-11-21	
Barium, dissolved	**0.0206**	0.0050	mg/L	2020-11-21	
Beryllium, dissolved	< 0.00010	0.00010	mg/L	2020-11-21	
Bismuth, dissolved	< 0.00010	0.00010	mg/L	2020-11-21	
Boron, dissolved	**0.0652**	0.0500	mg/L	2020-11-21	
Cadmium, dissolved	**0.000092**	0.000010	mg/L	2020-11-21	
Calcium, dissolved	**122**	0.20	mg/L	2020-11-21	
Chromium, dissolved	< 0.00050	0.00050	mg/L	2020-11-21	
Cobalt, dissolved	**0.00074**	0.00010	mg/L	2020-11-21	
Copper, dissolved	**0.00175**	0.00040	mg/L	2020-11-21	
Iron, dissolved	< 0.010	0.010	mg/L	2020-11-21	
Lead, dissolved	< 0.00020	0.00020	mg/L	2020-11-21	
Magnesium, dissolved	**46.8**	0.010	mg/L	2020-11-21	
Manganese, dissolved	**0.197**	0.00020	mg/L	2020-11-21	
Mercury, dissolved	< 0.000010	0.000010	mg/L	2020-11-21	
Molybdenum, dissolved	**0.00196**	0.00010	mg/L	2020-11-21	

TEST RESULTS

REPORTED TO	Regional District of Central Okanagan	**WORK ORDER**	20K1873
PROJECT	Westside Landfill	**REPORTED**	2020-11-25 09:23

Analyte	Result	RL	Units	Analyzed	Qualifier
BH7 (20K1873-07) | Matrix: Water | Sampled: 2020-11-17 10:05, Continued					
Dissolved Metals, Continued					
Nickel, dissolved	**0.00424**	0.00040	mg/L	2020-11-21	
Phosphorus, dissolved	**0.117**	0.050	mg/L	2020-11-21	
Potassium, dissolved	**2.66**	0.10	mg/L	2020-11-21	
Selenium, dissolved	**0.00083**	0.00050	mg/L	2020-11-21	
Silicon, dissolved	**13.6**	1.0	mg/L	2020-11-21	
Silver, dissolved	< 0.000050	0.000050	mg/L	2020-11-21	
Sodium, dissolved	**64.4**	0.10	mg/L	2020-11-21	
Strontium, dissolved	**0.805**	0.0010	mg/L	2020-11-21	
Sulfur, dissolved	**16.5**	3.0	mg/L	2020-11-21	
Tellurium, dissolved	< 0.00050	0.00050	mg/L	2020-11-21	
Thallium, dissolved	< 0.000020	0.000020	mg/L	2020-11-21	
Thorium, dissolved	< 0.00010	0.00010	mg/L	2020-11-21	
Tin, dissolved	< 0.00020	0.00020	mg/L	2020-11-21	
Titanium, dissolved	< 0.0050	0.0050	mg/L	2020-11-21	
Tungsten, dissolved	< 0.0010	0.0010	mg/L	2020-11-21	
Uranium, dissolved	**0.0101**	0.000020	mg/L	2020-11-21	
Vanadium, dissolved	**0.0062**	0.0010	mg/L	2020-11-21	
Zinc, dissolved	< 0.0040	0.0040	mg/L	2020-11-21	
Zirconium, dissolved	**0.00017**	0.00010	mg/L	2020-11-21	
General Parameters					
Alkalinity, Total (as CaCO3)	**446**	1.0	mg/L	2020-11-20	
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0	mg/L	2020-11-20	
Alkalinity, Bicarbonate (as CaCO3)	**446**	1.0	mg/L	2020-11-20	
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0	mg/L	2020-11-20	
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0	mg/L	2020-11-20	
Ammonia, Total (as N)	< 0.050	0.050	mg/L	2020-11-18	
Conductivity (EC)	**1110**	2.0	µS/cm	2020-11-20	
pH	**7.74**	0.10	pH units	2020-11-20	HT2
Solids, Total Dissolved	**675**	15	mg/L	2020-11-23	
MW99-2 (20K1873-08) | Matrix: Water | Sampled: 2020-11-17 11:07					
Anions					
Chloride	**119**	0.10	mg/L	2020-11-18	
Nitrate (as N)	**0.652**	0.010	mg/L	2020-11-18	
Sulfate	**20.1**	1.0	mg/L	2020-11-18	
Calculated Parameters					
Hardness, Total (as CaCO3)	**755**	0.500	mg/L	N/A	
Dissolved Metals					
Lithium, dissolved	**0.0425**	0.00010	mg/L	2020-11-21	
Aluminum, dissolved	< 0.0050	0.0050	mg/L	2020-11-21	

TEST RESULTS

REPORTED TO	Regional District of Central Okanagan	**WORK ORDER**	20K1873
PROJECT	Westside Landfill	**REPORTED**	2020-11-25 09:23

Analyte	Result	RL	Units	Analyzed	Qualifier
MW99-2 (20K1873-08) | Matrix: Water | Sampled: 2020-11-17 11:07, Continued					
Dissolved Metals, Continued					
Antimony, dissolved	< 0.00020	0.00020	mg/L	2020-11-21	
Arsenic, dissolved	< 0.00050	0.00050	mg/L	2020-11-21	
Barium, dissolved	**0.0107**	0.0050	mg/L	2020-11-21	
Beryllium, dissolved	< 0.00010	0.00010	mg/L	2020-11-21	
Bismuth, dissolved	< 0.00010	0.00010	mg/L	2020-11-21	
Boron, dissolved	< 0.0500	0.0500	mg/L	2020-11-21	
Cadmium, dissolved	< 0.000010	0.000010	mg/L	2020-11-21	
Calcium, dissolved	**132**	0.20	mg/L	2020-11-21	
Chromium, dissolved	< 0.00050	0.00050	mg/L	2020-11-21	
Cobalt, dissolved	**0.00023**	0.00010	mg/L	2020-11-21	
Copper, dissolved	**0.00241**	0.00040	mg/L	2020-11-21	
Iron, dissolved	**0.076**	0.010	mg/L	2020-11-21	
Lead, dissolved	**0.00024**	0.00020	mg/L	2020-11-21	
Magnesium, dissolved	**104**	0.010	mg/L	2020-11-21	
Manganese, dissolved	**0.0221**	0.00020	mg/L	2020-11-21	
Mercury, dissolved	< 0.000010	0.000010	mg/L	2020-11-21	
Molybdenum, dissolved	**0.00027**	0.00010	mg/L	2020-11-21	
Nickel, dissolved	< 0.00040	0.00040	mg/L	2020-11-21	
Phosphorus, dissolved	< 0.050	0.050	mg/L	2020-11-21	
Potassium, dissolved	**0.41**	0.10	mg/L	2020-11-21	
Selenium, dissolved	< 0.00050	0.00050	mg/L	2020-11-21	
Silicon, dissolved	**7.1**	1.0	mg/L	2020-11-21	
Silver, dissolved	< 0.000050	0.000050	mg/L	2020-11-21	
Sodium, dissolved	**49.6**	0.10	mg/L	2020-11-21	
Strontium, dissolved	**2.11**	0.0010	mg/L	2020-11-21	
Sulfur, dissolved	**9.3**	3.0	mg/L	2020-11-21	
Tellurium, dissolved	< 0.00050	0.00050	mg/L	2020-11-21	
Thallium, dissolved	< 0.000020	0.000020	mg/L	2020-11-21	
Thorium, dissolved	< 0.00010	0.00010	mg/L	2020-11-21	
Tin, dissolved	< 0.00020	0.00020	mg/L	2020-11-21	
Titanium, dissolved	< 0.0050	0.0050	mg/L	2020-11-21	
Tungsten, dissolved	< 0.0010	0.0010	mg/L	2020-11-21	
Uranium, dissolved	**0.00720**	0.000020	mg/L	2020-11-21	
Vanadium, dissolved	< 0.0010	0.0010	mg/L	2020-11-21	
Zinc, dissolved	< 0.0040	0.0040	mg/L	2020-11-21	
Zirconium, dissolved	**0.00028**	0.00010	mg/L	2020-11-21	
General Parameters					
Alkalinity, Total (as CaCO3)	**620**	1.0	mg/L	2020-11-22	
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0	mg/L	2020-11-22	
Alkalinity, Bicarbonate (as CaCO3)	**620**	1.0	mg/L	2020-11-22	
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0	mg/L	2020-11-22	
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0	mg/L	2020-11-22	

TEST RESULTS

REPORTED TO	Regional District of Central Okanagan	**WORK ORDER**	20K1873
PROJECT	Westside Landfill	**REPORTED**	2020-11-25 09:23

Analyte	Result	RL	Units	Analyzed	Qualifier
MW99-2 (20K1873-08) | Matrix: Water | Sampled: 2020-11-17 11:07, Continued					
General Parameters, Continued					
Ammonia, Total (as N)	< 0.050	0.050	mg/L	2020-11-18	
Conductivity (EC)	**1440**	2.0	µS/cm	2020-11-22	
pH	**7.90**	0.10	pH units	2020-11-22	HT2
Solids, Total Dissolved	**837**	15	mg/L	2020-11-23	

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**	20K1873
PROJECT	Westside Landfill	**REPORTED**	2020-11-25 09:23

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 [diss Ca] + 4.118 [diss Mg]	✓	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

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**	20K1873
PROJECT	Westside Landfill	**REPORTED**	2020-11-25 09:23

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 B0K1556										
Blank (B0K1556-BLK1)				Prepared: 2020-11-18, Analyzed: 2020-11-18						
Chloride	< 0.10	0.10	mg/L							
Nitrate (as N)	< 0.010	0.010	mg/L							
Sulfate	< 1.0	1.0	mg/L							
Blank (B0K1556-BLK2)				Prepared: 2020-11-18, Analyzed: 2020-11-18						
Chloride	< 0.10	0.10	mg/L							
Nitrate (as N)	< 0.010	0.010	mg/L							
Sulfate	< 1.0	1.0	mg/L							
LCS (B0K1556-BS1)				Prepared: 2020-11-18, Analyzed: 2020-11-18						
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		101	90-110			
LCS (B0K1556-BS2)				Prepared: 2020-11-18, Analyzed: 2020-11-18						
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			
Dissolved Metals, Batch B0K1821										
Blank (B0K1821-BLK1)				Prepared: 2020-11-21, Analyzed: 2020-11-21						
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							

APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO	Regional District of Central Okanagan	**WORK ORDER**	20K1873
PROJECT	Westside Landfill	**REPORTED**	2020-11-25 09:23

Analyte	Result	RL	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
Dissolved Metals, Batch B0K1821, Continued										
Blank (B0K1821-BLK1), Continued				Prepared: 2020-11-21, Analyzed: 2020-11-21						
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 (B0K1821-BS1)				Prepared: 2020-11-21, Analyzed: 2020-11-21						
Lithium, dissolved	0.0182	0.00010	mg/L	0.0200		91	80-120			
Aluminum, dissolved	0.0229	0.0050	mg/L	0.0199		115	80-120			
Antimony, dissolved	0.0204	0.00020	mg/L	0.0200		102	80-120			
Arsenic, dissolved	0.0206	0.00050	mg/L	0.0200		103	80-120			
Barium, dissolved	0.0208	0.0050	mg/L	0.0198		105	80-120			
Beryllium, dissolved	0.0188	0.00010	mg/L	0.0198		95	80-120			
Bismuth, dissolved	0.0209	0.00010	mg/L	0.0200		105	80-120			
Boron, dissolved	< 0.0500	0.0500	mg/L	0.0200		95	80-120			
Cadmium, dissolved	0.0204	0.000010	mg/L	0.0199		102	80-120			
Calcium, dissolved	2.10	0.20	mg/L	2.02		104	80-120			
Chromium, dissolved	0.0208	0.00050	mg/L	0.0198		105	80-120			
Cobalt, dissolved	0.0205	0.00010	mg/L	0.0199		103	80-120			
Copper, dissolved	0.0211	0.00040	mg/L	0.0200		105	80-120			
Iron, dissolved	2.08	0.010	mg/L	2.02		103	80-120			
Lead, dissolved	0.0207	0.00020	mg/L	0.0199		104	80-120			
Magnesium, dissolved	2.12	0.010	mg/L	2.02		105	80-120			
Manganese, dissolved	0.0218	0.00020	mg/L	0.0199		110	80-120			
Molybdenum, dissolved	0.0198	0.00010	mg/L	0.0200		99	80-120			
Nickel, dissolved	0.0210	0.00040	mg/L	0.0200		105	80-120			
Phosphorus, dissolved	2.15	0.050	mg/L	2.00		108	80-120			
Potassium, dissolved	2.12	0.10	mg/L	2.02		105	80-120			
Selenium, dissolved	0.0199	0.00050	mg/L	0.0200		100	80-120			
Silicon, dissolved	2.0	1.0	mg/L	2.00		99	80-120			
Silver, dissolved	0.0203	0.000050	mg/L	0.0200		102	80-120			
Sodium, dissolved	2.07	0.10	mg/L	2.02		103	80-120			
Strontium, dissolved	0.0205	0.0010	mg/L	0.0200		103	80-120			
Sulfur, dissolved	5.7	3.0	mg/L	5.00		114	80-120			
Tellurium, dissolved	0.0194	0.00050	mg/L	0.0200		97	80-120			
Thallium, dissolved	0.0205	0.000020	mg/L	0.0199		103	80-120			
Thorium, dissolved	0.0196	0.00010	mg/L	0.0200		98	80-120			
Tin, dissolved	0.0213	0.00020	mg/L	0.0200		106	80-120			

APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO	Regional District of Central Okanagan	**WORK ORDER**	20K1873
PROJECT	Westside Landfill	**REPORTED**	2020-11-25 09:23

Analyte	Result	RL	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
Dissolved Metals, Batch B0K1821, Continued										
LCS (B0K1821-BS1), Continued				Prepared: 2020-11-21, Analyzed: 2020-11-21						
Titanium, dissolved	0.0203	0.0050	mg/L	0.0200		101	80-120			
Tungsten, dissolved	0.0211	0.0010	mg/L	0.0200		106	80-120			
Uranium, dissolved	0.0197	0.000020	mg/L	0.0200		99	80-120			
Vanadium, dissolved	0.0233	0.0010	mg/L	0.0200		117	80-120			
Zinc, dissolved	0.0210	0.0040	mg/L	0.0200		105	80-120			
Zirconium, dissolved	0.0205	0.00010	mg/L	0.0200		103	80-120			
Reference (B0K1821-SRM1)				Prepared: 2020-11-21, Analyzed: 2020-11-21						
Lithium, dissolved	0.0949	0.00010	mg/L	0.100		95	70-130			
Aluminum, dissolved	0.261	0.0050	mg/L	0.235		111	70-130			
Antimony, dissolved	0.0466	0.00020	mg/L	0.0431		108	70-130			
Arsenic, dissolved	0.463	0.00050	mg/L	0.423		109	70-130			
Barium, dissolved	3.16	0.0050	mg/L	3.30		96	70-130			
Beryllium, dissolved	0.208	0.00010	mg/L	0.209		100	70-130			
Boron, dissolved	1.72	0.0500	mg/L	1.65		104	70-130			
Cadmium, dissolved	0.231	0.000010	mg/L	0.221		104	70-130			
Calcium, dissolved	7.81	0.20	mg/L	7.72		101	70-130			
Chromium, dissolved	0.461	0.00050	mg/L	0.434		106	70-130			
Cobalt, dissolved	0.131	0.00010	mg/L	0.124		106	70-130			
Copper, dissolved	0.899	0.00040	mg/L	0.815		110	70-130			
Iron, dissolved	1.37	0.010	mg/L	1.27		108	70-130			
Lead, dissolved	0.114	0.00020	mg/L	0.110		103	70-130			
Magnesium, dissolved	7.09	0.010	mg/L	6.59		108	70-130			
Manganese, dissolved	0.366	0.00020	mg/L	0.342		107	70-130			
Molybdenum, dissolved	0.427	0.00010	mg/L	0.404		106	70-130			
Nickel, dissolved	0.901	0.00040	mg/L	0.835		108	70-130			
Phosphorus, dissolved	0.559	0.050	mg/L	0.499		112	70-130			
Potassium, dissolved	3.26	0.10	mg/L	2.88		113	70-130			
Selenium, dissolved	0.0344	0.00050	mg/L	0.0324		106	70-130			
Sodium, dissolved	19.6	0.10	mg/L	18.0		109	70-130			
Strontium, dissolved	0.955	0.0010	mg/L	0.935		102	70-130			
Thallium, dissolved	0.0401	0.000020	mg/L	0.0385		104	70-130			
Uranium, dissolved	0.256	0.000020	mg/L	0.258		99	70-130			
Vanadium, dissolved	0.911	0.0010	mg/L	0.873		104	70-130			
Zinc, dissolved	0.908	0.0040	mg/L	0.848		107	70-130			
Dissolved Metals, Batch B0K1869										
Blank (B0K1869-BLK1)				Prepared: 2020-11-20, Analyzed: 2020-11-20						
Mercury, dissolved	< 0.000010	0.000010	mg/L							
Blank (B0K1869-BLK2)				Prepared: 2020-11-20, Analyzed: 2020-11-20						
Mercury, dissolved	< 0.000010	0.000010	mg/L							
Matrix Spike (B0K1869-MS2)			**Source: 20K1873-01**	Prepared: 2020-11-20, Analyzed: 2020-11-20						
Mercury, dissolved	0.000201	0.000010	mg/L	0.000250	< 0.000010	80	70-130			
Reference (B0K1869-SRM1)				Prepared: 2020-11-20, Analyzed: 2020-11-20						
Mercury, dissolved	0.00586	0.000010	mg/L	0.00581		101	70-130			
Reference (B0K1869-SRM2)				Prepared: 2020-11-20, Analyzed: 2020-11-20						
Mercury, dissolved	0.00577	0.000010	mg/L	0.00581		99	70-130			
Dissolved Metals, Batch B0K1871										

APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO	Regional District of Central Okanagan	**WORK ORDER**	20K1873
PROJECT	Westside Landfill	**REPORTED**	2020-11-25 09:23

Analyte	Result	RL	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
Dissolved Metals, Batch B0K1871, Continued										
Blank (B0K1871-BLK1)				Prepared: 2020-11-20, Analyzed: 2020-11-21						
Mercury, dissolved	< 0.000010	0.000010	mg/L							
Duplicate (B0K1871-DUP1)			**Source: 20K1873-06**	Prepared: 2020-11-20, Analyzed: 2020-11-21						
Mercury, dissolved	< 0.000010	0.000010	mg/L		< 0.000010				20	
Matrix Spike (B0K1871-MS1)			**Source: 20K1873-07**	Prepared: 2020-11-20, Analyzed: 2020-11-21						
Mercury, dissolved	0.000223	0.000010	mg/L	0.000250	< 0.000010	89	70-130			
Reference (B0K1871-SRM1)				Prepared: 2020-11-20, Analyzed: 2020-11-21						
Mercury, dissolved	0.00651	0.000010	mg/L	0.00581		112	70-130			
General Parameters, Batch B0K1573										
Blank (B0K1573-BLK1)				Prepared: 2020-11-18, Analyzed: 2020-11-18						
Ammonia, Total (as N)	< 0.050	0.050	mg/L							
Blank (B0K1573-BLK2)				Prepared: 2020-11-18, Analyzed: 2020-11-18						
Ammonia, Total (as N)	< 0.050	0.050	mg/L							
LCS (B0K1573-BS1)				Prepared: 2020-11-18, Analyzed: 2020-11-18						
Ammonia, Total (as N)	0.981	0.050	mg/L	1.00		98	90-115			
LCS (B0K1573-BS2)				Prepared: 2020-11-18, Analyzed: 2020-11-18						
Ammonia, Total (as N)	0.995	0.050	mg/L	1.00		100	90-115			
General Parameters, Batch B0K1790										
Blank (B0K1790-BLK1)				Prepared: 2020-11-20, Analyzed: 2020-11-23						
Solids, Total Dissolved	< 15	15	mg/L							
LCS (B0K1790-BS1)				Prepared: 2020-11-20, Analyzed: 2020-11-23						
Solids, Total Dissolved	247	15	mg/L	240		103	85-115			
General Parameters, Batch B0K1817										
Blank (B0K1817-BLK1)				Prepared: 2020-11-20, Analyzed: 2020-11-20						
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 (B0K1817-BS1)				Prepared: 2020-11-20, Analyzed: 2020-11-20						
Alkalinity, Total (as CaCO3)	101	1.0	mg/L	100		101	80-120			
LCS (B0K1817-BS2)				Prepared: 2020-11-20, Analyzed: 2020-11-20						
Conductivity (EC)	1430	2.0	µS/cm	1410		102	95-104			
Duplicate (B0K1817-DUP1)			**Source: 20K1873-01**	Prepared: 2020-11-20, Analyzed: 2020-11-20						
Alkalinity, Total (as CaCO3)	370	1.0	mg/L		373			1	10	
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0	mg/L		< 1.0				10	
Alkalinity, Bicarbonate (as CaCO3)	370	1.0	mg/L		373			1	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)	978	2.0	µS/cm		980			< 1	5	

APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO	Regional District of Central Okanagan	**WORK ORDER**	20K1873
PROJECT	Westside Landfill	**REPORTED**	2020-11-25 09:23

Analyte	Result	RL	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
General Parameters, Batch B0K1817, Continued										
Duplicate (B0K1817-DUP1), Continued	**Source: 20K1873-01**			Prepared: 2020-11-20, Analyzed: 2020-11-20						
pH	7.56	0.10	pH units		7.55			< 1	4	
Reference (B0K1817-SRM1)				Prepared: 2020-11-20, Analyzed: 2020-11-20						
pH	7.00	0.10	pH units	7.01		100	98-102			
General Parameters, Batch B0K1948										
Blank (B0K1948-BLK1)				Prepared: 2020-11-22, Analyzed: 2020-11-22						
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 (B0K1948-BLK2)				Prepared: 2020-11-22, Analyzed: 2020-11-22						
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 (B0K1948-BLK3)				Prepared: 2020-11-22, Analyzed: 2020-11-22						
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 (B0K1948-BS1)				Prepared: 2020-11-22, Analyzed: 2020-11-22						
Alkalinity, Total (as CaCO3)	99.5	1.0	mg/L	100		100	80-120			
LCS (B0K1948-BS2)				Prepared: 2020-11-22, Analyzed: 2020-11-22						
Alkalinity, Total (as CaCO3)	100	1.0	mg/L	100		100	80-120			
LCS (B0K1948-BS3)				Prepared: 2020-11-22, Analyzed: 2020-11-22						
Alkalinity, Total (as CaCO3)	101	1.0	mg/L	100		101	80-120			
LCS (B0K1948-BS4)				Prepared: 2020-11-22, Analyzed: 2020-11-22						
Conductivity (EC)	1460	2.0	µS/cm	1410		103	95-104			
LCS (B0K1948-BS5)				Prepared: 2020-11-22, Analyzed: 2020-11-22						
Conductivity (EC)	1470	2.0	µS/cm	1410		104	95-104			
LCS (B0K1948-BS6)				Prepared: 2020-11-22, Analyzed: 2020-11-22						
Conductivity (EC)	1440	2.0	µS/cm	1410		102	95-104			
Reference (B0K1948-SRM1)				Prepared: 2020-11-22, Analyzed: 2020-11-22						
pH	6.99	0.10	pH units	7.01		100	98-102			
Reference (B0K1948-SRM2)				Prepared: 2020-11-22, Analyzed: 2020-11-22						
pH	6.99	0.10	pH units	7.01		100	98-102			
Reference (B0K1948-SRM3)				Prepared: 2020-11-22, Analyzed: 2020-11-22						
pH	6.99	0.10	pH units	7.01		100	98-102			

APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO	Regional District of Central Okanagan	**WORK ORDER**	20K1873
PROJECT	Westside Landfill	**REPORTED**	2020-11-25 09:23

Analyte	Result	RL	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier

APPENDIX 3: REVISION HISTORY

REPORTED TO	Regional District of Central Okanagan	**WORK ORDER**	20K1873
PROJECT	Westside Landfill	**REPORTED**	2020-11-25 09:23

Sample ID	Changed	Change	Analysis	Analyte(s)
20K1873-	2020-11-25	Project	N/A	N/A

APPENDIX C

2020 Groundwater and Soil Gas Monitoring Result Tables

Table C-1: Groundwater Analytical Results
2020 Monitoring Report - Westside Landfill
West Kelowna, BC

Location Relative to Landfill				Within Landfill				Downgradient (< 50 m)				Downgradient (> 50 m)					Upgradient		
Monitoring Well				**BH 1**		**BH 2**		**BH 4**		**BH 5**		**BH 3**			**BH 7**		**MW99-2**		
Laboratory ID	**Units**	**BC CSR[1] DW**	**Interim Provinicial Background Concentration[2]**	0051274-02	20K1873-02	0051274-03	20K1873-03	0051274-05	20K1873-05	0051274-06	20K1873-06	0051274-04	20K1873-04	20K1873-01	0051274-07	20K1873-07	0051274-08	0051274-01	20K1873-08
Sample Date				14-May-20	17-Nov-20	14-May-20	17-Nov-20	14-May-20	17-Nov-20	14-May-20	17-Nov-20	14-May-20	17-Nov-20	17-Nov-20	14-May-20	17-Nov-20	14-May-20	14-May-20	17-Nov-20
QA/QC													FDA	FD			FDA	FD	
General and Nutrient Parameters																			
pH	pH units			7.33	7.32	7.49	7.55	7.70	7.67	7.93	7.88	7.57	7.68	7.55	7.79	7.74	7.84	7.79	7.90
Conductivity	uS/cm			2510	1850	2810	3040	2000	2010	847	960	953	1070	980	1060	1110	1270	1200	1440
Total Dissolved Solids	mg/L			-	1100	-	2120	-	1230	-	599	-	643	610	-	675	-	-	837
Alkalinity, Total (as CaCO3)	mg/L			706	601	1530	1490	692	676	245	243	366	379	373	470	446	598	600	620
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			706	601	1530	1490	692	676	245	243	366	379	373	470	446	598	600	620
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			0.199	0.454	0.316	0.480	<0.050	<0.050	<0.050	<0.050	0.055	0.066	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Chloride	mg/L	**250**		**460**	218	177	163	230	237	110	123	85.4	80.3	67	68.4	61.1	97.9	98.3	119
Nitrate (as N)	mg/L	10		<0.100	0.111	<0.010	0.011	3.62	2.13	5.54	6.10	2.55	1.96	2.23	3.73	3.71	0.669	0.622	0.652
Sulfate	mg/L	500		93.2	64.5	122	126	99.7	91.6	38.0	31.8	38.7	60.5	44.1	37.4	42.3	19.9	19.7	20.1
Dissolved Metals																			
Hardness, Total (as CaCO3)	mg/L			1160	905	1690	1700	949	977	340	384	414	484	508	520	498	694	677	755
Aluminum	mg/L	9.5		<0.0050	<0.0050	0.0075	0.0284	<0.0050	0.0054	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0072	<0.0050
Antimony	mg/L	0.006		0.00025	<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
Arsenic	mg/L	0.01		0.00153	0.00549	0.00560	0.00274	<0.00050	0.00052	0.00133	0.00125	0.00144	0.00135	0.0013	0.00225	0.00210	<0.00050	<0.00050	<0.00050
Barium	mg/L	1		0.066	0.0493	0.0107	0.0109	0.0362	0.0456	0.0119	0.0127	0.0116	0.0147	0.0156	0.0215	0.0206	0.0076	0.0077	0.0107
Beryllium	mg/L	0.008		<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		1.76	1.04	0.734	0.467	0.605	0.514	0.238	<0.0500	0.301	0.161	0.178	0.190	0.0652	0.114	0.0335	<0.0500
Cadmium	mg/L	0.005		0.000294	0.000096	0.000021	<0.000010	0.000079	0.000085	<0.000010	<0.000010	0.000020	0.000017	0.000023	0.000122	0.000092	0.000016	0.000012	<0.000010
Calcium	mg/L			310	219	363	352	185	181	93.2	102	110	120	124	132	122	128	126	132
Chromium	mg/L	6 [III], 0.05 [VI]		0.00067	0.00074	0.00220	0.00188	<0.00050	<0.00050	<0.00050	<0.00050	0.00068	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Cobalt	mg/L	0.001	**0.020**	**0.00423**	**0.00187**	**0.00276**	**0.00236**	**0.00164**	**0.00151**	<0.00010	<0.00010	0.00013	0.00023	0.00029	0.00078	0.00074	0.00022	0.00021	0.00023
Copper	mg/L	1.5		0.00923	0.00254	<0.00040	<0.00040	0.00200	0.00161	0.00070	<0.00040	0.00146	<0.00040	<0.00040	0.00224	0.00175	0.00492	0.00484	0.00241
Iron	mg/L	*		0.868	7.11	1.79	2.09	<0.010	<0.010	<0.010	<0.010	0.028	0.496	0.674	<0.010	<0.010	0.015	<0.010	0.076
Lead	mg/L	0.01		<0.00020	0.00030	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	0.00103	0.00029	0.00024
Lithium	mg/L	**0.008**		**0.0270**	**0.0193**	**0.0218**	**0.0220**	**0.0314**	**0.0330**	**0.0193**	**0.0185**	**0.0167**	**0.0166**	**0.0163**	**0.0196**	**0.0180**	**0.0368**	**0.0373**	**0.0425**
Magnesium	mg/L			94.2	87.1	189.0	200	118	127	26.1	31.5	34.1	44.3	47.8	46.2	46.8	90.7	87.8	104
Manganese	mg/L	*		2.93	4.14	7.80	8.30	0.482	0.378	0.00223	0.00113	0.00118	0.0890	0.118	0.283	0.197	0.0117	0.0116	0.0221
Mercury	mg/L	0.001		<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		0.00122	0.00130	0.00456	0.00397	0.00561	0.00687	0.00817	0.00671	0.00432	0.00401	0.00415	0.00216	0.00196	0.00032	0.00034	0.00027
Nickel	mg/L	0.08		0.0230	0.0161	0.0190	0.0186	0.0185	0.0204	<0.00040	0.00043	0.00105	0.00301	0.00345	0.00434	0.00424	<0.00040	<0.00040	<0.00040
Phosphorus	mg/L			0.059	0.205	0.112	0.175	<0.050	<0.050	<0.050	<0.050	<0.050	0.080	<0.050	0.092	0.117	<0.050	<0.050	<0.050
Potassium	mg/L			14.0	9.98	2.30	2.62	5.49	5.72	2.92	2.88	4.71	4.64	4.82	2.97	2.66	0.59	0.51	0.41
Selenium	mg/L	0.01		<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.00051	<0.00050	0.00065	0.00052	0.00053	0.00093	0.00083	<0.00050	<0.00050	<0.00050
Silicon	mg/L			19.1	19.3	28.6	25.4	13.2	11.8	10.2	9.7	14.7	12.4	12.4	17.8	13.6	9.0	8.4	7.1
Silver	mg/L	0.02		<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		136	131	125	140	93.7	105	54.2	53.8	57.9	61	63.5	68.1	64.4	44.5	43.1	49.6
Strontium	mg/L	**2.5**		2.18	1.75	**3.40**	**3.60**	2.04	2.32	0.446	0.499	0.708	0.806	0.853	0.877	0.805	1.89	1.85	2.11
Sulfur	mg/L			37.2	25.3	48.4	57.4	39.4	41.4	13.3	13.8	13.4	27.4	33.7	15.6	16.5	8.3	7.6	9.3
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			<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	0.000024	<0.000020	<0.000020	<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	3		<0.00020	<0.00020	0.00021	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	0.00022	<0.00020
Titanium	mg/L			<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**		0.00571	0.00191	0.00603	0.00470	**0.0299**	**0.0292**	0.00607	0.00535	0.00843	0.00945	0.0102	0.0117	0.0101	0.00822	0.00804	0.00720
Vanadium	mg/L	0.02		<0.0010	<0.0010	0.0054	<0.0010	0.0028	<0.0010	0.0048	<0.0010	0.0031	<0.0010	<0.0010	0.0129	0.0062	<0.0010	<0.0010	<0.0010
Zinc	mg/L	3		<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	<0.0040	<0.0040
Zirconium	mg/L			0.00077	0.00127	0.00395	0.00435	0.00054	0.00044	<0.00010	<0.00010	<0.00010	0.00012	0.00013	0.00020	0.00017	0.00022	0.00028	0.00028

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. 13/2019, updated to 1 Feb 2021]).

[2] From BC ENV Protocol 9 (v2 1 Feb 2021).

Land use abbreviations: DW = Drinking Water.

V = standard is valence dependent, Cl = standard varies with chloride concentration, H = standard varies with hardness, pH = standard varies with pH.

* 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.

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

1320 Indicates parameter concentration exceeds the CSR DW standard (but is less than the Interim Provincial Background Concetration for cobalt).

1320 Indicates parameter concentration exceeds the CSR DW standard.

Table C-2: Summary of Soil Gas Monitoring Results
2020 Monitoring Report - Westside Landfill
West Kelowna, BC

Date	Monitor ID	Methane (ppm)	CO2 (%)	O2 (%)	H2S (ppm)	LEL (%)	Notes
January							
27-Jan-20	BH101d	45	0	20.9	0	0	Slight back pressure
27-Jan-20	BH101s	70	0.8	19.9	0	0	
27-Jan-20	BH102	50250	12.7	0.7	0	**100**	
27-Jan-20	BH103	55	0	20.9	0	0	Slight back pressure
27-Jan-20	MW07-1	0	0	20.9	0	0	Slight back pressure
27-Jan-20	MW99-2	55	1.5	19.5	0	0	
27-Jan-20	MW99-3	20	0.8	20.5	0	0	
27-Jan-20	MW99-4	150	3.5	16.7	0	0	
27-Jan-20	VP07-01d	10	0.1	20.9	0	0	
27-Jan-20	VP07-01s	10	0.5	20.6	0	0	
27-Jan-20	VP07-02	5	0.5	20.7	0	0	
27-Jan-20	VP07-03	75	0.4	20.9	0	0	
27-Jan-20	VP07-05	0	0	20.9	0	0	
27-Jan-20	VP07-08	5	0	20.9	0	0	
27-Jan-20	VP07-09	15	0	20.5	0	0	
27-Jan-20	VP07-14	N/A	N/A	N/A	N/A	N/A	Water too high to sample
27-Jan-20	VP07-15	50	1.4	19.2	0	0	
27-Jan-20	VP07-16	75	1.3	20.1	0	0	
27-Jan-20	VP11-01	15	0.2	20.3	0	0	
27-Jan-20	VP11-02	35	0.7	19.5	0	0	
27-Jan-20	VP11-04	95	0	20.9	0	0	Slight back pressure
27-Jan-20	VP11-05	80	1.8	18.8	0	0	
27-Jan-20	VP11-06	15	0.2	20.9	0	0	
27-Jan-20	VP11-07	25	0.7	20.3	0	0	
27-Jan-20	VP11-08	15	0.5	20.7	0	0	
27-Jan-20	VP11-09	70	0.9	19.3	0	0	
27-Jan-20	VP11-10	35	0	20.9	0	0	Slight back pressure
27-Jan-20	VP12-01	115	1.2	18.4	0	0	
27-Jan-20	VP15-01	40	1.3	19.1	0	0	
27-Jan-20	VP15-02	NA	NA	NA	NA	NA	purge back pressure
27-Jan-20	VP15-03	15	0	20.9	0	0	
February							
3-Feb-20	BH101d	110	0.8	15.9	0	0	
3-Feb-20	BH101s	25	0.5	20.7	0	0	
3-Feb-20	BH102	20000	13.8	1.7	0	**31**	
3-Feb-20	BH103	25	0.6	19.4	0	0	Slight back pressure
3-Feb-20	MW07-1	95	0	20.9	0	0	Slight back pressure
3-Feb-20	MW99-2	50	0.9	20.1	0	0	
3-Feb-20	MW99-3	35	0.6	19.9	0	0	
3-Feb-20	MW99-4	160	3.2	16.5	0	0	
3-Feb-20	VP07-01d	10	0	20.6	0	0	
3-Feb-20	VP07-01s	30	0.7	19.6	0	0	
3-Feb-20	VP07-02	40	0.6	19.8	0	0	
3-Feb-20	VP07-03	5	0	20.9	0	0	
3-Feb-20	VP07-05	15	0	20.9	0	0	
3-Feb-20	VP07-08	25	0	19.7	0	0	
3-Feb-20	VP07-09	20	0	20.5	0	0	
3-Feb-20	VP07-14	N/A	N/A	N/A	N/A	N/A	Water too high to sample
3-Feb-20	VP07-15	120	1.4	16.1	0	0	
3-Feb-20	VP07-16	50	1.2	19.7	0	0	
3-Feb-20	VP11-01	35	0.2	20.3	0	0	
3-Feb-20	VP11-02	50	0.8	19.3	0	0	
3-Feb-20	VP11-04	55	0.8	19	0	0	
3-Feb-20	VP11-05	200	0.2	13.3	0	0	
3-Feb-20	VP11-06	20	0.2	20.9	0	0	
3-Feb-20	VP11-07	35	0.6	20.3	0	0	
3-Feb-20	VP11-08	30	0.6	20.9	0	0	
3-Feb-20	VP11-09	50	0.7	19.9	0	0	
3-Feb-20	VP11-10	25	0	20.9	0	0	
3-Feb-20	VP12-01	250	1.5	18.1	0	0	
3-Feb-20	VP15-01	75	1.3	18.6	0	0	No Water
3-Feb-20	VP15-02	NA	NA	NA	NA	NA	no sample - purge back pressure
3-Feb-20	VP15-03	NA	NA	NA	NA	NA	no sample - purge back pressure

Table C-2: Summary of Soil Gas Monitoring Results
2020 Monitoring Report - Westside Landfill
West Kelowna, BC

Date	Monitor ID	Methane (ppm)	CO2 (%)	O2 (%)	H2S (ppm)	LEL (%)	Notes
March							
9-Mar-20	BH101d	190	2.9	12.1	0	0	
9-Mar-20	BH101s	35	1.1	19.9	0	0	
9-Mar-20	BH102	50250	26	0	0	**100**	
9-Mar-20	BH103	175	4.5	13.5	0	0	Slight back pressure
9-Mar-20	MW07-1	220	0.5	20.8	0	0	
9-Mar-20	MW99-2	75	1.6	18.8	0	0	
9-Mar-20	MW99-3	55	1.3	19.2	0	0	
9-Mar-20	MW99-4	160	4.2	15.8	0	0	
9-Mar-20	VP07-01d	0	0	20.9	0	0	
9-Mar-20	VP07-01s	30	0.8	20	0	0	
9-Mar-20	VP07-02	0	0.8	20.1	0	0	
9-Mar-20	VP07-03	25	0.4	20.9	0	0	
9-Mar-20	VP07-05	15	0	20.9	0	0	
9-Mar-20	VP07-08	25	0.2	19.9	0	0	
9-Mar-20	VP07-09	15	0	20.8	0	0	
9-Mar-20	VP07-14	N/A	N/A	N/A	N/A	N/A	Water too high to sample
9-Mar-20	VP07-15	6400	9.6	8.9	0	**13**	
9-Mar-20	VP07-16	85	2.5	18.2	0	0	
9-Mar-20	VP11-01	35	0.6	20.1	0	0	
9-Mar-20	VP11-02	60	1.2	18.9	0	0	
9-Mar-20	VP11-04	65	1.3	18.2	0	0	
9-Mar-20	VP11-05	180	4.4	14.6	0	0	
9-Mar-20	VP11-06	15	0.4	20.9	0	0	
9-Mar-20	VP11-07	55	0.9	20.1	0	0	
9-Mar-20	VP11-08	55	1.4	19.9	0	0	
9-Mar-20	VP11-09	75	1.8	18.8	0	0	
9-Mar-20	VP11-10	30	0.1	20.9	0	0	
9-Mar-20	VP12-01	55	1.6	18.4	0	0	
9-Mar-20	VP15-01	0	1.8	18.4	0	0	No Water
9-Mar-20	VP15-02	NA	NA	NA	NA	NA	no sample - purge back pressure
9-Mar-20	VP15-03	NA	NA	NA	NA	NA	no sample - purge back pressure
March Re-sampling Event 1							
10-Mar-20	BH102	50250	26	1.6	0	**100**	
10-Mar-20	VP15-01	110	1.7	18.7	0	0	
10-Mar-20	VP15-02	NA	NA	NA	NA	NA	no sample - purge back pressure
10-Mar-20	VP15-03	670	0	20.9	0	0	
10-Mar-20	VP07-02	45	1.3	19.2	0	0	
10-Mar-20	VP07-15	890	9.3	10.6	0	1	
March Re-sampling Event 2							
12-Mar-20	BH102	50250	25.3	0	0	**100**	
12-Mar-20	VP15-01	55	1.7	18.5	0	0	
12-Mar-20	VP15-02	NA	NA	NA	NA	NA	no sample - purge back pressure
12-Mar-20	VP15-03	95	0	20.9	0	0	
12-Mar-20	VP07-02	35	1.3	19.1	0	0	
12-Mar-20	VP07-15	380	7.9	12.3	0	0	
March Re-sampling Event 3							
16-Mar-20	BH102	50250	25.8	0	0	**100**	
16-Mar-20	VP15-01	0	1.7	19.2	0	0	
16-Mar-20	VP15-02	NA	NA	NA	NA	NA	no sample - purge back pressure
16-Mar-20	VP15-03	900	0.2	20.8	0	0	
16-Mar-20	VP07-02	10	1.3	20.6	0	0	
16-Mar-20	VP07-15	160	6.7	14.4	0	1	

Table C-2: Summary of Soil Gas Monitoring Results
2020 Monitoring Report - Westside Landfill
West Kelowna, BC

Date	Monitor ID	Methane (ppm)	CO2 (%)	O2 (%)	H2S (ppm)	LEL (%)	Notes
April							
7-Apr-20	BH101d	350	9.3	7.1	0	0	
7-Apr-20	BH101s	50	1.2	19.2	0	0	
7-Apr-20	BH102	50250	25.6	0	0	**100**	
7-Apr-20	BH103	250	6.9	13.8	0	0	
7-Apr-20	MW07-1	60	0.7	20	0	0	
7-Apr-20	MW99-2	55	1.4	18.6	0	0	
7-Apr-20	MW99-3	40	1.3	19.1	0	0	
7-Apr-20	MW99-4	110	3.2	17.9	0	0	
7-Apr-20	VP07-01d	40	0.2	20.9	0	0	
7-Apr-20	VP07-01s	35	0.5	20.6	0	0	
7-Apr-20	VP07-02	35	1.6	19.1	0	0	
7-Apr-20	VP07-03	20	0.6	20.6	0	0	
7-Apr-20	VP07-05	0	0	20.9	0	0	
7-Apr-20	VP07-08	0	0.6	20.3	0	0	
7-Apr-20	VP07-09	0	0	20.9	0	0	
7-Apr-20	VP07-14	95	1.7	18.7	0	0	
7-Apr-20	VP07-15	155	5.9	15.6	0	0	
7-Apr-20	VP07-16	115	2.5	17.9	0	0	
7-Apr-20	VP11-01	20	0.9	19.8	0	0	
7-Apr-20	VP11-02	20	1.2	19.1	0	0	
7-Apr-20	VP11-04	70	1.3	18.8	0	0	
7-Apr-20	VP11-05	100	3.8	17.3	0	0	
7-Apr-20	VP11-06	5	0.6	20.8	0	0	
7-Apr-20	VP11-07	15	1	20.1	0	0	
7-Apr-20	VP11-08	55	1.4	19.9	0	0	
7-Apr-20	VP11-09	35	1.5	19	0	0	
7-Apr-20	VP11-10	0	0	20.9	0	0	
7-Apr-20	VP12-01	45	1.5	19	0	0	
7-Apr-20	VP15-01	110	2	18.6	0	0	
7-Apr-20	VP15-02	NA	NA	NA	NA	NA	no sample - purge back pressure
7-Apr-20	VP15-03	25	0	20.9	0	0	slight purge back pressure
May							
16-May-20	BH101d	540	15.5	4.7	0	0	
16-May-20	BH101s	85	2.4	17.9	0	0	
16-May-20	BH102	7400	16.9	6.2	0	14	
16-May-20	BH103	165	5.9	16	0	0	
16-May-20	MW07-1	105	1.5	17.8	0	0	
16-May-20	MW99-2	60	1.8	17.5	0	0	
16-May-20	MW99-3	65	1.6	17.9	0	0	
16-May-20	MW99-4	55	1.6	18.2	0	0	
16-May-20	VP07-01d	35	1.2	19	0	0	
16-May-20	VP07-01s	20	0.6	20.7	0	0	
16-May-20	VP07-02	30	1.3	19.6	0	0	
16-May-20	VP07-03	35	0.3	20.9	0	0	
16-May-20	VP07-05	0	0.6	19.4	0	0	
16-May-20	VP07-08	20	0.6	18.6	0	0	
16-May-20	VP07-09	10	0.2	19.2	0	0	
16-May-20	VP07-14	50	2.1	18.9	0	0	
16-May-20	VP07-15	115	3.6	17	0	0	
16-May-20	VP07-16	85	2.1	18.1	0	0	
16-May-20	VP11-01	10	0.8	19	0	0	
16-May-20	VP11-02	10	1.7	17.7	0	0	
16-May-20	VP11-04	45	1.5	17.9	0	0	
16-May-20	VP11-05	30	1.6	18.6	0	0	
16-May-20	VP11-06	25	0.8	19	0	0	
16-May-20	VP11-07	35	1.1	18.7	0	0	
16-May-20	VP11-08	250	6.9	12.3	0	0	
16-May-20	VP11-09	25	1.4	19.4	0	0	
16-May-20	VP11-10	0	0.4	19.2	0	0	
16-May-20	VP12-01	40	1.4	18.3	0	0	
16-May-20	VP15-01	50	1.7	19.1	0	0	
16-May-20	VP15-02	NA	NA	NA	NA	NA	no sample - purge back pressure
16-May-20	VP15-03	30	0.1	20.9	0	0	slight purge back pressure
June							
15-Jun-20	BH102	1000	13.9	6.7	0	1	
15-Jun-20	BH103	210	4.3	16.6	0	0	
15-Jun-20	VP11-06	20	1.3	19.5	0	0	
15-Jun-20	VP11-07	95	1.6	19.2	0	0	
15-Jun-20	VP11-08	0	7.3	13.4	0	0	
15-Jun-20	VP11-09	90	1.6	19.1	0	0	
15-Jun-20	VP15-01	80	1.9	18.7	0	0	
15-Jun-20	VP15-02						purge back pressure - something covering screens
	VP15-03						purge back pressure - something covering screens

Table C-2: Summary of Soil Gas Monitoring Results
2020 Monitoring Report - Westside Landfill
West Kelowna, BC

Date	Monitor ID	Methane (ppm)	CO2 (%)	O2 (%)	H2S (ppm)	LEL (%)	Notes
July							
6-Jul-20	BH103	170	3.7	17.4	0	0	
6-Jul-20	BH102	115	4	16.5	0	1	
6-Jul-20	VP15-01	35	1.6	18.9	0	0	
6-Jul-20	VP15-02						purge back pressure - something covering screens
6-Jul-20	VP15-03	0	0	20.7	0	0	purge back pressure - something covering screens
6-Jul-20	VP11-09	0	1.2	19.4	0	0	
6-Jul-20	VP11-08	430	8.2	12.4	0	0	
6-Jul-20	VP11-07	95	1.6	18.8	0	0	
6-Jul-20	VP11-06	75	1	19.3	0	0	
August							
23-Aug-20	BH101d	100	3.4	18.1	0	0	
23-Aug-20	BH101s	45	3.3	18.2	0	0	
23-Aug-20	BH102	25	1.4	19.9	0	0	
23-Aug-20	BH103	40	1.9	19.2	0	0	
23-Aug-20	MW07-1	95	1.9	18.6	0	0	
23-Aug-20	MW99-2	45	1.6	19.7	0	0	
23-Aug-20	MW99-3	50	1.7	19.2	0	0	
23-Aug-20	MW99-4	55	1.8	19.4	0	0	
23-Aug-20	VP07-01d	50	1.6	19.9	0	0	
23-Aug-20	VP07-01s	5	0.6	20.9	0	0	
23-Aug-20	VP07-02	50	1.2	19.9	0	0	
23-Aug-20	VP07-03	5	0.5	20.5	0	0	
23-Aug-20	VP07-05	130	2.7	18.6	0	0	
23-Aug-20	VP07-08	10	1.1	20.5	0	0	
23-Aug-20	VP07-09	35	0.6	18.5	0	0	
23-Aug-20	VP07-14	60	2.8	18.8	0	0	No Water
23-Aug-20	VP07-15	65	1.9	19.2	0	0	
23-Aug-20	VP07-16	70	2.8	18.2	0	0	
23-Aug-20	VP11-01	0	0.3	20.4	0	0	
23-Aug-20	VP11-02	20	1.3	19.3	0	0	
23-Aug-20	VP11-04	50	1.4	19.4	0	0	
23-Aug-20	VP11-05	25	1.3	20.1	0	0	
23-Aug-20	VP11-06	15	0.9	20.3	0	0	
23-Aug-20	VP11-07	20	1.2	20.1	0	0	
23-Aug-20	VP11-08	270	6.6	14	0	0	
23-Aug-20	VP11-09	0	0.8	20.8	0	0	
23-Aug-20	VP11-10	0	0.5	20.6	0	0	
23-Aug-20	VP12-01	20	1.2	20.3	0	0	
23-Aug-20	VP15-01	20	1.1	20.1	0	0	
23-Aug-20	VP15-02	NA	NA	NA	NA	NA	no sample - purge back pressure
23-Aug-20	VP15-03	45	0	20.9	0	0	slight purge back pressure
September							
14-Sep-20	BH103	55	1.7	19.8	0	0	
14-Sep-20	BH102	0	1.3	20	0	0	
14-Sep-20	VP15-01	15	1	20.1	0	0	
14-Sep-20	VP15-02						purge back pressure - something covering screens
14-Sep-20	VP15-03	5	0	20.9	0	0	slight purge back pressure
14-Sep-20	VP11-09	10	0.6	20.8	0	0	
14-Sep-20	VP11-08	260	6.8	14.1	0	0	
14-Sep-20	VP11-07	30	1	20.1	0	0	
14-Sep-20	VP11-06	20	0.9	20.1	0	0	
October							
8-Oct-20	BH103	0	1.6	19.7	0	0	
8-Oct-20	BH102	40	1.5	18.2	0	0	
8-Oct-20	VP15-01	0	1.1	19.3	0	0	
8-Oct-20	VP15-02	NA	NA	NA	NA	NA	no sample - purge back pressure
8-Oct-20	VP15-03	0	0.1	20.6	0	0	
8-Oct-20	VP11-09	10	0.7	19.5	0	0	
8-Oct-20	VP11-08	NA	NA	NA	NA	NA	Not accessed due to saftey concerns
8-Oct-20	VP11-07	NA	NA	NA	NA	NA	Not accessed due to saftey concerns
8-Oct-20	VP11-06	NA	NA	NA	NA	NA	Not accessed due to saftey concerns

Table C-2: Summary of Soil Gas Monitoring Results
2020 Monitoring Report - Westside Landfill
West Kelowna, BC

Date	Monitor ID	Methane (ppm)	CO2 (%)	O2 (%)	H2S (ppm)	LEL (%)	Notes
November							
15-Nov-20	BH101d	460	9.8	13.2	0	0	
15-Nov-20	BH101s	260	3.3	17.5	0	0	
15-Nov-20	BH102	155	3.5	16.1	0	0	
15-Nov-20	BH103	120	1.8	18	0	0	
14-Nov-20	MW07-1	30	1.1	19.7	0	0	
14-Nov-20	MW99-2	95	1.5	19.7	0	0	
14-Nov-20	MW99-3	35	0.5	20.9	0	0	
14-Nov-20	MW99-4	145	3.4	16.9	0	0	
15-Nov-20	VP07-01d	75	1.4	19.9	0	0	
15-Nov-20	VP07-01s	40	0.7	20.6	0	0	
15-Nov-20	VP07-02	55	1.2	19.4	0	0	
15-Nov-20	VP07-03	175	0.6	20.1	0	0	
14-Nov-20	VP07-05	35	1.1	19.3	0	0	
14-Nov-20	VP07-08	25	0.6	19.7	0	0	
14-Nov-20	VP07-09	35	0.5	18.5	0	0	
15-Nov-20	VP07-14	100	2.1	19	0	0	
15-Nov-20	VP07-15	75	1.7	18.9	0	0	
15-Nov-20	VP07-16	130	2.3	19.1	0	0	
14-Nov-20	VP11-01	0	0.2	20.9	0	0	
14-Nov-20	VP11-02	50	1	20.4	0	0	
14-Nov-20	VP11-04	0	1.3	19.5	0	0	
14-Nov-20	VP11-05	145	2.8	18.3	0	0	
14-Nov-20	VP11-06	75	0.8	20.9	0	0	
14-Nov-20	VP11-07	55	1.1	20	0	0	
14-Nov-20	VP11-08	35	1.1	20.4	0	0	
15-Nov-20	VP11-09	195	0.9	19.3	0	0	
14-Nov-20	VP11-10	5	0.1	20.9	0	0	
15-Nov-20	VP12-01	55	1	19.7	0	0	
15-Nov-20	VP15-01	35	0.6	20.3	0	0	
15-Nov-20	VP15-02	NA	NA	NA	NA	NA	no sample - purge back pressure
15-Nov-20	VP15-03	35	0	20.9	0	0	slight purge back pressure
December							
5-Dec-20	BH101d	350	9.6	10.7	0	0	
5-Dec-20	BH101s	125	3.5	17.3	0	0	
5-Dec-20	BH102	240	5.3	12.3	0	0	
5-Dec-20	BH103	105	2	17.6	0	0	
5-Dec-20	MW07-1	45	0.9	20	0	0	
5-Dec-20	MW99-2	80	1.7	20.2	0	0	
5-Dec-20	MW99-3	55	1.1	20.9	0	0	
5-Dec-20	MW99-4	175	4.1	16.3	0	0	
5-Dec-20	VP07-01d	55	1.3	19.5	0	0	
5-Dec-20	VP07-01s	35	0.6	20.5	0	0	
5-Dec-20	VP07-02	40	1.2	19.5	0	0	
5-Dec-20	VP07-03	15	0.4	20.9	0	0	
5-Dec-20	VP07-05	35	0.6	20.3	0	0	
5-Dec-20	VP07-08	45	0.5	18.8	0	0	
5-Dec-20	VP07-09	55	0.2	17.7	0	0	
5-Dec-20	VP07-14	95	2.2	18.3	0	0	
5-Dec-20	VP07-15	80	2	18.7	0	0	
5-Dec-20	VP07-16	75	2.6	18.8	0	0	
5-Dec-20	VP11-01	20	0.3	20.9	0	0	
5-Dec-20	VP11-02	70	1.1	19.2	0	0	
5-Dec-20	VP11-04	115	1.6	18.4	0	0	
5-Dec-20	VP11-05	210	3.2	17.4	0	0	
5-Dec-20	VP11-06	45	0.7	20.7	0	0	
5-Dec-20	VP11-07	60	1.1	20	0	0	
5-Dec-20	VP11-08	40	0.8	20.7	0	0	
5-Dec-20	VP11-09	40	0.9	19.7	0	0	
5-Dec-20	VP11-10	5	0	20.9	0	0	
5-Dec-20	VP12-01	55	1.1	19.1	0	0	
5-Dec-20	VP15-01	50	1.2	19.3	0	0	
5-Dec-20	VP15-02	NA	NA	NA	NA	NA	no sample - purge back pressure
5-Dec-20	VP15-03	10	0	20.9	0	0	

Table C-3: Groundwater Elevations
2020 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)
27-Jan-20	-	-	-	-	-	-	-	-	-	-	-	-	4.73	541.64	4.81	533.45	6.10	530.15
03-Feb-20	-	-	-	-	-	-	-	-	-	-	-	-	3.38	542.99	4.22	534.03	6.04	530.22
09-Mar-20	-	-	-	-	-	-	-	-	-	-	-	-	4.42	541.95	4.23	534.02	5.40	530.85
07-Apr-20	-	-	-	-	-	-	-	-	-	-	-	-	5.03	541.34	4.32	533.94	5.42	530.84
16-May-20	2.82	516.49	3.47	523.45	14.16	457.77	2.44	492.15	11.54	477.21	4.11	496.05	6.75	539.62	Dry	-	5.45	530.81
23-Aug-20	-	-	-	-	-	-	-	-	-	-	-	-	5.37	541.00	4.55	533.70	6.08	530.18
14-Nov-20	3.58	515.73	3.52	523.40	14.39	457.54	2.47	492.12	11.64	477.11	4.35	495.81	5.34	541.03	4.68	533.57	6.23	530.02
05-Dec-20	-	-	-	-	-	-	-	-	-	-	-	-	5.38	540.99	4.73	533.52	6.20	530.05

Notes:

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

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

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

Table C-4: Quality Assurance and Quality Control Results - Groundwater
2020 Monitoring Report - Westside Landfill
West Kelowna, BC

Sample Location	Units	BH3		Method Reporting Limit	Mean	Relative Percent Difference (%)	Difference Factor (-)	MW99-2		Method Reporting Limit	Mean	Relative Percent Difference (%)	Difference Factor (-)
Laboratory ID		20K1873-04	20K1873-01					0051274-08	0051274-01				
Sample Date		17-Nov-20	17-Nov-20					14-May-20	14-May-20				
QA/QC		FDA	FD					FDA	FD				
General and Nutrient Parameters													
Conductivity	uS/cm	1070	980	2	1025	8.8%	NA	1270	1200	2	1235	5.7%	NA
Total Dissolved Solids	mg/L	643	610	15	627	5.3%	NA	-	-	15	-	-	-
Alkalinity, Total (as CaCO3)	mg/L	379	373	1.0	376	1.6%	NA	598	600	1	599	0.3%	NA
Alkalinity, Phenolphthalein (as CaCO3)	mg/L	<1.0	<1.0	1.0	-	-	-	<1.0	<1.0	1	-	-	-
Alkalinity, Bicarbonate (as CaCO3)	mg/L	379	373	1.0	376	1.6%	NA	598	600	1	599	0.3%	NA
Alkalinity, Carbonate (as CaCO3)	mg/L	<1.0	<1.0	1.0	-	-	-	<1.0	<1.0	1	-	-	-
Alkalinity, Hydroxide (as CaCO3)	mg/L	<1.0	<1.0	1.0	-	-	-	<1.0	<1.0	1	-	-	-
Ammonia (as N)	mg/L	0.066	<0.050	0.050	NC	NC	NA	<0.050	<0.050	0.05	-	-	-
Chloride	mg/L	80.3	67.0	1.0	73.7	18.1%	NA	97.9	98.3	1	98.1	0.4%	NA
Nitrate (as N)	mg/L	1.96	2.23	0.01	2.10	12.9%	NA	0.669	0.622	0.010	0.646	7.3%	NA
Sulfate	mg/L	60.5	44.1	1.0	52.3	**31.4%**	NA	19.9	19.7	1	19.8	1.0%	NA
Dissolved Metals													
Hardness, Total (as CaCO3)	mg/L	484	508	0.5	496	4.8%	NA	694	677	0.5	686	2.5%	NA
Aluminum	mg/L	<0.0050	<0.0050	0.0050	-	-	-	<0.0050	0.0072	0.0050	-	-	-
Antimony	mg/L	<0.00020	<0.00020	0.00020	-	-	-	<0.00020	<0.00020	0.00020	-	-	-
Arsenic	mg/L	0.00135	0.00130	0.00050	0.00133	NA	0.10	<0.00050	<0.00050	0.00050	-	-	-
Barium	mg/L	0.0147	0.0156	0.0050	0.0152	NA	0.18	0.0076	0.0077	0.0050	0.0077	NA	0.02
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	0.161	0.178	0.050	0.170	NA	0.34	0.114	0.0335	0.050	0.0738	NA	1.61
Cadmium	mg/L	0.000017	0.000023	0.000010	0.000020	NA	0.60	0.000016	0.000012	0.000010	0.000014	NA	0.40
Calcium	mg/L	120	124	0.2	122	3.3%	NA	128	126	0.2	127	1.6%	NA
Chromium	mg/L	<0.00050	<0.00050	0.00050	-	-	-	<0.00050	<0.00050	0.00050	-	-	-
Cobalt	mg/L	0.00023	0.00029	0.00010	0.00026	NA	0.60	0.00022	0.00021	0.00010	0.00022	NA	0.10
Copper	mg/L	<0.00040	<0.00040	0.00040	-	-	-	0.00492	0.00484	0.00040	0.00488	1.6%	NA
Iron	mg/L	0.496	0.674	0.010	0.585	**30.4%**	NA	0.015	<0.010	0.010	-	-	-
Lead	mg/L	<0.00020	<0.00020	0.00020	-	-	-	0.00103	0.00029	0.00020	0.00066	NA	**3.70**
Lithium	mg/L	0.0166	0.0163	0.0001	0.0165	1.8%	NA	0.0368	0.0373	0.0001	0.0371	1.3%	NA
Magnesium	mg/L	44.3	47.8	0.01	46.1	7.6%	NA	90.7	87.8	0.01	89.3	3.2%	NA
Manganese	mg/L	0.0890	0.118	0.0002	0.104	**28.0%**	NA	0.0117	0.0116	0.0002	0.0117	0.9%	NA
Mercury	mg/L	<0.000010	<0.000010	0.000010	-	-	-	<0.000010	<0.000010	0.000010	-	-	-
Molybdenum	mg/L	0.00401	0.00415	0.00010	0.00408	3.4%	NA	0.00032	0.00034	0.00010	0.00033	NA	0.20
Nickel	mg/L	0.00301	0.00345	0.00040	0.00323	13.6%	NA	<0.00040	<0.00040	0.00040	-	-	-
Phosphorus	mg/L	0.080	<0.050	0.050	-	-	-	<0.050	<0.050	0.050	-	-	-
Potassium	mg/L	4.64	4.82	0.10	4.73	3.8%	NA	0.59	0.51	0.10	0.55	14.5%	NA
Selenium	mg/L	0.00052	0.00053	0.00050	0.00053	NA	0.02	<0.00050	<0.00050	0.00050	-	-	-
Silicon	mg/L	12.4	12.4	1.0	12.4	0.0%	NA	9.0	8.4	1.0	8.7	6.9%	NA
Silver	mg/L	<0.000050	<0.000050	0.000050	-	-	-	<0.000050	<0.000050	0.000050	-	-	-
Sodium	mg/L	61.0	63.5	0.1	62.3	4.0%	NA	44.5	43.1	0.1	43.8	3.2%	NA
Strontium	mg/L	0.806	0.853	0.001	0.830	5.7%	NA	1.89	1.85	0.001	1.87	2.1%	NA
Sulfur	mg/L	27.4	33.7	3.0	30.6	**20.6%**	NA	8.3	7.6	3.0	8.0	NA	0.23
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	0.00022	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	0.00945	0.0102	0.00002	0.00983	7.6%	NA	0.00822	0.00804	0.00002	0.00813	2.2%	NA
Vanadium	mg/L	<0.0010	<0.0010	0.0010	-	-	-	<0.0010	<0.0010	0.0010	-	-	-
Zinc	mg/L	<0.0040	<0.0040	0.0040	-	-	-	<0.0040	<0.0040	0.0040	-	-	-
Zirconium	mg/L	0.00012	0.00013	0.00010	0.00013	NA	0.10	0.00022	0.00028	0.00010	0.00025	NA	0.60

Notes:
Method 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 method 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 method 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 method reporting limit
40% indicates the parameter analysed exceeds Golder's internal QA/QC targets; refer to report

APPENDIX D

Quality Assurance / Quality Control (QA/QC) Results

1.0 METHODS

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

The following sections include a summary of the Quality Assurance and Quality Control (QA/QC) procedures established for the field groundwater sampling program, the 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 collect during the 2020 monitoring program, one for each sampling event, satisfying the requirement of at least 10% duplicate samples. In May, a duplicate sample was collected from BH3 and in November a duplicate sample was collected from MW99-2.

The calculated RPD and DF values for the paired groundwater analyses are provided in Table C-4 in Appendix C. The calculated RPD and DF values met Golder's DQOs with the following exceptions:

- **BH3** (Nov 2020)**:** The calculated RPDs for sulfate (31.4%), iron (30.4%), manganese (28.0%) and sulfur (20.6%) exceeded the DQO of 20% for inorganic substances. The RPD and DF values for the remaining parameters at BH3, where calculated, met Golder's DQOs. The concentrations of sulfate, iron, manganese, and sulfur reported for both the sample and the duplicate were less than the CSR drinking water standards (where applicable). The elevated RPD values are not considered to affect the interpretation of groundwater quality at the Site.

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.

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